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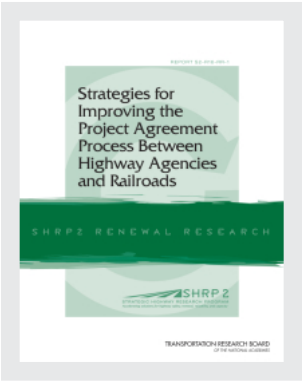

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ISBN 978-0-309-12888-9 | DOI 10.17226/14438

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The Second

STRATEGIC HIGHWAY RESEARCH PROGRAM

SHRP 2 REPORT S2-R16-RR-1

Strategies for Improving the Project Agreement Process Between Highway Agencies and Railroads

GORDON PROCTOR & ASSOCIATES, INC.
with
STARISIS CORPORATION
MICHAEL L. BRADLEY & ASSOCIATES CONSULTING, LLC

TRANSPORTATION RESEARCH BOARD

WASHINGTON, D.C.
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The Second Strategic Highway Research Program

America's highway system is critical to meeting the mobility and economic needs of local communities, regions, and the nation. Developments in research and technology—such as advanced materials, communications technology, new data collection technologies, and human factors science—offer a new opportunity to improve the safety and reliability of this important national resource. Breakthrough resolution of significant transportation problems, however, requires concentrated resources over a short time frame. Reflecting this need, the second Strategic Highway Research Program (SHRP 2) has an intense, large-scale focus, integrates multiple fields of research and technology, and is fundamentally different from the broad, mission-oriented, discipline-based research programs that have been the mainstay of the highway research industry for half a century.

The need for SHRP 2 was identified in *TRB Special Report 260: Strategic Highway Research: Saving Lives, Reducing Congestion, Improving Quality of Life,* published in 2001 and based on a study sponsored by Congress through the Transportation Equity Act for the 21st Century (TEA-21). SHRP 2, modeled after the first Strategic Highway Research Program, is a focused, time-constrained, management-driven program designed to complement existing highway research programs. SHRP 2 focuses on applied research in four focus areas: Safety, to prevent or reduce the severity of highway crashes by understanding driver behavior; Renewal, to address the aging infrastructure through rapid design and construction methods that cause minimal disruptions and produce lasting facilities; Reliability, to reduce congestion through incident reduction, management, response, and mitigation; and Capacity, to integrate mobility, economic, environmental, and community needs in the planning and designing of new transportation capacity.

SHRP 2 was authorized in August 2005 as part of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The program is managed by the Transportation Research Board (TRB) on behalf of the National Research Council (NRC). SHRP 2 is conducted under a memorandum of understanding among the American Association of State Highway and Transportation Officials (AASHTO), the Federal Highway Administration (FHWA), and the National Academy of Sciences, parent organization of TRB and NRC. The program provides for competitive, merit-based selection of research contractors; independent research project oversight; and dissemination of research results.

SHRP 2 Report S2-R16-RR-1

ISBN: 978-0-309-12888-9
Library of Congress Control Number: 2010927335

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ACKNOWLEDGMENTS

This work was sponsored by the Federal Highway Administration in cooperation with the American Association of State Highway and Transportation Officials. It was conducted in the second Strategic Highway Research Program (SHRP 2), which is administered by the Transportation Research Board of the National Academies. The project was managed by Monica A. Starnes, Senior Program Officer for SHRP 2 Renewal.

This research was prepared by Gordon Proctor & Associates, Inc., in association with StarIsis Corporation and Michael L. Bradley & Associates Consulting, LLC. The principal investigators were Gordon Proctor and Shobna Varma, who were assisted by Michael Bradley.

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FOREWORD

Monica A. Starnes, PhD, *SHRP 2 Senior Program Officer*

This report for SHRP 2 Renewal Project R16 provides a comprehensive collection of recommended practices that promote cooperation between railroads and transportation agencies on highway projects that cross or lie alongside railways. The report presents standard processes and successful practices that can help both sides reduce the time and cost of project reviews. The report also includes a series of model agreements that both parties can use and amend as needed.

Currently, the presence of a highway across or alongside a railroad creates significant challenges to the rapid renewal of that highway facility. Moreover, freight analysis from the U.S. Department of Transportation predicts an 88% increase in rail freight from 2002 to 2035. Highway renewal projects will also increase dramatically in the upcoming years as the highway infrastructure continues to age and require reconstruction. The need to improve cooperation between railroads and public transportation agencies is more critical than ever.

To mitigate project-delivery setbacks for the transportation agencies and the railroads, the project's research team of Gordon Proctor, Shobna Varma, and Michael L. Bradley conducted a thorough review of the railroads' and transportation agencies' perspectives. In addition, the research team members themselves have state department of transportation and railroad backgrounds. This combination of backgrounds provides an insightful understanding of the motivations, needs, and processes of public highway agencies and railroad companies. Nonetheless, to further enhance this balance from the start, the research team established an advisory panel of volunteer experts. Three Class I railroads, six state departments of transportation, two federal agencies, and the Association of American Railroads were represented on the panel. Throughout this project, the experts reviewed and commented on the research products.

In the initial stages of the research, the team surveyed all state departments of transportation and interviewed key staff from 10 of them. Likewise, the team interviewed core personnel in all Class I railroads and several engineering firms that regularly review and design railroad and highway projects. All the interviews proved invaluable for discovering and identifying successful practices and legal agreements.

After completing the information gathering, the project team produced a collection of recommended practices, streamlined permitting processes, and, ultimately, model agreements for use by public agencies and railroads. The goal of these products is to enhance constructive cooperation between railroads and public highway agencies as they undertake renewal activities that affect them both.

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Executive Summary

North American railroads and public highway departments interact thousands of times annually as the highway agencies conduct projects that cross over, under, or parallel to the railways. Each interaction requires a thorough review of the safety, engineering, and operating effects that the project will have on the railroad during construction and for decades thereafter. Although most of these reviews and agreements proceed smoothly, both the highway agencies and the railroads agree that delays and problems occur routinely. These delays can cause important highway projects to increase in cost, and they can consume valuable staff and engineering resources by all parties.

The focus of this project is to provide recommended standard agreements, standard processes, and best practices that can help both sides reduce the time and cost of project reviews. To succeed, each must understand the basic needs of the other and both must have common languages, practices, standards, and expectations.

Understanding the Railroad Perspective

A brief history of the railroads' recent past can help explain their approach to public projects. Railroads have downsized dramatically in recent decades, which has led to a reduction in non-core staff. As a result, many have outsourced most of their engineering departments that used to focus on public projects. Although much smaller in terms of number of employees, the North American railroads today are operating at unprecedented levels of volume, efficiency, and reliability (*1, 2, 3*). This success has been hard-won after decades of deregulation, downsizing, consolidation, and shareholder demands for increased efficiencies and profitability. As a result, railways are more heavily traveled than ever in their history, while the railroad staffs are at their smallest. The railroads can tolerate no delay to their operations and they are unwilling to accept risk or constraint to their finite and ever-more-valuable rights-of-way.

The railroads' approach to public projects is dominated by several overriding factors:

- Public highway projects seldom benefit the railroads.
- Projects can constrain future rail capacity.
- Construction activities can create great risk to workers, railway equipment, and track operations.
- Railroads cannot tolerate train delays on tightly strung national corridors.
- Railroads must cover all their costs, including engineering reviews and construction monitoring.

Understanding the State Perspective

The state and local highway agencies are the mirror image of the railroads when they approach highway–railroad projects. Highway agencies are public entities, accustomed to providing advice and reviews without cost. Highway agency personnel are trained to focus on the public's

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expenditures and, therefore, they try to reduce the cost of their bridges and other projects whenever possible. Highway construction projects frequently close travel lanes for months and divert traffic to redundant parallel routes. Highway agencies have long lead times for planning. They develop their projects much differently with years of analysis, as opposed to railroads, which make capital decisions on an annual basis. Although both highway agencies and railroads are driven by engineering factors to make investment decisions about linear transportation facilities, they approach their decisions from very different perspectives.

Dozens of state and local highway agencies were consulted. Their commonly expressed needs from the railroads include the following:

- Timely and reliable reviews;
- Better internal railroad coordination;
- Improved mechanisms for access to rights-of-way;
- Consistent design requirements; and
- A spirit of cooperation and a recognition that public agencies have limited time and resources to accommodate railroad needs.

Findings

The following key findings hold promise for improving the agreement process.

Few Metrics Exist

A common issue throughout this research is a lack of common baselines of performance. It appears that there are no widely recognized standards for performance in conducting railroad reviews, agreements, or approvals. In fact, few states could produce metrics on their own project submittals to determine how many projects fail to receive a review or an approval within an agreed-on time frame. A few states have developed master agreements that include desired review times, but those appear to be in the minority. As a result of this lack of baseline information, the reporting of best practices and the listing of recommendations have been based on the informed consensus of the practitioners, and not the empirical observation of performance.

Pressures on Both Sides Will Increase

Railroad traffic is projected to steadily increase because of international trade, long-term economic and population growth, and the expansion of intermodal traffic. The recession of 2008 depressed rail traffic, but as a long-term trend, rail volumes are predicted to grow. The existing and finite rail corridors will become busier, more congested, and even less tolerant of delays or encroachments. Neither side can expect a lessening of pressures to manage project reviews efficiently.

Both Sides Agree on Best Practices

On the positive side, however, the highway agencies and railroads have identified more than 20 best practices that expedite the review process. The productive and complementary examples illustrate practices that have been drawn from "partnering," good project management strategies, and the type of "process improvement" efforts common in frameworks such as Six Sigma, the Baldrige process, or "environmental streamlining." As with the streamlining best-case examples, both parties have enumerated their requirements and have jointly identified practices and processes that satisfy them while at the same time advancing highway renewal projects. These best practices include the following:

- Early formal coordination while project concepts are still under development;
- Periodic, ongoing reviews throughout the project's development;

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- Open, continuous lines of communication;
- Escalation procedures to resolve conflicts;
- Common, consistent, and empowered points of contact in both agencies who can make decisions and remove bottlenecks;
- Regular process-review meetings, where both sides identify issues and strategies to address them;
- Standard, streamlined agreements to address recurring issues such as insurance, rights-of-entry, liability, easements, safe construction practices, and ongoing maintenance;
- Commonly understood design standards and construction practices agreeable to both parties;
- Training for designers, construction personnel, and maintenance personnel who interact with railroads; and
- Standard process manuals to follow in developing projects or conducting maintenance activities near railways.

Both Sides Identify Some Common Problems

The highway agencies and railroads independently cite some common problems that they believe need to be addressed to everyone's mutual interest. Some of these are the following:

- Inability to reimburse engineering review costs early in the life cycle of a project, even before the project is programmed or under development;
- The cost and availability of insurance; and
- Right-of-way appraisal processes for railroad easements, which can be restrictive or contentious.

Partnering: A Strategic Opportunity

Another strategy that could be helpful to the agreement process is "partnering." This process was first articulated by the U.S. Army Corps of Engineers in addressing its large civil works projects. It also has been encouraged by the Federal Highway Administration, some state departments of transportation, and their associated contracting companies. In partnering, both parties

- Define what a successful outcome would be;
- Formally agree that each wants to assist the other in achieving this common success;
- Develop a level of service agreement that spells out what each expects from the other in terms of service and timeliness;
- Identify escalation paths for when problems cannot be resolved at the lowest level;
- Agree to remain in constant communication to ensure that problems are identified early and to monitor whether milestones have been achieved; and
- Periodically analyze what went right, what went wrong, and what can be learned for the future.

Recommendations

In this report, state and local highway agencies and railroads can review best practices, model processes, and model agreements. Then, they can self-assess whether any of the following recommendations can assist them in streamlining the agreement process:

- Negotiate a memorandum of understanding between the highway agency and the railroad as to how they desire to conduct the review process, including periodic process-improvement efforts.
- Develop draft model agreements and streamlined permitting language.
- Adopt a "continuous improvement" framework to the agreement process so that both the highway agency and the railroad are tracking performance and regularly conferring on ways to improve it.

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- Participate in efforts through their professional associations to continue dialogue on ways to share best practices and perpetuate the further development of model agreements and model practices.

References

1. Federal Railroad Administration. Freight Railroads Background. www.fra.dot.gov/downloads/policy/freight2006%20final.pdf. Accessed April 30, 2008.
2. Association of American Railroads. U.S. Freight Railroad Productivity (Sept. 2009). www.aar.org/incongress/~/media/aar/backgroundpapers/usfreightrailroadproductivity.ashx. Accessed July 26, 2010.
3. Cambridge Systematics. *Freight Demand and Logistics Bottom Line Report* (Draft). American Association of State Highway and Transportation Officials, Washington, D.C., Dec. 2006, pp. 3–9.

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CHAPTER 1

Background

The Problem Statement

The objectives of this project were to

- Identify strategies and institutional arrangements that will facilitate beneficial relationships between railroad companies and public agencies;
- Investigate and develop innovative partnering techniques whereby railroads and the highway community can work cooperatively;
- Develop a draft model agreement and streamlined permitting processes; and
- Identify barriers to an effective agreement process and propose remedies.

Highway agencies and railroad companies agree that the project review and project agreement processes can be improved. For this research project, more than 50 practitioners from highway agencies and railroads across the country were interviewed, and many more were surveyed. There was consensus among them that delays in project reviews and project agreements were common. All respondents cited instances in which either highway agency applicants or railroads contributed to delays. Most, however, were circumspect and were hesitant to appear critical of their counterparts, with whom they must continue working. Both highway agency representatives and railroad officials appeared willing to acknowledge that occasionally their own agencies were the cause of the delays. They would acknowledge that not all parties in their agencies were always punctual, complete, or cooperative with the other parties. The anecdotes and observations were consistent that the parties believed improvement is possible and needed.

A baseline for current performance, needed to direct and track improvement, does not exist, however. The highway agencies, railroads, and some state departments of transportation (DOTs) have their own internal goals and performance measures for how promptly they want reviews and agreements to be conducted. However, the research team did not find definitive compilations of past performance. In many cases, the research team found no common definitions, performance measures, or performance baselines between the states or railroads. Calculating length or cost of delays is thus extremely challenging.

This report presents the perspectives of the state and the railroads on the project agreement process. Drawing from interviews and a survey, the report describes the perceived problems associated with the agreement process, as well as the best practices that should be embraced to improve it.

Types of Projects and Types of Agreements

In the United States, more than 500 railroads operate more than 140,000 miles of railway. These railways intersect more than 150,000 times with more than 4 million miles of public roads. During the course of road maintenance and construction projects, the public agencies that manage these highways need to work with the railroad companies whose railways are crossed by the highways.

The types of projects that the public agencies need to conduct tend to fall generally into the following categories:

- Improving at-grade crossings, such as resurfacing the approaches;
- Installing automatic flashing lights and gates or other safety improvements at at-grade crossings;
- Building longitudinal encroachments when parallel highways are improved and other projects, such as drainage ditches and structures, that interact with adjacent railway property;
- Constructing new overhead or under-grade structures when at-grade crossings are improved with grade separations;
- Reconstructing or rebuilding an existing grade separation either overhead or under-grade where additional highway capacity is needed;

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- Realigning track configurations to allow adjacent highway capacity or alignment improvements;
- Maintaining existing highway bridges that cross over railroads; and
- Installing pipe or wire crossings parallel to, perpendicular to, beneath, or overhead of the railroad when those utilities are new, upgraded, or required to accommodate an adjacent highway expansion.

The seven Class I railroads and the highway agencies have interacted on such projects for decades. They have developed their respective standard agreements, processes, and protocols to address their regular interactions. However, the individuals who manage these interactions tend to change because of retirements, promotions, or transfers. Public agencies turn over staff regularly through administrative changes. Local governments may interact with the railroads only sporadically because the local governments have fewer projects than do state DOTs. Therefore, the execution of standard processes for agreements tends to vary significantly. This variation in execution lies at the heart of this research.

Note that in this report, "memorandum of understanding" refers to an agreement that is not legally binding, such as an agreement between the parties to adopt a partnering process. "Memorandum of agreement" and "standard agreement" are used in this report when contractual elements are included in the agreement, such as an agreement to pay for engineering reviews. Highway agencies generally need contracts to be in place before they can expend funds. Memoranda of agreement include provisions that allow for the payment for services. Memoranda of understanding only reflect a shared desire to cooperate in regard to specific functions.

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CHAPTER 2

Research Approach

The research project began with the formation of a team of veteran state highway and Class I railroad personnel. A project advisory panel was formed to meet at critical points of the project. The panel consisted of three public projects managers of Class I railroads, five state transportation agency rail project coordinators, and representatives from the Federal Highway Administration (FHWA) and the Federal Railroad Administration (FRA). The panel met early in the project to identify common issues, to assemble an initial list of best practices, and to approve survey language.

A survey was sent to all 50 state DOTs and to more than 350 local governments nationwide. It asked respondents to identify common problems and to rank potential best practices for their effectiveness. Respondents also were asked to identify federal regulations and practices that could be changed to improve the project review and project agreement processes.

The project team members reviewed the processes and standard agreements used by the seven Class I railroads. Six of the seven agreed to extensive interviews, which further clarified the railroad practices. During the interviews, the Class I railroads were asked to further evaluate best practices and to list strategies to expedite the review and agreement processes.

Five of the national engineering firms that conduct project reviews on behalf of the Class I railroads also were interviewed. Because these firms provide engineering services for both highway agencies and the Class I railroads, they had particular insight into how both entities approach the project-development process.

Twelve state DOTs were interviewed in depth about the best practices they have developed.

An extensive body of material was reviewed, including the following:

- State manuals for the railroad coordination process;
- Standard project agreements used throughout the country by railroads and highway agencies;
- Master agreements that have been developed in some states;
- The standard provisions that some states have developed in conjunction with the railroads to be included in all construction contracts that involve railroad rights-of-way;
- The public project manuals and information provided by the Class I railroads;
- The standard drawings and construction requirements that some of the Class I railroads provide to highway agencies;
- The standard agreements and permits that some of the Class I railroads provide to access railroad rights-of-way or to install pipe and wire crossings;
- Federal statutes and their related Code of Federal Regulations;
- Guidance from FHWA and FRA;
- Policy positions of the Association of American Railroads;
- National highway design standards pertaining to railroads;
- Studies on the legal and economic history of American railroads;
- Recommended practices for project management, partnering, and process improvement from groups such as the Project Management Institute and the Baldrige National Quality Program; and
- Studies and practices related to Environmental Streamlining.

The interviews, advisory panel meeting, and literature review provided an initial list of recommended best practices. These best practices then were included in the survey for evaluation by the survey respondents. There was a high correlation between the best practices identified by the advisory panel and the interviews with the rankings made by the survey respondents. These practices then were ranked in terms of their perceived effectiveness.

In the second phase of the project, the team developed model agreements and processes and identified mechanisms by which model agreements and processes can be maintained and updated.

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CHAPTER 3

Findings and Applications

PART 1: Review of Class I Railroad Permitting and Agreement Processes

The railroads' permitting and agreement review processes are the result of nearly 100 years of interaction with modern highways and with highway agencies. The trends apparent in today's agreement process reflect the legal, engineering, economic, and operational strategies that affect the modern Class I railroads. The first section of this chapter includes a brief history of modern railroad developments that influence the railroads' approach to project agreements and project reviews.

Summary of Railroads' Perspectives

Today, 559 railroads operate in the United States, but the seven Class I railroads dominate the industry, according to FRA. Class Is represent only 1% of the railroad companies in the country but generate more than 90% of the rail revenue. The remaining 99%, generating less than 10% of rail revenue, comprises 33 regional carriers and 519 local railroads (*1*).

Numerous reports indicate that the American rail industry is healthier than it has been for decades. FRA reports that in 2006 the railroads generated $54 billion in revenue and set a new record for freight traffic with 1.77 trillion revenue ton-miles, up 4% from 2005. (The revenue ton-mile is a unit that incorporates weight and distance into the calculation of volume shipped.) Many studies show that for the first time in decades railroads were able to raise rates in excess of inflation and to increase hiring after decades of downsizing (*1*), at least before the recession of late 2008.

However, these accomplishments are relatively recent and are the result of decades of struggle, retrenchment, bankruptcies, deregulation, and slow rebirth of the American rail industry. In 1920, the American rail industry was the largest U.S. employer, with 2 million workers (*2*). Today, it has 187,000.

The North American Class I railroads overall reduced staff from 209,000 in 1990 to 168,000 in 2006 (*1*). At the same time, freight volumes, profitability, and on-time performance have significantly increased since deregulation under the Staggers Act of 1980. The Association of American Railroads (AAR) cites numerous efficiency statistics in documenting the resurgence of the railroads:

> America's freight railroads are the most productive in the world. . . . Railroads generated 93 percent more ton-miles of freight in 2008 than they did in 1980, but they did so with 41 percent fewer miles of track, 64 percent fewer employees, 15 percent fewer locomotives, and no increase in gallons of fuel consumed—and at rates that, on average, were 49 percent lower when adjusted for inflation (*3*).

These trends have resulted in the railroads operating fewer tracks but having much higher train volumes on those that remain. Train lengths have increased over the decades; it is now common to see trains over 1 to 2 miles long. Mainlines, therefore, are critical, 24-hour operations that cannot be delayed without serious effects on the just-in-time operation. The AAR reports that between 1980 and 2008 rail employee productivity rose 439%, locomotive productivity rose 126%, and productivity of each mile of track rose 226%. It says that overall productivity, measured in ton-miles per dollar of inflation-adjusted operating expenses, rose 144% since 1980 and the Staggers Act deregulation (*3*).

Productivity rates increased because of track consolidation, railroad mergers, dropping of inefficient lines, and improved operations. The U.S. rail network hit its peak miles in 1916, with 254,000 miles of rail service (*2*). Today the U.S. has 140,810 miles, or 44% less. Class I railroads control 96,664 miles, regional lines 15,388, and local railroads 22,519 (*4*). Although the current American rail network is 44% smaller in terms of miles, it is carrying record volumes. Since 1980, ton-miles shipped have risen 93%.

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These successes have made railroads profitable, but they still struggle to earn their cost of capital, since railroads earn only about 7% on net capital, according to FRA (*1*). This is a modest rate of return compared to some other industries. For decades, American railroads earned the lowest rates of return of any major U.S. industry. Between 1960 and 1979 the average annual return on shareholder equity was 2.3% (*2*). U.S. railroads have estimated that up to 40% of their revenues are devoted to capital assets, a percentage that is significantly higher than most industries. The high cost of maintenance for track, rolling stock, and yards requires substantial capital investments, which are not liquid or mobile. Investing in a line represents a significant long-term investment for a railroad. Therefore, railroad executives repeatedly note that they are reluctant to pay for projects that do not provide a proven return on investment.

The railroads' reluctance to invest in or cost-share on highway projects has also been constrained by the intense competitive rate pressures they face. Because railroads competed with barges and trucks for decades, they had not raised rates commensurate with inflation. The railroads and FRA repeatedly note that between 1980 and 2006 rail freight rates declined 55% in inflation-adjusted terms. Much of that decrease occurred in the early decades of deregulation. FRA now reports that inflation-adjusted rates increased by 14% between 2003 and 2006, representing a significant new trend, but one that again was suppressed by the 2008 economic downturn.

Expansion Concerns

After consolidating and abandoning tracks for decades, Class I railroads have been for the past decade in a marginal but steady period of expansion, despite the downturn in 2008. The U.S. DOT's Freight Analysis Framework 2 predicts an 88% increase in rail freight demand between 2002 and 2035 (*5*). This increasing demand is spurred by general growth in the economy, increasing foreign trade, and the continued pressure of just-in-time logistics. Current annual volumes are forecast to increase from 1.77 trillion to 3.5 trillion tons moved annually by 2035. These volumes will continue to represent approximately 40% of all ton-miles of freight.

This percentage of the nation's ton-miles represents the heavy lifting of the U.S. freight industry. The major categories of commodities include coal, chemicals, farm products, transportation equipment, and food. Mixed shipments, which include intermodal shipments, are one of the largest single revenue categories, according to the AAR (*6*). Intermodal shipments are those that inherently rely on two or more modes, mostly rail and truck or rail and ship, and are generally very time-sensitive deliveries.

Intermodal shipments from the coasts into the heartland have repeatedly been predicted to at least double in the coming decades. The Ports of Los Angeles and Long Beach accommodate the largest portion of these imports. From there, the shipments stream across the continent on trains to warehouses and other distribution points. The trade with China, the growth in India, and the general global economic trade expansion spurred significant growth in the past decade's rail intermodal shipments. Panama is expanding the Panama Canal, which will allow the largest Asian container ships greater access directly to the East Coast and the Gulf of Mexico ports. Such trends could significantly increase intermodal traffic on the eastern and southern coasts, as has already occurred on the West Coast. Again, the higher oil prices of 2006 and 2007, along with the international recession of 2008, have significantly clouded the short- and intermediate-term forecasts for international intermodal trade. However, over the long term, 20 to 30 years, international intermodal trade is expected to steadily increase.

A 2007 study examined the effects if the major U.S. rail lines are not expanded (*7*). *The National Rail Freight Infrastructure and Capacity Study*, prepared for the Association of American Railroads by Cambridge Systematics, Inc., examined current levels of rail freight capacity, focusing on the 52,340 miles of primary rail corridors that carry the majority of the nation's freight traffic. The study forecasted that on these corridors an estimated $148 billion (in constant dollars) in improvements will be required over the next 28 years to keep pace with economic growth and freight demand. Although the large majority of the current system is operating at an acceptable level of service, the amount of excess capacity on the rail network has diminished in the last two decades of growth, the study reported. It forecasted that if the 2035 rail freight volumes were to occur on today's rail network, 30% of the major rail network would be operating above capacity, creating severe congestion. Because of the interrelated nature of the nation's rail network, this congestion would affect every region of the country. Frustrated shippers would potentially shift freight to already congested highways, the study suggested.

Of the $148 billion in constant dollars needed to keep pace with the level of growth through 2035, the Class I railroads could contribute about $96 billion from expected income and operations and the Class II and short-line railroads could contribute $13 billion, the same study estimated. That leaves an investment gap of $39 billion, or $1.4 billion annually, to meet the rail capacity needs through 2035 (*7*).

These trends indicate the following:

- Major U.S. rail corridors will require additional rail capacity and right-of-way.
- Railroads will be seeking to optimize their capacity through new technology.
- The railroads will face a continuing capital shortage despite their growth.

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- Partnering with public agencies on major corridor projects will become more valuable to the railroad and the public.
- It is in the national interest to preserve the maximum capacity of these rail corridors to capture the environmental, energy, and congestion-reduction benefits of rail freight.

For these reasons, railroads are reluctant to accept any highway project that can constrain the horizontal, vertical, or operating capacity of a railway—or its potential future expansion.

Safety Concerns

To understand the railroads' attitude to the construction of highway projects on or adjacent to their rights-of-way, one must appreciate their attitude toward safety. Safety concerns are paramount to them. Railroading has a lower employee injury rate than many other major industries, including trucking (*8*), but deaths of rail workers still are common nationally. Workers who are required to work in proximity to passing trains can be struck by the trains, by debris coming off the trains, or by items extending from passing trains. In addition to their workforce, the railroads are also concerned about liability for highway construction workers who are killed when working on or adjacent to rail rights-of-way.

Highway construction projects can cause derailments that are potentially catastrophic to the railroads. Derailments can be caused by undercutting near the railroad base and inadvertently lowering the rail grade, by fouling the tracks with debris, or by equipment such as cranes getting too close to the tracks or undermining the rail bed while boring casing pipes beneath the right-of-way.

Such derailments and accidents can cause disruptions to shipments that can ripple for days across the busy rail network. Railroads often have guaranteed shipping windows for which they earn premium rates. Missing delivery times results in penalties and potentially lost business.

Even more worrisome is the potential for loss of life and property caused by hazardous materials releases. The railroads transport only 5% of all hazardous materials (*9*); trucking, which handles many shorter trips of commodities such as gasoline, carries an estimated 53%. However, individual train tanker cars carry large volumes of chemicals, and when they crash they are subjected to intense forces and heat caused by sparks, friction, and impact. This can lead to toxic releases, fires, and poisonous plumes.

A summary of crash reconstruction reports from the National Transportation Safety Board (NTSB) provides a litany of examples from recent years. Just one example follows:

> At 4:56 a.m., central daylight time, on October 15, 2005, westbound Union Pacific Railroad (UP) train ZYCLD 13 collided with the rear of standing UP train MPBHG 15 in the UP rail yard in Texarkana, Arkansas. The collision resulted in the puncture of a railroad tank car containing propylene, a compressed flammable gas. The propylene was heavier than air and flowed near the ground into a nearby neighborhood. The flowing gas reached a house where an unknown ignition source ignited the gas, and the house exploded. The single occupant was killed. The fire moved quickly along the flowing gas back to the punctured tank car. A second, unoccupied, home was destroyed in the fire, and a wooden railroad trestle burned completely. Approximately 3,000 residents within a 1-mile radius of the punctured tank car were advised to evacuate the area. The two crews and the employees working at the Texarkana yard were not injured, and they evacuated the area safely. Total damage was $2.4 million, including $325,975 in equipment damage and $2,053,198 in track damage (*10*).

The AAR reports that each year 1.5 to 1.6 million carloads of hazardous materials are transported by rail in the United States; toxic inhalation hazards (TIH), such as chlorine and anhydrous ammonia, account for approximately 76,000 carloads annually (*11*). It notes that the rail industry is particularly concerned because it legally cannot refuse to ship these materials under government regulations. While TIH materials make up a small fraction of the railroads' total volumes of freight, they represent significant liability to the railroads.

These safety concerns cause the railroads to be cautious in allowing construction activity on or near their tracks. They insist on standard contract provisions to ensure that contractors abide by their safety provisions. They require "flagging," or control of train traffic through construction sites by trained personnel. They reserve the right to shut down any operation deemed unsafe. In addition, they require indemnification for contractor error and require Railroad Protective Liability Insurance with amounts that vary from $2 million per incident to $10 million aggregate.

Railroads are adamant about these provisions. Failure to include them in project agreements will lead to delays with the railroad reviewers.

The following summarizes the railroads' perspectives regarding highway projects.

Highway Projects Don't Directly Help Railroads

Highway agencies personnel are deeply imbued with an ethos that they exist for the public good. Hence, they deeply believe that the projects they build are clearly and without question necessary for the safety, mobility, and convenience of the nation's travelers and freight shippers. However, railroads also exist for the public good. They move the nation's freight, carry its coal, ship much of its chemicals, and transport much of the farmers' grain to market. Railroads struggle to compete against trucks for trips less than 500 miles. While they struggle to ship goods competitively against trucks that travel on public

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highways, the railroads generally derive little direct benefit from highway projects that, moreover, may constrain them horizontally, vertically, or longitudinally. Such projects may give rise to physical constraints, operational delays, and disastrous construction accidents. So, while highway agencies innately assume that the projects they bring to the railroads have intrinsic public benefits, the railroads only indirectly share in those benefits.

Railroads Are Private Companies

Fundamentally, railroads are legally, financially, and morally bound by their corporate structure to first and foremost protect the interests of their shareholders and, subsequently, their customers. Making money and protecting their assets are not a sign of malevolence but a legal commitment that railroads have as public companies. When shareholders purchase stock, they receive an implicit and explicit guarantee that the company assets will be used first and foremost to generate returns on investment. This obligation greatly discourages railroads from donating rights-of-way, providing free project reviews, allowing future rail expansion to be curtailed by low or narrow bridges, granting unrestricted access to rights-of-way, interrupting service, or exposing the corporation to liability.

Highway agencies do not expect banks to give them free money, or oil companies to provide them free fuel. However, highway agencies have often asked railroads to donate property, provide engineering advice for free, or constrain future rail capacity in the interest of public highway projects. Highway agencies routinely pay $150 to $200 per hour for senior engineering consultants to review and manage complex projects. However, some are surprised when railroads do not provide such reviews for free on highway projects that cross railways. Such costs are incurred by the railroads during review of public highway projects. Passing those costs back to the highway agency is routine for the railroads, which otherwise must pass on the cost to shippers or shareholders.

Railroads Have Little Tolerance for Interruptions

Highway agencies routinely close lanes and even entire freeways periodically for maintenance and construction. Highway networks have extensive redundancy, which allows motorists to detour onto other bypasses, beltways, arterials, and even local streets. Railroads lack this redundancy. They have fewer routes and each one is optimized for maximum 24-hour, 365-day-a-year operation. Because of the huge costs, railroads cannot afford to build redundant tracks, bridges, or sidings or buy additional rolling stock. Since approximately 1920, the entire business structure of railroads has been to consolidate greater volumes of freight onto fewer, more efficient routes. Therefore, closing a track even for a few hours can lead to disruptive delays, penalties on guaranteed shipments, and rippling effects across their national network.

Railroads will not accept interruption to train traffic as the highway agencies build overhead bridges, resurface grade crossings, or work adjacent to tracks. One rail executive noted that closures measured in hours rather than days are what the railroad will accept. To close tracks longer would disrupt shipments and cause penalties of hundreds of thousands of dollars to the railroads.

Railroads take such constraints in stride. It is common for railroads to replace their own bridges in a day, not months or years as highway agencies do. Railroads plan their maintenance in short windows arranged around train schedules. They build bridges for 100-year life spans to avoid repairs. They have unique construction and maintenance equipment that accommodates rapid activity within narrow windows. These practices are much less common among highway agencies.

Safety Is Paramount

Train wrecks in past decades have resulted in hundreds of deaths, chemical spills that forced city evacuations, and disruptions to train networks that took days to resolve. Highway projects are not a common cause of derailments, but many construction activities could cause a derailment or accident. Debris left on tracks can cause derailments. Trackside workers distracted by equipment noise periodically are struck by passing trains. Changes in track signaling are required when workers are present; and signal confusion is a leading cause of train collisions.

Such potential disasters are why railroads protect their rights-of-way. When highway contractors bring cranes, loaders, dozers, dump trucks, and boring equipment near rail rights-of-way, the railroad wants to monitor carefully the contractor's actions. Railroad "flaggers" need to be present to warn of approaching trains, which may take miles to stop. The railroad safety engineers must be assured that tracks can be restored to service within minutes if necessary. Railroad attorneys and safety officers must be assured that trains and their cargos are not threatened by crashes or derailment.

Highway agencies and their contractors face complex construction requirements, narrow construction windows, and absolute indemnification requirements when dealing with railroads. These requirements are generally more restrictive than those highway agencies impose on themselves or their contractors. To the highway officials unaccustomed to dealing with railroads, these requirements can seem onerous and expensive. However, imposing such restrictions is well within the rights of the railroad and is understandable when past construction catastrophes are analyzed.

One railroad official described the railroads' concern for their rights-of-way to be analogous to highway agencies' concerns for

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their most congested interstate highways. Highway agencies do not allow construction in live lanes of interstate traffic. Similarly, railroads cannot allow construction in active rights-of-way without minute-by-minute control.

Railroads Were There First

Highway agencies generally are influential organizations. They have large budgets, a public mandate, powers of eminent domain, and teams of engineers and attorneys to advocate for what the public highway agency needs.

However, railroad companies wield significant rights and protections, too, and these have been recognized by the nation's courts for decades before highway agencies were even created. These rights and protections go back to the 1850s when the private capital, private initiative, and private engineering expertise of the railroads were welcomed as the salvation to a land-rich but transportation-poor continent. Railroads, under a series of influential laws and court decisions, were given protection for their rights-of-way, allowed to use eminent domain, and viewed generally as benign and essential public utilities (*12*).

This history instills in the railroad personnel a deep, proprietary sense regarding their right-of-way and their operations. This can be surprising to the uninitiated highway official who is accustomed to routinely using eminent domain, or the threat of it, to acquire property. A large highway agency may routinely acquire 2,000 or more parcels of right-of-way annually for their projects. Most are small parcels needed when bridges are expanded, curves are flattened, or interchange ramps are extended. Acquiring such property is taken for granted by highway agencies, which have few areas that are generally off limits, except for cemeteries, schools, parks, churches, and historic properties. However, railroads routinely are cautious when the highway agency needs railroad property. Railroads may not acquiesce to takings because of the effect they could have on the railroads' future ability to add more tracks or sidings. The railroad may insist on longer spans and wider pier spacing for overhead highway bridges to protect its right-of-way, regardless of the higher cost to the public.

Railroads Want to Be Responsible Corporate Citizens

The railroad engineers and executives interviewed for this study stress that they want to be good corporate citizens. They are "corporate" in that they have to represent the best interests of their shareholders and customers. However, they also are citizens who live in and serve the communities through which their railways pass. After 150 years of operation, they expressed uniform understanding that they need to accommodate highway projects that cross or are adjacent to their rights-of-way.

The railroad personnel interviewed consistently offered the following general guidance to sponsors of projects that will interact with their rights-of-way.

Coordinate Early

Coordination at the project concept or early planning stages was routinely recommended. Early coordination is particularly important for any project that may create horizontal or vertical constraints on the railroad right-of-way or that may be contemplated to interfere even briefly with track operations. Railroad personnel repeatedly told of initial coordination occurring at the 30% plan-development stage, which sometimes was far too late. At that point designers had already made decisions about overhead bridge type, size, and alignment that may not be acceptable to the railroads. Critical issues, such as pier placement, drainage outfalls, vertical clearances, and structure types, may create nonnegotiable issues for the railroads. These basic concepts need to be clarified early.

A common issue that was repeatedly cited by railroad personnel was a need for overhead bridge structures to span the width of railroad rights-of-way to accommodate future track expansion. The railroad may require additional track capacity that could warrant numerous tracks beneath an overhead structure. Railroad executives routinely stated that their business plans and needs may change quickly. While a few years ago they might have been content with two tracks, today they want to protect certain rights-of-way for three, four, or even five tracks. Without early coordination, the highway designer will not know what span configuration is acceptable to the railroad. These issues can be particularly important and expensive in areas of skewed alignments, expensive rights-of-way, or complex terrain that can increase the cost and complexity of longer spans.

Review Commitments When Projects Take Years to Develop

Highway agencies routinely complained about railroads changing their requirements for span length and pier location on previously reviewed projects. However, the railroads noted that some highway projects had taken years to develop. Although the railroads might have found acceptable a narrower right-of-way several years before, changing business needs may now require track expansion. Railroad personnel routinely advised that highway project sponsors should update basic assumptions when projects take years to develop after initial coordination.

Predicate All Design on Railroads' Unique Standards

The American Railway Engineering and Maintenance-of-Way Association (AREMA) represents a cooperative effort

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among the nation's railroads to develop common standards. AREMA standards provide ready guidance for designers who need to accommodate railroad needs. However, nearly every railroad interviewed noted that it has key deviations from AREMA standards that are unique to its specific railroad. Some want longer tangents between S curves because of the terrain. Some want track centers as wide as 25 feet so maintenance can be done without disrupting trains on adjacent tracks. Some may accept open bridge decks, and others do not. Some railroads publish their design standards, some do not. Those who do not, cite potential liability concerns as their reason. In such cases, the designer should use the early coordination process to establish basic project parameters and then should expect comments from the railroad at the preliminary design stage. In effect, the railroad will explain how its standards differ from AREMA's, but the explanation will come in the form of case-by-case project review comments. The full array of unique standards is not available from some railroads.

Use Only Experienced Railroad Designers

Although state and federally funded projects generally require a "Qualifications-Based Selection Process" for consultants, a firm that is qualified for highway work may not have extensive experience with railroad coordination. Also, local public agencies using local funds often tend to select local, hometown firms that may have little experience in railroad coordination.

All railroads interviewed suggested selecting firms for project development based on their explicit experience with the railroad involved. They noted that such expertise can compensate for the lack of published design standards. Firms that have undergone repeated project reviews with specific railroads are more likely to have experience with the unique design requirements of an individual railroad. Most prequalified design firms are experienced with the national highway design manual, *A Policy on Geometric Design of Highways and Streets, 2001,* published by the American Association of State Highway and Transportation Officials (AASHTO). This "Green Book" is the national standard by which highway design engineers are trained. Despite its 905 pages, however, the Green Book provides minimal guidance on projects involving railroads. Much of the guidance that is provided addresses signage and signals by referencing the Manual of Uniform Traffic Control Devices. This brevity is indicative of the need for reference to the AREMA standards and to individual consultation with the railroads. Moreover, the Green Book is a design manual, not a construction manual. There are means and methods of construction that present issues outside of the Green Book standards.

Many projects present unique situations because of terrain, adjacent structures, alignment, hydraulics, or other factors that cannot always be addressed in design manuals. In such cases, consultation with the railroads is needed. The interviewees commonly stated that an intimate knowledge of each of the railroads' standards makes the accommodation of unique situations more manageable for the project designer.

Anticipate Time Frames for Review

A decision on a project can affect a railroad for decades. Highway bridges are designed for at least a 50-year life span. Highway alignments are seldom changed once constructed. The finality of much highway construction work compels the railroads to make a measured, fully informed decision about any project. Also, a project may affect multiple departments within a railroad. The structures department, the operations unit, the construction department, the signal and communication division, and the real estate or legal department routinely all need to coordinate their comments on a project.

The need for coordinated, fully considered comments requires time from the railroads. Some offer standard performance measures for reviews in 30 to 60 days, while others do not. The ones that do not offer guaranteed review times say they are unable to do so because of the wide variation in types and quality of submittals. As is common with many review agencies, the completeness of the submittal is a critical factor in the railroad's ability to provide timely comments.

A representative from one of the national engineering firms that conduct reviews for railroads noted that it is important not only to include the proper information but also to include it in the format and sequence to which the railroads are accustomed. Having the right information but in the wrong format can lead to delays and confusion.

Another national firm that works for both highway agencies and railroad companies said that a common problem is for state or local officials to blame project delay on railroad reviews. Blame, the firm advised, is the worst strategy for expediting reviews. Often, when delays occur, it is because submittals come late in the project development, they are incomplete, or are not predicated on advice received from earlier rail coordination. Such conditions can add months to the review process.

Railroads and experienced engineering firms advise planning on at least 60 days for each review stage. Shorter time frames have been negotiated, particularly when highway agencies work routinely with the reviewing firms who are working for the railroads. When highway agencies can reliably predict when they will make a submittal, and when the submittal is complete based on railroad needs, turnaround times can be as short as 30 days.

Use Standard Designs and Legal Agreements

Many state DOTs and railroad companies have negotiated standard legal agreements and standard designs. Use them,

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advise the railroads. If a local agency faces the need for an infrequent project review, it should obtain and use standard agreements and designs already in place between the DOTs and the railroads.

Most of the Class I railroads offer standard legal agreements for various types of projects. Pipe and wire crossings, grade crossings, grade separations, right of entries for studies, drainage improvements, or parallel encroachments all tend to have standard agreements. These agreements have been vetted by railroad attorneys, which eliminates the needs for additional legal reviews, and consequently reduces the time for approval.

Provide Insurance Correctly

Railroads typically require both General Business Liability Insurance and Railroad Protective Liability Insurance, in amounts from $2 million to $10 million. The need for indemnification is absolute, although the insurance amounts required varies by railroad and occasionally by project type and duration. The railroads and engineering firms frequently cite examples where local project sponsors resist indemnification, seldom with success; resistance leads to project delays. Contractor indemnification should be considered as a given. In cases where governments have statutory provisions preventing them from indemnifying third parties, the contractors generally are required to accept the indemnification.

One national engineering firm that conducts project reviews for railroads estimates that 20% of its effort is spent on acquiring basic, accurate, and timely information from insurance providers. The lack of details on appropriate corporate names, indemnified parties, and even addresses causes repeated delays.

BNSF Railway and some other railroads simplify the insurance process by allowing states or construction companies to buy riders on their existing policy. This saves time and money, allowing firms to buy policies for short periods during construction.

Expect to Pay for Reviews and Permits

Highway agencies offer advice and time to local communities without charge—at least without direct charges. As a result, local project sponsors and some highway agencies object to being charged for railroad reviews, permits, and agreements. They are accustomed to not charging local communities and they expect similar treatment from the railroads. However, when the Ohio DOT adopted a cost-accounting system, it determined that its typical highway engineer cost up to $150 per hour when all overhead costs were considered. Although Ohio does not bill these costs to communities directly for project consultation, the state does so indirectly through fuel taxes, which cover its operation.

When highway agencies hire design firms, they routinely pay more than $100 per hour for basic design and review costs. Railroads incur similar costs either when they conduct reviews in-house or when they contract them out to engineering firms. It has become routine in recent years for railroads to bill these costs back to highway agencies. Sometimes the contract arrangement comes as a preliminary engineering agreement in which both partners agree to escrow review funds at the start of a project. In other cases, the railroads bill the agencies after the reviews. Regardless of the details, the process of billing for reviews is a given.

Railroads' Approach to Agreements

The Class I railroads have developed over the decades formal, official processes by which they review proposed highway projects that interact with their facilities. These processes generally are intended to "matriculate" a proposed project through a variety of internal reviews, each of which reflects a major consideration of the railroad. These reviews evaluate projects in terms of their effects on the following:

- The minimization of train delays during the course of the construction;
- The railroad's long-term track needs;
- Any nearby industrial development the railroad may envision;
- The safe operation of trains during construction;
- Long-term maintenance needs, such as maintaining drainage, communication devices, or structures;
- Internal workforce needs, such as when to schedule in-house crews to do necessary work related to the project;
- The cost of rights-of-way or easements that may be necessary;
- The scheduling of engineering and other reviews;
- Reimbursement for engineering reviews, in-house maintenance crew's work, rights-of-way, or easements; and
- Legal review of draft and final agreements.

The number of these considerations and their complexity varies by the complexity of the project. Minor highway resurfacing projects conducted at crossings are often addressed with simple letter agreements that do not require extensive reviews. Large projects, such as new grade separations or realignments of tracks, involve all these areas of concern.

The railroads generally have different processes for the various types of projects. Among the common categories of projects the railroads have developed are the following:

- Pipe and wire crossings of tracks or yards;
- Short-term maintenance work that requires temporary access to railroad property;

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- Access to railroad property for engineering studies, such as soil borings or environmental analysis necessary for highway projects that are proximate to railways;
- Paving of crossings;
- Installation of safety devices at crossings, such as lights and gates;
- Horizontal encroachments onto linear railroad property when adjacent roads are improved; and
- Grade separations of crossings, either over or under the railroad.

The four largest Class I railroads—Union Pacific Railroad (UP), BNSF, CSX, and Norfolk Southern Railway (NS)—have created "public projects" divisions that serve as the points of contact and coordination for these projects. Amtrak has as well. Kansas City Southern Railway handles the projects through its normal engineering staff. The four largest Class I railroads typically provide standard agreements, design standards, and other routine documents to assist public agencies. (See Appendix A for additional information on railroad processes for addressing agreements.)

In interviews with the Class I railroads, all expressed a strong desire to cooperate on public projects. They stated in various ways that their publicly traded corporations have expressly adopted policies that commit them to be corporate citizens who want to enhance the communities in which they do business. At the same time, all of them have repeatedly stressed the complexity of conducting highway construction work on or adjacent to railroad properties. To reconcile the need to cooperate on projects while protecting the railroads' interests, the Class I railroads have developed formal review processes.

Standard Review Process

Although the seven Class I railroads have differences in their internal project review processes, they also have many similarities. These similarities reflect the universal nature of the issues that must be addressed when highways and railways cross. A generic, idealized project review process is summarized below. The summary is not intended to describe in accurate detail any one railroad's review process, but it reflects the processes described by all the Class I railroads when they consider projects. This summary was assembled after reviewing the railroads' internal workflows and their project agreements, and after interviewing their public projects staff.

Typical Project Review Process

1. Initial inquiry about a potential project or initial submittal of draft project plans is received.
   - Record the project into the internal railroad project tracking and billing systems.
   - Determine the exact log points of the project.
   - Establish the internal billing number for all time to be spent on the project.
   - Write to the agency acknowledging the notification and advising it of the standard issues to consider.
2. Begin the process to notify the internal offices of the preliminary project.
   - Contact internal railroad offices of engineering, communications, rights-of-way, legal, industrial development, and maintenance.
     - Inform them of the potential project and its essential elements, such as clearances, distribution of costs, and need for in-house force account effort.
     - Request comments relevant to present and future track needs.
     - Determine which railroad appurtenances, such as communication equipment or maintenance facilities, may be affected.
     - If right-of-way for additional tracks is to be provided for, determine which side of existing tracks it should be on.
     - Determine if the railroad has planned any industrial development near the proposed project.
     - Determine if special geometric considerations are necessary for that location, such as horizontal and vertical clearances, access to the site for maintenance equipment, or planned future changes to the alignment.
     - Determine what the railroad's right-of-way is at the location and if there are any special legal considerations.
     - Determine if the mechanical department has any concerns.
     - Determine if the transportation department has concerns regarding operations or other issues.
   - Allow 4 to 6 weeks internally for comments from the notified offices.
3. After receiving the internal comments, summarize them in writing to the public agency. Include the following:
   - Provide initial comments about the project concept and scope and whether it meets standard railroad designs and specifications.
   - Seek clarifying details.
   - Advise as to the need for continued coordination as plans develop.
   - Inform as to the need for preliminary engineering agreement and other necessary initial agreements.
   - Provide an estimate of costs for preliminary engineering.
   - Begin the preliminary engineering agreement.
4. The next submittal, which would be some form of preliminary plans, is received.
   - Acknowledge receipt of the plans.
   - Conduct an initial cursory internal review of the plans.

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- Submit the plans to the contract engineering firm for detailed review.
- On acknowledgment by the public agency of the agreement to pay the contract engineering firm, the contract engineering firm conducts reviews.
- The contract engineering firm determines if changes have been made to the project concept or scope that would conflict with any issues raised by the internal railroad departments that reviewed the initial concept in Step 2.
- Circulate any significant changes internally as described in Step 2.
- Allow 4 to 6 weeks for internal comments.
- Prepare and submit the comments to the public agency.

5. The final plans are received.
   - Acknowledge receipt.
   - Get an estimate of the review costs from the contract engineering firm.
   - Authorize the contract engineering firm's reviews.
   - The contract engineering firm reviews the plans to ensure that any changes are in accordance with the earlier comments from the railroad.
   - Seek concurrence from the internal offices listed in Step 2 if any significant plan changes have been made.
   - Allow 4 to 6 weeks for internal reviews.
   - Summarize the comments and transmit them to the public agency for inclusion in the final plans.
   - Request corrected final plans and review them as to whether they have addressed comments.
   - Request the necessary number of sets of the final plans.
6. Prepare the project agreement.
   - Estimate the force account costs.
   - Prepare the right-of-way provisions.
   - Include the standard or special provisions necessary to control the contractor during the construction process, such as flagging, coordination with railroad road master, or coordination with train master or local operating official.
   - Include any long-term maintenance agreements.
   - Include all payments and contributions from the involved parties.
   - If the railroad makes a contribution, begin the internal process to secure funds.
   - Specify the contractor's insurance requirements.
   - Transmit the final agreement.
7. The public agency awards the project.
   - Notify internal divisions of the schedule of work.
   - Schedule a preconstruction meeting with the public agency and contractor.
   - Schedule the in-house or contract forces necessary for any force account work.
   - Schedule flagging.
   - Ensure that the safety plan is adequate.
   - Ensure that the operations divisions coordinate any change in train operation to accommodate the construction phases.
   - Ensure that the contractor's insurance is in place and is legally adequate.
   - Provide the public agency with a letter authorizing contractor to proceed.
8. Construction begins.
   - Monitor the conduct of the contractor for compliance with safety provisions.
   - Schedule and conduct force account work.
   - Inspect ongoing work.
   - Schedule and conduct flagging.
   - Collect costs and submit them to the agency for reimbursement.
9. The project is completed.
   - Inspect the project and address any deficiencies with the agency.
   - Record, both in hard copy and electronic GPS format, any final changes to the railway and bridge inventories to reflect the changes created by the project, such as altered alignments, grades, clearances, and signaling.
   - Record right-of-way or easement changes.
   - Prepare the final billing.

As the railroads frequently stress, the time frames for project reviews and agreements can vary significantly depending on the complexity of the project and the quality of submittals. The unique nature of each railroad's engineering needs creates special considerations that are not always apparent to the uninitiated public sponsor, or to the sponsor's engineering firm. These special considerations underlie the railroads' repeated emphasis on the need for projects to be developed by engineers who have experience dealing with railroads and, preferably, with the particular railroad that is affected.

The Railroads' "Desired State"

The implied "desired state" for the railroads is included in the best practices and recommendations they repeatedly cite. In the desired state in which they would prefer to operate, the following conditions would be common:

- Public highway agencies would have fully developed master and standard agreements that spell out the roles and responsibilities of the agency and of the railroads in developing and reviewing projects.
- Public highway agencies would execute a preliminary development agreement early in the conceptual stage of every significant project and use that agreement to compensate the railroad for its staff and consultant review effort.

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- Public highway agencies would approach railroads early in the project-development process and seek their input into the projects' original purpose, need, and conceptual scope.
- Public highway agency personnel would be highly experienced in railroad coordination and would only seek design exceptions and minimum clearances when these cannot be avoided.
- Experienced consulting firms who have extensive history in working with the particular railroad would be hired to develop the project.
- The means and methods of construction would be considered early in the process to minimize incursions into the operating envelope.
- Projects would be developed using engineering and construction standards unique to the affected railroad.
- The project agreement process would begin early in the project development process. The development of the agreement would run concurrent with the development of plans. The agreement would incorporate the railroad's standard legal language regarding insurance, indemnification, safety, and other key issues.
- Project submittals would occur at the 30%, 60%, and 100% plan-completion stages.
- All plan comments would be incorporated into later submittals.
- All right-of-way agreements and payments, environmental permits, right-of-entry permits, and insurance requirements would be secured, accurate, and submitted with the final plans.
- The railroad's construction provisions would be included in the contract plans.
- Contractors and state highway personnel would have completed safety training before construction begins.
- Preconstruction meetings would be held to coordinate activities with all parties.
- Flagging would be scheduled well in advance of the start of construction.
- Construction activities would be conducted safely and under the review of the railroad road master's designee.
- At the end of construction, all materials and equipment would be removed and the rights-of-way restored.
- As-built plans would be provided.

These conditions constitute the idealized desires of the railroads' public projects divisions. All the railroad personnel interviewed willingly acknowledged, however, that they understood that circumstances would often prevent these conditions from occurring. They said they realized that some states and localities operate under statutes that do not allow all these conditions to be met. They also realized that meeting optimal design standards in all situations can lead to longer spans and more expensive designs, which public sponsors may reasonably resist. They acknowledged that public auditors may question the need to reimburse staff time and expenses of railroad reviewers. However, they noted that understanding what conditions they desire makes it easier for a public project sponsor to organize its submittals and processes to better address the railroads' concerns.

Best Practices

Several best practices were identified during interviews with the railroads and the review of their processes. The highlights of those are described below.

- CSX Transportation publishes a Public Project Information manual that summarizes the process, agreements and permits required to develop a project.
- NS's website includes an extensive listing of its design guidelines and standards.
- BNSF and UP developed a joint set of standards and guidelines for the development of projects.
- Kansas City Southern Railway developed a program for the simplified acquisition of low-cost Railroad Protective Liability Insurance.
- BNSF's attempts to meet at least annually with each state DOT to discuss the project review process.
- Some railroads publish permit applications and approval guidelines for basic activities, such as rights-of-entry and maintenance of existing structures.
- NS publishes its Special Provisions for construction, which can be incorporated into construction contracts.
- The railroads are willing to participate in regular project-tracking and milestone-review meetings with DOTs when DOTs request such meetings.
- BNSF assigned an individual engineer to assist the Washington State DOT through the course of an extended multiyear rail-corridor development process.

Areas for Improvement

Although each of these efforts appears to be a best practice, no railroad seems to have captured and implemented them all. Rather, each railroad had some of the best practices in place but had not fully exploited all the practices identified by the other railroads. Areas for improvement that are apparent include the following:

- There appears to be additional opportunity for all the railroads to capture the best practices that have been developed by the others.
- Railroads and public highway agencies could further develop partnering strategies and agreements to identify common approaches to project development. Such agreements can

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include agreed-on milestones, communication channels, review processes, and escalation paths.
- The publication of updated design and construction standards could be more uniform and consistent across all the railroads.
- Standing process-improvement meetings could be scheduled periodically between the DOTs and railroads. The analysis of "defects" and the systematic improvement of them is a fundamental aspect of modern quality-control systems such as ISO 9002, Six Sigma, or the Baldrige Program. A systematic problem-identification-and-analysis process does not seem to have occurred between railroads and the state DOTs with which they interact.
- The development of master agreements and standard project agreements has occurred in many instances but not universally.

PART 2: Review of Highway Agency Processes

The SHRP 2 R16 project, to reiterate, seeks the following outcomes and objectives regarding highway–railroad project agreements:

- Identify strategies to facilitate beneficial relationships between railroads and public agencies.
- Investigate and develop innovative partnering techniques.
- Develop a draft model agreement and streamlined permitting processes.
- Identify barriers that impact effectiveness and propose remedies.
- Recommend how to implement the model agreements and streamlined permit process.

The task is complex because of the large number of entities involved and the great differences that can exist between projects. Statistics vary as to the number of highway–railroad crossings in the United States, but they are known to number at least 150,000 across 4 million miles of public roads. These crossings involve seven Class I railroads, 33 regional railroads, and 364 short-line railroads. These railroads are interacting with 50 states, an estimated 19,000 municipal governments, and more than 3,000 counties. The projects involved vary considerably as well. A "project" can be as simple as granting access to railroad rights-of-way for routine maintenance of adjacent highway property, to as complicated as a multistructure urban highway–railroad grade separation complex. As a result of this great diversity, any description of "typical" projects and processes is unavoidably generalized.

This second section of the chapter reviews representative public-agency processes, practices, and time frames. With the caveat of project diversity cited above, the following discussion summarizes agency processes and practices regarding the most typical types of projects. It also summarizes a representative sample of public highway agencies' manuals, agreements, and guidance regarding highway–railroad project agreements. Finally, the section reviews a survey of more than 400 public officials who are involved in the railroad–highway project agreement process. Their responses as to the most common problems and their opinions as to best practices are included.

Where Projects Originate

As mentioned, the U.S. highway system is managed by an array of state, municipal, county, and even township governments. In the West, federal agencies such as the Bureau of Land Management commonly maintain roads on public lands. Native American tribes also are sovereign nations that plan, build, and maintain roads that can cross railways. In some cases, toll authorities, port authorities, parks, or other governmental subdivisions own roads. As a result, projects are generated from many agencies, all of which may have their own unique means of pursuing agreements. Table 3.1 shows FHWA's breakdown by category of ownership for public road miles in the United States.

For ease of description, this analysis focuses on the most typical types of projects—those generated by state departments of transportation and large cities. These agencies generate most of the projects because they manage the majority of high-volume roadways. Although state highway agencies manage only about 19% of all road mileage, the roads they manage are the high-volume interstates and arterials that carry the most traffic. Roads that FHWA categorizes as "local" carry an estimated 13% of total miles traveled; roads in the higher functional classes, which are generally managed by state highway agencies and the larger municipalities, carry 87%.

Types of Projects

Most highway projects are routine maintenance projects. A comparison of federally reported highway lane miles between

Type of Agency	Miles of Roads Owned
States	780,000
Counties	1,791,000
Municipalities, Townships	1,252,000
Other Agencies	65,843
Federal Agencies	128,349

Source: Highway Statistics 2006, Federal Highway Administration, Table HM-14.

Table 3.1. Miles of Road by Agency (13)

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1997 and 2006 shows that public highway lane miles increased only 2.1%, or approximately two-tenths of 1% annually over that decade (*14, 15*). Out of an estimated $67 billion spent on highways annually by all levels of government, the large majority of it is spent on maintaining existing infrastructure. Of the estimated 4 million miles of public roads, the vast majority of the mileage is mature, which means it has been built and repaired over the course of many decades. As a result, highway agencies are constantly maintaining the pavement surfaces, bridges, culverts, and other components of those aging highways. Of the nation's 590,000 bridges, the average age is 43 years, which means that highway agencies are constantly repairing or maintaining components of them. In addition to bridges, there are millions of culverts or pipes that carry water beneath the highways. Although there is not a national culvert inventory, culverts or pipes number in the millions and range in diameter from 12 inches to 5 feet. These also are subject to steady degradation and continuous repair by highway agencies.

Maintenance Projects

Most highway agency personnel are in maintenance. This reflects the fact that the primary activity of the highway agency is to conduct the routine maintenance work necessary to keep highways and their appurtenances from degrading as a result of water, weather, traffic, routine crashes, and other wear and tear. Typical types of highway maintenance work that may involve railroad coordination include the following:

- **Drainage structure maintenance** to keep pipes, ditches, drainage basins, and other drainage components free-flowing and well-maintained. Highway drainage systems almost always connect into the drainage systems of the larger drainage basins in which they are located. This integration requires highway agencies to work with adjacent landowners, sewer districts, and adjacent railroads.
- **Pavement preventive and reactive maintenance** consists of pot-hole patching, thin overlays, sealing of cracks, or stabilizing pavement edges. This preventive and reactive maintenance is strongly encouraged by most highway agencies and FHWA as an essential strategy to preserve pavements and prolong their use.
- **Signage and pavement marking improvements** are constant undertakings. The reflectivity of signs degrades in less than a decade, and pavement marking materials seldom perform well after three years of constant abrasion from vehicular traffic. Signs and pavement markings are essential safety features of highways and require continuous repairs. Signs frequently are knocked down in crashes and require immediate replacement.
- **Minor resurfacings** are another constant undertaking by highway agencies. Asphalt surface treatments are the predominant pavement treatment and generally have a useful life of 15 years or less. As a result, somewhere between 5% and 10% of a state highway system is being resurfaced annually.
- **Bridges** are designed to flex, expand, and drain to accommodate precipitation, temperature changes, loads, and wind. As a result, their drainage features, their expansion joints, their bearings, and other features require periodic maintenance to prevent premature failure. This maintenance requires both contract and in-house highway agency forces to access the structures, many of which cross over or under railroad properties or are adjacent to them.
- **Resurfacing highway–rail crossings** is a high-profile subset of highway maintenance projects. The inherent complexity of keeping pavement at a smooth profile with the raised steel rails of railroads creates special maintenance issues that require the cooperation of the highway agencies and the railroads.

Safety Projects

Approximately 41,000 persons are killed annually in highway crashes, and another 2.5 million are injured. Crashes are estimated to cost society $230 billion annually in medical costs, lost wages, and property damage (*16*). Typical safety projects that involve railroads include the following:

- **Intersection improvements** are a disproportionate percentage of all safety projects because of the inherent conflicts that occur at intersections between traffic that turns and traffic that stops. When intersections are near railroad crossings, their complexity increases significantly because of the frequent need to have railroad crossing signals coordinated with traffic signals. The operation of traffic signal phases is significantly affected by the blockage of tracks when trains pass nearby.
- **Railroad crossing projects** are a specific subset of safety projects, which are recognized and funded through the Sec. 130 funding programs of the Title 23 FHWA programs. Most states and their railroad partners have taken steps to standardize these projects. These projects have been occurring for decades and are often similar. As a result, most states have developed standard approaches to simplify these projects with the railroads.

Expansion Projects

Projects that increase the capacity of the highway system represent a small percentage of overall projects but consume a disproportionate amount of attention from highway officials, the public, and agencies that interact with highway agencies. These projects' disproportionate attention and analysis is caused by

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the need to acquire rights-of-way from property owners, to mitigate their environmental impacts, and the difficulties in paying for what are often expensive undertakings. Typical types of expansion projects that involve railroads include the following:

- **Highway–railroad grade separation projects** that frequently increase highway capacity by reducing a major impediment to the flow of traffic. The frequent highway blockages that mainline Class I railroads can cause in an urban area are significant. Major Class I railroads can move more than 80 trains per day. Eliminating these bottlenecks by grade separating major highway–railroad intersections is often a major congestion strategy in cities and on major suburban highways.
- **Highway widening projects** often involve railroad interaction. Interstates, freeways, and arterials all cross railroads and require the widening of bridges to carry the new, widened lanes over or under railways.

Highway Agency Processes to Address Railroad Needs

Most state highway agencies are approximately 100 years old. As they were organized in the early 20th century and began their efforts to improve highways, they immediately encountered the large and powerful railroads, which at that time were the nation's largest employers. Decades of statutes and case law recognized the railroads' rights to control rights-of-way. As highway agencies improved the nation's roadway network, they developed decades of experience not only in how to safely cross railroads but also in how to interact with railroad officials to get the railroad approvals they needed to cross or interact with railroad rights-of-way.

In most aspects, the highway agencies' processes are the mirror images of the railroads' processes. The highway agencies attempt to anticipate the railroads' requirements and to incorporate them into standard agreements, construction specifications, and internal project-development processes. All states examined have rail-coordination offices whose job it is to secure railroad approvals. These offices nearly universally serve as a central point of coordination between the highway agencies and the railroads.

Most state and local statutes require highway agencies to develop agreements or contracts before they can spend money or enter into commitments. Therefore, the development of an agreement is a major focus of the project-development process if that project involves highway agencies compensating the railroads or making commitments to them. As a result, there are many kinds of project agreements. Agreements, like projects, generally fall into the following categories, each of which may involve a type of agreement or a major area within a larger agreement:

- Planning study agreements, in which the railroad agrees to provide personnel, operating data, and planning assumptions so the highway agency can conduct long-term planning about how railroad facilities may interact with local highway and transit operations;
- Preliminary engineering study agreements for highway agencies to evaluate project concepts or weigh environmental options for multiple alternatives for a potential project;
- Project review agreements, which address the review of detailed plans;
- Construction agreements, in which the contractor's means and methods are limited to ensure safe train operations during construction;
- Long-term maintenance agreements for the finished projects;
- Routine maintenance agreements to resurface or repair existing at-grade crossings or existing overhead or under-grade crossing structures;
- Safety project agreements to install lights, gates, signals, signage, or other safety appurtenances at crossings;
- Agreements to close crossings or to develop new ones;
- Agreements to grade separate at-grade crossings;
- Various right-of-entry agreements so that crews can access railroad properties in order to study geological, environmental, or hydrological aspects of adjacent highway properties;
- Various utility agreements allowing highway agencies to improve pipes, drainage features, or even utility pipes and wires that cross or run parallel to the railroads;
- Lateral encroachment agreements where improvements to an adjacent roadway may infringe, even temporarily during construction, on the railroad; and
- Agreements concerning rehabilitation of at-grade crossings.

Many projects include several of these aspects, which therefore may be consolidated into one larger, complex agreement. In contrast, other agreements may be simple letters that incorporate by reference long-standing provisions or specifications that have been programmatically adopted by both the railroad and the highway agency.

Agreements also vary because of the different governance requirements of the highway agencies. In some states, the state transportation agency has statewide jurisdiction over nearly all roads, so that the highway agency manages most of the railroad negotiations. Other states are "home rule" states, in which local governments manage local roads. In these states, the local governments may frequently be the project sponsor and may require direct engagement on agreements. Some state highway agencies share authority for railroad interaction with utility commissions or commerce commissions. In these states, both the highway agency and the commission may be parties to the negotiations. Within cities, the municipal government may be a project sponsor. In large cities such as Chicago, New

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York, and Los Angeles, the municipal government may have dozens or hundreds of crossings and have full-time staff dedicated to railroad agreements. As a result, the cities may be direct negotiators with the railroads and bring their unique local ordinances and requirements to the agreement process. As a result of these variations, the project agreement process can be diverse.

The Project Development Process

Every project that uses federal funds must be developed from an official, formal Project Development Process (PDP) established by the state highway agency. The PDP requires an alternatives analysis to be conducted for most projects that involve any significant complexity or impacts. Minor maintenance projects, such as a resurfacing, would require only nominal analysis that creates little time delay or analytic cost. Other projects, however, create multiple and iterative analyses that can involve extensive public hearings and comment periods. This public involvement process brings multiple stakeholders into the process, whom the highway agency must attempt to reasonably accommodate.

An informed and complete alternatives analysis includes substantial comparative studies of various project alternatives as to cost, feasibility, impacts, and constructability. Each alternative must be evaluated to determine which has the least detrimental environmental or community impacts. To conduct multiple analyses requires substantial information and comment from the railroads. As noted earlier, the railroad considerations are diverse. Informed comment about a project alternative involves reviews from several disciplines and divisions within the railroads. The railroads also want to charge for these reviews, many of which are subcontracted to engineering firms. As a result, lengthy and expensive alternatives analyses can result in multiple iterations. Each iteration can take several months of analysis by the highway agency before it submits the new iteration to the railroad for its multiple divisions to review again. As a result, several years of alternatives analysis, public comment, railroad review, and environmental analysis can precede the identification of the final project concept.

From the railroad's perspective, the impact of the project alternatives on its operations is of paramount importance. To the highway agency, the railroad is only one of multiple stakeholders that it needs to satisfy in a complex project. Among its external stakeholders for a complex urban grade-separation project are the following:

- City or county elected officials where the project is located;
- The affected residents within the neighborhood;
- City or county engineering officials concerned about traffic impacts;
- Emergency service providers, if crossings are to be closed or traffic patterns changed;
- School officials concerned about bus routes;
- State historic preservation officers, if any actual or potentially historic structures or historic districts are involved;
- State and federal hazardous materials officials, because railroad rights-of-way are assumed to have transported many decades worth of hazardous materials that may have contaminated rights-of-way or groundwater;
- The U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency (EPA), and probably the state environmental protection agency, if any streams are affected or runoff into public waters is created;
- State and federal EPA officials, to review the air-quality impacts or benefits of the project;
- The U.S. Fish and Wildlife Service, which generally must receive routine notification in case any threatened or endangered species are in the vicinity of a complex railroad–highway project;
- Utility companies, to be consulted to ensure that the project does not require extraordinary and expensive relocation of utilities, such as power substations or sewer lift stations;
- FHWA and its attorneys, who need to approve the project (if federal funds are used, FHWA would be responsible for defending the project against any legal challenges resulting from environmental or neighborhood impacts); and
- FRA, which may be involved in some cases.

These entities would only be the external stakeholders. Internally, a variety of highway agency divisions would be reviewing, commenting on, or suggesting changes to the project concept:

- The planning division would ensure that the project agrees with local short- and long-term plans, that it is fiscally balanced, and that it has been approved by the metropolitan planning organization.
- The environmental division would coordinate approvals from environmental agencies that have jurisdiction over issues of air and water quality, hazardous materials, terrestrial or aquatic species impacts, and historic or potentially historic structures or districts.
- The geotechnical unit reviews soil boring data, which can have a major impact on structure type and foundation design.
- The traffic division reviews the project for its effect on adjacent signal systems and traffic patterns.
- The design division would scope, hire, and review consultants who develop the plans.
- A structures division would review issues of structure cost, constructability, and long-term maintenance.
- A construction division wants to ensure that plans consider all construction complications.

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- An estimating division needs to provide accurate costs.
- The utilities division requires long lead times to coordinate with utility companies that may have to relocate utilities to enable contractors to build the project.
- The right-of-way unit must hire appraisers, conduct title searches, and review easements to ensure that all property owners have full and fair compensation for their property.
- A contracting and scheduling division needs to review final plans, distribute plans to potential bidders, and actually schedule a bid letting.

At least three successively complex stages of engineering generally occur, with each circulating for review. Generally, preliminary plans are produced at the 30% plan stage, which include the following:

- An exact alignment;
- Dimensions of horizontal and vertical limits;
- A structure type selection; and
- General "typical sections" that illustrate the general design of the project along its length.

After comments on the 30% plans are reviewed, the next submittal advances to a 60% stage, where more details are developed on the following:

- The structure design;
- General project right-of-way limits;
- Consideration of utility impacts;
- General quantities of materials; and
- Greater design detail.

Then, depending on the agency, final plans are presented at the 90% or 100% stage. These would include another successive iteration of detail about the following:

- Precise designs on where and how drainage structures will function;
- The temporary work limits that may extend outside the final rights-of-way as equipment maneuvers and excavations occur during construction;
- Precise delineation of right-of-way takings in sufficient detail for filing deed descriptions, appraisals, and right-of-way negotiations;
- Precise plan sheets for every stage and aspect of the project;
- Precise cost estimates by project item and stage;
- Maintenance of traffic plans; and
- Plans for landscaping or restoring the site after construction.

Once all these details are approved, the highway agency begins the often complex, expensive, and sometimes contentious processes of acquiring the rights-of-way and convincing the utility companies to relocate affected utilities before the project commences. Also, the "permit" process for wetlands or stream impacts cannot begin until precise impacts, such as cubic yards of fill or lineal feet of drainage ditches, are known. The water resources permit processes of the U.S. Army Corps of Engineers and EPA require another round of public notice and comment before the project can proceed.

These multiple stages consume considerable cost, time, engineering analysis, and staff resources by the highway agency attempting to complete a complex highway–railroad project. Generally, such large undertakings are pursued when there is a great transportation need. Such need generally produces substantial community and political pressure on the highway agency to complete the project. Also, such projects often involve multiple funding partners. State highway agencies often pool funds with the affected community or use a congressional earmark on such high-profile projects. The multiple funding partners, therefore, experience pressure to control costs.

When such large, complex, expensive, and often contentious projects then face delays and changes caused by railroad requests, it can lead to confrontation and backlash from the state and local project partners. As mentioned, at each submittal, the plans matriculate through several different railroad divisions to examine the proposal from its impact on the various disciplines within the railroad. Divisions such as structures, construction, maintenance, signals, operations, industrial development, and mechanical would be responsible for consideration of how the project would affect the railroad during construction, and also in perpetuity after its completion. Railroads typically warn of 30-, 60-, and even 90-day comment periods at each review, depending on the complexity of the impacts. If the railroad finds the plans to be unacceptable, this can lead to another series of revisions and another round of submittals and reviews for each project stage.

Highway agencies frequently report that it can take a decade to plan, design, and construct a complex project.

Financial Impacts on Highway Agencies

Earlier, the financial pressures on the railroads were described in general. The railroads have faced substantial downsizing in the face of traffic volume increases just to remain profitable and competitive. The railroads generally refuse to contribute to projects or to provide engineering comments without compensation because of the financial pressures they face to cover all their costs and not to pass those costs on to shareholders or shippers. The railroads note they are private, publicly traded companies that are obligated to maximize shareholder value. They note that engineering time is expensive, that rights-of-way are finite, and that their daily train operations are their financial lifeblood.

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Likewise, the highway agencies report significant financial hardship attributed to the railroads' needs for engineering payments, compensation for rights-of-way, larger and more complex structures to allow for future track expansion, and costs for intangible benefits such as air rights. The highway agencies' financial hardship has been regularly documented in national studies and federal analyses. Several definitive studies in recent years all reached the same conclusion—the amounts appropriated for transportation are seriously below the levels needed to improve or even sustain the system at today's congested levels.

In December 2007, the National Surface Transportation Policy and Revenue Study Commission reported that the current 18.3 cent per gallon federal motor fuels tax would need to increase by an additional 40 cents to meet highway investment needs. It estimated that the nation is spending only 40% of what is needed to sustain and improve the highway network.

The commission's most conservative forecast indicates that the nation needs to be investing at least $199 billion annually in transportation through 2020. Today, the nation is spending from all sources $86 billion. The commission report forecasts that at current levels of investment, delay *per traveler* on urban principal arterials would increase by 20% by 2020, by 50% in 2035 and double by 2055. Since more people will be traveling in a growing population, *total hours of delay* on principal arterials would double by 2035 and quadruple by 2055, the commission forecasts (*17*).

The FHWA's 2006 Condition and Performance Report notes than an increase in capital outlay of 87.4% above current levels would be required to reach the projected $131.7 billion level that provides the optimum highway investment level, according to its complex modeling (*18*). For transit, the report says the average annual cost to improve both the physical condition of transit assets and transit operational performance to targeted levels by 2024 is estimated to be $21.8 billion in constant 2004 dollars, 73.0% higher than transit capital spending of $12.6 billion in 2004 (*19*).

The Texas Transportation Institute's Travel Time Index shows that from 1995 to 2008, the additional time needed to travel in the peak hour versus nonpeak times increased from 27% to 38%. However, these numbers include all urbanized areas, including the relatively small and lightly congested ones. When the largest urban areas are examined, the severity of congestion is noticeably increased (*20*). The Texas Transportation Institute's 2007 Annual Urban Mobility Report notes that annual hours of delay per traveler rose from 21 hours in 1982 to 43 hours in 1995 to 51 hours in 2004 to 54 hours in 2005—an increase of 157% in 23 years.

These types of national estimates have been replicated frequently at the state and local levels. The state and local highway agencies that are negotiating with railroads feel significant pressure to constrain costs. They repeatedly said in interviews that an increase in cost demanded by a railroad for one essential project leads to the deferral of another essential project.

The Debilitating Effects of Inflation

These already-inadequate levels of investment have been further eroded by the unprecedented construction price inflation since 2005. A global tipping point in oil demand driven by the flourishing economies of China and India spurred record petroleum and construction prices from 2004 through early 2008. Although oil prices moderated in 2009, construction prices remained significantly above unit prices of 2005 and earlier.

Highway construction is particularly prone to oil price increases because of the energy-intensive nature of steel, asphalt, concrete, and excavation. Asphalt obviously is a petroleum product and its price is heavily influenced by oil prices. The manufacture of concrete is energy intensive. Extracting, crushing, and delivering aggregate all depend on large amounts of diesel fuel. These factors have caused the construction inflation rate to significantly exceed overall price rises.

AASHTO and many other groups have noted the dramatic reduction in state DOT construction purchasing power caused by inflation. FHWA's Price Trends for Highway Construction notes a 52% increase in its composite construction cost index between 2000 and the end of 2006. The large majority of it occurred in 2005 and 2006 (*21*).

These pressures create great resistance within the highway agencies to increase project costs, particularly if the benefits are not apparent to the public. Agencies have objected to having to pay monopolistic fees for the railroads to provide internal crews for force account work, flagging, and inspection. The highway agencies also have complained of having to provide longer structures to provide room for track expansion, even when the track expansion needs are uncertain.

Survey of State and Local Agencies

A web-based survey was designed to query state and local transportation agencies about best practices, streamlined processes, and challenges in the relationship between state and local agencies and the railroads. An e-mail message with a link to the survey was sent to each state department of transportation and to each member of the project advisory panel. Approximately 400 local transportation officials also were sent an explanatory letter about the survey that included a link to it. (See Appendix B for the survey instrument and a detailed summary of responses.)

The survey listed 27 suggested best practices that the team had identified during earlier research stages. The survey

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asked each respondent to indicate if they used any of the listed 27 practices and to rate their effectiveness. It also asked for additional best practices. The survey asked if the responding agency had any metrics to measure the effectiveness of agency best practices on railroad approval time frames or cost. It provided respondents the opportunity to rate their own agency's performance in submitting plans and submittals that addressed railroad needs in the review of projects. It requested agency perspective on reasons for successful and for unsuccessful project reviews. It provided an opportunity for responding agencies to list specific issues in the coordination between railroads and highway agencies that needed to be addressed. It also asked agencies if they had problems with indemnification or liability insurance.

Best Practices

The following 27 best practices are listed in order of effectiveness as ranked by the survey respondents:

1. **Have DOT central point of contact.** Have one empowered point of contact at the DOT to coordinate railroad project issues.
2. **Conduct formal crossing diagnostics.** Do not program a crossing project without a formal diagnostic study.
3. **Open communication.** Establish ongoing formal communication channels between the highway agency and the railroad.
4. **Have one railroad point of contact.** Have one empowered point of contact at the railroad to coordinate project issues.
5. **Require early scoping.** Require early predesign scoping on project concept between the railroad and the DOT.
6. **Have preliminary engineering agreements.** Have formal agreements that allow railroads to be compensated for engineering advice during preliminary development—even if a project is not eventually constructed.
7. **Schedule regular meetings.** Have standing monthly or quarterly meetings—in person or via phone or video—to address project schedules with the railroads.
8. **Have formal points of concurrence.** Establish agreed-on, regular points of coordination, review, and concurrence between the DOT and the railroad on projects.
9. **Use experienced engineering firms.** Select only engineering firms that have extensive railroad experience.
10. **Standard plan notes.** To ensure railroad construction requirements are included in DOT plans.
11. **Require preconstruction meetings.** Require a preconstruction meeting between contractors, DOT, and the railroad for any significant project.
12. **Hold regional conferences.** Bring neighboring states and railroads together to share best practices and common issues.
13. **Dedicate personnel for reviews.** Have dedicated personnel either in the railroad or with the contract engineering firms to focus solely on highway project reviews.
14. **Coordinate projects for locals.** Have the DOT coordinate railroad reviews and submittals for the local governments.
15. **Ongoing reviews.** Require reviews at the 30%, 60%, and 90% plan stage.
16. **Master agreements.** To develop programmatic approaches between railroads and states.
17. **Standard billing agreements.** Streamline or standardize the billing process with the railroads.
18. **Hold annual meeting.** At least annually, have the DOT and railroad staffs meet to identify common needs and approaches.
19. **Enact statutes to close crossings.** Enact state statutes that reward, encourage, or require crossing closures whenever possible.
20. **Programmatic right-of-entry agreements.** Develop standard agreements for routine right-of-entry for processes such as bridge inspections.
21. **Have standard review times.** Have the DOT and the railroads agree on standard review times for submittals.
22. **Prequalify firms.** Develop additional prequalification for engineering firms to ensure that they have railroad expertise.
23. **Education.** Require education for DOT project managers and other employees to ensure that they understand railroad requirements.
24. **Produce manuals.** Provide DOT staff procedure manuals on how to prepare acceptable railroad plans and submittals.
25. **Develop escalation procedures.** Have agreed-on escalation path to resolve issues that cannot be solved at lower staff levels.
26. **Reengineer Section 130 program.** Because railroad grade crossing countermeasures are often similar, reengineer the state's Section 130 process to standardize and streamline it between the DOT and the railroads.
27. **Use NHI course.** Send staff to the NHI course on railroad crossing projects.

The following eight practices were consistently rated as "excellent" by the respondents.

Have a DOT Central Point of Contact

"Have a DOT Central Point of Contact" is one of two practices that tied for the most highly rated practice overall, with 22 respondents rating it as an "excellent" or "good" practice. This high ranking in the survey was validated in interviews with state DOTs. It was also highly rated by the advisory panel, by railroad personnel, and by state DOT rail coordinators.

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In a centralized-point-of-contact model, the central office coordinates, prioritizes projects, schedules, and ensures that agreements and approvals are on schedule, and the district technical contacts work directly to resolve technical issues and keep the project on schedule. This model enables the central point of contact to help with any additional coordination required between the central office and the railroad when required. Examples of agencies using this practice are the Florida, Nebraska, Iowa, Washington, Pennsylvania, Minnesota, Texas, New Mexico, and Ohio DOTs; the Arkansas Highway and Transportation Department; and the Illinois Commerce Commission.

Although the railroads were not asked to participate in the survey, in separate interviews the railroad personnel also strongly supported having a central point of contact in the DOTs.

Conduct Formal Crossing Diagnostics

The second of the two practices that tied for highest number of responses for an "excellent" practice was "Conduct Formal Crossing Diagnostics." It was one that the railroads also identified in interviews as a best practice. It was rated "excellent" by several states and local agencies.

Establish Ongoing Communication Channels

"Open Communication—Establish ongoing formal communication channels between the highway agency and the railroad" received the second highest number of responses as "excellent." In interviews with state transportation agencies, this practice was identified as one of the essential elements to successful workings between the railroads and the state transportation agencies.

This practice was listed as a reason for success of projects and reviews. Open communication was cited as one of the key elements for good working relationships between railroads and state transportation agencies. Agencies such as the Pennsylvania and Washington DOTs attributed meetings and ongoing communications to facilitating easier exchange of ideas, expediting revisions to agreements, expediting approvals, and building trust between both teams. Open communication was attributed as being especially helpful when the teams disagreed on projects, schedules, agreements, billings, or processes. Some agencies in the survey and interviews noted that agency personnel sometimes avoided scheduling meetings to avoid confrontations when there was a difference of opinion or ideas between the two teams.

One of the respondents in the survey noted, "Sometimes, an adversarial relationship develops between the railroad and the highway agency on some projects. Some DOT project managers try to avoid having to deal with the railroad if possible." In agencies where open communication was integrated into the workings between agency and railroad personnel, both teams often found workable solutions to challenges.

Have One Empowered Railroad Point of Contact

"Have One Empowered Railroad Point of Contact" received the third highest number of responses as "excellent." This also corroborated agency feedback during interviews that having multiple points of contact in the railroads created confusion and delays. It led to inconsistency in dealing with project issues and led to waste of resources. Railroad personnel noted that this approach led to railroad staff receiving calls from state agency personnel regarding projects about which they had no knowledge. Often the railroad person receiving the call had no involvement or information about the project and would have to redirect the calls. Besides being a waste of time, it often led to confusion and difficulty in prioritizing project needs and often caused project delays.

Often the same divisions within the railroads worked on both public and internal projects. Most Class I railroads have a public projects manager who coordinates the work between the agencies and the railroads. Prioritization of project work was also done by the public projects manager, an area outside the railroad technical team. Because of this separation of the railroad technical team, direct calls to them from state and local transportation agency staff often did not result in good responses. Having an empowered railroad point of contact helped coordinate public works within the different areas of the railroad and made for smoother and quicker information flow. Agencies that had a single or few designated points of contact with the railroads reported it was easier to revise schedules and project priorities if a situation required shuffling of priorities.

Require Early Scoping

"Require Early Scoping" received the fourth highest number of responses as "excellent." This practice enables both sides to bring up differences and concerns early in the process. It was also one factor that helped eliminate or change alternatives that either railroads or the agencies had strong reservations about. It often helped minimize the so-called "being held hostage to last-minute decisions," in which concessions are demanded late in a project when the project sponsor cannot afford further delays. One of the agencies in the survey noted, "When comments and needs are expressed early and are consistent throughout the development of the project [it] leads to a more successful outcome."

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Preliminary Engineering Agreements

Three practices tied for the fifth highest number of responses rated as "excellent." One is the practice of having preliminary engineering agreements that allowed railroads to be compensated for engineering advice during preliminary development even if the project is not eventually constructed. At the advisory panel meeting there was much brainstorming and discussion about this practice and overwhelming support to change the regulations that covered how and when railroads could be compensated for preliminary engineering work. The advisory panel in its first meeting discussed the fact that the railroads, as private businesses, had to charge for the hours of work done irrespective of the final decision to construct a project. Several states have said FHWA will not allow compensating the railroads until the final agreement is signed. Many projects in the preliminary stages never get to construction or have a final agreement signed. Railroads never got compensated for such work. One of the railroads discussed having hundreds of thousands of dollars of uncompensated expenses attributed to its public projects division as a result.

The participants at the advisory panel meeting felt that in view of the project objective to smooth relationships and devise mitigation strategies to improve the workings between railroads and local and state transportation agencies, this issue needed to be resolved and a better and simpler mechanism to compensate railroads for preliminary engineering work needed to be devised.

Railroads, like other private businesses, are accountable for the profitability of their units and operations. There is a natural inclination to focus on work that brings in revenue versus work that will not be compensated. The state agency and the railroad representatives felt strongly that the inability to pay for preliminary engineering reviews was one cause of discordance and delays.

Have Scheduled Regular Meetings

"Have Scheduled Regular Meetings" is the second of the three practices that received the fifth highest number of responses as "excellent." This was also identified as a good practice during interviews with two of the Class I railroad representatives. The railroads identified this practice as one of the factors in expediting reviews and approvals on projects. They noted that the frequency of the conference calls varied from biweekly to monthly to quarterly, depending on the maturity and progress of the projects. These scheduled calls helped address project issues and schedules and enabled timely correction on activities that were off schedule.

Have Formal Points of Concurrence

"Have Formal Points of Concurrence" is the last of three practices that received the fifth highest number of responses as "excellent." This practice helps to ensure adequate communication and shared understanding of progress by both the railroads and the highway agencies. Generally, the points of coordination and concurrence were recommended to be at the preliminary planning stage, at 30% plan completion, 60% completion, and 90% completion. These four stages allow for early agreement on the preliminary concept scope and then further concurrence as that general scope translates into an increasingly detailed set of project plans.

Highway Agency Practices

As has been mentioned repeatedly, documenting "typical" practices is subject to arbitrary generalization because of the large diversity of public agencies. However, several of the largest states have railroad-agreement manuals that illustrate their processes and provide insight into the state's general approaches.

The difficulties states face in securing railroad agreements is apparent, even in the dry and formal language of the process manuals. One state's draft manual refers to the "coveted, yet ever elusive, construction and maintenance agreements" needed from the railroads for each project. Another state warns its districts emphatically to expect a year or more delay in receiving railroad approvals. A third state notes that one of the railroads provides agreements after a review of at least 6 months, while another major Class I railroad requires 12 months. It is apparent that the states frequently experience long review times and delays. They warn districts to plan such uncertainties into project schedules.

These manuals refer to the standard agreements, specifications, and contract provisions the states have developed to ensure that the railroads' concerns are routinely addressed. The documents attempt to streamline the review process by addressing known and long-standing railroad concerns programmatically in all projects. The internal project managers, the outside design consultants, and ultimately the contractors are all required to incorporate these requirements directly into the project-development procedures.

Two of the more comprehensive approaches are summarized below. The first is the Texas Department of Transportation's rail coordination manual. It outlines the steps and responsibilities of its project managers to enable them to secure railroad agreements. The second is a summary of the Illinois DOT master agreement with CSX. The master agreement spells out the routine steps and provisions that both entities use to streamline their interactions.

Texas Department of Transportation

The Texas DOT is updating its rail project manual to try to further improve its interactions with the railroads. As with many other departments, it advises its internal project managers to

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seek immediate involvement of the railroads as soon as a project is approved for preliminary development. It requires a DOT railroad project manager to seek a site visit with the railroad to get initial comments from it before plan preparation. If a structure is involved, the project manager is to attempt to get a DOT bridge project manager present at all meetings with the railroad. Projects are also recorded in an agreement status report, which tracks the progress of agreements. The report is updated monthly and shared with internal Texas DOT divisions and the railroad. Quarterly updates are sent to the districts and to the district rail coordinators. In addition, a letter of authorization is issued by the Texas DOT, which serves as a standard preliminary engineering agreement allowing the railroad to charge the DOT for reviews and consultations.

After initial concurrence from the railroad regarding project approach, the project manager secures the field surveys, soil drillings, signal diagnostics, and other items that will be fundamental to the project. These likewise are shared with the railroad.

As detail design begins, the rail manual requires the use of standard drawings and project design elements that are specifically developed to meet the railroad's requirements. These include the following:

- Detailed geographic and typographic information;
- Typical roadway geometry;
- Location of all utility poles and lines;
- Top-of-rail profiles for approximately 1,000 feet in each direction of highway intersection;
- Drainage features and calculations to ensure no increase in discharge into railroad drainage systems;
- Assurance that any demolition will occur in accordance with railroad specifications;
- Casing adequate to prevent cave-in will be used around drilled shafts that are subject to railroad surcharge;
- All minimal clearances required by the railroad are met for vertical and horizontal clearances;
- At least one additional track is accommodated in the design;
- All construction activities will remain at least 21 feet above the rail and 12 feet horizontally from it;
- The contractor will submit plans for erosion and sediment control to be approved by the railroad;
- Erection over the right-of-way will not cause disruption to railroad operations and construction windows will be provided by the railroad;
- Contractors must remain outside 50 feet of the track center when trains pass;
- All permanent clearances will be verified before final project closeout;
- A clear description of all work done by Texas DOT and railroad employees will be provided;
- All railroad equipment and utilities that may need adjustment will be delineated;
- Boring data will be provided;
- The summary, description, and sequence of work will be described; and
- All temporary crossings will be detailed.

The Texas DOT has standard drawings and plan notes for typical railroad items, unique to each railroad. For instance, the standard plan sheet for a bridge to be constructed on UP right-of-way refers to the specific UP standards that must be met. These standard drawings and notes are provided uniformly to accommodate the known requirements of this specific railroad. "Coordinate with UPRR while performing the work outlined in this Contract, and afford the same cooperation with UPRR as with TxDOT," says the standard plan note.

"Arrange and conduct the safe operation of the tracks and property of UPRR and traffic moving on such tracks, or the wires, signals and other property of the UPRR, its tenants and licensees, at or in the vicinity of the work," the standard note advises the contractor. "The Contractor is responsible for train delay costs and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities."

The standard provisions for a UP bridge project include another 91 separate paragraphs of instructions, all intended to ensure that Texas DOT bridge projects are predicated on the railroad's unique requirements. These provisions address the key railroad requirements discussed earlier, including issues such as safe conduct of construction activities; lack of interference to train operations; adequate insurance; railroad control over flagging and inspection; safe shoring to not harm tracks; and the exclusion of people, equipment, and materials from the minimum construction clearance envelope.

The Texas DOT advises its project managers to expect review times of between 2 months and 6 months for simple projects and up to two years for complex ones.

Illinois DOT Master Agreement

The Illinois DOT is one of several state departments that have developed master agreements for highway improvements involving the railroads. This overarching agreement includes the major considerations required by both the railroad and the department of transportation. As individual projects arise, they are amended to the master agreement to save time. Among the major items included in the master agreement are the following:

- As with a partnering agreement, the master agreement notes that both parties desire to cooperate for the mutual benefit of themselves and their customers.
- They agree to process a separate, descriptive addendum for each individual project.

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- For the projects amended to the agreement, the railroad will provide a right-of-entry and temporary construction easement.
- The railroad agrees to provide comments and approvals to submitted plans and provisions within 90 days of receipt by the agency.
- The state will not allow contractors to work until railroad approval is received.
- Both parties agree not to change approved plans without the consent of the other.
- The railroad will be notified when contracts are awarded.
- Preconstruction meetings will be held between the state, the railroad, and the contractor. At these meetings a schedule will be agreed to and necessary work by all parties will be coordinated.
- The state will inspect the work to ensure that the contractor meets the provisions of the agreement.
- The contractor will give 30 days' notice of needing flagging services and will give 5 days' notice of cancellation.
- The railroad will provide flagging, at state expense.
- The state and railroad agree that Railroad Protective Liability Insurance of $5 million per instance and up to $10 million aggregate will be provided at state expense.
- The state will cover the railroad's costs for construction inspection, preliminary engineering, and force account work.
- The addendum will serve as a right-of-entry agreement.
- Twenty-three feet of vertical clearance and 12 feet of lateral clearance will be provided at all times.
- The safety and continuity of rail traffic will be protected at all times. Contractor plans will be approved by the railroad, but the contractor retains liability for his acts.
- A separate Special Provisions and Insurance Requirements is included that addresses standard items, such as the following:
  - The authority of railroad engineering over all operations.
  - The contractor will not interfere with any railroad operations without written approvals.
  - The contractor will provide notice before commencing work.
  - The contractor will abide by all access and crossing provisions.
  - The contractor will cooperate with the railroad to anticipate the railroad's force account scheduling.
  - The contractor cannot charge the railroad for any delays to his project on account of CSX force account delays.
  - The contractor will abide by all railroad construction provisions.
  - Blasting will be approved by the railroad.
  - All ditches and drainage will be protected.
  - The railroad has sole authority over flagging, and the costs will be covered by the agency or contractor.

Simplified Billing and Auditing

A recurring point of contention between some highway agencies and the railroads was billing and auditing of reimbursable costs. Some state officials complained of receiving bills for meals, travel, flagging, and engineering expenses that occurred in other states. Prompt explanations were not forthcoming and they complained of protracted efforts to secure justification. Because the states are strictly audited and criticized for paying unjustified expenses, the state officials were reluctant to pay such bills without formal documentation. One state official said it was common for such bills to be turned over to a state agency that settles billing disputes, which took considerable staff time and caused considerable billing delay for both the highway agency and the railroad. It also led to distrust and suspicion of the overall railroad coordination process, he said. At least one of the Class I railroads complained of considerable ambiguity regarding which costs were eligible and which were not. They noted that they had staff from multiple states working on projects, therefore costs for staff, engineering, and travel outside of the state in which a project was located may be needed.

It appeared clear that a chance for process improvement lies in further simplification and standardization of billing. Some examples of simplified processes are the following:

- Discussed below is an Iowa innovation to pay for standard track improvements on a lineal foot basis for typical projects, such as crossing resurfacings.
- Amtrak said it is negotiating with Massachusetts officials to directly enter bills and their explanation into the state's billing system, saving both parties the administrative cost of handling paperwork.
- Several states pay fixed per-unit prices for components in typical safety-upgrade projects.

Summation of State Practices

It is clear that many states have gone to great lengths to anticipate the railroads' requirements, to incorporate those requirements into standard agency practices, and to attempt to make the project agreement process routine and predictable for the railroads. It also is clear from the railroads' approval of many of these standard processes, that the railroads have routinely agreed to practices intended to streamline the approval process. It is clear also, however, that problems still routinely develop between the entities. These problems lead to disputes over the cost of railroad services, to changes in proposed project plans and to delays in project schedules.

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Selected Case Studies of Best Practices

Four states were examined in greater depth to illustrate the types of strategies used to improve the project agreement process. The four were selected to illustrate different aspects of the agreement process. Some of the strategies cited relate to routine projects, such as the resurfacing of crossings. Other strategies are used to expedite complex grade-separation and corridor-improvement projects. These strategies are not unique to these agencies, but they serve to illustrate the types of innovative practices that have been deployed around the country.

Iowa DOT Best Practices

Iowa DOT has partnered with the railroads, cities, and counties to systematically streamline the process to resurface at-grade railroad crossings. The Iowa process has been continually refined since its initiation in 1976, so that today it expedites all major phases of a typical crossing project.

The Grade Crossing Surface Repair Program began in 1976 with $600,000 annually, with one-third participation each from the state, railroads, and local governments. The funding increased to $900,000 and the participation changed to 60/20/20 in 1983. This program funds at-grade railroad crossing resurfacings on a first-come, first-served basis. In 1998 the Crossing Committee was established with representation from the Iowa DOT, railroads, highway authorities, and Wisconsin DOT.

The primary objective of the committee is to increase the life and rideability of all crossings and to develop recommended maintenance practices for the crossings.

Streamlined Project Selection

The Iowa DOT has addressed the delays that some states have experienced in selecting and scheduling the rebuilding of at-grade crossings by streamlining the project-selection process. All state and local crossing projects submitted by cities and counties are prioritized by the Iowa DOT Rail office staff. Assessments of the condition of the crossings obtained annually from the DOT field staff and from the railroads are used in the evaluation and scoring of projects. Prioritization of projects is based on 19 factors that include number of daily trains, rideability, fouled ballast, drainage pattern, rail stability, average daily traffic, number and percentage of truck traffic, speed limit, surface stability, elevation differential, cross section, surface deterioration, tie condition, approach profile, and header area.

On a first-come, first-served basis, projects are reviewed, scored, and selected. In the past, projects were selected and scheduled on a four-year cycle. Since the condition of the crossing could change significantly in four years, the project selection cycle was changed in 2008 to a two-year cycle. This change was made to keep the safety analysis as close to real-time as possible while providing the railroads and the local highway agencies time to plan for funding. It also keeps the option to advance a project if another falls out of the program.

The goal of the Iowa DOT is to reconstruct all at-grade railroad crossings and then follow up with effective maintenance. Each reconstructed crossing is expected to last between 10 to 15 years. The life of the crossing varies depending on the volume and type of traffic. The DOT field office does basic maintenance work on a yearly basis.

Established Standards and Process for Projects: Use of Best Practices

The Iowa DOT has successfully avoided agreement delays by developing with the railroad companies common standards for at-grade crossing projects. Technical aspects for the common standards are based on UP/BNSF drawings of proper subbase depth, compaction, and specifications for track panel and surface material and DOT standards for all roadwork. The agency selected best practices after conducting extensive field trips and reviews of standards, materials, processes, and practices used by other state transportation agencies. The Iowa DOT then brought together best practices in funding, staffing, equipment, material specifications, and streamlined processes for rebuilding crossings. The sequence of steps involved in the rebuilding of the crossings is "cookie cutter," and serves as a template that is used repeatedly on rebuilding all at-grade crossings.

Preconstruction Meeting

Preconstruction meetings are held 2 to 3 weeks before the estimated start of construction. The meetings bring together representatives of the state, highway authority (city/county officials), railroads, businesses, school districts, and local emergency services. Besides providing the opportunity to discuss and finalize project details, these sessions also serve as a forum to communicate with the community and surrounding businesses about road closures and detour routes. The preconstruction meetings help all parties working on the project to have a clear understanding of roles, responsibilities, and schedules while improving community relations.

Partnership with Well-Defined Roles and Responsibilities

The Iowa DOT and the railroad each brings its equipment and crews to the project site. The roles and responsibilities

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and sequence of steps are well-defined and both sides work collaboratively to complete the project on schedule. Generally, each project takes 5 days to complete.

The Iowa DOT attributes the success of the program to the collaboration between the agency and the railroads during the project and beyond it. Both sides combine their skills and expertise effectively to deliver the project.

The DOT Design and Materials Offices bring their equipment and expertise and the railroads bring their expertise and standards for track structure. Beyond the rebuilding of the crossing, the DOT field offices monitor crossings for maintenance needs and take action as necessary (milling, oiling, sealing) and alert the railroads when they see any loose panels or structures that need attention.

Simple Agreement and Lump Sum Payment

A simple agreement is drawn up indicating that the agency will reimburse the railroads for material costs only, at the rate of $400 per lineal foot. This eliminates issues between the railroads and the DOTs on billing, tracking of actual costs, and requirements related to audits. The agreement indicates the total dollar amount based on total lineal feet of surface material and the number of inches the track will be elevated above the existing roadway. Payment is made by the agency within 30 days after receiving the billing. All costs associated with relocation or repair of existing signals, signal wires, and switches are covered by the railroads. This approach also reduces the amount of administrative work required from the railroads.

A streamlined project selection process and an estimated project start date, coupled with a simple agreement and payment process allows the DOT and the railroads to plan and assign resources to projects with minimal time spent on negotiations.

Annual Meeting

Relationship building and open communication were cited repeatedly in interviews and in the survey as reasons for the success of projects.

At the conclusion of the construction season each year, Iowa DOT holds meetings with each railroad. At this meeting various levels of management from the DOT and the railroads provide an overview of surface repair projects, signal projects, and all completed and future rail projects, as well as issues related to billing and insurance. This serves as a session to share information with others in the organization not actively involved with the crossing projects. The DOT also finds these sessions useful in reinforcing goals, roles, responsibilities, and expectations of both sides.

Standard Agreements

The Iowa DOT has a simple, two-page standard agreement between the agency and the railroad for rebuilding at-grade crossings. The agreement provides a space for the total amount to be reimbursed based on total lineal feet at $400 per lineal foot. An Exhibit A that shows the lineal foot of surface material for reimbursement purposes is attached to each agreement. The only change from project to project is the Exhibit A and the respective total amounts to be reimbursed per project.

The well-established Iowa process also eliminates the need for general liability and Railroad Protective Liability Insurance. All the work is done by the DOT staff and railroad personnel, so both are covered by their own self-insured coverage.

Florida DOT Best Practices

Florida DOT officials say they have a productive and efficient relationship with their railroads because they have implemented several best practices that serve their agency and the railroads well. The Florida DOT takes an approach that recognizes the needs of the railroads to protect their rights-of-way, to protect their operations during construction, and to cover their costs for project reviews, say Florida DOT representatives Fred Wise, state rail manager, and Gary Fitzpatrick, administrator of rail operations.

Partnering Meetings

The Florida DOT central office staff meets annually with CSX, which is by far the largest operator in the state. At the meeting, they discuss policies, pending legislation, and changes in business operations that could affect how the DOT and the railroads cooperate on agreements.

In addition, all district rail administrators and coordinators meet annually with railroads as a group to discuss issues associated with project delivery, maintenance involving railroads, and improvement projects. Before the meeting, they solicit agenda topics from districts and the central office. The central office staff say the meeting is an opportunity for training, coordination, and exchange of best practices between districts and the railroad staff.

Quality Assurance Reviews

A strategy that appears to be unique to the Florida DOT is the conduct of quality assurance reviews. Every two years, each district's railroad coordination process is reviewed by the central office staff to ensure it complies with the department's policies and procedures. The review helps spread best practices, identify new innovations, and ensure that the DOT maintains a

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consistently productive relationship with the railroads. Any innovations found are shared, and any shortcomings are documented for correction.

Master Agreements

Another strategy used by the Florida DOT is to have a standardized master agreement for each project and then to use a one-page letter modification for individual approvals. Routine approvals such as the authorization of reviews can be handled with a simplified one-page form, saving the central office, the districts, and the railroads considerable time. For each new project, a new agreement is signed, but the agreements are based on routine language that the railroads and the DOT have used many times before. Throughout the course of the project, each activity can be kept on track with the one-page approval that can be issued in a day. The DOT reports that the frustrations of waiting for approvals have been largely eliminated. The authority to issue the one-page approvals has been devolved to the district project personnel, but with oversight from the central office.

Liability Insurance

While other states said disputes periodically have arisen with the railroads over liability limits, the Florida DOT has standardized the approach, which the DOT officials say has addressed past problems. They note that in past years when the railroads would try to raise liability limits above statutory minimums, the DOT would resist and a delay would occur. Now, they have a letter of agreement that can be used in cases where the railroad believes a specific location has increased risk and warrants increased liability coverage. The DOT does not accept, and railroads do not request, increased liability limits at all locations. Instead, both parties have agreed to be judicious about the higher limits and the state now agrees to the higher limits when the railroad letter of agreement provides a valid justification.

Collaborative Attitude

The Florida DOT does not experience the frustration that other agencies report having with the railroads, according to Wise and Fitzpatrick. They describe their relationship with the railroads as "mature" and "excellent," the result of their understanding and appreciation for the railroads' perspective.

Although the Florida DOT's various processes have served to simplify the project review process, its railroad coordination staff say the most important component to their good relationship is a sense of collaboration. They say they try to understand the railroads' perspectives and to compromise with the railroads whenever possible. They say their attitude of collaboration is reciprocated by the railroads.

Pennsylvania DOT Best Practices

Pennsylvania DOT (PennDOT) personnel attributed constant and open communication as an important reason for successful projects. PennDOT has an office that acts as the liaison between the agency and the railroads. According to Elizabeth Bonini, a PennDOT official and a member of the advisory panel for this project, building relationships has fostered an environment of trust. She said that her office has been able to contact railroad officials at all hours because of the relationship that was built over many years of meetings and discussions. She went on to explain that in no way does this mean that both parties agree with each other on every topic or on the approach to resolve every issue, but it has created an environment where both sides can discuss openly, call each other and express their point of view, brainstorm, and arrive at possible acceptable solutions.

Annual Meetings

PennDOT conducts an annual meeting with each railroad. The purpose of the annual meeting is to exchange information between PennDOT and the Class I railroads to meet common expectations. These meetings bring together people from different areas of the agency and the railroads whose understanding of project status, issues, regulations, and processes influence the schedule and delivery of projects. These meetings enable people to have face-to-face discussions. They also enable the agency and the railroads to clarify roles, responsibilities, and expectations. Attorneys from the railroads get to meet attorneys from the Office of Chief Counsel. PennDOT's district and central office staff meet representatives at various levels from the railroads' public works sections. The agency also invites representatives from the Public Utility Commission, Federal Highway Administration, and the Bureau of Rail Freight for these annual meetings.

PennDOT's Bonini and Jack Hubbard, grade crossing engineer, say that the agency's central office also meets with each district and the railroads in separate smaller, project-specific meetings throughout the year as necessary.

These meetings helped achieve the following goals.

Discuss Issues with 2008 and 2009 Projects

The team discusses issues with all ongoing projects and any delays and issues on future projects. This includes flagging, grade crossing closure plans, vertical and horizontal bridge clearance requirements, temporary right-of-way, and insurance and indemnification.

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The agency briefly discusses changes in any of its practices and obtains feedback from the railroads. The agency also discusses billing and invoicing issues and both sides brainstorm on ways to resolve them.

At the 2008 annual meeting with CSX, PennDOT reviewed its right-of-way clearance process and time requirements and obtained feedback from CSX. They discussed priority crossings that both CSX and the agency would like closed and the incentives that can be used. The agency also discussed billing issues and invoices, including ways to speed up CSX's process to review and sign railroad reimbursement agreements.

The agency staff provided an update on ongoing projects and projects scheduled for the next year. Information sharing about ongoing projects helps attendees not involved in a project on a day-to-day basis to get an overview. The information about future projects helps the districts and the agency resolve resource conflicts and schedule meetings early in the process.

Clarify Communication Points of Contact

In interviews and in the survey conducted by the project team, agencies mentioned that a significant amount of time was wasted in redirecting or finding documents sent to the wrong office or the incorrect person at the railroads. Railroads say that sometimes railroad personnel not connected to roadway projects have received repeated phone calls and requests for information from agency staff. Agencies mentioned issues and delays arising from disconnect as a result of different people in the agency calling the railroads about different aspects of the same project. By clarifying the communication points of contact, the agency minimizes such issues.

Legal Issues

A railroad attorney noted that his staff reviews state agreements on a first-in basis because they have received no order of priority from the agency. Even if a later document requires only minimal review, it will wait in order because the agency has indicated no order of priority for reviews. By having the legal officials from the state and the railroads at the annual meeting and by setting aside time to discuss legal issues, several issues such as the above, are resolved quickly. Additionally, both sides get to know each other. This has enabled the state legal team to call the railroad attorney and vice versa to expedite document review. Clarifications are also simplified when both sides can call and talk with each other. This practice reduced the time to get the necessary legal reviews and approvals to start projects.

Reimbursements

The attendees discuss reimbursements and resolve pending issues. The state also discusses changes or expected changes in billing, funding, and reimbursement that may affect any ongoing or future project with the railroads.

The state also provides an overview of its billing process. It reminds the railroads that when projects approach the 75% agreement amount, the railroad needs to evaluate the budget. If additional funding beyond the approved amount will be required, the railroad needs to inform the agency.

This practice allows the agency to review the current status of project funding and, if increases are required and appropriate, to approve them. Such proactive processes ensure that the project stays on track and work is not delayed, while continuing to enhance the relationship between the agency and the railroads.

Update of Major State Initiatives

The railroads provide an update of all major railroad initiatives across the nation. The update provides perspective to all attendees about impacts to state projects and the work being done by the railroads in other states. This helps common understanding and clarifies expectations. It also provides information for resource planning.

Discussion on Best Practices

Having experts from various areas and different levels of the railroad and the agency at the meeting provides an opportunity to share best practices in use in other states and railroads. The agency staff can share practices they found useful in working with other railroads, and the railroads can share practices and processes that they found helpful in working with other state or local agencies or within PennDOT.

At the 2008 annual meeting, CSX shared a practice used by one of the PennDOT districts that starts the process for obtaining the utility commission's order for advertising early in the process. This practice helped expedite the overall project.

Another practice discussed was that some districts provided preliminary engineering agreements before receiving the Public Utility Commission agreement while others did not, causing project delays. The discussion highlighted some inconsistencies in practices across districts that led to project delays. By sharing and discussing information about the practice, other districts got to know about the efficiencies and agreed to adopt the practice.

Grade Crossing Electronic Document Management System

PennDOT has deployed a Grade Crossing Electronic Document Management System (GCEDMS) that has streamlined various operations within the agency. Besides helping PennDOT manage all its grade crossing projects within the

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agency, the software helps the railroads working on agency projects. Jack Hubbard, PennDOT grade crossing engineer, says GCEDMS will help the railroads as they work on projects with PennDOT. Some of the benefits are the following:

- **Virtual visit to project site.** The railroads can view up-to-date photographs with location maps of public highway–rail crossings, along with all the FRA crossing inventory information.
- **Access to the latest project information and documentation.** If the railroad is involved with a specific highway–rail safety project or highway–bridge project involving a railroad facility, it will be able to view most of the information and documentation stored within the system about that project.
- **Project monitoring.** The railroad can monitor the progress of projects in which they are involved from initial development and design through construction and closeout.
- **Quick access to additional resources.** The application provides links to various key resources almost serving as a single one-stop shop for relevant information. This includes key links to other agency websites (for example, FRA, FHWA, MUTCD, PennDOT, and PUC).
- **Future single source of all inventory information.** Proposed major enhancements to the system include allowing the railroads to update their FRA railroad inventory information within the system along with its GIS mapping. Potential enhancements are expected where PennDOT's information will synchronize with FRA when it is updated. Simplistically, this will mean that updating GCEDMS will translate to updating FRA systems and that users of GCEDMS will have the latest FRA updated information. Currently, state and federal systems are not integrated in any way, and in the majority of cases, the data in each of these systems are different, thus making it challenging for users to work with them. This enhancement will be of great benefit to railroad personnel, who will in the future be able to access the updated information through GCEDMS.

Most software deployments are preceded by business process streamlining and improvements, as was the case with the deployment of GCEDMS in PennDOT. The use of the software will help railroads and the agency to have a common understanding about projects and also manage projects more efficiently.

Washington State DOT Best Practices

The Washington State Department of Transportation (WSDOT) is considered to be one of the transportation agencies with good business practices and success in working with the railroads. The agency has made improvements to business processes that led to better coordination and communication, both within the agency and with the railroads. According to Ahmer Nizam, a project advisory panel member and WSDOT headquarters railroad liaison, open communications, understanding each other's perspective, and the business goals of both organizations enable both sides to work toward acceptable solutions.

WSDOT understands and accounts for the fact that BNSF's business goals and customer obligations prohibit track work in the fourth quarter of the year. The agency also knows that there is increasing demand for rail transportation and that the railroads are making more capital improvements. Consequently, the railroads have a policy to preserve capacity within the rail corridors, and the agency understands that it must consider this policy when working on expansion of existing structures or building new roads around railroads. WSDOT is currently rebuilding and repairing a larger number of older structures and roads. It also is expanding the highway network. Therefore, an unprecedented number of state highway projects are impacting railroad operations. Class I railroads in Washington provide specific design standards for highway improvements around railroads, and WSDOT advises its project offices to incorporate these standards to the extent possible early in design phases.

WSDOT understands that there will be many issues and differences with respect to acceptable legal language, design, and other requirements, and that there will be many areas of disagreement on both sides; but continuing to work through the differences toward resolution has been the focus of the agency.

Nizam notes that streamlining the railroad processes for engineering and legal review and establishing a mechanism where the railroad reviewer is prompted to contact the WSDOT if there are questions or concerns regarding a submittal will go a long way to expedite project work between the railroad and the agency.

The agency has several best practices that have helped keep agency projects on track and could be adopted by other state transportation agencies, with minor changes.

Centralized Railroad Coordination Within the Agency

WSDOT has centralized all coordination on highway projects with the railroads for about 30 years. WSDOT has seven regions, all working on different projects that involve the railroads. Without centralized coordination each region would be communicating with the railroads, trying to get their projects the highest priority. This not only could cause scheduling challenges but also would waste time and resources. In such a scenario, the railroads would have to deal with the task of prioritizing agency projects.

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Centralized coordination allows the agency to prioritize projects according to agency goals. It also ensures that there is consistency in negotiations, policies, design, agreements, and all aspects of work on agency projects involving railroads. This consistency significantly reduces the time taken on individual tasks.

Centralized coordination has helped the agency by providing consistency in agreements and design across railroad projects. There is more efficient use of personnel and engineering expertise across projects when there is consistency in design and agreements. The regions communicate with the central project office on all railroad projects. The steps involved in project planning, development, and design are uniform across all regions. The regions provide updates on project status and have to notify the central coordination office of all future projects at least one year ahead of time. This formal and consistent process across regions also helps the central coordination office prioritize and plan projects in a timely manner.

Internal Partnering

Another best practice in WSDOT is the internal partnering that exists within the agency on all highway projects. According to WSDOT personnel, the agency approaches the railroad as a single agency rather than as separate divisions. All the initial coordination between the agency and the railroad for highway projects is done by the central railroad coordination office. As the project matures, the central office person is virtually integrated with the regional team on coordinating between the agency and the railroad.

Nizam says that this virtual integration ensures continuity of communication and coordination on the project and is one of the reasons for successful projects. The partnering of communication and coordination with the technical aspects of the project is vital to keeping the project on track. In WSDOT there is no time lost handing off tasks from one office of the agency to another.

The central office real estate services negotiate property management (easement and right-of-way) with the Class I railroads, while the region coordinates with short lines on right-of-way issues. The regional utility engineer provides the coordination required on utility aspects of the projects, except for megaprojects where the region dedicates a full-time utility coordinator to manage the complexity and volume of utility design/coordination required in such large projects. All detailed engineering work is coordinated and supervised by the region itself.

This transparent partnering brings together the best of coordination, communication, technical and design expertise, and project management, achieving project goals while accomplishing the overall agency goals.

Annual Design and Construction Conferences

WSDOT has an annual design and construction conference where central office and region staffs meet. At this meeting the teams discuss projects and address issues on all WSDOT projects. They discuss the challenges encountered and share information about how the challenges were resolved and the lessons learned. All aspects of any railroad project that needs special attention is also discussed at this meeting.

The meeting is an information-gathering and information-sharing opportunity for all WSDOT personnel. Agency personnel who attend other national conferences share information about best practices from other states that may impact WSDOT. In 2007, information shared included changes to land use planning adjacent to railways, risk analysis methodologies, federal initiatives, and information on specific engineering treatment and case studies. The annual conference is another forum for participants to provide updates on evolving engineering practices, trends, and policy initiatives at the federal level that may have an impact or be useful to WSDOT.

Full-Time Railroad Person Dedicated to WSDOT Projects

Most Class I railroads have a public projects manager (PPM) who is responsible for coordinating work between the state and local agencies and the railroads. These project managers often are responsible for large territories covering many states. During interviews, state agency personnel identified the busy schedules of the public projects managers as one of the reasons for the long turnaround time on reviews. This also was attributed to causing delays in scheduling meetings with railroad engineers and attorneys. The agency personnel said that it sometimes takes several months for a PPM to respond to a simple question and the delay may cost the agency more than the cost of funding a PPM position.

The Class I railroads explain that they operate as a business where each section/division has to be independently profitable. The railroads understand that sometimes review backlogs delay highway agencies. However, the uncertainty of future workloads constrains the expansion of public project staffs.

WSDOT has addressed the issue by funding a position at BNSF dedicated to agency projects. This dedicated railroad person is responsible for expediting and coordinating reviews and scheduling face-to-face or phone meetings between the railroad and WSDOT to help expedite reviews and approvals of new agreements. This person does the necessary liaison work for the railroad attorneys, clarifies questions, compares new agreements with older agreements, and makes sure that the railroads' interests are not compromised. The person also schedules regular monthly meetings and more frequent meetings if necessary to follow up on all railroad-related action items to keep projects on track.

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Though paying for a PPM may not be feasible for every state DOT, one option would be for adjacent states working with the same railroads to collaborate and fund a position. This can reduce, if not eliminate, the delays and long turnaround times. It may also provide an opportunity for states to have time-saving similarity in negotiations, designs, and agreements on projects. As adjacent states join together to fund a PPM position with a railroad, they could establish close relationships and open channels of communication and share information on successful practices and lessons learned.

Clear Definition and Formal Documentation of Roles

WSDOT has formalized and documented in detail the roles and responsibilities of all agency personnel working with the railroads. The agency understands that negotiations with the railroad can take significant time and effort. The agency believes that clarity in roles and responsibilities help both WSDOT headquarters and regions pay the necessary attention to the projects and start work on negotiations and agreements in a timely manner.

The agency's manuals list the responsibilities and the processes to be followed within the agency and with the railroads. All major tasks, along with roles, responsibilities, and processes to expedite work, where applicable, are detailed in the manuals. For example, the design manual details the circumstances that will require a Washington Utilities and Transportation Commission (WUTC) petition and the related roles and responsibilities of the region and the headquarters. Details within the agency's manuals include who is responsible for performing the construction administration of agreements, construction railroad coordination, railroad billing and communication with road masters. It also details steps to expedite various reviews and approvals for different types of projects including grade separation, railroad–highway grade crossing and temporary railroad crossing.

This detailed documentation ensures that agency personnel working on projects know how and when to act on tasks to ensure successful and timely completion of projects. The clarity of roles and responsibilities also helps the agency units coordinate with each other and with the railroads on projects.

WSDOT-BNSF Agreement Process

WSDOT and BNSF have agreed to a process for review and approval of all new agreements (Figure 3.1). The process defines the activities and steps beginning with the identification of the need for a construction and maintenance agreement to obtaining approval and signature on the agreement. It also shows the expected time for each activity.

The agency attributes this formal process for reducing the time to process agreements from several years to 31 weeks.

Formal Escalation Process with BNSF

WSDOT has a formal escalation process to address issues between the Environmental and Engineering Programs Division and BNSF.

- Level 1: The agency headquarters railroad liaison works with the BNSF public projects manager to resolve all issues that come up between the agency and BNSF. In the event that an issue does not get resolved, the agency headquarters liaison can resort to a formal defined escalation procedure that moves to the next level in the escalation process.
- Level 2: If any issue cannot be resolved in the first 21 days after the first draft is offered (or requested), then it can be escalated to the assistant director of public projects in BNSF and the state design engineer in WSDOT.
- Level 3: If after 14 days of escalation to Level 2, the issue still remains unresolved, then either party can escalate the issue to the director of environmental engineering programs in WSDOT and, in BNSF, to the general director of commuter construction if the issue is engineering related and the director of public projects for all nonengineering-related issues.
- Level 4: If 10 days after escalating the issue to Level 3 the issue still remains unresolved, then the issue will be escalated to the assistant vice president of engineering in BNSF and the assistant secretary of transportation in WSDOT.

Because of the processes, practices, and frequent and open communication that occurs between the agency headquarters liaison and the dedicated BNSF project works manager, only 10% of issues escalated beyond Level 1 from 2005 to 2008.

Seventy-five percent of WSDOT railroad projects are with BNSF; the remaining 25% is split between UP and 15 shortline railroads. The agency is considering a similar escalation procedure with UP in the future.

Agency Culture and "Desired State"

Although most highway agencies are parts of larger state departments of transportation, most such agencies are primarily focused on highway construction and maintenance. Few of them have formal authority to build or operate railways, therefore there is little institutional knowledge of how railroads operate. This lack of institutional knowledge underlies the need for highway agencies to develop additional standards and guidelines to ensure their projects do not conflict with the railroads.

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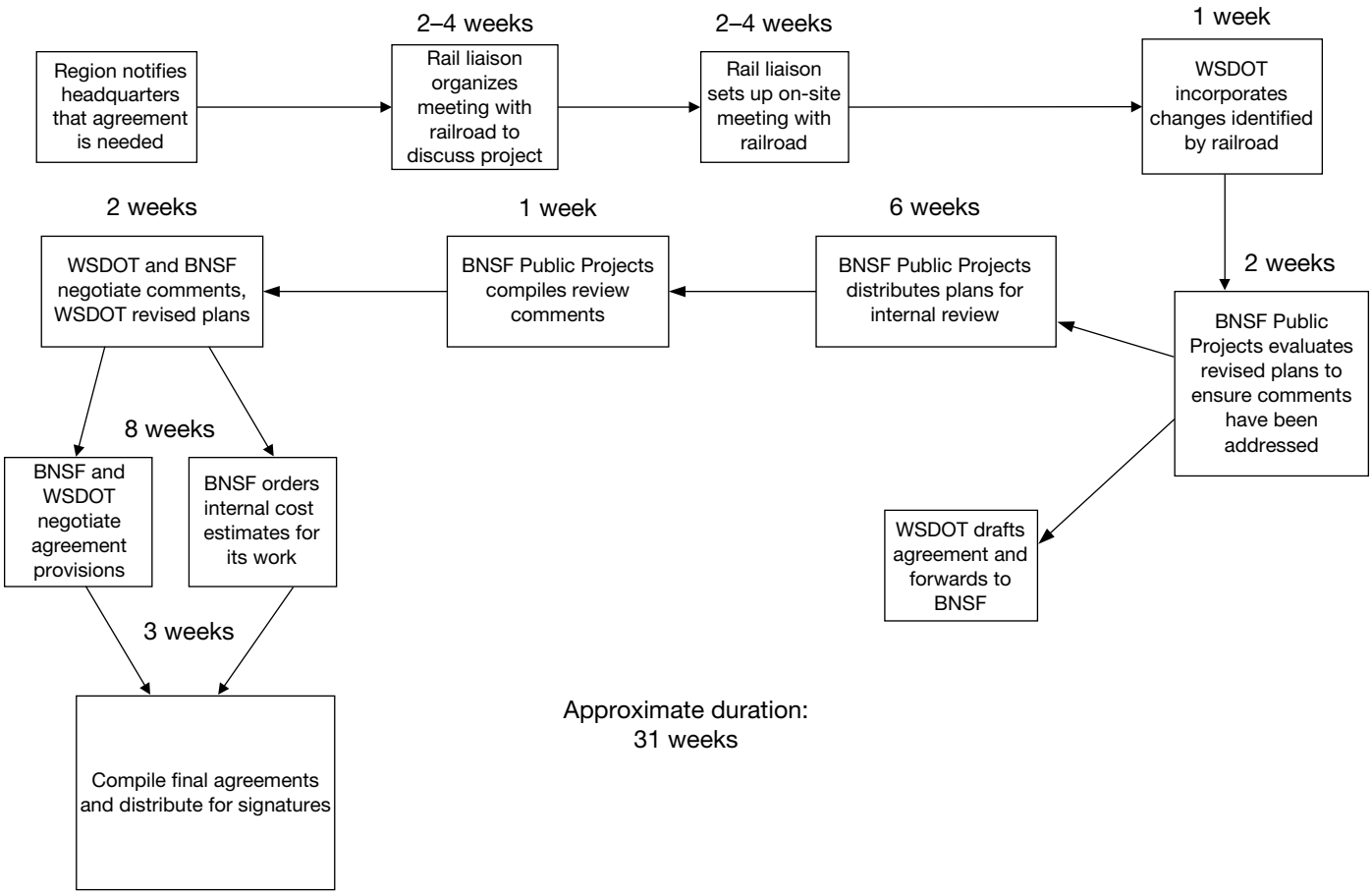

Figure 3.1. WSDOT-BNSF agreement process.

The state highway agency officials who process railroad agreements seldom are located near the top of their agencies' organizational charts. Normally, these personnel are housed within divisions of design, preliminary development, or utilities.

The highway agencies are seriously underfunded. Increasing project costs in order to satisfy the railroads' needs provides little direct benefit to the highway agency. Although the highway agencies understand that over the long term the shift of freight from highway to rail may well alleviate highway maintenance expenses, those benefits generally are deferred into the future and are difficult to measure.

As public agencies, highway agencies are accustomed to not charging communities or other agencies for their expertise. Seldom do DOTs charge utilities, railroads, communities, counties, or other local governments when those entities seek advice or consultation from the highway agency. As a result, the highway agency personnel may be unaccustomed to the railroads insisting that the highway agency pay for the cost of meetings, reviews, and comments.

Highway engineers are focused on the benefits of the projects they produce, but they are not exposed to any detriment that their projects may cause the railroads. The railroads' internal delays and costs are not public information, as is congestion on highways; therefore, the negative effects of highway projects on railroads are largely undocumented. The highway engineer who faces additional costs and delay as a result of railroad requests may see the railroad's request as arbitrary and unreasonable. Also, the highway engineer receives no promotions, praise, or budget increases for satisfying railroads. They may be rewarded, however, for keeping project costs down and delivering projects on time.

The self-interest of highway agency officials to receive prompt reviews has led many of them to adopt updated practices to ensure that railroads more quickly approve project agreements. The history of most of these practices has been rooted in efforts to improve project delivery. As public pressures for accountability have increased, agencies are increasingly focused on timely and predictable project delivery. As efforts to increase reliability have grown, the attention placed on the approvals needed by outside agencies such as environmental agencies and railroads have increased accordingly.

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The "desired state" for most highway agencies in regard to railroad project agreements could be summarized in the following considerations:

- **Timeliness.** Exasperated pleas for timely reviews, timely responses, timely meetings, and timely decisions are the most common requests from highway agencies consulted for this study. In their desired state, firm and predictable time frames would exist for when they could expect responses on requests, reviews, and agreements.
- **Reliability.** Consistent information is desired about what railroads want in terms of right-of-way widths, construction windows, vertical and lateral clearances, and other such basic design and construction detail. The railroads have produced a substantial number of standard drawings, which are consistently used. However, the differences in terrain, elevation, curvature, geometry, and available rights-of-way create the need for exceptions to the standard drawings. Knowing promptly and consistently what the long-term track and right-of-way needs of railroads are at specific project locations is frequently cited as a highly desired outcome.
- **Reasonable insurance limits.** Railroads have increased their insurance requirements above the federal minimum levels. The current federal levels include $2 million for general liability and $6 million for Railroad Protective Liability Insurance. However, highway agencies report frequent insistence of insurance for $25 million or more for projects in urbanized areas. Such limits can be allowed under federal rules with justification. Consistent, reasonable justification for high levels has often been requested by the highway agencies, as well as flexibility for lesser amounts for minor projects.
- **Predictable force account timelines.** Railroad forces are generally required by union contract to perform any work needed on the railroad right-of-way as a result of changes caused by a highway project. Highway agencies have complained about contractor delay if the railroad is not prompt and reliable. The agencies desire assurances as to force account time frames.
- **Availability.** Having a reliable and empowered point of contact who can provide dependable information—particularly early in the design process—has been repeatedly cited by highway agencies as a highly desired condition.
- **Collaboration on simple at-grade crossing rehabilitation projects.** Having a simple "cookie-cutter" approach to rehabilitating at-grade crossings—with simple standard agreements and schedules—has been cited as a desirable practice.
- **Reasonable right-of-way pricing.** Having reasonable negotiated costs for rights-of-way is sought. This may include faster mediation and an improved process for appraising values.

Areas for Improvement

The best practices ranked by the highway agencies and railroads obviously provide opportunities for improvement in the highway–railroad project agreement process. Any agency that has not adopted a full array of the best practices is likely to improve its agreement process by doing so.

Although the cited best practices are proven tactics, they do not completely make up a strategic and methodical approach to the agreement process. The adoption of process-improvement models has been become standard in many professional fields and can be drawn on for improving the highway–railroad agreement process as well. Four common frameworks for process-improvement are summarized below. The intent is to illustrate that many disciplines have elevated process-improvement to a systematic framework that continuously improves the process outcome. Drawing on these frameworks provides models that could be adopted or modified for the railroad–highway agreement processes.

Project Management Institute

The ongoing development of highway and railroad project agreements bears attributes to the disciplines of project management and process management. Project management has been defined as "the application of knowledge, skills, tools and techniques to project activities to meet project requirements" (*22*). Projects have been defined as temporary undertakings that result in a distinct product. The ongoing management of collections of projects has been defined as program or portfolio management (*22*). Project and program management have developed their own professional standards of conduct, best practices, and even ethical behavior. Professional study and training in project and program management can be obtained from the Project Management Institute, through various professional organizations, and trade associations. The collective body of knowledge acquired by these groups provides analogous lessons that the highway agencies can apply to their interactions with the railroads. The Project Management Institute categorizes sound project and program management as requiring the following general skills:

- Knowledge of basic project management tools, such as critical path scheduling;
- Subject matter expertise in the specialty area, such as railroad operations;
- Understanding of the project environment, such as the attitudes within highway agencies and railroads;
- General management skills; and
- Interpersonal and communication skills.

Although volumes of materials are produced on sound project and program management, several of the key strategies from

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those disciplines are particularly relevant to the highway–railroad agreement process. These include the following:

- Clearly identifying stakeholders in the approval process and identifying what their requirements are;
- Clearly identifying cost, scope, and schedule for all deliverables and sharing them with the stakeholders;
- Monitoring performance of the schedules and deliverables;
- Creating analysis or feedback processes so that stakeholders examine underlying causes for not meeting standards of scope, cost, and schedule; and
- Adopting a "continuous improvement" ethos in which both parties agree to continue innovating until they regularly achieve their shared customer requirements.

Six Sigma

Six Sigma is a widely used process-improvement framework that relies on continuous analysis of process defects. When a component or process fails to meet its desired specifications, it is analyzed for root causes of failure, which are then addressed. Six Sigma began at Motorola in the 1980s. Engineers determined they could dramatically reduce manufacturing defects by carefully controlling production processes. They aimed for a virtually error-free manufacturing process that sought a 99.9997% success rate in producing products that met specifications.

Six Sigma is expressed in statistical terms and appeals to persons with a statistical or engineering background. Its concepts rely heavily on the "continuous improvement" and "institutional learning" practices of other process-improvement systems. It trains a workforce in how to statistically and methodically evaluate the cause of defects and then to continuously improve production processes until they are virtually eliminated.

It combines quantified analysis of results with workflow process-improvement techniques. It is widely accepted in manufacturing sectors, and it contains many elements that would be relevant to the interactions of highway and railroad organizations. If the "product" is defined as a review or agreement that is to be approved within a given time frame, the tracking of agreements that fail to meet "specifications" provides both parties with data for root-cause analysis of process failure. Six Sigma trains practitioners to categorize the defects and to determine their root causes, and then to correct those root causes.

ISO

Founded in 1947, the International Organization for Standardization (ISO) has produced more than 17,000 international standards, which include quality-control and quality-assurance frameworks for managing processes. These voluntary standards are developed by more than 200 technical committees with membership from more than 150 companies. "ISO Certified" means that an organization has been evaluated and its processes comply with these internationally recognized processes for quality assurance.

DOTs in Illinois, Pennsylvania, and Florida have adopted the ISO framework for several core business processes. The Florida and Pennsylvania DOTs rely on the ISO process to ensure their materials testing processes are sound. Illinois has used ISO processes for project management and other managerial functions.

Like the other systems considered here, ISO provides a strategic managerial system that can be applied to processes for managing almost anything, including project agreements. Its principles include the following:

- **Customer focus.** The organization begins with an understanding of its customers' needs and focuses all subsequent activities toward meeting them.
- **Involvement of people.** The organization actively engages all process participants to contribute to solutions.
- **Process approach.** Internal processes are reconfigured to achieve desired results.
- **Systems approach to management.** Interrelated processes are viewed as parts of a system and as such must operate in complementary and mutually supportive ways.
- **Continuous improvement.** Continuous improvement of the organization's performance is a permanent objective.
- **Fact-driven decision making.** Basing decisions on data and analysis is a key corporate attribute.
- **Mutually beneficial supplier relationship.** Producers and suppliers rely on one another and should have a relation that increases value for both of them.

Partnering

Program Management, Six Sigma, and ISO are applicable for recurring projects or programs. They are less applicable for cities or counties that only occasionally interact with the railroads. In the case of a small city, it may only pursue a complex railroad project once in a decade.

Another strategy that can be applicable to a stand-alone project as well as to ongoing programs is the "partnering" process. This process was first articulated by the U.S. Army Corps of Engineers in addressing its large civil works projects. It also has been encouraged by FHWA, some state DOTs, and their associated contracting companies. In partnering, both parties

- Define what a successful outcome would be;
- Formally agree that each wants to assist the other in achieving this common success;

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- Develop a level of service agreement that spells out what each expects from the other in terms of service and timeliness;
- Identify escalation paths for each to follow when problems cannot be resolved at the lowest level;
- Identify a dispute resolution path for when escalation fails;
- Agree to remain in constant communication to ensure that problems are identified early and to monitor whether milestones have been achieved; and
- Periodically, through the course of the project, analyze what went right, what went wrong, and what can be learned for the future.

Strategic Framework with Continuous Improvement

A major conclusion of this study to date is that a systematic, ongoing, continuously improving formal structure adopted by both the highway agency and the railroad can significantly improve both parties' perception of the project agreement process. When the two institutions formalize their expectations, definitions, avenues of communication, and ongoing collaboration, a greater degree of satisfaction by both parties becomes evident. Anecdotally, it seemed clear that state officials whose processes included elements of partnering were among the most satisfied with the agreement process. Other officials complained of recurring problems. The process-improvement frameworks of Six Sigma, ISO, PMI, and partnering are intended to identify such recurring problems and to focus both parties' efforts on solving them.

Data Needs

All these process-improvement frameworks rely on data. Without data, formal root-cause analysis is weakened. Having project-tracking systems are an essential component of improving the project agreement process.

Tactical Improvements

Even if adopting a strategic framework seems impractical to highway and railroad officials, the best practices cited by the states and railroads offer clear areas for agencies to improve their practices. The following best practices include many elements of partnering and appear to be widely embraced by both highway agencies and the railroads:

- Ensure ongoing and continuous communication channels between the railroad and the highway agency.
- Have one empowered central point of contact at the railroad who can coordinate reviews.
- Have one empowered point of contact at the highway agency to coordinate submittals.
- Adopt formal concurrence points that both parties monitor for progress on the project.
- Provide dedicated personnel to focus on reviews and agreements.
- Hold preconstruction meetings so that the contractors, highway agencies, and railroads have common expectations for the construction project.
- Jointly develop standard plan notes or contract provisions that are minimum standards of performance on the job site to ensure safety and the protection of rail operations.
- Schedule regular review meetings in which both sides review successes and issues.
- Hire only experienced engineering firms recognized by the railroads for the development of project plans.
- Adopt standard billing agreements that reduce the administrative costs of both the railroads and the highway agencies.
- Adopt master agreements in which both parties agree to standard provisions within all projects to streamline the project agreement process.

Funded Staff Positions

Another area of improvement that should be examined by state highway agencies is either to fund positions at railroads or to support additional task-order positions at engineering firms dedicated to highway reviews. WSDOT has funded a position at BNSF, and it reports positive results.

AASHTO reports that 34 state transportation agencies fund positions at environmental resource agencies (*23*). These positions are dedicated to processing permits and conducting reviews for the highway agencies. The practice began in the 1990s and accelerated after the Transportation Equity Act for the 21st Century (TEA-21) was enacted in 1998. Section 1309(e) of TEA-21 gave DOTs the option to spend federal-aid highway dollars to fund positions at other agencies in order to meet cooperatively determined time frames, if such amounts are "necessary . . . to meet the time limits for environmental review" and "if such time limits are less than the customary time necessary for such review."

This authority was extended and broadened in 2005 with the enactment of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The law retained and broadened the funding authority, allowing transportation agencies to support activities outside the National Environmental Policy Act (NEPA) process.

A survey of AASHTO members who are funding positions at resource agencies produced a set of recommendations for this practice that are similar to some of the recommendations made for this project. They include the following:

- Devote sufficient DOT effort to prioritizing projects and ensuring funded position attention to those priorities.

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- Provide clear expectations through position descriptions and quarterly or annual performance reviews.
- Provide accountability measures and joint review.
- Develop guidance for funded position programs at resource agencies.
- Keep lines of communication open.
- Designate a program management person at the DOT. Where multiple DOT-funded staff are employed, designate/fund the position of a program manager within the resource agency.
- Provide orientation to the DOT transportation planning and project development process for funded positions.
- Support ongoing professional training for the position.

Timeliness Incentives

Another variation could be to pay premiums for prompt reviews. Highway agencies regularly pay incentives to contractors for early completion of projects. These incentives have become standardized as various contract provisions that can be applied to the specific conditions of construction projects. Highway agencies have paid incentives for early completion, included penalties for delays, and charged "lane rentals" that give the contractor incentives to keep traffic open. They have also used "A+B" bidding, in which A is the price of the construction and B is the length of construction; a combination of both results in the awarded bid.

No highway official suggested paying premiums for prompt reviews, and there is only one example of a state agency that funds a position at a railroad to accommodate its reviews.

PART 3: Review of Federal Regulations

This research project called for the research team to "review applicable federal regulations that impact public agencies and railroads on highway renewal projects and identify conflicting interests among the participating parties." Comments from the project panel subsequently directed that the project team explicitly examine 23 CFR 140.900–140.922, 23 CFR 646.101–646.220, including the appendix to Subpart B of Part 646, and 23 CFR 635.201–635.205. In addition, the team agreed to examine 23 CFR 636. In the final section of this chapter, these regulations are explained and examined in detail. In summary, they relate to how highway agencies can use federal funds to plan and build railroad–highway projects and how they can, or cannot, reimburse railroads for costs related to such projects.

The team gathered information about the effects of these regulations on the parties in four primary ways. It interviewed six of the seven Class I railroads in detail. It interviewed 10 states. It conducted a meeting of a project advisory panel. Finally, it conducted a survey of state and local agencies that interact with the railroads on project agreements. The comments relating to regulatory issues were linked to the following topics:

- **Insurance coverage.** Current federal regulations require contractor liability insurance of $2 million per incident, or cumulatively $6 million per year. These limits were last updated in 1982 and are far below amounts now required by the railroads. Using federal funds to pay for higher amounts requires case-by-case federal approvals.
- **Reimbursement for preliminary engineering.** Preliminary engineering costs are eligible for federal reimbursement, including costs for railroad reviews of proposed project concepts and plans. However, if no project is built, federal law requires reimbursement from the states. Some states said this provision limits their flexibility in consulting early with railroads on project concepts. If the consultations lead to a decision not to build a project, the railroads' costs for engineering reviews are not eligible for reimbursement.
- **Mandatory project review timelines.** Lack of timely responses from railroads was one of the most frequent complaints. Several highway agencies said mandatory response times were desired. Cities were particularly adamant about a lack of timely responses to requests to establish quiet zones.
- **Railroad participation limits.** Federal regulations require railroads to contribute little to projects that cross their properties, even for projects such as grade separations that provide some operating benefits to railroads. Some highway agencies said railroads should recognize the benefit to the transportation system of highway projects and agree to contribute more to them.
- **Preserving rights-of-way for future track expansion.** Extending highway bridge spans over railroads to allow more right-of-way for future track expansion is a recognized federally eligible expense, if the need for the tracks can be reasonably documented. Some highway agencies and some FHWA officials complain that railroads have required longer bridge spans even though these railroads have no firm plans for track expansion. Some highway agency personnel called for more explicit justification from the railroads before accommodating their requests for right-of-way protection.

Insurance Coverage

Contractors who work on railroad rights-of-way are required to have public liability and property damage insurance to cover not only the railroad but also any other damages that may occur as a result of the project (23 CFR 646.105). In 23 CFR 646.111(a), the liability limit is set at $2 million per occurrence, with an aggregate amount of $6 million for aggregate damages in a year. The Code of Federal Regulations indicates these limits were last updated in 1982. Railroads routinely demand

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much higher liability limits from highway agencies. This creates several issues. The highway agency must use state funds to pay for the coverage or it must seek case-by-case federal exemption to pay the higher limits. The case-by-case exemption can add additional time to the project-development process, especially if the highway agency or FHWA believes the insurance requests to be excessive.

States and railroads generally agreed that the 1982 limits in 23 CFR 646 are low by current insurance standards. Railroads point out that just a new train locomotive costs more than $2 million and that the minimum liability limits have not escalated with inflation, or with modern legal standards. The railroads' position in general has been that highway projects do their private companies little good but can create extraordinary liability. Railroads are required by law to accommodate large amounts of hazardous material shipments. A derailment, explosion, or release of hazardous materials can lead to multimillion-dollar liability. Such liability can increase significantly when freight trains operate on the same tracks as passenger trains, or when freight shipments travel through densely populated areas. As a result, both railroads and highway agencies say the railroads have required liability limits of up to $25 million for some projects, particularly ones that could affect passengers or populated areas. Some states include standard limits of $5 million per episode and $10 million aggregate liability as a matter of course in project agreements.

FHWA's Federal Aid Policy Guide of June 6, 2005, provides the following guidance for its state divisions to determine if the higher liability limits are warranted:

> AMOUNT OF COVERAGE (23 CFR 646.111)
>
> In determining whether a larger dollar amount of coverage is necessary for a particular project, consideration should be given to:
>
> (1) the size of the project in question;
>
> (2) the amount and type of railroad traffic passing through the project area;
>
> (3) the volume of highway traffic in the project area, including traffic generated by the contractor's activities; and
>
> (4) the safety rating, if available, for the contractor involved in the particular project.
>
> a. The decision of the Division Administrator as to Federal participation in railroad protective insurance exceeding the dollar amounts in 23 CFR 646.111, paragraph (a), should ordinarily be final. Exceptional or unusual cases should be referred by the field offices to the FHWA Washington Headquarters, Office of Safety Design, for decision.

As mentioned, the positions of highway agencies are mixed on this matter. In response to a survey question about the issue, 16 agencies reported that insurance was a common problem in agreements, while 21 respondents indicated it was not. In some cases, the agencies agree that the railroads' requests are warranted, whereas in other cases they contend the railroads are overly conservative and create needless public expense. In cases where a project may occur on a railway shared with passenger service or on a highly traveled line in a dense urban area, high liability amounts may be understandable to the highway agencies. Agencies have said, however, that when those same high amounts of coverage are requested for a rural project, they cannot readily accept the higher costs.

The highway agencies also note that small contractors may not be able to secure such an amount of liability insurance and, therefore, cannot bid on such projects. In many states, the average contractor is a small contractor and their exclusion results in fewer bidders. When the number of bidders is restricted for any reason, it generally over time leads to higher bid prices.

The FHWA Office of Program Administration reported in December 2008 that it was initiating a Notice of Proposed Rule Making to reexamine the liability limit issue.

Some agencies also objected to some attempts by railroads for complete indemnification, even for railroad negligence. However, the insistence on indemnification even for railroad error does not appear to be universal. Several agreements were found in which indemnification requirements were tempered by statements which acknowledged that indemnification would be shared based on each party's negligence.

Federal Eligibility for Preliminary Engineering

As mentioned, the railroads routinely charge for their staff's time when asked to comment on proposed highway–railroad projects. The need to make such charges generally is accepted by most public highway agencies, who understand the railroads' need to attribute staff hours and costs under their cost accounting systems. If the costs for project reviews and consultations are not billed back to the public highway project, those costs are passed on to the general railroad customers as overhead.

Federal highway regulations recognize the eligibility of project reviews and allow them to be reimbursable under 23 CFR 646.202 and 23 CFR 140.900–907. The regulations are flexible in that they allow the railroads to be reimbursed whether the reviews and consultations are provided by their in-house staff or whether the railroads or highway agencies hire a consulting firm on the railroads' behalf.

A point of contention arises, however, regarding federal eligibility if a project eventually is not built after federal funds have been spent for reviews or consultation. FHWA can seek reimbursement of the funds. In other cases, FHWA may not allow eligibility unless the state first "programs" the project. This includes listing the project in the State Transportation Improvement Program and taking other procedural steps to make the project eligible for federal funding. "Programming" a project consists of several substantive steps, such as providing guarantees that it can be paid for and assuring that its air-quality impacts have been considered.

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Some highway agencies have contended that these formalities restrict their ability to consult freely with the railroads at the critical early stages of a potential project's conceptualization. Railroads have reported that they have had to write off hundreds of thousands of unreimbursed engineering expenses incurred early in the project-development process because of the preliminary engineering (PE) regulations. At the early stages, a project may be only a concept without any facts regarding its costs or feasibility. On the basis of the railroad's early reaction, the state possibly could decide not to pursue the project as feasible, or to fundamentally change the project concept. While most parties agree that early, often, and continuous communication is beneficial, the federal eligibility requirement can be an impediment, according to several highway agencies and railroads.

To comment knowledgeably about a potential project, some degree of engineering analysis, geotechnical assessment, or even railroad operational assessment may be needed. For instance, a request to build a grade separation in an urban environment raises complex questions as to how to elevate the railroad over the highway without significant impacts. The vertical clearance for the bottom of a railroad bridge over a highway should be a minimum of 23 feet. The degree of grade preferable for the railroad's approach to the bridge is 1%, or 1 foot for every 100 feet of approach. These conditions can cause the railroad approach embankments to extend 2,600 feet on either side of the crossing, or up to approximately 1 mile in total. Creating this length of embankment in an urban setting may mean that adjacent cross streets would be cut off by the embankment, which would change neighborhood traffic flows.

If the overpass location is within several miles of a railroad classification yard or intermodal loading facility, its effect on that facility would need to be analyzed. Trains often can be stopped while awaiting access into such facilities. Their stoppage can block streets and create impediments for other trains using those tracks. The new, elevated tracks approaching the new overpass must be integrated into the network of mainlines and sidings that flow into railroad yards and intermodal facilities.

Not only must the tracks and sidings for the new crossing physically tie into the new elevated tracks, but the electronic signaling and switching systems must also be considered. Again, because of the long tangents and curves required for modern trains, a change in switching and signaling may affect miles of tracks, or even the operations within a railroad's entire region.

Therefore, preliminary discussions can be quite complex regarding whether such a crossing is feasible, what its costs might be, how it may affect a neighborhood, or what types of construction staging may be necessary to build the crossing without affecting busy railroad operations. The highway agency that is considering the project would like accurate information regarding the project's costs, engineering concepts, construction duration, and what requirements the railroads may have. The railroads cannot knowledgeably provide such information without factual engineering and railroad operational analysis. Because experienced engineers can cost $200 or more per hour, the preliminary discussions for the feasibility of such a project can run into many thousands of dollars.

The ambiguity of whether such early discussions are federally eligible for reimbursement can create delay, particularly if the sponsoring agency is a local government with limited resources who needs to coordinate with the railroad, the state highway agency, and FHWA.

Part of the issue lies with the definition of preliminary engineering in 23 CFR 646.204:

> Preliminary Engineering shall mean the work necessary to *produce construction plans, specifications, and estimates* to the degree of completeness required for undertaking construction thereunder, including locating, surveying, designing, and related work. (emphasis added)

In 23 CFR 140.902, similar federal intent is noted:

> This subpart, and all references hereinafter made to "projects," applies to Federal-aid projects involving railroad facilities, including projects for the elimination of hazards of railroad–highway crossings, and other projects which use railroad properties or which involve adjustments required by highway construction to either railroad facilities or facilities that are jointly owned or used by railroad and utility companies.

The concept of "project" has not been consistently applied to consultations about the viability of a project concept in its very preliminary stages. Section 646.206(7)(e) notes that specific authorization from FHWA is required for each project cost prior to the cost being incurred. The railroads' internal costs for PE before a project is authorized can be used as part of the railroads' financial contribution to a project, if such contribution is required. However, those preauthorization costs are not eligible for federal reimbursement as PE.

Section 102(b) of Title 23 of the U.S. Code requires that if construction or acquisition of right-of-way for a highway project is not commenced within 10 years after the date at which federal funds were provided for PE, the state will repay the funds. However, the code notes that the 10-year period may be extended if the state requests it and FHWA approves the extension.

A June 26, 2008, memorandum (Repayment of Preliminary Engineering Costs) from the FHWA Office of Program Administration provides additional leeway for states to seek extension of repayment, or the outright forgiveness of such PE expenditures. It cites the controlling Federal Code but also

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notes that 23 CFR 630.112 provides a slightly longer time frame for repayment, which FHWA Division Offices may use.

The memorandum notes that when project termination is the result of compliance with another federal law, FHWA has a long-standing policy of not requiring repayment. For instance, if the environmental analysis leads to a "no build" decision, then the PE funds do not need to be repaid. To require otherwise, would create a "Catch-22" where the agency could be penalized for not conducting an objective environmental analysis or face penalties of having to repay the PE funds if the environmental process results in a "no build" decision.

> It is FHWA's view that 23 U.S.C. 102(b) is intended to address the matter of PE projects remaining active for indefinite periods of time. While an outright waiver of repayment of PE costs is not prescribed under this section, States may request a time extension from FHWA for repayment of Federal funds on a project that has stalled. The request should be accompanied with sufficient justification to the Division offices. Division Administrators may grant an extension of time to begin the subsequent phase of work only if the justification is determined reasonable and beyond the State's control.

The memorandum lists the following as reasonable examples for time extensions:

- Litigation;
- Complex consultations with state, federal, or local agencies;
- The public involvement process has altered the state's plan for satisfying the project's "purpose and need"; and
- Projects that use unique implementation or a funding approach to which the state is not accustomed.

The memorandum notes that it is not acceptable to forgive PE expenditures because of shifting political priorities, insufficient transportation budgets, or a lack of staffing to pursue the project.

Many ambiguous circumstances are possible that can cloud the issue of whether PE funds would need to be repaid. Although "shifting political priorities" do not constitute a valid reason to forgive PE expenditures on a project, clear public opposition to a project that is noted in the environmental process could be a valid justification for dropping a project in the NEPA process. "Insufficient transportation budgets" may not be a valid reason, but localities have the ability to influence the withdrawal of funds for a project through the metropolitan planning organization (MPO) process. If a community opposes a project because of its impact, it can work through the MPO process to remove the project from the regional transportation program, which then eliminates federal funding for the project. Differentiating between an appropriate and an inappropriate justification for not pursing a project may be quite nuanced and dependent on the unique circumstance.

It is not clear from the highway agency comments about PE eligibility if the highway agencies have considered using the NEPA path as a justification for using federal funds for preliminary review of projects but then later dropping the projects if the project is not feasible because of environmental and community impacts. An e-mail communication with the FHWA Office of Program Administration indicated that such consideration would be made by the state Division Office under the provisions relevant to a NEPA "no build" decision.

Also not clear from the comments is whether the highway agencies have exhausted opportunities to use federal funds for "planning studies" of rail projects. Several categories of federal funds are available for planning studies, including Surface Transportation Program funds. These are widely distributed and flexible funds that states, MPOs, and sometimes counties have as a result of pass-through funding from FHWA to the states. These funds can be used for local planning studies, such as studying mobility, safety, emergency response, and intermodal needs of an area or region. Inherent in such studies can be the expenditure of engineering funds, and possibly reimbursement of expenses to railroads, for the consideration of highway–rail projects. Because such funds are not PE funds, they probably can be construed as not falling within the requirements for repayment if a project is not built. It is quite common for planning studies to examine projects that are not eventually constructed because of their cost, impacts, or impracticality. Again, although the planning study approach may need case-by-case approval, it appears that it could be a mechanism for states to use federal funds for early coordination of project concepts.

Required Time Frames for Reviews

The greatest number of open-ended comments from state and local highway agencies regarding the railroad agreement process was a request for timely responses from the railroads. Timeliness was a consistent theme from highway agencies that ran through every phase of this project.

Several states called for a formal highway–railroad project-coordination process adopted into federal code. They advocated for mandatory coordination periods and required turnaround times for responses from the railroads. In effect, the highway agencies are asking for a process similar to the long-sought "environmental streamlining" that highway agencies have desired from the NEPA process for highway projects. The environmental streamlining movement has been quite extensive, and attracted considerable discussion in the 2004 transportation reauthorization debates.

The streamlining issue is quite complex and contentious. Highway agencies frequently complain that it takes a decade or more to receive environmental approvals for a complex project, such as a bypass or new interchange. However, environmental

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groups and federal resource agencies are adamant that federal environmental laws do not allow them to cut corners. Statutes such as Section 404 of the Clean Water Act or the Endangered Species Act contain absolute provisions that require the avoidance of impacts to critical resources such as wetlands, waters of the United States, or threatened or endangered species. Those statutes do not easily accommodate programmatic approvals or other strategies that often are used to accelerate project reviews. The issue of environmental streamlining has been debated for more than a decade and has resulted in several time-saving innovations, both at the federal and state levels. However, the timelines for environmental reviews have not been noticeably shortened for complex projects, except in isolated high-profile cases.

The state and local officials responding to this project survey, however, reiterated repeatedly their calls for some kind of streamlining of the railroad process, or for mandatory turnaround times from the railroads.

In response to an open-ended survey question, state and municipal railroad coordination officials advocated the following:

- Federal regulations should define the review process from start to finish and include standard agreements that the railroads should accept.
- The federal regulations should also define the process to use if the DOTs and railroad companies cannot come to an agreement.
- Railroads should always promptly respond to agency inquiries.
- Railroads should hire more public projects staff to expedite reviews and respond to inquiries.
- Railroads should understand and try to avoid the contractor delay claims that project sponsors can incur when railroad decisions lead to project delay.
- Project sponsors should be able to advance projects if railroad companies do not respond promptly to submittals.

An agreed-on series of coordination steps with agreed-on timelines theoretically is possible. Highway departments and review agencies have regularly shared such milestones, both for individual projects and for programs of projects. The use of critical-path scheduling is common in the construction industry and often has been used for the project-development process, as well. In such a process, the review milestones are identified in advance and the highway agency reaches understanding with the various review agencies as to when submittals should be expected and what the desired response times are. Following the collapse of the I-35 bridge in Minneapolis, the Minnesota DOT completed a design-build of a new bridge in less than 12 months. Such a feat requires extensive coordination and cooperation with various review agencies, and the Minneapolis example demonstrates that such cooperation is possible.

In the SHRP 2 R-16 project, the extensive interviews with railroads and highway agencies reveal that it is not common for highway agencies to present railroads with critical-path schedules. It is not common for the highway agencies to present a firm program of projects to the railroads, with a clear sense of priorities for review and clearly requested deadlines for the reviews. Repeatedly, the railroads have expressed skepticism that highway agencies could present a clear list of projects that should be reviewed during the course of a year. The railroads—speaking from years of experience—note that the funding of many proposed projects often is very uncertain. They report gaps of years sometimes between when they provide comments on projects and when they next see those projects. The railroads noted such gaps uncritically. They expressed understanding that highway agencies face uncertain funding sources, particularly when locally funded projects are presented. However, during in-depth interviews with six of the seven Class I railroads, most expressed skepticism that highway agencies could routinely provide them with a clear sense of a year's worth of projects needing review. The railroads indicated they review projects as they arrive, without the ability to anticipate how many projects they must plan to review in a year.

Railroad reviews are conducted with a mix of internal railroad engineers and a mix of outside, task-order consultants. The in-house reviewers generally have a finite review capacity, based on their finite available work hours. However, the external review capacity of the railroads is more or less infinite, considering their ability to refer review work to a national network of consulting engineering firms. Several of the Class I railroads noted that they have agreements with up to a dozen consulting engineering firms for reviews. Because these review costs are passed on to the highway agency, the cost of the reviews does not present an impediment to the railroads.

It would appear possible for the railroads to anticipate the needed review workload for any one state or municipality, if the state or municipality would provide the railroad with a firm, multiyear schedule of which projects will be referred to the railroad at what time over the course of the next one, two, or even three years. Such firm time frames are anticipated in the federally required State Transportation Improvement Programs (STIP) and the regional Transportation Improvement Programs (TIP) developed by the MPOs. The STIP and TIP are required to be fiscally balanced, which means they should only contain projects that can be afforded. They should by regulation only include projects that have been accepted into the regional plans by the public planning agencies. In short, the STIPs and TIPs are required under federal regulations to be realistic, legitimate schedules of projects that are to be constructed within the next four years. In addition, each state is required to adopt a project development process (PDP), which is a clear sequence of steps it follows to develop each project. The PDP is intended to provide the public and interested parties an understanding of the steps necessary to develop a project, providing them

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opportunity to comment on such projects at the appropriate decision points. Theoretically, the predictable STIP and PDP milestones should provide a clear path of what railroad–highway projects are under development, what their schedules are, what their milestones are, and, therefore, when railroad reviews should be required. In addition to the federally required lists of projects and their milestones, nearly every state highway agency has some form of computerized project management system. These systems can produce lists of projects by their anticipated schedules and needed milestones.

In summary, the states in some cases are calling for firm federal guidelines for railroad reviews, but it has not been documented that the states and local agencies have exhausted voluntary efforts to assist the railroads to routinely anticipate which projects they should expect to review over the course of a year. Nor have the highway agencies been able to produce metrics that document the delay which they report.

The experience of the environmental streamlining efforts have revealed several major issues that need to be addressed in any project-streamlining framework if a national framework for railroad reviews were to be enacted:

- The national framework most likely would require standard project development processes across the states. The seven Class I railroads each work with many states. For the railroads to adhere to common review time frames, standardization in how the states identify milestones and in how they define these milestones, as well as what elements are included at each milestone's submittal, would need to be achieved.
- A common problem with environmental streamlining with federal review agencies has been that when a resource agency receives a submittal, if it decides the submittal is incomplete, it can request additional information, which "restarts the clock" for the review period. Routinely, resource agencies respond to submittals by requesting more information, which extends the review period.
- Many highway–railroad projects are local ones, which neither the state or federal highway agencies control. It will be difficult for the state highway agency to guarantee schedules from the local agencies.

A subset of the timely review issue was the issue of timely reviews relating to urban quiet zones. At least 2 of the 11 responding cities singled out a lack of responsiveness on quiet zone requests and reviews as particular causes of delay.

Railroad Participation

Several of the respondents called for greater financial participation from the railroads for highway–railroad projects. In 23 CFR 646.210, several conditions are spelled out under which railroads either do or do not have to contribute financially to highway–railroad projects. In most circumstances, the railroads do not have to contribute.

The section specifically exempts railroads from state laws requiring them to participate in hazard-elimination projects that are federally funded. It also says that projects for the reconstruction of grade separations are of "no ascertainable net benefit to the railroad" and, therefore, the railroads should not have to contribute to them financially. If a project separates a crossing that has lights and gates, then the railroad contributes 5% of the cost of the grade separation. If the crossing is not actively protected, the railroad is not required to contribute 5% to the cost of the grade separation.

Several of the states that commented in the survey for this project advocated for additional railroad participation. Their logic was that all the modes are linked and that railroad users also depend on the highway network for mobility. They disagreed with the contention that a grade separation does not benefit a railroad. They contended that the elimination of a crossing improves railroad operations and that the railroads receive benefits from the crossings. As one state described this sentiment, "Certain railroad companies should rethink their business model to accept the fact that (1) publicly funded highway capacity improvement projects that cross or affect existing railroad rights-of-way are not funded and designed to benefit railroad operations [and] (2) railroad companies use and depend upon the entire transportation infrastructure (including highways) just as much as any other highway user or mode of transportation (i.e., air or ship), and should accommodate highway construction projects accordingly."

Since at least the deregulation of the rail industry in 1980, the railroads have received exemptions from different state requirements on contributions for projects. Histories of the rail industry have noted how in earlier decades the highly regulated railroads were forced to pay for grade separations and other improvements that they neither sought nor benefited from. The federal clarification of their contributions in federal code largely ended such different financial requirements, at least for federal aid projects. The railroad officials interviewed in this study were adamant that their companies cannot have their capital-investment decisions dictated by outside parties, such as the highway agencies. To do so would put them in a uniquely disadvantaged position in which their internal investment needs could be overridden by local agencies who insisted they contribute to highway projects that they cannot control or benefit from.

Provisions for Additional Tracks

In 23 CFR 646.212, FHWA agrees to participate in the additional costs to provide space to allow for additional tracks to be added when highway projects cross or affect railroad rights-of-way. The section notes that it will participate when the railroad "establishes to the satisfaction of the State highway agency and FHWA that it has a definite demand and plans for installation of the additional tracks within a reasonable time."

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State highway agencies have complained that railroads have routinely requested wider spans to accommodate additional tracks beneath them without providing documentation that they have definite plans to add tracks. Some of the respondents advocated that railroads should provide greater justification for the additional expense of lengthening overhead bridges. They have argued that without definite plans documenting the need for the additional tracks and when the tracks will be built, the highway agency should not have to incur additional expense to lengthen structures to accommodate those future tracks.

The railroads counter that almost all long-term forecasts indicate that rail volumes will grow for decades. They note that a new bridge may stand for at least 50 years, making it highly likely that during the life of the highway bridge, the adjacent railroad tracks will need to be expanded. Providing space for additional tracks on most mainline railroads represents a reasonable assumption, the railroads contend.

Accounting Rules

Under 23 CFR 140.900–922, a wide variety of railroad costs are eligible for federal reimbursement. Eligible costs include both hazard-elimination project costs and the costs for non-safety projects that affect railroads and that create expense for the railroads. Several stipulations apply:

- The project has to be programmed in the STIP.
- The work must be federally authorized before it is begun.
- Expanded crossings must meet the horizontal and vertical clearance standards set in 23 CFR 646.

The provisions allow the railroads to bill for labor, professional services costs, overhead rates, fringe benefits, materials, and insurance.

At least one railroad noted its difficulty in documenting that its costs are "reasonable" as required in 23 CFR 140.907, and that the costs are in compliance with 48 CFR 31 of the Federal Acquisition Regulation (FAR). FAR Part 31 consists of 38 pages of federal accounting rules. The FAR rules were developed for a large array of federal contracts, including highly complex defense contracts as well as relatively simple highway projects. To ensure that a company bills its costs in compliance with the FAR requires a degree of accounting sophistication that is unique and applicable only to instances in which charges are billed back through the highway agencies to FHWA. At least one of the railroads suggested that simplified accounting requirements would streamline its process and probably lessen its costs.

FHWA Lead on Safety Projects

In some states, a public utilities commission still plays a role in railroad safety projects. The involvement of these commissions dates back to the early 20th century when railroads were considered to be publicly sanctioned monopolies, much like power and telephone companies. In states with these commissions, the highway agencies develop arrangements with them to share duties on developing projects and passing through federal funds for the projects.

In at least one state, the highway agency was adamant that the Federal Highway Administration should assert its primacy as the lead agency, or that FHWA at least should approve each project specifically. The officials in this state contended that the lack of FHWA sponsorship left primacy for the project with the state utilities commission, which asserted control over projects that do not exist in federal regulation. The state contended that if FHWA approved each Section 130 hazard-elimination project, the state DOT would be able to exert more stewardship over the projects and not have unreasonable requirements imposed by the non-highway-focused utilities commission.

Railroad Reimbursement Costs

Several of the Class I railroads have union agreements that require most track improvement work and most "flagging" to be conducted by its union personnel. Flagging involves monitoring the approach of trains into a construction zone, which may be impeded by equipment, construction workers, or construction materials. Several of the states, and particularly the cities, complained that the railroad costs were excessive and that their taxpayers could save money if the highway agency were allowed to bid this work or to hire its own flaggers.

"Railroad force account work reimbursed with public funds should be performed and billed as if it was being paid for by their own company, rather than considered 'free money' to perform work outside of what is required/necessary to accommodate the highway improvement project work," said one state.

"Also it would be extremely beneficial if DOT contractors could do some or all of the RR crossing work. This is likely a union issue. However, allowing DOT contractors to do some or all of the work would save our jurisdiction probably tens of thousands in tax dollars," said one city.

The ability to draft federal regulations to override railroad union agreements is probably quite limited. The right to collectively bargain is also protected in federal law. It would appear difficult to develop regulations that would countermand union agreements relating to railroad construction work and railroad flagging.

Federal Representation

Four cities that independently responded to the survey called for an undefined but firm statement of federal advocacy on behalf of local governments that interact with the railroads.

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The cities said they have no allies when dealing with the large national railroads, which have their own statutes and federal agency. Their comments included the following:

- "Local governments face a very uneven playing field when addressing railroad issues. Railroads have their own DOT agency, separate funding, separate authorities. Local governments' funding tends to be filtered through counties, states, and RPOs [regional planning organizations]."
- "Railroads always claimed to be federally protected due to the interstate commerce laws. . . . Federal laws need to be addressed that require better service from the railroad."
- "Railroads need to be more friendly to the local people" (from a city official whose city is the headquarters for a Class I railroad).
- "We have not had any successful project reviews by the railroad."

References

1. Federal Railroad Administration. Freight Railroads Background. www.fra.dot.gov/downloads/policy/freight2006%20final.pdf. Accessed April 30, 2008.
2. Stover, J. F. *American Railroads,* 2nd ed. University of Chicago Press, Chicago, 1997, pp. 153, 194.
3. Association of American Railroads. U.S. Freight Railroad Productivity (Sept. 2009). www.aar.org/incongress/~/media/aar/backgroundpapers/usfreightrailroadproductivity.ashx. Accessed July 27, 2010.
4. Office of Freight Management and Operations, Federal Highway Administration, U.S. Department of Transportation. Table 3-1: Miles of Infrastructure by Transportation Mode, 1980–2005. http://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/docs/07factsfigures/table3_1.htm. Accessed March 5, 2010.
5. Office of Freight Management and Operations, Federal Highway Administration, U.S. Department of Transportation. Tables 2-1 and 2.1M: Weight of Shipments by Mode, 2002, 2006, 2035. http://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/docs/07factsfigures/table2_1.htm. Accessed April 17, 2008.
6. Association of American Railroads. Class I Railroad Statistics (May 24, 2010). www.aar.org/~/media/aar/Industry%20Info/AAR%20Stats%202010%200524.ashx. Accessed July 27, 2010.
7. Cambridge Systematics. *National Rail Freight Infrastructure Capacity and Investment Study.* Association of American Railroads, Washington, D.C., Sept. 2007, p. ES-2.
8. Association of American Railroads. Railroads: Moving America Safely (June 2010). www.aar.org/incongress/~/media/aar/backgroundpapers/railroadsmovingamericasafely.ashx. Accessed July 27, 2010.
9. Bureau of Transportation Statistics, Research and Innovative Technology Administration, U.S. Department of Transportation, and Census Bureau, U.S. Department of Commerce. 2002 Economic Census, Transportation, 2002 Commodity Flow Survey, Hazardous Materials, Table 1a, Dec. 2004.
10. National Transportation Safety Board. Railroad Accident Brief: Collision of Two Union Pacific Railroad Freight Trains, Texarkana, Arkansas, Oct. 15, 2005. www.ntsb.gov/publictn/2006/RAB0604.htm. Accessed April 17, 2008.
11. Association of American Railroads. Hazmat Transportation by Rail: An Unfair Liability (Sept. 2009). www.aar.org/incongress/~/media/aar/backgroundpapers/hazmattransportationbyrailanunfairliability.ashx. Accessed July 27, 2010.
12. Ely, J. W., Jr. *Railroads and American Law.* University Press of Kansas, Lawrence, Kansas, 2001, pp. 71–105.
13. Federal Highway Administration. Highway Statistics 2006. Table HM-14: Federal-Aid Highway Length, 2006—Miles by Ownership. www.fhwa.dot.gov/policy/ohim/hs06/roadway_extent.htm. Accessed March 9, 2010.
14. Federal Highway Administration. Highway Statistics 2006. Table HM-48: Federal-Aid Highway Lane-Length, 2006—Lane-Miles by System. www.fhwa.dot.gov/policy/ohim/hs06/roadway_extent.htm. Accessed March 9, 2010.
15. Federal Highway Administration. Highway Statistics 1997. Table HM-48: Federal-Aid Highway Lane-Length, 1997—Estimated Lane-Miles by System. www.fhwa.dot.gov/ohim/hs97/roads.htm. Accessed March 9, 2010.
16. Blincoe, L. J., A. G. Seay, E. Zaloshnja, T. R. Miller, E. O. Romano, S. Luchter, and R. S. Spicer. *The Economic Impact of Motor Vehicle Crashes, 2000.* National Highway Traffic Safety Administration, U.S. Department of Transportation, May 2002.
17. *Report of the National Surface Transportation Policy and Revenue Study Commission: Transportation for Tomorrow.* National Surface Transportation Policy and Revenue Study Commission, Washington, D.C., Dec. 2007, Vol. 2, Chap. 4.
18. Federal Highway Administration. Status of the Nation's Highways, Bridges, and Transit: 2006 Conditions and Performance. Chapter 8: Executive Summary. www.fhwa.dot.gov/policy/2006cpr/es08h.htm. Accessed Feb. 11, 2008.
19. Federal Highway Administration. Status of the Nation's Highways, Bridges, and Transit: 2006 Conditions and Performance. Highlights. www.fhwa.dot.gov/policy/2006cpr/hilights.htm. Accessed Feb. 11, 2008.
20. Federal Highway Administration. Status of the Nation's Highways, Bridges, and Transit: 2006 Conditions and Performance. Chapter 4: Executive Summary. www.fhwa.dot.gov/policy/2006cpr/es04h.htm. Accessed March 10, 2010.
21. Federal Highway Administration. Price Trends for Federal-Aid Highway Construction. www.fhwa.dot.gov/programadmin/pt2006q4.cfm. Accessed Feb. 11, 2008.
22. *A Guide to the Project Management Body of Knowledge,* 3rd ed. Project Management Institute, Newtown Square, Pa., 2004, pp. 7–9, 16–17.
23. *DOT-Funded Positions and Other Support to Resource and Regulatory Agencies, Tribes, and Non-Governmental Organizations for Environmental Stewardship and Streamlining Initiatives.* AASHTO Center for Environmental Excellence, Washington, D.C., May 2005. http://environment.transportation.org/center/products_programs/dot_funded.aspx. Accessed March 10, 2010.

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CHAPTER 4

Conclusions and Suggested Research

Enhancing Partnerships

Partnership is a term commonly used in business. It is important to understand that partnerships that are not understood, agreed to, and appreciated by all parties involved will fail. There are many ways to develop and maintain partnerships, but they start with strategies, agreements, processes, and practices that support success for both parties.

Douglas M. Lambert and A. Michael Knemeyer (*1*) say the following about partnerships:

> Partnerships are costly to implement—they require extra communication, coordination, and risk sharing. They are justified only if they stand to yield substantially better results than the firms could achieve without partnering.

Rosabeth Moss Kanter (*2*) notes that "successful partnerships manage the relationship, not just the deal":

> [Business alliances] must yield benefits for the partners, but they are more than just the deal. They are living systems that evolve progressively in their possibilities. Beyond the immediate reasons they have for entering into a relationship, the connection offers the parties an option on the future, opening new doors and unforeseen opportunities.
>
> Alliances that both partners ultimately deem successful involve *collaboration* (creating new value together) rather than mere *exchange* (getting something back for what you put in). Partners value the skills each brings to the alliance. (italics in the original)

To "manage the relationships" between railroads and highway agencies so that their partnership "yields substantially better results than the firms could achieve without partnering" is the objective of the model processes described earlier. The model process outlined below is intended to allow the large institutions involved to identify common understandings, common processes and ongoing cooperation so that each achieves substantially better results in the railroad–highway agreement process than either could achieve on its own.

Because two institutions are involved, the model process is formal. It is tiered and stratified to outline the broad understandings that the parties agree to overall. It then progresses through more detailed agreements down to streamlined and standardized project-specific agreements. The intent of the model process is to outline an overall framework for ongoing partnership, agreement-streamlining and continuous process improvement. Although formal, the model process is flexible to allow it to be modified to meet the circumstances of the various railroads and highway agencies.

Two successful precedents form the basis for the proposed railroad–highway partnering processes proposed here. First is the construction partnering process that has been widely adopted by many state transportation agencies and that was pioneered by the U.S. Army Corps of Engineers. Construction partnering is so successful and so mature that several generations of training manuals, facilitator courses, and textbooks have been developed over the past two decades. The second successful precedent forming the basis for the partnering and model processes is the field of environmental streamlining. Likewise, this field has become so mature that it has its own websites, national resource centers, model agreements, and templates for success. An environmental streamlining resource center is jointly funded by FHWA and AASHTO to facilitate streamlining and environmental excellence. Both the construction partnering process and the environmental streamlining process hold many lessons and analogies for improving the partnerships and relationships of railroads and highway agencies.

Principles of Construction Partnering

In construction partnering, neither the owner nor the contractor abdicates any of their legal rights or obligations. However, they use specific tools and processes to reach common

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goals. At a minimum, the steps of partnering include the following:

1. Defining what success is for both parties;
2. Formally agreeing that each wants to assist the other in achieving this common success;
3. Developing a level of service agreement that spells out what each expects from the other in terms of service and timeliness;
4. Identifying escalation paths for each to follow when problems cannot be resolved at the lowest level;
5. Identifying a dispute resolution path for when escalation fails;
6. Agreeing to remain in constant communication to ensure that problems are identified early and to monitor whether milestones have been achieved;
7. Periodically analyzing what went right, what went wrong, and what can be learned for the future; and
8. Identifying critical reports and information throughout the process so that they do not become detrimental to timely project completion.

Begin with Common Understanding

The model process described here begins with the understanding of both the railroads' and the highway agencies' perspectives. From the railroads' perspective, there is little benefit or new value added to their business from most highway projects. On the contrary there is the possibility of encroachment and loss of valuable and irreplaceable right-of-way from these projects. In addition, the construction process can endanger rail safety and hamper rail operations. This perception needs to be addressed when discussing, developing, and enhancing partnerships between the two parties. After years of minimal growth, the railroads are now in an expansion era. Major railroads are looking to expand corridors in the future and are protective of their limited and finite rights-of-way. Additionally, project reviews are expensive to railroads. As private businesses, they need to recover the costs of these reviews.

From the highway agencies' perspective, there is a significant need to improve aging highway infrastructure, but public agencies face severe budget limitations. They are reluctant to increase project costs to accommodate the railroads unless they see an overriding safety or operational need to do so. For the highway agencies, moreover, the length of the agreement process also is important. Most highway agencies are trying to meet project schedules, which can be delayed by lengthy railroad agreement processes.

Both parties, therefore, face pressures to reduce their own costs and to protect their own assets. A successful partnership or partnering process between railroads and highway agencies will need to create ongoing processes that reduce both parties' costs and protect their assets and interests to the extent possible. Partnering seeks to create a win-win mindset between two parties as opposed to an "I win, you lose" approach. Partnering is both an agreement and an active, ongoing relationship. The partnering agreement clarifies what both parties expect and what they both want to mutually achieve. The relationship is the ongoing series of steps that each side takes to fulfill its obligations to the other from the partnering agreement.

The California Department of Transportation (Caltrans) and its construction industry view partnering as a means for the private sector to remain profitable while the public-sector transportation agency receives a quality product. In 2006, Caltrans, the Associated General Contractors of California, the Southern California Contractors Association, and the Engineering and Utility Contractors Association signed a partnering agreement. In it, they stated the following:

> We, the undersigned partners in California transportation construction, agree to work together as a cohesive, cooperative team to safely deliver quality projects to the public on time and within budget, providing an opportunity for well-managed, competent contractors to make a reasonable profit.
>
> Based on our collective experience in implementing partnering in Caltrans construction projects, we have identified the following partnering success factors and commit ourselves to their continuous improvement.
>
> - Follow-up and Measurement
> - Training and Empowerment of Field Staff
> - Project Stakeholder Partnering
> - Strategic Level Partnering
> - Decision Making and Risk Management
> - Recognition and Awards.

Analogous to this project, Caltrans executed an overall partnering agreement with its construction industry addressing how they want to work together. In addition to this, Caltrans executes specific, project-level partnering agreements for each construction project. Likewise, Caltrans has proposed that highway agencies and railroads develop an overall partnering agreement for their ongoing relationships, as well as use specific partnering techniques for each project.

To have a successful partnership, both highway agencies and railroads will have to work on building, growing, and maintaining their relationship. The railroad–highway agency relationship can be preserved if both perceive the partnering process to lead to the efficient use of resources, appropriate compensation without wasteful administrative activities, good communication and streamlined processes for both.

Partnering as a Framework

A high-level process to improve the partnering between the railroads and the public agencies is discussed below. The partnering

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process provides the framework for collaboration at two levels: at the specific-project level and at the larger, overarching programmatic level. Included in the partnering process are various practices, processes, and strategies (including examples of best practices) that can contribute to a strong partnership. Streamlining of processes before, during, and after project implementation can be effective in making the interaction between the parties and the delivery of projects effective. Models for various processes are also discussed below. Some of these practices/processes can be used during multiple stages of the project life cycle. Examples of best practices identified during the SHRP 2 R16 project hold many parallels to successful partnering strategies. These best practices include the following:

- Project start-up meetings;
- Annual highway-railroad process-review meetings;
- Liaison and coordination between public agencies and railroads;
- Formal communication and information sharing;
- Escalation procedures;
- Dedicated railroad person for agency projects;
- Effective project management;
- Quality-assurance review and feedback;
- Central project repository;
- Design and standards for new projects;
- Project closeout meetings; and
- Development of standard project agreements.

These practices can be incorporated into overarching memoranda of understanding that highway agencies and railroads can adopt to guide and define their overall partnerships. In addition, the details of these best practices can be incorporated into standardized legal project agreements that can save considerable time and cost in approving individual projects. The combination of an overall partnering process that incorporates the best practices and streamlined standard project agreements can significantly enhance the highway–railroad project agreement process. In short, the streamlined process requires development of two types of agreements: nonbinding memoranda of understanding that spell out how the parties choose to coordinate and binding agreements. The binding master agreement and standard agreements include contract provisions that allow the highway agencies to reimburse the railroads for reviews and other costs.

Steps in the Partnership Process

The partnering memorandum of understanding is intended to encapsulate the parties' understanding of how to operate in a spirit of partnering. A model partnering memorandum is included in Appendix C.

Figure 4.1 is a high-level representation of a model process that public agencies and railroads could adopt for successful partnering. The first step is having meetings and discussions to begin the process of defining how each party wants to streamline and standardize the agreement process.

Step 1: Plan the Partnering Memorandum

In this step, the public agency and the railroad begin discussions on how to reach a common approach to the highway–railroad project agreement process. The process begins with a meeting or series of meetings. The following major provisions are likely to be included in a partnering memorandum between a highway agency and a railroad:

- Define what success means to each of them.
- Deliberate and agree on areas in which both parties can collaborate to ensure success for both.
- Agree to communicate frequently on projects and issues.
- Agree to adopt project management practices for managing collaborative efforts, identifying issues early in the process and keeping projects on schedule, scope, and within budget.
- Agree to adopt joint continuous improvements and best practices. These include strategic and operational best practices, such as the following:
  - Both agree to a project-tracking process that provides notice of all pending activities.
  - Both agree to adopt an escalation process for problem resolution.
  - Both agree to adopt a dispute resolution process when the escalation process fails.
  - Both agree to identify desired project review times.
  - Both agree to track the actual review times and to use that data for performance improvement and monitoring.
  - Both agree that preliminary notice is given for all highway projects that may involve railroad rights-of-way.
  - Both execute a standardized preliminary engineering agreement within days of railroad notice to facilitate railroad review and comment.
  - Both agree to meet at least annually to discuss success and improvement opportunities for their project review activities.
  - Each party recognizes the other's legal requirements.
  - Both agree to develop an overall master legal agreement that incorporates standard provisions universal to all projects.
  - Both express in writing a mutual understanding of a project review process that they recognize as logical, efficient, and effective.
  - Both agree to identify and adopt standard project management practices similar to those identified by the Project Management Institute.

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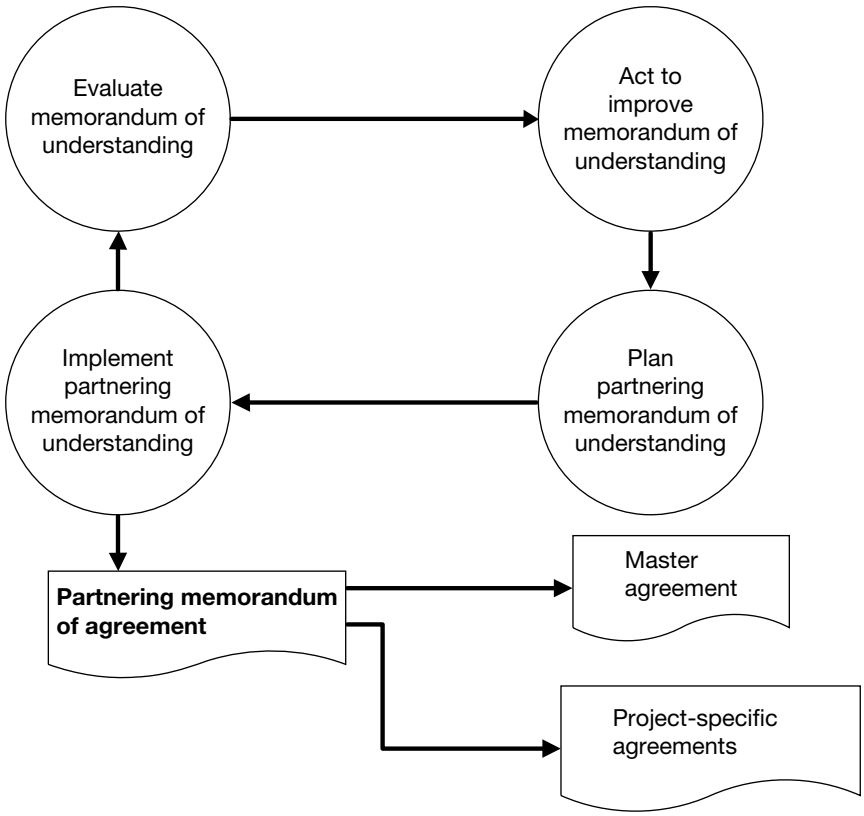

Figure 4.1. The partnering process between public agencies and railroads.

- Both agree to standard construction and maintenance agreements with provisions that can be incorporated into all projects.
- Both recognize that they experience staff turnover and that they want to institutionalize the mutually beneficial project-review process to extend beyond the tenure of individuals.
- Both parties identify a central point of contact responsible for all project coordination.
- Each recognizes that the other will expend considerable effort to execute the letter and spirit of the understanding, and both express their intent to fulfill their obligations.
- Both agree to identify the typical project milestones at which they agree to submit plans for review.
- The highway agency agrees to create a central project repository to assist with knowledge management and "institutional memory."
- Both recognize that frequent and ongoing communication is desired.
- The highway agency agrees to train project-development personnel on the basic railroad provisions to be incorporated into all projects.
- Agree to adopt a cooperative and joint continuous improvement attitude toward the project review process.

Step 2: Implement the Partnering Memorandum

In this step of the partnering process, the public agency and the railroad develop and eventually sign a memorandum of understanding formalizing their intentions to partner on the overall project agreement process (partnering MOU).

Step 3: Evaluate the Partnering Memorandum

This third step of the partnering process occurs sometime after the implementation of the memorandum, optimally 1 year after implementation. In this step, the railroad and the public agency meet to evaluate the performance and the outcome of the actions resulting from the memorandum and the practices adopted in earlier steps. During this meeting, they do the following:

- Review the performance of the implemented agreements, practices, and processes as a result of the memorandum.
- Review and evaluate both ongoing and completed projects.
- Identify issues with the agreements, processes, and practices. Potential changes and "continuous improvement" opportunities can be identified.

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Step 4: Act to Improve the Partnering Memorandum

If the changes from the previous step require discussion and concurrence with others from within their respective organizations, then the two parties will meet again after obtaining internal feedback. The results of this step will be a list of changes that need to be made to the existing partnering agreement. These recommended improvements will then be incorporated into the memorandum and used to refine the process. The objective of Step 4 is to continue the cycle of continuous improvement throughout the partnering process.

Implementation at the Program and Project Levels

The four steps described above lead to a programmatic agreement to create a partnering process for the overall highway–railroad relationship. The same logic that is used at the programmatic level is also used at the individual project level. Each project, in effect, is handled through a similar series of steps and processes that mirror the larger, programmatic relationship between the two organizations.

Figure 4.2 shows that the implementation of the partnering process occurs at both the project level and the overall program level. The feedback from the results of the implementation both at the program and at the project level will be used as input to improve the partnering process detailed in Figure 4.1. Applicable changes will be incorporated, plans will be revised, and changes will be made to the master agreements, project agreements, program agreements, practices, and provisions in the partnering process.

Examples of Best Practices and Processes

The implementation steps described in this section elaborate on the best practices that are incorporated into the memorandum described earlier. Many of them were identified in general by the members of the advisory panel. When the advisory panel and the resulting survey identified a best practice, the project team researched examples of it as employed by highway agencies or railroads around the country. The following best practices are synthesized from several examples found nationally. Some are modified to include examples pulled from the partnering and streamlining processes.

In keeping with the project requirements, any constraints—including financial ones—that must be considered or overcome are included.

Project Start-up Meeting: Trigger for the Start of Project Partnering

Ongoing communication and having buy-in from both parties are key elements to developing partnerships that will ensure the

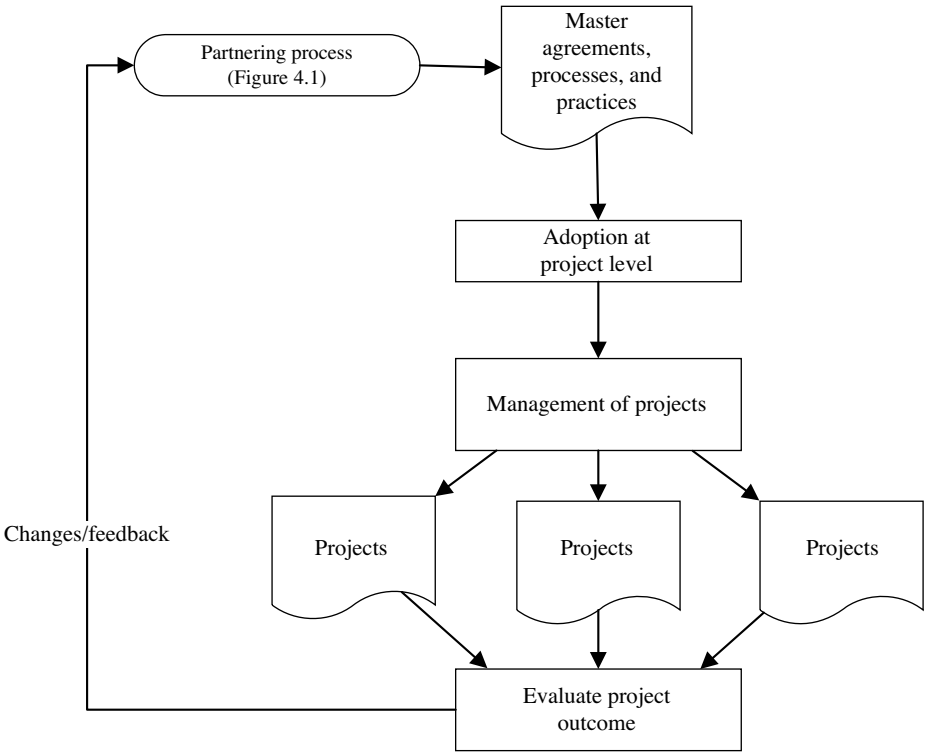

Figure 4.2. Partnering cycle.

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success of any process that is implemented. To facilitate this, conducting early start-up meetings for all new projects is a good practice. All transportation agencies have a project development process (PDP) for new projects. The PDP details the steps that agencies take from the start of the planning process to the end of construction of the project. Early in the PDP, the highway agencies look at existing data, conduct technical studies, prepare base maps and identify study areas and logical termini for new projects. If during this early stage the study areas indicate any potential impact to the railroads, the highway agencies should engage the railroads in early discussions. Early coordination and communication between the railroads and highway agencies could eliminate or at least reduce disagreements as the projects proceed to design and construction.

One of the early steps in most highway agencies' PDP is identifying stakeholders and communicating with them. Highway agencies should treat the railroads as an important stakeholder through the PDP process and communicate with them on projects that cross or are in close vicinity to a railroad. This early involvement should provide the railroads information that can initiate internal discussion and could prevent major delays later in the process.

Legal, financial, institutional, or other constraints to implementing this process: None. All projects affecting railroads are eventually coordinated with the railroad. This best practice only accelerates the notification and makes it routine early in every involved project.

Liaison and Coordination

The process for liaison and coordination of activities on projects both within the agency and with the railroads plays an important role in reducing stress, minimizing miscommunication, streamlining work and resource requirements, minimizing delays, and effectively and efficiently delivering the project.

The best decisions can fail because of improper coordination resulting in poor implementation. For projects to be successful, good decisions should be followed by good coordination that involves communicating the goals clearly and translating them into specific expectations, actions, and clear goals on deliverables and schedules.

Highway agencies and railroads are large organizations with complex operational needs and organizational structures. Moreover, the priorities, roles, and responsibilities of personnel in each highway agency and within various divisions and districts vary. Coordination helps get everyone to march to the same beat. It helps streamline the overall project process, eliminate duplication, and avoid confusion on priorities.

Some state DOTs have an organizational unit that is dedicated to coordinating all activities for the various internal divisions. The office also coordinates with external agencies such as the railroads. Other DOTs have virtual organizational units where staff from various organizational units collaborate to coordinate the same activities. In either case, the importance of coordination is recognized and special attention is given to the activity. Also, personnel assigned to the coordination task have certain authority to take actions and manage aspects of projects.

Having someone in a highway agency that acts as a liaison and coordinates projects with the railroad helps the agency in the following areas:

- **Focus on organizational goals.** Focus on the overall agency goals and prioritize activities across projects to ensure that the overall goals of the agency are achieved. This eliminates districts and divisions focusing on regional priorities.
- **Eliminates internal competition.** Eliminates situations in which divisions or districts communicate and negotiate higher priorities for their own projects versus those submitted by other divisions or districts. It also eliminates competition among agency personnel for the attention of the railroads.
- **Reduces contentious discussions involving the railroad.** The task of prioritizing projects can lead to contentious discussions between the railroad and agency personnel and could have a negative effect on relationship and trust between various personnel on both sides.
- **Effective use of railroad's time.** Reduces the time on project management activities required from the railroads. The activities involved in prioritizing tasks across multiple projects can be time consuming and often require significant time in project management including negotiations and coordination with project sponsors. It is time-consuming for the railroad to take on the task of prioritizing and coordinating agency projects and activities.
- **Provides clear direction to railroad on agency project priorities.** Provides clear direction and guidance to the railroads on the project priorities of the agency and provides clearer timelines for various deliverables.
- **More options for the agency to change project priorities.** Enables the agency to communicate change in project priorities and reshuffle projects when agency priorities change.
- **Consistency in project management agencywide.** Provides consistency in dealing with projects across multiple districts and regions. This consistency makes it easier for the railroad to work on multiple projects within an agency than when dealing with varying processes and approaches of different projects and project managers within an agency.
- **Consistency in negotiations and billing.** Facilitates consistency in negotiations, policies, billings, designs, agreements, and other aspects of work between the agency and the railroads.
- **Facilitates continuous improvement.** Facilitates continuous improvement and sharing and adoption of best practices within the agency.

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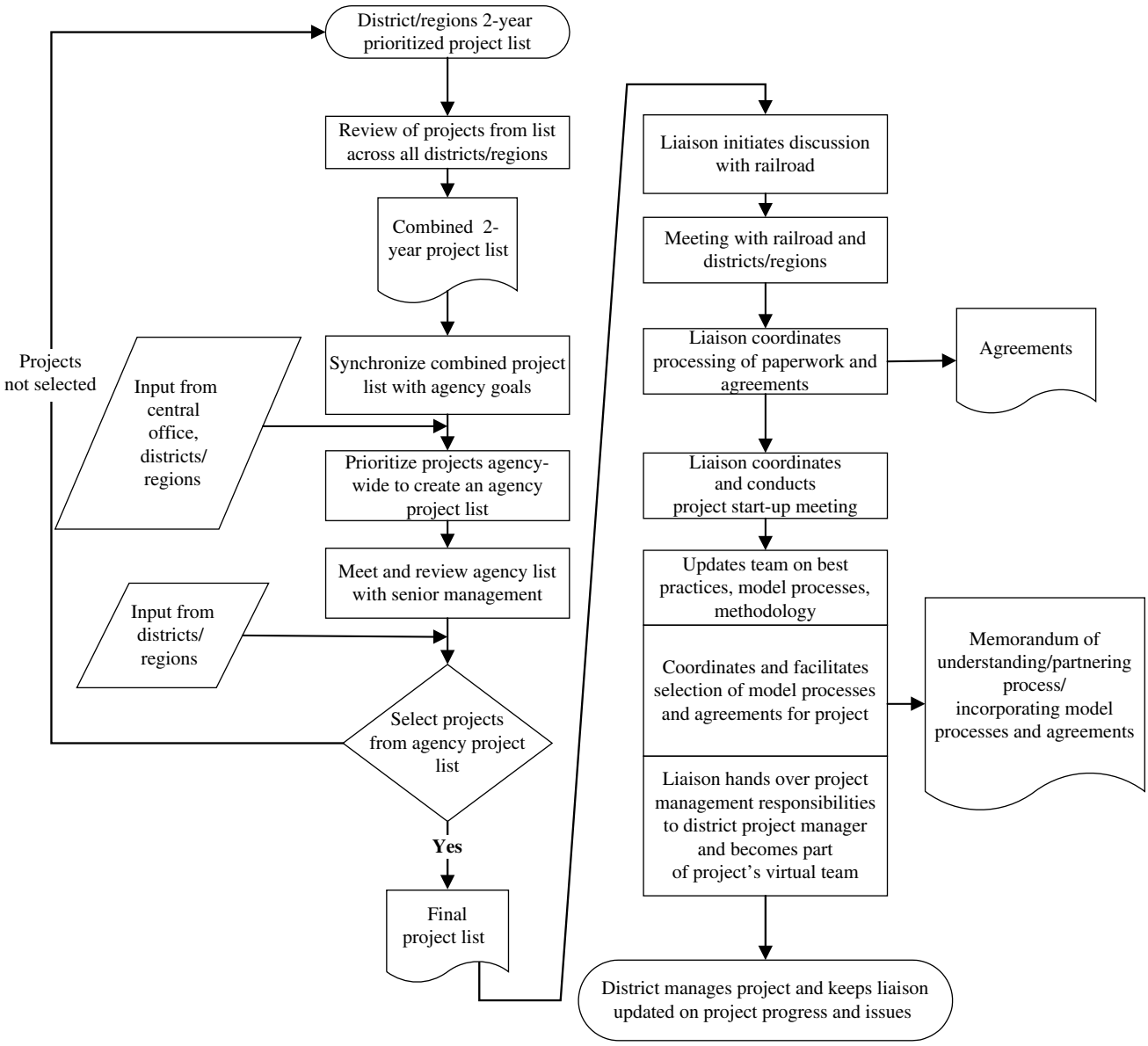

Figure 4.3. Steps in coordinating projects.

A number of steps are involved in the coordination of projects (Figure 4.3). First, the districts/regions prioritize their list of projects that involve the railroad for the next 2 years and provide the priority list to the liaison. The liaison then

1. Reviews projects across all divisions and regions;
2. Creates a combined 2-year list of projects;
3. Synchronizes the 2-year list to ensure consistency with the goals of the agency;
4. Obtains input from districts and divisions, prioritizes the project list, and prepares for meeting with agency senior management;
5. Meets with appropriate level of agency senior management and discusses and finalizes the list and the order of priority;
6. Communicates with the agency's districts and regions and obtains concurrence;
7. Coordinates with the railroads and initiates discussion;
8. Coordinates with all internal agency divisions and appropriate person(s)/areas within the railroads to schedule discussions and meetings to get all necessary paperwork completed and appropriate agreements signed;
9. Leads the initial coordination and start-up meetings for projects;
10. Provides an update and shares information about agency processes, best practices, and methodology with agency and railroad teams, as appropriate (this information sharing ensures consistency in practices across projects);
11. Hands over project management lead responsibility to districts/regions;

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12. Stays involved as a virtual project team member on the projects;
13. Keeps track of project progress and coordinates activities between divisions/regions, other offices within the agency, and the railroads to resolve issues and keep the projects on schedule, scope, and budget;
14. Attends relevant project meetings and assists with resolving issues;
15. Attends national conferences and communicates with other states to keep updated on new practices, processes, methodologies, and other issues that can help improve agency project delivery; and
16. Attends closeout meetings and culls new practices, processes, and lessons learned and incorporates these into the agency knowledge base for use in future projects.

Legal, financial, institutional, or other constraints to implementing this process: The creation of the position or office of liaison will require initiative and buy-in from the agency leadership team. Since the liaison will be required to work across districts on the prioritization of projects and in the event of any resource constraints, will need to have the authority to make decisions, support for the position/office of the liaison from senior agency management is important. A possible constraint could be the cost of funding such a position.

Formal Communication and Information Sharing

In today's age of mass communication and e-mail overload, the balance between no communication and too much communication is extremely important. Effective communication involves communicating with the right person(s) and providing the right amount of information that has the right level of detail. Ensuring that appropriate communication protocols are identified ahead of time and followed through will facilitate partnering and keeping projects on track. The information gathered by the SHRP 2 R16 project team showed that, frequently, delays in obtaining timely reviews and feedback occurred in agencies where communication was informal.

Railroads have procedures on who should be contacted and what needs to be included in the communication package for various services on projects. For instance, BNSF has partnered with Staubach Global Services to provide all real estate services. Staubach processes all requests for permits to access BNSF's property. The process for contacting and communicating with Staubach is formal and is detailed on a website. Similarly, Norfolk Southern Corporation has secured the services of DMJM Harris to process all right-of-entry applications. The process includes application processing and approval. After approval is received, the agency has to contact the approved Norfolk Southern designee listed in the approval papers before entering the Norfolk Southern property.

Although the railroads have created a position of public projects manager (PPM) who is responsible for coordinating all project activities between divisions and sections within the railroad and the public agency, there are processes similar to those listed above where interacting with the railroads does not involve the PPM. The railroad PPM is likewise not the one to contact for obtaining flagging services. Depending on the type of project and the railroad involved, the processes vary. So, it is important for each agency to identify early in the process all appropriate communication protocols, processes, and contact persons for various aspects of the project, along with their responsibilities and contact information.

Legal, financial, institutional, or other constraints to implementing this process: The communication processes vary, depending on the type of project and the railroads involved. To keep projects on schedule, the agency should identify all applicable processes and make them available to the project team. The processes may change periodically making it necessary for quick review and validation at the start of the project. This is especially important if the project team members are new to the process or have not worked on similar projects with a particular railroad. A lack of resources to devote to this task would be the primary constraint.

Escalation Procedures

Having an escalation procedure for timely resolution of issues is common practice in the service industry. Delays in solving a customer problem could lead to irreparable damage to a company's name and to loss of customers and future business. To mitigate such issues, escalation procedures are integrated into service industry operations. They help keep projects on track and expeditiously resolve issues or find solutions to customer queries within a prespecified period.

Escalation procedures also are common in construction project partnering. Most construction partnering agreements include a clear path of different levels of escalation that should be pursued if decisions cannot be reached within a specified period. Likewise, the environmental streamlining guidance generally includes escalation procedures when front-line staff at highway agencies and resource agencies cannot reach agreement.

Escalation procedures are sometimes perceived as a bad practice of going above someone in the chain of command to achieve a resolution. However, there are circumstances when a project can come to a standstill without escalation in which one cannot find fault with the participants. Examples include the following:

- Limitation in technical expertise of the participants involved;
- Limitation in authority to approve changes to the project scope, schedule, or budget;

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- Need to add other resources to the project beyond the authority of current participants;
- Schedules of current participants may not permit timely resolution of issues;
- Legislative, policy, and other regulatory changes beyond the charge or authority of participants involved; and
- Need to get other internal and external parties involved in the decision.

Escalation procedures are effective if used constructively to deliver projects on time and within scope and budget.

The process suggested is a generalized version of the process adopted by the Washington State Department of Transportation (WSDOT). WSDOT has successfully used escalation procedures to expedite agreement processing. Its formal escalation procedure to address issues related to agreement processing between its Environmental and Engineering Programs Division and BNSF, detailed in chapter 3 (see p. 35), can be considered a starting point for highway agencies and railroads, and it can be changed to accommodate individual agency and railroad circumstances, project types, needs, agreements, and organizational structure.

Legal, financial, institutional, or other constraints to implementing this process: The success of this strategy depends on both the agency and the railroads agreeing to have managers in the higher levels available for meetings and discussions to resolve issues expeditiously.

Dedicated Railroad Person for Agency Projects

The railroads operate as a business; major areas of their focus are safety, growth, and profitability. Highway projects, however, in a majority of cases, do not help the railroads.

The organizational structure of the railroads is streamlined to do railroad projects. Typically, railroads have four major divisions: transportation, engineering, mechanical, and marketing. Often, depending on the type and complexity of the highway projects that involve the railroads, several, if not all, of these four divisions have some involvement with public projects. Receiving and responding to communications and coordinating requests for input on projects and services from multiple states, and sometimes from multiple persons within one state agency, can be time-consuming and often frustrating for the railroad personnel.

To mitigate such issues and to streamline the process of coordinating project requests and activities with the railroads, most Class I railroads have created the position of the public projects manager (PPM). The PPM is responsible for coordinating all project activities between the railroad (including all its divisions and sections) and the public agency. Still, the PPMs are responsible for multiple states and their busy schedules make it difficult for them to focus their attention on just one state's projects. The business model of the railroad requires each division/section to be independently profitable. The uncertainty in the number of projects, in a project's proceeding beyond the preliminary engineering stage and getting completed, and the in the level of funding that will be available from the states makes it difficult for the railroads to add resources to the public project's area. Over the years, several state agencies have each funded a position in the railroads dedicated to focusing and expediting the respective agencies' projects. For example, WSDOT funds a position in BNSF that

- Expedites and coordinates reviews, approvals, and processing agreements;
- Manages BNSF's public agency construction and maintenance agreement process, including reviewing and distributing agreement documents and contract plans, securing estimates of work to be done by BNSF, and performing other duties normally handled by the BNSF PPM;
- Schedules face-to-face meetings and manages other aspects of coordination between WSDOT and BNSF to keep agency projects that interact with or impact BNSF property within schedule, budget, and scope;
- Signs and releases the agency project-related agreements, approval letter, and regulatory petition (subject to BNSF rules governing delegation of authority and the responsibilities normally within the authority of the BNSF PPM); and
- Keeps both parties informed about project status and issues, expedites issue resolution, and submits monthly reports detailing work performed in the previous month.

The responsibilities of both sides are detailed in an agreement.

During interviews and discussions with both the railroads and the transportation agencies, participants said project delays occurred on projects as a result of the time taken to get both sides available for meetings to resolve issues. Sometimes the cost of such delays could be more than the cost of funding a position with the railroad. Though the delays are often unavoidable, stopping project work can cost the agency thousands of dollars a day.

Since it may not be financially possible or politically popular for an agency to fund such a PPM position in the railroad, state agencies could adopt a hybrid version of the model adopted by WSDOT. This hybrid version would include the following considerations:

- Two or three adjacent states that work with the same railroad collaborate on funding a position in the railroad dedicated to addressing their needs.

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- The dedicated railroad person could meet each of the collaborating/partnering states in rotation on an agreed schedule.
- The collaboration makes it possible for more give-and-take between the partnering states.
- In case of serious issues requiring more attention in one state for a short period, the collaborating agency liaisons could negotiate temporary schedule changes.
- The partnering states could collaborate on developing standard agreements, processes, and practices for arrangements and workings between the agency and the railroad.
- With a larger pool of resources to tap, the partnering state agencies could benefit from knowledge sharing. This arrangement would also allow the railroad to focus more effort on the agencies' projects.

Depending on the needs and circumstances of each partnering agency, changes can be made to customize this model process.

Legal, financial, institutional, or other constraints to implementing this process: Success of this strategy depends on adjacent states having projects with the same railroad. It will also depend on the willingness of the states to collaborate. There may be some challenges to collaborate on funding the position. The partnering agencies will have to spend some time initially to discuss and detail the working arrangements. However, all the constraints appear surmountable.

One process that is a result of having a dedicated person within the railroad is the WSDOT–BNSF agreement process that is shown in Figure 3.1. The process ensures that all agreements between the agency and the railroad will be completed within 31 weeks of initiation.

An enhancement of this model would be the inclusion of a financial incentive for meeting the project duration goal. For example, it is common practice for construction project agreements to include financial incentives to the contractor for completing the project before a specified goal date and a penalty for delay beyond a specified date. A similar model could be included in the agreement processing, where some form of financial incentive can be included for agreements that are processed before the agreed duration is completed.

Effective Project Management

Bad project management can delay even a simple project, while the most complex and difficult project can be successfully completed within schedule, scope, and budget using effective project management. Good project management can help minimize stress, conflicts, contentious relationships, and surprises and smooth the working relationship between highway agencies and railroads.

During the project team's visits and interviews with agencies they observed that agencies that had formal processes for managing projects with the railroads were more successful at identifying potential issues and getting them resolved early in the process. Agencies with more informal processes that often revolved around using e-mail and calling the railroads on an as-needed basis to discuss issues had more difficulty getting timely responses. The delay in responding to on-the-spot calls has been attributed to the busy schedules of the railroad project managers and the lack of clarity regarding the issue that needed to be resolved. By adopting formal project management processes, these issues can be improved.

Some recommended activities associated with project management that can help expedite review and delivery of highway projects are listed below. Each project will have its own nuances and will require the project manager to make adjustments based on resource availability and staffing commitments.

Some of the steps for effectively managing projects that interact with or involve railroads include:

- **Kick-off meeting.** Having a virtual or face-to-face kick-off meeting at the start of each project is a recommended project management best practice. Considering the busy travel schedules and large territories covered by the railroad PPMs, this also initiates the process of getting both parties engaged and brings the project back into focus for both sides.
- **Participation management.** Prior to the start of the project, identify and clarify roles and responsibilities. This will make clear *who does what and when* and will make the management and delivery of the project more efficient.
- **Schedule management.** Ensure that before the project starts, the schedule of activities needed to successfully complete the project is agreed on or at least understood by both parties. The schedule is monitored and managed carefully and all changes are agreed on and reflected in the schedule. The project schedule should be easily accessible to everyone on the project. The project manager should keep everyone associated with the project informed about the activities, with special emphasis on those on the critical path, and follow up on activities that have potential to get delayed or that are delayed.
- **Scheduled monthly or quarterly project-update meetings.** A formal schedule for conducting meetings ensures that time is allocated to the project. These meetings will vary in frequency, depending on the stage and complexity of the project. The frequency of most project meetings build up to monthly and then reduce to quarterly or less frequently toward the end of the project. The project manager can monitor the project progress and make changes to schedules as necessary.
- **Detailed agenda for each meeting.** Providing a detailed agenda ahead of time will ensure some level of preparation by attendees prior to the meeting. It also keeps focus on important areas that need discussion and keeps the meeting

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on track. It helps the team resolve project issues and keeps everyone informed about decisions made on the project.

- **Tracking issues and assigning responsibility for resolution.** Anything that is measured and tracked is more likely to get done, so issues and their effective resolution must be identified early and deadline dates for resolution of issues and follow-up on resolutions should be specified. The project manager should list and discuss all issues during meetings and assign responsibility for resolution of each issue to individuals or groups. Special emphasis should be given to the following areas:
  - Design standards;
  - Safety and railroad operations;
  - Project review and schedule;
  - Resource allocation;
  - Costs and billing; and
  - Insurance.
- **Meeting minutes.** Meeting minutes must be promptly captured and shared with participants and those involved in making decisions.
- **Informal discussions.** The project manager should provide time and opportunity whenever possible for informal discussions. These allow participants to discuss and share concerns and issues that they may otherwise be reluctant to discuss and help build trust and strengthen relationships.

Legal, financial, institutional, or other constraints to implementing this process: There may be resource constraints that make it difficult to assign agency resources to manage the project during its early stages. In some cases, there may be some upfront effort required to develop the project plan, schedule meetings, and get the participation needed for the successful completion of the project.

Conducting Quality Assurance Reviews and Feedback

The quality improvement cycle shown in Figure 4.4 is an effective way of analyzing processes; identifying areas of improvement; monitoring performance; devising action plans to improve performance; and then revising goals, processes, and action plans to further improve performance. This cycle of continuous improvement not only helps improve processes and practices but also helps knowledge sharing and knowledge transfer with new employees. The continuous-improvement cycle is inherent within the memorandum of understanding discussed earlier.

The continuous-improvement principles have been incorporated into the following model for a quality assurance review process. Conducting quality assurance reviews (QARs) and providing feedback on practices, agreement processing, issue resolution, and other activities can improve performance and identify innovations. The quality assurance reviews can serve as an effective mechanism to build partnerships within the agency and between the highway agency and the railroad. There are several models for conducting QARs, and agencies can customize the models depending on their needs. The review cycle is generally conducted every alternate year.

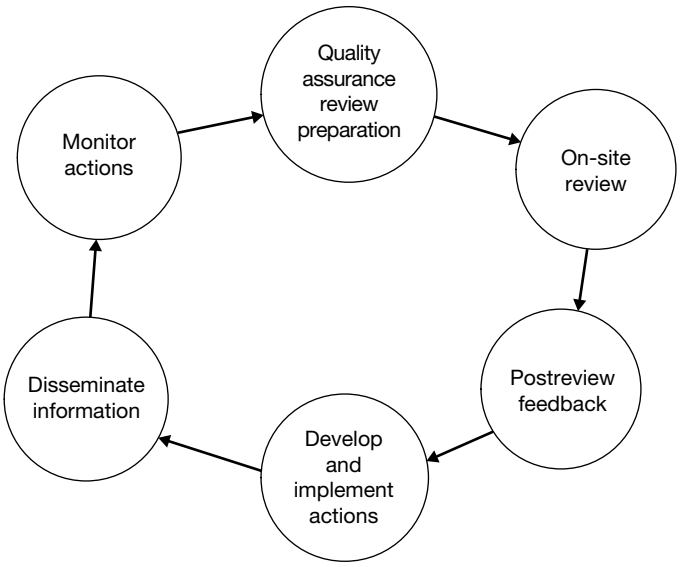

Figure 4.4. Steps in the continuous-improvement process.

A simple model involves creating a quality assurance review group (QARG) that will be responsible for conducting the reviews. This group can be a virtual group that meets according to a predetermined schedule to work on the QAR. The QAR is conducted on districts and divisions that have worked on railroad–highway projects during the review cycle.

The QAR consists of six major steps:

1. Quality assurance preparation;
2. On-site review;
3. Postreview feedback;
4. Develop and implement improvement actions;
5. Disseminate information; and
6. Monitor actions.

Quality Assurance Preparation

The following actions are taken by the QARG in preparation for the quality review:

- Select representative projects from each district and division, including projects in the stages of planning, preliminary development, and construction.
- Review actions and plans implemented in previous review cycles.

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- Highlight potential areas of excellence and areas of deficiency for review during the site visit.
- Communicate and schedule a date for each site visit.

On-Site Review

- The QARG meets with the district and division personnel to jointly review the processes and practices identified as areas of excellence and areas of deficiency during the preparation phase. This often involves a step-by-step review from the start to the end of each process. If there is any impact on the railroads or if action is required from them, they will also be invited to these meetings.
- The two teams (one consisting of the QARG and district and division personnel and the other of the railroad personnel) may jointly review new agreements from initiation to execution.
- For the preliminary engineering and construction stages, the QARG, district and division personnel, and, if available, railroad personnel
  - Start with reviewing the steps involved with agreement initiation;
  - Review the planning and coordination processes used, looking at each process at various milestone points in the project life cycle—for example, at approximately 30%, 60%, and 90% of project development; and
  - Look at project management and other activities that occur during the construction process, including day-to-day project activities; communication; process used to manage schedule, cost; and scope; time taken to resolve issues, billing, insurance, and other similar activities that could potentially delay a project.
- For projects that are completed during the review cycle, the team
  - Reviews postconstruction activities, such as postconstruction meetings;
  - Examines the lessons learned; and
  - Ensures that the lessons learned are incorporated into the agency processes and that procedures are in place for incorporating future lessons learned.
- During the review, the QARG validates areas of excellence and areas of improvement identified in the preparation phase and creates a final list for follow-up.
- The QARG also checks to see if early coordination is being done.

Postreview Feedback

- After the review is completed, the QARG provides a written report back to each district and division and all railroads involved in the quality review, as applicable. The report provides feedback on their performance, areas of excellence, and areas of deficiencies.
- The district/division and, where applicable, the railroads review the feedback report and respond with their comments.

Develop and Implement Improvement Actions

- In collaboration with individual districts/divisions and railroads, where applicable, the review team sets up action plans that address the areas of improvement.
- The implementation plans have goals and deadlines for each action.
- The improvement action items are also reviewed in the next review cycle.

Disseminate Information

- The QARG either conducts one joint meeting with all the districts/divisions and railroads that were part of the quality review or conducts meetings with each district and each division and railroad as applicable, to share findings.
- At this meeting, the QARG will share
  - The summary of all good practices and all areas of excellence;
  - The areas of deficiencies and actions implemented to address issues;
  - Practices to avoid; and
  - Lessons learned.

Monitor Actions

- The QARG monitors the results of implemented actions and provides guidance as necessary.
- The QARG conducts meetings to ensure that action plans are being implemented and the desired outcome is being achieved.

The above process provides the focus necessary for continuous improvement and facilitates sharing of knowledge and best practices within the agency. Agencies can modify the process, the review cycle and the timing of the reviews to meet their agency needs.

Legal, financial, institutional, or other constraints to implementing this process: There may be resource constraints that make it difficult to assign agency resources to conduct quality assurance reviews.

Central Project Repository

Locating information days or months after it is received is challenging. Having a central repository for all projects makes it easier to publish, post, retrieve, and review the latest project information. Sending simple e-mails with links when new information is posted on the site can act as a trigger for

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the recipient to access the link and view the information. This also allows the participants to go to the repository link anytime later and access the information. The repository can be a simple file system on a server managed through permission controls or it can be a simple application permitting access through a website.

The most common practice for communication between the railroads and highway agencies currently is via e-mails, attaching documents to e-mails where necessary. The advantage of e-mail is that it can be accessed from anywhere using mobile devices and is thus a quick way to communicate. On the other hand, this convenience has led to the excessive use of e-mails, where it becomes difficult to sort through the gigabytes of e-mails and to distinguish the important e-mails from the unimportant.

Agency staff and railroads have shared some of the challenges and hurdles that new employees face because of a lack of formal transition of documents and training as they start working on projects. One agency staff member shared his challenge of having to sift through years of files and finally having to ask the railroads for information to help him get started on a project. Another public agency–railroad liaison explained how his predecessor had created a folder of several years of project documents that he handed over prior to his retirement. The files were invaluable and helped with a quicker transition. The folder had years of project information, issues, and resolutions and continues to be a valuable resource.

The railroad public projects manager coordinates and directs most of the communication between the public agency and the internal divisions/sections within the railroads. The PPMs normally forward documents received from the public agencies to others within the railroads and then responds back to the public agencies using e-mails to forward documents reviewed and approved by the railroad personnel. Although convenient, the exclusive reliance on e-mails does not create an institutional record of transmittals between the highway agency and the railroad.

In view of the current communication practices in the industry, the model process uses e-mails where appropriate, along with links to files on a central repository. The model proposes a central repository where all information associated with projects that involve both road and rail is stored in a logical fashion. Change management and version control procedures should be defined, shared with all users, and managed at the project level by the project manager. This will ensure that appropriate versions of pertinent documents for each project are stored in the repository and access to the files/folders can be managed and controlled. An agency can decide whether to give access to folders and files to a railroad depending on the agency's business model. Even if access to the repository is provided to agency personnel only, the agency will benefit both in cost savings on storage and access and by creating a knowledge base of projects that will be beneficial for all agency employees. This will reduce the time required for new employees to get conversant on projects, practices, and other pertinent information as they start working on projects. The repository can be implemented to facilitate consistency and sharing of practices across projects.

A central repository has many useful functions. These include the following:

- Projects and files can be logically organized. This will help new personnel to navigate the file structure and find project information. Staff turnover is a common problem. The repository can play an important role in knowledge sharing and help train new personnel taking on project responsibilities.
- It allows access to files through e-mail links. Processes can be implemented where employees can get alerts when new files are published to the repository or changes are made to project plans. The agency can also allow the railroad personnel, if given permission, to access the repository and download or review files via the links.
- It enables agency personnel to review both technical and managerial information associated with older projects that may be helpful to ongoing or new projects.
- It makes it easy to access project information and documents at anytime in the life of the project.
- It helps manage versions. It is easier to access the latest version of documents from a central repository instead of having to search e-mails or to search within personal file folders to access versions of documents.
- It reduces use of overall disk storage in the agency when all versions of documents are stored and accessed via the central repository. This eliminates the need for individual employees to save attachments received in e-mails.
- It leaves a legacy of information on projects for future employees. The repository is a good place to access old agreements and information about processes, practices, lessons learned, and issues encountered and how they were resolved.

Legal, financial, institutional, or other constraints to implementing this process: Implementing a central repository requires initial investment of time and resources. Agencies may have many other priorities competing for resources and since a mechanism of e-mails exists to serve the purpose, they may not give the design and implementation of a repository the priority necessary to make it successful.

Model Process for Design and Construction

Though this aspect has been covered in several other processes, a special focus is being given here to design and construction

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details because of the disproportionate attention they received throughout the project's interviews. Concerns for safety by the railroads have triggered many discussions stemming from the highway agencies' construction phasing and design details deviating from the railroads' recommended standards. In order to address these concerns, the following process is recommended:

- Involve the railroads early in the project development process.
- Where possible, in preparing project plans and designs, hire engineering firms that have experience working on similar projects involving both roads and railroads.
- Use design standards and processes approved by the railroads. These are documented by each railroad.
- Get sign-off from the railroads as the project proceeds through the planning, design, and construction process.
- Make sure to have frequent and constant communication with the railroad throughout the project development process, including at 30%, 60%, and 90% plan completion.
- Identify, closely manage, and resolve issues, and monitor progress on
  - Complex design and related issues;
  - Changed design standards;
  - Safety standards; and
  - Construction issues that require special modification.

Legal, financial, institutional, or other constraints to implementing this process: The railroads have great concerns about changes to standard designs or construction methods, so it is important for the agency to make sure that staff and consultants working on projects are trained in railroad design. It is also important to get the railroads involved and comfortable with the design early in the project development process.

Model Agreements

Public agencies are required to have a contract in order to make payments to other entities. Therefore, contracts must be executed before highway agencies can compensate railroads for preliminary engineering reviews, flagging services, easements, and other expenses relating to highway railroad projects. Agreements for such payments lend themselves to standardization because of the similar issues that they repeatedly address. The use of standard agreements for many types of projects has been common for a number of years. Interviews with highway agencies revealed that they commonly reuse, with slight modifications, past contracts that have been earlier agreed to by both parties.

An innovation in the use of standard agreements is the development of an overall master agreement that incorporates many basic legal provisions, which then can be incorporated by reference in subsequent project–specific agreements. The list below details the types of provisions that can be included in the master agreement. The master agreement can address recurring non-project-specific issues, such as how to address standard provisions in construction contracts, insurance limits, personnel training, and other issues universal to all projects or contributory to the partnering process. A generic master agreement is provided in Appendix C.

Another advantage of the master agreement is that it can be the legal vehicle to compensate the railroads for expenses that improve the overall process but are not tied to individual projects. Generally, if a project agreement is the only vehicle for allowing payment, costs need to be associated with a specific project. This payment limitation can inhibit the railroads from providing engineering advice on general practices, which may be necessary to enhance the overall partnering process. If the master agreement includes provisions for the payment of general advice, then those provisions can be the basis for the railroads to participate in a wider range of interactions in the partnering process.

The following are typical master agreement provisions:

- Parties agree to authorize preliminary engineering (PE) within 30 days of notification of the railroad.
- No contractors or department employees can proceed without written approval from the railroad.
- Railroad will provide right-of-entry for PE and construction activities, with due notice.
- Department agrees to select consultants experienced with specific railroad.
- Department will ensure that insurance provisions will be met by contractor.
- Railroad will make all reasonable efforts to accommodate contractors.
- Parties recognize that it is in the interest of taxpayers and shareholders that both entities economize.
- Railroad agrees to 60-day reviews of PE submittals.
- Department will provide 30 days' notice of flagging needs. Railroad will make all reasonable attempts to provide flagging.
- Railroad will specify operating envelope and construction windows.
- Both want safe, efficient highway and railroad operations.
- Railroad agrees to keep thorough records for invoicing of PE expenses.
- Plans affecting railroad will require approved safety training for contractors.
- A separate right-of-way agreement will be developed if needed.
- Parties recognize that a master agreement is needed to standardize the legal review process.

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- Department agrees to 30-day prompt payment of complete invoices.
- All plans will require preconstruction meeting to be offered to railroad.
- A postconstruction meeting will be offered to railroad.
- Preliminary engineering is defined.
- Both parties will agree to standard PE rate schedule.
- All plans will note the railroad's control of the project site and its ability to direct the contractor in issues relating to safety and train operations.
- Separate project agreement will address maintenance agreement.
- Both parties agree to develop a standard PE agreement.
- Both parties agree to abide by Title 23 eligibility.
- All plans will note that the contractor will abide by all railroad utility and right-of-way agreements.
- Thirty days' notice will be given railroad for maintenance right-of-entry needs.
- Department agrees to give timely notice of intention to develop a project.
- PE approval does not constitute project approval or participation.
- Plans will note that railroad has the right to inspect and approve all work affecting railroad.
- Railroad will keep and provide auditable, complete records.
- The parties will indemnify the other for individual negligent liability and will share joint liability.
- Department will attempt 30-day prompt payment of railroad expenses.

Legal, financial, institutional, or other constraints to implementing this process: There appear to be no legal or financial constraints to the process of developing a master agreement. The provisions of the master agreement are not new in that they have been included in the individual project agreements. There may be institutional constraints to developing a master agreement. These constraints could consist of the time involved for staff attorneys to negotiate a master agreement and of institutional inertia regarding developing a new process.

Scheduled Project Closeout Meetings

Another best practice is the conduct of closeout meetings after complex or major construction projects to share practices that helped the project and to compile lessons learned. This should be a forum where both sides can share candidly their experience about the project and about the practices, processes, and aspects of agreements they recommend be retained and those that should be eliminated or changed. Areas for discussion could include the following:

- Identification of processes and practices that expedited and helped the successful delivery of the project.
- Analysis and discussion of practices, processes, and documents that delayed or hindered the project.
- Discussion of practices, processes, and documents that need to be revised.
- Identification and resolution of possible billing and reimbursement issues.
- Identification of changes that need to be made to
  - Any agreement;
  - Other legal processes;
  - Bill processing;
  - Reimbursements;
  - Project management processes;
  - Any aspect of insurance; and
  - Other aspects of the project.

This feedback process will allow the agency to make refinements to the existing approach and agreements to benefit future projects.

Legal, financial, institutional, or other constraints to implementing this process: None, except for the staff and travel time involved.

Annual Meetings

Irrespective of the type or complexity of the projects, there is general agreement that conducting annual meetings with participation from both the railroads and the highway agencies will help build partnerships. State transportation agencies such as the Pennsylvania and Iowa DOTs that conduct annual meetings and the railroads that participate in them, give such annual meetings high marks.

Pennsylvania invites a mix of different people, thus providing a forum for exchange of information and an opportunity to brainstorm and to network. Invitees include central office and district personnel and attorneys from the state. Railroads bring representatives from various levels of their management, including their attorney, public projects manager, and director of public works. They also bring to the meeting representatives from engineering firms that work with them on highway agency projects.

The Iowa DOT invites to the meeting similar representatives as well as railroad staff working on current projects and those who are expected to work on the following year's projects.

The idea of such a meeting is to discuss big-picture issues and to work toward establishing a common understanding of important areas, and then to agree on the mechanisms and processes to ensure successful execution of projects.

A high-level checklist of items to be considered at the annual meeting includes the following:

- Share communication protocols and contact information of personnel from both sides, particularly for new members.

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- Exchange information that will facilitate shared understanding and lead to establishing and meeting common expectations.
- Discuss issues and resolutions about current and previous year's projects.
- Discuss legal issues faced and any that are expected in the coming year, along with resolutions.
- Discuss processes and resolve any issues related to insurance, billing, or reimbursements.
- Discuss lessons learned and best practices from within the agency and the railroad.
- Discuss lessons learned and practices from other states or other railroads that are applicable and could be beneficial. Examples include the following:
  - Simple agreement and lump sum payment for rehabilitation projects as used by Iowa DOT;
  - Conducting preconstruction meetings and inviting surrounding businesses and community for briefing on project and impacts, if any;
  - Processes for collaboration on rehabilitation projects; and
  - Simple two-page standard agreement for rebuilding and rehabilitation of at-grade crossings.
- Discuss and make revisions to escalation procedures as necessary. If an escalation procedure is not in place, this could be a forum to start the discussion about an escalation process.
- Review and refine any dispute resolution process that is currently in use. If none exists, then share information and brainstorm about such processes used in other states and start the conversation for adoption in the state.
- Share information about major initiatives and major projects that either party will be involved with in the coming year.
- Share information about any expected legislation, ordinances, or regulations that will have an impact on projects or operations.
- Provide an opportunity to discuss any issues or questions about master agreements currently being used by the agency and railroad.
- Share master agreements from other states, the adoption of which will improve the project and processes for both sides. If possible, have someone from the state and railroad using the agreement either attend or, using video or phone, participate in the meeting to share their perspectives and answer questions.
- Discuss issues with existing project management processes. Update and refine the process based on feedback and discussion.
- Discuss any impacts to funding of projects. This could be increases or decreases in funding, along with changes to any processes related to funding.

Legal, financial, institutional, or other constraints to implementing this process: None, except for the staff and travel time involved.

Railroad Incentives

Cooperation between highway agencies and railroads in developing project agreements occurs continuously, as was documented by the discussions, surveys, and interviews summarized elsewhere in this report. All the Class I railroads devote considerable staff resources to accommodating reviews and to responding to state highway agency requests. Any discussion of incentives to increase cooperation should not be construed to indicate that little cooperation already exists.

Despite the institutional efforts to cooperate with public projects, delays do commonly occur and disagreements arise over project costs, scopes, and schedules. The delays that occur with project agreements indicate that some types of projects and some types of agreement processes are more successful than others. The best practices to reduce such delays were discussed earlier as were the federal regulations that can hamper the agreement process.

In this section of the report, the issue of incentives for railroad companies to collaborate with highway renewal projects is examined. In summary, many of the incentives for collaboration are very closely related to the best practices and process innovations cited earlier. The incentives for cooperation tend to be very similar to the practices, agreement provisions, attitudes, and communication strategies that already have been identified as streamlining the review process.

Providing incentives for the railroads to collaborate requires approaching the agreement process from the railroads' perspective. Projects and processes that complement the railroad's operations, reduce their risk, preserve their assets, and enhance their capacity are most often cited by the railroads as inducing their collaboration.

Railroads are privately held companies that survive only if shareholders are rewarded financially through increased stock value or dividends, providing customer service that is reliable and cost competitive, reducing their operating expenses, increasing profit while reducing the operating ratio, and operating in a safe manner. Any incentives would have a positive effect in these areas.

Attractive incentives for collaboration generally lie in three areas: safety and liability, capacity, and reduced operating costs.

Safety and Liability

Safety and liability are of overriding importance to a railroad. The railroad is interested in the safety of their trains, their employees, their cargo, anyone who ventures on to their property, and the surrounding communities through which they pass. The exposure to current and future liability is a major risk for the industry. As noted, railroads are required to provide transportation for hazardous materials. Whenever a contractor is working on or near the tracks, the possibility of a catastrophic hazardous material release that could cause deaths,

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debilitating injuries, and even mass evacuations increases. Some of the materials the railroads are required to transport include airborne and flammable toxic chemicals whose release could create significant loss of life and property, as well as disruptions to homes and businesses.

The Class I railroads provide a greater institutional focus on safety than is typical within the average state highway agency. Safety is not simply a slogan, but a way of operation practiced intensely throughout the industry.

From a project-approval perspective, projects that improve rail safety or reduce railroad liability are more likely to be well-received and more quickly approved, according to the rail officials interviewed for this study. The following are examples of these projects:

- Closing of highway grade crossings;
- Consolidating grade crossings;
- Constructing grade separations, particularly overhead;
- Safety improvements to highway grade crossings;
- Sealed grade crossing improvements, such as four-quadrant gates;
- Installation or upgrades for automatic flashing light signals and gates; and
- Securing pedestrian access on rights-of-way through fencing or other means.

A major goal of every railroad and the Federal Railroad Administration is to reduce the number of highway–railroad grade crossings. The liability that exists with motorists traveling across freight or passenger rail grade crossings is significant, and the only way to reduce the railroads' full exposure is by eliminating the crossing itself. Projects that are initiated with grade crossing reduction will be supported by the industry and may lead to financial contribution from the railroad. Corridor projects whereby a host of contiguous at-grade crossings are evaluated with the target of closing grade crossings and improving the safety at the remaining crossings are well supported by the railroad industry.

Grade separation projects that eliminate at-grade crossings are also well received. The rail industry prefers overhead to undergrade structures because the maintenance of the overhead structure is almost always the responsibility of the state or local government, not of the railroad.

Safety improvement initiatives at existing grade crossings where either the technology of the grade crossing protection is increased or additional protection such as the implementation of four-quadrant gates is provided are good candidates for gaining the railroads' cooperation. Four-quadrant gates seal off a vehicle's ability to cross over the tracks. In designing four-quadrant gates, the highway agency should ensure that the potential for trapping vehicles between the gates is eliminated. Four-quadrant gates are associated with quiet zones, which the railroads may support in cases where the zones provide greater protection than what currently exists. The Federal Railroad Administration has established new rules for quiet zones, and not in all cases will railroads support the implementation of them. The railroads generally do not want to increase their liability by eliminating horns, nor do they want the additional costs associated with gating all crossings to eliminate the need for horns.

Old track-circuit technology still exists at many grade crossings whereby the circuit does not have the ability to sense the movement or speed of the train and, consequently, the lights and gates at grade crossings may be activated long before the train reaches the grade crossing. New technology that measures train speed to activate the lights and gates within approximately 30 seconds of the train passing over the crossing is more effective and results in fewer accidents at grade crossings. With such "active warning," the liability to the railroad is reduced. This is because many crashes are caused by impatient drivers driving around closed crossing gates.

Renewal projects that secure the railroad's right-of-way, such as adding fencing along a limited-access freeway, can increase benefits to the railroad. The benefits are limited, but they reduce exposure to the railroad and the highway agency.

Safety is not limited to projects, but to the implementation of the projects themselves. Before a project commences, some railroads insist that the contractor's employees go through safety training specifically designed by the railroad company. Preconstruction meetings are held before anyone has access to the freight corridor. The railroad wants to minimize any exposure to accidents and liability that could be caused by the contractor on the site. While this alone never ensures that an accident will not occur, it reduces the chances of one. Highway agencies that support the safety programs of the railroad will have greater success working with the railroad industry.

As mentioned, the current federal limits for insurance are $2 million for an individual event and $6 million cumulative annually. The railroads frequently insist on much higher limits, because the current ones were set in 1982. The railroads note that their liability has increased substantially since 1982 because of increased rail traffic, greater populations near rail lines, and an increase in hazardous materials shipped. FHWA will allow federal funds to be used to pay for higher limits, but it generally requires individual, project-by-project approval.

Some states, such as Illinois, Ohio, and Florida, routinely incorporate higher liability limits as a standard provision in their agreements with railroads and in their specifications for contractors bidding on such projects. These and other states have reached accommodations with the local FHWA division office to routinely approve the higher limits, thereby providing the railroads the higher insurance protections their attorneys require. These steps increase the railroad's likelihood of

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more quickly accepting the insurance provisions within the project agreements.

Both Kansas City Southern Railway and BNSF offer "riders" on their insurance coverage to contractors. The contractors can buy short-term coverage for projects that interact with these two railroads. This allows contractors to quickly identify an insurance carrier and to work with a carrier who is familiar with and acceptable to the railroads.

Capacity Constraints and Efficiencies

One example where a railroad has a vested interest to cooperate with a highway agency would be when the agency seeks to repair or replace a bridge structure that limits both highway and rail traffic. If the project allows the railroad to expand its tracks, it may be attractive for the railroad to participate in funding the project.

A significant disincentive for a railroad is the creation of new highway–railroad at-grade crossings. While this clearly increases safety and liability exposure to the railroad, it may also diminish the capacity of the rail corridor. For instance, if a new grade crossing divides a segment of track that previously was used to stage train movements, it diminishes the railroad's capacity. Such constraints are not widely recognized by the agencies that may pursue new crossing projects.

In contrast, eliminating a highway–railroad grade crossing and thereby allowing trains to be staged on the track would give an operating benefit to the railroad. Grade-crossing elimination is not always a result of a new grade separation, but it can be part of a rail corridor project where at-grade crossings are closed and consolidated.

Administrative Costs

One cost that the railroads cited in the interviews was losses associated with public-project reviews. CSX reported that these losses are in the hundreds of thousands of dollars annually. The major reason for the loss is that some state and local agencies will not enter into agreements soon enough for the railroad to capture all its costs associated with project coordination. In addition, railroads are incurring the review costs, with reimbursement coming only months or even years later. Such slow payment reduces their cash flow and working capital. Any early or up-front payment would be viewed positively by the railroads.

Amtrak and Massachusetts transportation officials have discussed reducing the additional staff time for the railroad to produce the necessary documentation for project cost reimbursement. In the past, it was necessary to complete the documentation on a specific form for employees of the railroad and for the equipment and material used. This is typical of most state agencies. Amtrak will be working with its highway agency counterparts to accept the documentation directly from Amtrak's payroll and material purchases in order to reduce staff time. Although Amtrak still will be able to bill only for actual costs, it should reduce the railroad's administrative expenses.

As cited earlier, the Iowa Department of Transportation has an expedited agreement process and force account reimbursement process for highway–railroad resurfacing projects. Although the process was developed to expedite projects, it also provides an incentive for the railroads to cooperate on re-surfacing projects. The railroads' administrative costs are reduced because the reimbursement is based on preapproved unit prices based on the number of feet of track affected. A simple, routine agreement is used to promptly reimburse the railroad for its costs.

The Ohio Department of Transportation in 2000 sought prompt reviews on approximately 30 grade-separation projects it wanted to build following the breakup of Conrail. As the NS and CSX railroads absorbed the Conrail tracks, train volumes increased significantly on some Ohio lines as the railroads consolidated their operations. To ensure progress on the large program, the Ohio DOT worked closely with CSX's and NS's subcontracted engineering firms. The Ohio DOT received price proposals from the firms through the railroads within 30 days of notice for preliminary engineering needs. The former ODOT rail-grade separation program manager reported satisfaction with the timeliness of the reviews once the DOT made it clear what its review needs would be and that it would pay for those reviews promptly.

Also as noted, the Florida DOT lowers CSX's administrative costs by using a standard master agreement for each new project. Then, subsequent approvals for individual reviews or reimbursements for the project can be approved with one-page addenda. The long-established practice reduces administrative costs for both the railroad and the highway agency. The Florida DOT railroad-coordination officials attribute the process to ensuring railroad cooperation on project agreements.

Direct Payments to Railroads

No direct monetary strategies were found to be in use by highway agencies to provide incentives to the railroads to cooperate on projects. The most common practice is to reimburse the railroad for project expenses such a project reviews, flagging, and force account work conducted on behalf of highway projects. The railroads all insisted that they only charge enough to cover their actual costs, so it is debatable whether cost reimbursement is an actual benefit as opposed to simple cost recovery. Such work is often audited and the review of expenses creates additional administrative costs for highway agencies, the railroads, and ultimately FHWA, which covers project expenses.

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Highway agencies regularly provide incentives to other parties with whom they interact. Highway agencies regularly pay incentives to contractors to expedite projects. These incentives have been standardized by various contract models, such as incentives for early completion, "lane rentals," and "A+B" bidding, which involves the contractor bidding both the cost of construction and the time of construction. Highway agencies also will pay slightly above appraised value for rights-of-way if the property acquisition affects the project schedule. Highway agencies also provide incentives to design agencies to provide prompt submittals. Many states also adopt a "prompt payment" policy to contractors in the belief that it provides the contractors reliable cash flow, which in the long-term results in lower bid prices for the department.

No similar provisions were found to be in use by highway agencies to provide incentives to the railroads.

Although the Washington DOT is the only example found that involves a state agency funding a review position at a railroad, it is common for state highway agencies to fund positions at environmental resource agencies for reviews. At least 34 state transportation agencies pay for one or more positions at resource agencies, according to a study conducted for the AASHTO Environmental Center for Excellence (*3*). It reports a steady increase in this practice, as highway agencies seek more "streamlining" opportunities.

One example of incentivizing a railroad involves the Capitol Corridor in California. More than 98% of the trains are operated on time by Amtrak over the Union Pacific Railroad (UP). Over the years, the Capitol Corridor Joint Power Authority learned how to effectively incentivize the railroad and consequently has the highest percentage of on-time passenger trains in the country, even eclipsing Amtrak trains in the northeast corridor. UP can potentially earn $2.4 million from incentives annually.

Issues Involving Specifications, Policies, and Institutional Changes

In earlier sections, model processes and model agreements were described. Those model processes and model agreements included most of the changes in specifications, institutional practices, or policies that are required to streamline the project review process. In addition, several potential federal regulatory and policy changes were noted. In each description of a model practice, it was stated what institutional or legal changes were necessary to implement the model process. In the large majority of cases, there were no legal impediments to the model process. Instead, impediments generally were attributable to the organizational structures and processes adopted by the highway agency or the railroad.

The lack of specification changes necessary to streamline the agreement process was referenced by one of the five engineering firms interviewed for this project. "The engineering is easy," he said. In other words, the railroad–highway agreement process generally breaks down because of a lack of communication, a lack of understanding, cost disputes, liability disputes, and other issues unrelated to engineering or specifications. Once the parameters of the other issues are agreed to, the engineering details and construction specifications are readily apparent in the design manuals, calculations, and professional practices that have long existed in civil engineering. Although disputes over bridge size or span length were occasionally cited by all parties, disputes over bridge design or specifications seldom were listed as an impediment to the agreement process. In short, specifications and policies were not frequently cited as impediments, although institutional practices and institutional attitudes frequently were.

A caveat to the statement that specifications are not an impediment is that highway agencies that do not frequently deal with railroads can be surprised by the more robust design standards insisted on by railroads. For instance, differing from highway agencies, the railroads

- Generally do not accept mechanically stabilized earth walls, which are common in highway construction;
- Require shoring around excavation in railroad embankments; and
- Require more robust 100-year bridge designs for railroad bridges as opposed to lesser standards for highway bridges.

Arguably, relaxing these construction specifications could save the highway agency money in the construction phase. However, the railroads have adopted these standards for their own projects as part of an engineering philosophy to ensure that bridges and embankments last indefinitely under the greater loads and stresses caused by trains. Unlike highway agencies, the railroads generally design for longer service life and reduce their need for maintenance on the densely used railways. These specifications imposed on highway projects are the same specifications imposed on their own projects to cope with their operating environment. Highway networks have many alternate routes and significant redundancy when maintenance occurs. Railroad networks have fewer alternate routes and less redundancy, therefore they design projects to reduce the frequency of maintenance.

Suggested New Specifications, Policies, and Procedures

Although no changes in statute or regulation are required to adopt the model processes and practices, some changes in specifications, policies, and procedures could be helpful toward facilitating greater railroad–highway cooperation and toward procedurally supporting the cooperative, partnering processes envisioned in the model processes. This section identifies what

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new specifications, administrative rules, or procedures could contribute to an enhanced environment of partnering in the highway–railroad process.

Planning and Coordination Eligibility Policy

Most highway–railroad projects are sponsored by state highway agencies and the majority of those projects are federally funded. State highway budgets have become seriously strained in recent years. As a result, limited state funds are used for activities that are not federally eligible, such as conducting basic highway maintenance, plowing snow, and conducting routine administrative functions not specifically linked to an eligible federal project or activity. If states had abundant funds, they could spend them flexibly on project coordination and partnering activities. However, as state funds are severely limited, many states are constrained in their project-development activities to those activities and procedures that are eligible for federal reimbursement.

The federal reimbursement eligibility is currently limited to preliminary engineering and planning activities that are tied to a specific project. If federal "construction" funds are used for a planning activity and a specific project is not constructed as a result, the state highway agency could be compelled to repay the federal funds. The federal "repayment" can be virtually automatic in that the federal agency can simply withhold a like amount of funding from the state's current annual federal apportionment. Although it happens rarely, such repayment is a real possibility and serves as a serious factor on the states' considerations and approaches to project-coordination activities. The types of federal funds that states may typically use for highway–railroad projects but are not eligible for general coordination or "partnering" would include the largest federal categories, such as the Surface Transportation Program, Bridge Program, National Highway System Funds, Interstate Maintenance Program, and the Highway Safety Improvement Program. These funds generally make up the largest categories of a state's construction program.

Other categories of federal funds are eligible for general types of planning activities and coordination. However, they are not eligible for project-specific coordination. Funds such as State Planning and Research and Surface Transportation Program planning set-aside funds can be used for ongoing planning, research, or coordination activities.

Discussion by state and federal agencies of eligibility for the general highway–railroad coordination process could potentially assist this same process. Activities under the model processes that could benefit from funding eligibility could include the following:

- Paying for the position of highway agency–railroad liaison. The costs of staff, office, overhead, and travel attributable to the highway–railroad partnering process could be more easily accommodated by the states if they had available funding. Analogous to this eligibility is the eligibility of costs for ongoing coordination of activities between highway agencies and metropolitan planning organizations, and the eligibility of staff positions funded at federal environmental resource agencies. In both cases, general staff activities are eligible for federal reimbursement in order to encourage the ongoing coordination of highway activities with outside entities.
- Similarly, the travel costs associated with the annual or quarterly highway agency–railroad coordination meetings could be made federally eligible. Again, the ability to cover these costs with federal funds could encourage the conduct of these valuable process-improvement sessions.
- The cost of creating and sustaining a central repository likewise could be made federally eligible.

Accounting Rules Requirements

A related change that could assist the partnering process is the development of a joint recommendation from the Class I railroads, representative state highway agencies, and the Federal Highway Administration on eligible reimbursement costs under the Federal Acquisition Regulation (FAR). The FAR (48 CFR 1–53) governs how cost-accounting is to be conducted on federal aid projects. The rules are not written specifically for railroad cost recovery. At least one of the Class I railroads said the cost-accounting rules are cumbersome for the railroads and have led to delays and uncertainty. Developing FAR rules specific to the highway–railroad agreement process could further expedite the billing and reimbursement processes.

Similarly, the railroads that participate in streamlined agreements could review their accounting procedures to ensure they are clearly segregating the project review costs. Avoidance of inflated overhead costs from other departments and divisions for the project review and partnering process would provide assurances to the state highway agencies. During the course of the interviews, state officials complained of receiving vague or seemingly inflated invoices from railroads for project-coordination activities. Costs of meals, travel, overhead, and other expenses were not clearly delineated, some state officials said. They said such undocumented costs not only delayed payments but also undermined a sense of trust.

Cost of Capital Calculation

Although largely deregulated, the Class I railroads are subject to decisions and rule making by the Surface Transportation Board (STB). One important determination by the STB is in

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regards to the railroads' cost of capital. The STB uses the cost of capital figure in evaluating the adequacy of individual railroads' revenues each year. The figure is also used in maximum rate cases, feeder-line applications, rail line abandonments, trackage rights cases, rail-merger reviews, and more generally in the STB's Uniform Rail Costing System (*4*).

Although the costs of providing highway–railroad project reviews and agreements are a relatively small part of the Class I railroads' operations, it would be consistent with the partnering process to ensure that railroad costs and railroad income from the project review agreements are accurately captured by the STB in the cost of capital calculations.

Long-Range Expansion Plans Notification

A consistent complaint from state DOTs was railroads requiring additional track expansion to be accommodated in construction plans. This can result in greater bridge span lengths and other changes that can significantly affect the cost of highway projects. These requests often surprised state officials, because the existing number of tracks at a specific location had been stable for years, if not decades. As they prepared to improve the highway across such tracks, they were surprised to learn that they had to accommodate significantly more expensive requirements than they anticipated.

Several state officials suggested it would be helpful if the Class I railroads provided guidance as to their long-term plans for railway expansion. The officials suggested that knowing how many tracks and how many sidings were anticipated could help them as they planned the cost of highway improvements.

The railroads countered that their business plans seldom extended beyond five years, making it difficult to create meaningful forecasts of expansions. They noted that their business is reactive to shippers' needs. If a major customer goes out of business, relocates, or expands in the future, it would have a major impact on the need for trackage and sidings. Such changes are difficult, if not impossible, for the railroads to predict. In addition, they said publicly providing such proprietary information would require them to share company plans with competitors.

At the same time, the Class I railroads are increasingly seeking federal funds for expansion purposes. When state highway agencies and metropolitan planning organizations receive federal transportation funds, they are required to produce short- and long-range transportation plans that specify how they will be developing their transportation systems. Requiring the railroads to produce similar information would be congruent with past transportation policy.

Complex Right-of-Way Appraisal Process

The value of railroad rights-of-way can be complex to appraise, particularly for such values as air rights in dense downtowns. The state highway agencies are restricted in their ability to negotiate the value of such properties because they operate within the Uniform Relocation Assistance and Real Property Acquisition Policies Act. The act balances the property owner's rights to fair market value with the need to protect the federal taxpayer from states paying exorbitant prices to property owners. The act requires states to hire neutral appraisers to assess the value of rights-of-way before making an offer. The appraisal is based on comparable market prices for comparable real estate transactions. Because there is not a widely traded market for railroad rights-of-way or air rights, it can be difficult and subjective to determine the comparable fair-market value for such railroad property. Highway agencies reported several times during the research for this project that negotiating such values became contentious and led to significant project delays. They complained of the railroads seeking unreasonable compensation for such property or air rights. The railroads noted they had paid taxes for some of the property for decades and were seeking value for the shareholders' past outlays.

A policy that could be reviewed is the appraisal process for complex railroad properties. Research into how to appraise air rights and other atypical properties could result in amended approaches for appraising, negotiating, and securing such properties, thereby reducing another source of project delay. New professional practices for valuing railroad air rights could provide a basis for agreement by all parties.

Highway Agency Project Design Processes

It was stressed repeatedly by the railroads and by the engineering firms that represent them that plan development that adheres to railroad standards is crucial to reduce delays. Despite all good intentions and partnering agreements, in the end, the set of plans sent to the railroad must meet the railroad's acceptance.

An institutional practice and policy that may need to change to expedite project reviews is the incorporation of railroad standards and railroad formats into all plans submitted to the railroads for review. Highway agencies for decades have had design manuals and design policies. What some state highway agencies such as Texas, Washington, Ohio, and others have done is to create subsets of those design manuals that specifically address the necessary submittals and procedures for railroad projects. These institutional practices are devised to ensure that the most typical types of project impediments are clearly anticipated and addressed in each submittal to the railroad.

The four largest Class I railroads have produced substantial volumes of standard drawings, standard contract language, construction provisions, and other documentation to assist the designer and the project sponsor to anticipate the

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railroads' requirements. The total volume of these reports extends into hundreds of pages and includes considerable detail beyond that appropriate for this report. Each railroad's website includes draft agreements, standard drawings, and design standards to simplify the design and review process.

An institutional policy and practice change that could be considered by the highway agencies is to develop their own manual which is predicated on the standards and provisions provided by the railroads with which they most commonly conduct business. These state manuals then could be incorporated into the contracts of consulting engineers who are selected to produce plans for railroad–highway projects.

Interviews with the railroads, their consulting firms, and the state highway agencies indicated that the following types of issues were among the most common ones that led to project review delay. Therefore, it would be an advisable practice to include in the state-specific manuals guidance to avoid delays and conflicts over these most typical issues:

- Horizontal and vertical clearance;
- Bridge type selection;
- Accommodating the operating envelope (or window) and closures during construction;
- Contractor control by railroad in regards to safety and railroad operations;
- Shoring near embankment;
- Boring, tunneling, pipe, and wire beneath railways;
- Early flagging notice;
- Safety training of state and contractor staff;
- Road master's control of construction;
- Control of equipment adjacent to track;
- Guarantee that all rights-of-way and property will be left in good condition; and
- Ensuring that all utilities or other property in railroad rights-of-way are protected.

Suggested Institutional Performance Measures

Earlier, model processes were identified, including ones to continuously improve the project review process. Also, model agreements were provided to memorialize the model processes, including those processes to continuously improve performance.

Performance measures and other strategies for monitoring success are suggested in the model processes and the memorandum of understanding. Such performance measures should vary based on the type and complexity of agreements. Relatively simple projects, such as re-surfacing agreements or the maintenance of safety appurtenances such as lights and gates, do not have lengthy and numerous stages of development. However, a highway relocation project that significantly impacts railroad operations and rights-of-way could have many individual stages and multiple reviews.

The performance measures suggested below include all measures necessary for a complex project. A subset of these measures could be selected for use on less complex projects.

The following are suggested performance measures related to cycle times:

- Time from project programming to time for first notification of railroad;
- Time to process preliminary engineering agreement from time sent to railroad;
- Whether railroad comments are returned within 60 days of Stage 1 or 30% plan completion;
- Whether railroad comments are returned within 60 days of Stage 2 or 60% plan completion; and
- Whether railroad comments are returned within 60 days of Stage 3 or 90% plan completion.

The following are suggested performance measures related to plan quality:

- Whether changes in bridge type, size, roadway line, or grade or drainage structures or limits are requested after initial coordination;
- Whether project bid letting is delayed by requested railroad changes;
- Whether expected completion date is delayed by railroad issues; and
- Number of railroad interventions with contractor activities related to safety or railroad operations.

The following is a suggested performance measure related to cost:

- Total annual cost in hours, consultant costs, and overhead for administering railroad agreements.

The suggested performance measures are intended to provide insight into the timeliness, quality, and cost of the railroad–highway agreement process. As always with performance measures, the measures are intended to provide a "dashboard" of the agreement process and not to provide exhaustive details of each function. If the "dashboard" indicates a problem with performance, the highway and railroad liaisons can evaluate the causes and, if necessary, address them at the annual meeting or other joint forum. The intent of the performance measures is to complement the continuous-improvement process by providing common data for the evaluation of current performance against past performance and desired performance.

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Suggested Practices to Accommodate Design-Build

The project request for proposal (RFP) makes specific reference to identifying barriers to effectiveness and to proposed remedies. The RFP also makes a brief but specific reference to alternative project delivery techniques, such as the use of design-build. This section provides a brief guidance on how to incorporate design-build into the railroad-agreement process.

"Design-build," according to a report published by the AASHTO Joint Technical Committee on Design-Build (*5*), "is a project delivery method under which a project owner, having defined its initial expectations to a certain extent, executes a single contract for both architectural/engineering services and construction."

Design-build is pursued instead of the traditional design-bid-build for several reasons. The need to accelerate project delivery is a common reason. Another is the hope to encourage innovation between designers and contractors if they are given more latitude to innovate. A third reason is a desire to save costs on the assumption that faster, more innovative construction with fewer design details may be more economical. Complaints about design-build are that government control is lessened. Common concerns are that design-build could lead to substandard construction, a lack of adherence to regulations, a lack of protection of right-of-way owners, less adherence to environmental constraints, or indifference to common purchasing requirements by the contractor. In more precise and prescriptive design-bid-build contracts, the highway agency produces a more detailed set of construction plans that include precise details as to how the contractor will comply with numerous regulations or commitments.

In both instances, the contractor faces certain constraints. Even in a loosely defined design-build contract, the contractor must comply with all environmental statutes, right-of-way laws, and utility relocations and generally must comply with standard highway agency provisions, such as maintenance of traffic standards. Therefore, even in design-build, the contractor has less-than-free-rein to operate and must accept the risk that assumptions he made about how he would address such requirements may be challenged during construction.

Design-build is a variant but is not fundamentally different from the design-bid-build process. A design is produced in design-build, but to a lesser degree of detail. It must result in the construction of pavements, bridges, drainage structures, geometrics, lighting, signage, appurtenances, right-of-way acquisition, and environmental permitting, all of which must comport with professional standards, statutes, and regulations. What differs is the timing of the approvals and the shifting of risk. In design-build, the contractor assumes additional risk as to the timing of the approvals and the degree to which railroad requirements may vary from the roadway and bridge assumptions which he/she assumed in the contract. Provisions for managing the timing and risk need to be incorporated.

Design-build projects involving railroads are similar to design-build projects that require more complex environmental approvals or permits. In these cases, outside agencies have significant control over certain design and construction elements. These agencies' considerations need to be incorporated into the design, schedule, and construction of the projects. Such examples include the following:

- The need for environmental approval on alignments and impacts;
- Timing construction activities so that aquatic and terrestrial resources are protected during certain annual cycles, such as spawning runs or birthing seasons; and
- Various permits for stream work or wetland impacts that are required but cannot be obtained until after the contractor has produced detailed plans.

Similarly, the design-build contract needs to include provisions to accommodate the timing, risk, and uncertainty caused by railroad reviews. Strategies, tactics, and contract provisions to do so can include the following:

- The highway agency requiring certain parameters as to bridge type and roadway alignment be determined before bidding the design-build project. The highway agency may need to coordinate in advance with the railroad as to type, size, line, and grade of the structure and include those parameters as given in the design-build contract. In many design-build cases, the highway agency has secured environmental approval already before bidding the design-build contract. The environmental approval generally requires sufficient detail that approximately 30% plan completion is required. Those 30% plans, or Stage 1 plans, will need to include an alignment, grade, and bridge type, which can be coordinated with the railroad for concurrence. The determination of bridge type and alignment can be incorporated as a controlling factor in the design-build bid documents.
- The highway agency needs to ensure additional coordination with the railroad during project development by the contractor. As with environmental and permit requirements that are included as restrictions on the contractors in design-build projects, certain restrictions regarding railroad coordination will need to be included in design-build projects involving the railroad. During the design process, the contractor will need to include time for the review of the 60% and 90% plans by the railroad. The railroad should reciprocate in the partnering environment by ensuring timely reviews to the contractor's submittals. Considering the advance coordination conducted by the highway agency

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and the railroad under their partnering framework, and the review of the 30% plan submittal as part of the environmental process, the basic design parameters should have been agreed to before the bidding process. The contractor will need to coordinate the details of Stage 2 and Stage 3 design details with the railroad. It will be incumbent on the highway agency, the railroad, and the contractor's designers to conduct regular coordination calls. (It should be noted that in design-build projects, the contractor will not be producing complete Stage 2 and Stage 3 plans. However, the contractor will be addressing the types of design details that generally are in Stage 2 and Stage 3 plans. It is those details that need to be coordinated.)

Sustaining Best Practices and Model Processes

This report illustrates the best practices and model agreements used nationally to streamline the railroad–highway agreement process and to encourage partnering between highway agencies and railroads. This section examines several potential means to sustain and update these model agreements and practices beyond the period of this research project.

Necessary Activities to Sustain Agreements

The activities necessary to sustain and update model agreements and practices would include the following at a minimum:

- Creating a virtual library, website, or other repository of various project agreements, contracts, standard drawings, provisions, presentations, and related materials that support the development of model agreements and practices.
- Developing a means to refresh and update these materials in ways such as
  - Updating internet addresses to links;
  - Removing outdated materials; and
  - Posting new standards and requirements.
- Creating actual or virtual ongoing communication between the state and local highway agencies and the railroads to continually share new best practices, problems, solutions, and innovations to the agreement process.
- Sustaining dialogue between state and local officials and their railroad counterparts with other governmental stakeholders such as the Federal Highway Administration, the Federal Railroad Administration, possibly the Surface Transportation Board, and often state utility commissions in those states in which commissions play a role in the agreement process.
- Bringing together periodically in a formal, facilitated forum—either in person or virtually—a cross section of practitioners from the state and local agencies, the railroads, and the utility commissions to exchange ideas and best practices and to identify common initiatives that would benefit the process.

These needed activities have parallels in many professional-development or trade association activities. The following examples are explored below:

- Joint funding of a website or repository by the involved parties;
- Developing a subcommittee within AASHTO;
- Creating a subcommittee or task force within the Transportation Research Board;
- Creating a new nonprofit organization funded by all parties devoted to supporting this process;
- Seeking government funding to create a unit within a university devoted to supporting this process;
- Creating a staff position or office within a federal agency to sustain the efforts;
- Creating a joint committee or group from AASHTO, AAR, AREMA, and the involved federal agencies; and
- Relying on voluntary activities of the involved parties to host meetings, distribute materials, and create a repository of documents.

Create a Best Practices Repository

Throughout the interviews for this project, stakeholders were asked if a central repository of best-practice materials would be useful. Universally, they agreed that it would.

The types of materials that have been gathered for this project and that could be assembled into a virtual, online repository to benefit the practitioners includes the following:

- Current links to each of the websites hosted by the Class I railroads that are devoted to providing the railroads' individual draft agreements, standard drawings, permits, manuals, standard construction provisions, and other materials. Each state and local highway agency probably is familiar with these websites for the railroads with which they routinely work. However, convenient access to other railroads' sites provides them broader examples of best practices that they could pursue.
- Other resource documents, such as the final report of this effort, railroad agreement manuals from the various states, materials from related NHI courses, sample partnering agreements, and links to related sites such as the Project Management Institute, which promote best practices in project delivery.
- Access to ongoing dialogue between practitioners. This dialogue could be in the form of posting of online questions and responses, frequently asked questions, posting of presentations, and other information that give a practitioner access to current thinking within the field.

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- Links to federal regulations that frequently influence the process. These links could be to federal statutes, the Code of Federal Regulations, accounting standards in the Federal Acquisition Regulation, policies of FHWA and FRA, and other sources. Again, all these sources currently can be found on the web. However, they are not assembled in one website for convenient access.

It is beyond the scope of this task to prepare a formal estimate of cost or level of effort for such a resource. It is safe to assume that at least one person's effort for 6 months would be necessary to develop such a site. Then several months of effort annually would be necessary to sustain such a site. Such sites quickly can become obsolete as elements change, such as URLs, new federal regulations, updated manuals and so forth. Within a year or less, such a site could have substantial out-of-date materials if not continually updated. In addition, the costs of hosting the site on a robust server must be covered.

There are many such sites covering virtually every professional field. They often are funded by trade associations, joint efforts by interested parties, federal grants, university research institutes, and other professional bodies. Such a site for railroad–highway agreements would be congruent with current professional practice and with the suggestions offered by stakeholders interviewed for this project.

Form an AASHTO Subcommittee

The American Association of State Highway and Transportation Officials has approximately 42 committees and subcommittees. These cover a diverse array of professional activities, from the Standing Committee on Highways with its 16 subcommittees to the Standing Committee on Planning, the Standing Committee on Rail Transportation, and the Standing Committee on Public Transportation. In addition, AASHTO has two joint committees with outside industry groups, the AASHTO Joint Committee with the Associated General Contractors and the American Road and Transportation Builders Association and the AASHTO Joint Committee with the American Council of Engineering Companies (ACEC).

These various committees facilitate dialogue with outside entities in two primary ways. First, many of the committees and subcommittees invite private-sector or other public-sector groups to attend their meetings and to help them develop new standards, specifications, and procedures. For instance, representatives of roadway and bridge design firms attend meetings of the Subcommittee on Design or the Subcommittee on Bridges and Structures. Through their attendance, the professional engineering firms keep abreast of changing standards and participate in groups to develop the standards. Likewise, in the joint AASHTO-ACEC committee, the organizations collaborate on supporting legislation, adopting common accounting standards for federal reimbursement of design work, and in general keeping one another apprised of the other's position on common issues.

Such dialogue between multiple groups is necessary to sustain innovation in the highway–railroad agreement process. The parties of highway agencies, railroads, engineering firms, and federal officials need a means and forum to continue dialogue.

Closely analogous to the highway–railroad agreement process is the process by which states acquire rights-of-way and relocate utilities necessary to construct highway projects. In the right-of-way and utility process, the highway agencies work within federal statutes to acquire the property, services, and cooperation of outside entities, either property owners or utility companies. The right-of-way and utility process can be a common source of concern among highway project managers because of its ability to significantly delay projects or increase their cost.

The AASHTO Subcommittee on Right-of-Way and Utilities addresses functions of collaboration and process improvement similar to the best practices described regarding the railroad–highway agreement process. The mission of the Subcommittee on Right-of-Way and Utilities says in part:

> The subcommittee shall review the laws and regulations of the Federal Government, member states and territories pertaining to public acquisition and management of real property for transportation related purposes. The subcommittee will review issues related to the placement of utilities on highway rights-of-way. It shall provide a forum for the exchange of experiences, innovations and best practices; and will recommend such laws, rules, regulations, and procedures so as to improve the quality and efficiency of Right of Way and Utility operating practices. . . .
>
> The subcommittee may establish liaison relationships with appropriate offices of the Federal Highway Administration and *such other entities having a role and responsibility in the area* of Right of Way and Utilities. (emphasis added)

Establishing an AASHTO Subcommittee on Railroad–Highway Institutional Mitigation or a Subcommittee on Railroad Coordination could be a means to sustain continuous improvement in the railroad–highway agreement process. First, it would create a structure with members, a mission, duties, and resources that could be devoted to the topic of improving the railroad–highway agreement process. Second, AASHTO provides to its committees and subcommittees staff support. These staff become quite knowledgeable about the subject matter and help disseminate information to new members as state members change through turnover in the state departments. Third, the committees and subcommittees often invite their counterparts from the Federal Highway Administration,

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the Federal Railroad Administration, the Federal Transit Administration, or other agencies with which they regularly interact to meetings, which provide formal and informal opportunities for state and federal cooperation. Fourth, the private sector participants are often invited. In the case of this suggested committee, the public projects managers of the Class I railroads and short lines could be invited to participate. This participation ensures opportunity for dialogue. Fifth, these committees often publish best-practice documents and sponsor federally funded transportation research into best practices, standards, and specifications. Sixth, these committees and subcommittees often post information on AASHTO websites, which provide a means for further dissemination of best practices and standards.

Creating such an AASHTO subcommittee would face several hurdles. First, it increases costs to AASHTO, which must be covered through membership dues, the sale of AASHTO products, or other revenue sources. Second, AASHTO's members are increasingly challenged to be allowed to travel to out-of-state meetings because of tight state budgets. In its recent strategic plan, AASHTO identified lack of travel as a major impediment to ongoing collaboration and committee functioning. Third, strong support for such a subcommittee would have to be generated by the AASHTO board of directors, who are the same members who have noted their inability to allow out-of-state staff travel. Accommodating the cost of such a group would have to be addressed, in all likelihood, to generate the board of directors' support.

One possible option is to maximize the conduct of virtual meetings of this hypothetical new subcommittee. AASHTO's strategic plan anticipates the expanded use of web-enabled conference calls, webinars, websites, and other virtual means to create ongoing dialogue and exchange of information for training, development of standards, and other forms of professional development.

Create a TRB Group

Similar to the formation of an AASHTO group would be the formation of a committee, subcommittee, or task force within the Transportation Research Board. TRB has more than 200 committees and task forces involving more than 4,000 transportation professionals. These groups exist to advance the state of the practice in transportation. The committees address many issues comparable to the highway–railroad agreement process. For instance, there is a Committee on Utilities, which is concerned with the interrelationships between transportation systems and utilities, including the accommodation of utilities in transportation corridors and rights-of-way. Creating a committee, subcommittee, or task group would provide a forum for ongoing research, publication, and cooperation. The roles of committees are:

- Stimulating research by developing and publishing research problem statements, issuing calls for papers, submitting research problem statements to the NCHRP and TCRP, and defining and publishing critical issues and research needs;
- Keeping the transportation community apprised of recent and ongoing research through sessions at TRB annual meetings, specialty conferences and workshops, committee meetings, informal networking, responses to requests for information, and referrals to other experts;
- Synthesizing and disseminating research results through sponsorship of workshops and conferences, compilation of bibliographies, and publication of compendiums of research papers and state-of-the-art and state-of-the-practice reports;
- Reviewing and recommending research papers for publication by TRB and for TRB-sponsored awards;
- Cosponsoring special activities and providing liaison with other transportation-oriented agencies in the United States and in other countries; and
- Encouraging participation in TRB by students and professionals entering the transportation field.

The TRB Technical Activities Leadership Guide says that subcommittees are less formal than standing committees or task forces. A subcommittee may be formed by a standing committee to address one or more specific aspects of a committee's work. A joint subcommittee may be formed by multiple committees to address one or more areas of common interest among the committees. Joint subcommittees can be useful in addressing areas that cut across multiple committees, sections, and groups. Subcommittee appointments are for the period necessary to complete the assignment. All subcommittees should be discharged when they have completed their assignments.

A TRB task force addresses either a specific, well-defined problem or a task that encompasses the scope of more than one unit. A task force may be proposed by several organizations within the TRB hierarchy. Criteria for considering the formation of a task force include the following:

- Clarity of scope and task (a specific and concise description is needed that clearly defines the scope and task of the proposed task force);
- Evidence of need, demand, and potential accomplishment;
- Evidence of uniqueness; and
- Clear indication of planned activities.

However, as with AASHTO subcommittees, TRB groups also face the challenge of finding sponsorship, generating support, and sustaining a commitment from volunteers that they will be able to secure travel approval to attend meetings.

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Create a Federal Office

The Federal Highway Administration and the Federal Railroad Administration have dozens of individual offices devoted to improving transportation practices or conditions on the transportation system. Creating an office to oversee and improve the highway–railroad coordination process would be a possibility to consider. The creation of such an office would create a strong focus, provide official sanction to the improvement process, provide resources such as staff and websites, and generate a means to nationally distribute best practices and model agreements.

The hurdles, however, are considerable. The primary hurdle is the cost of creating a new federal office during a time of considerable constraint in transportation receipts and enormous demands on transportation budgets. The highway trust fund is facing a deficit and lacks a long-term source of revenue to sustain authorized expenditure levels. Creating a new federal office in the current fiscal climate probably would be difficult.

Form a Community of Interest or Association

A potential solution that requires no formal approval by a national organization or federal agency is the creation of a joint committee, "community of interest," or nonprofit association between motivated highway agencies and railroads to voluntarily meet, share best practices, and distribute model processes. Such an effort is likely to capture the interest of the most motivated members of highway agencies and railroads who seek to improve the agreement process.

Such communities of interest sometimes form associations that are supported by dues from members. One analogous group is the North American Rail Shippers Association, which lists the following as its objectives:

- To provide a common meeting ground between rail owners, vendors, and users to establish transportation requirements and ensure a smooth transition from the present era to the future in the rail industry.
- To promote operating efficiency in the handling of rail equipment.
- To give the shipping public a direct voice in the activities of the railroads on matters of mutual concern.
- To provide educational forums and seminars for the purpose of establishing and maintaining an understanding of shipper and receiver requirements and carrier innovations.
- To offer continuing-education programs designed to improve individual business and professional skills.

The North American Rail Shippers Association brings together rail shippers with the railroads to address common issues, although from different institutional perspectives. Likewise, it is conceivable that if interest were strong enough, highway agencies and the railroads could contribute dues to create an organization to sustain improvements in the project agreement process and to periodically bring all parties together in conferences and forums.

The impediments to such an organization are primarily in three areas. First, it would take active leadership from some unidentified segment of the highway community or railroads to organize such an undertaking. Secondly, the same constraints on funding and travel that would impede participation in an AASHTO subcommittee or TRB committee would face the members of such a public–private group as they consider membership dues and costs of conferences. Third, the legal issues of who would be the officers of such a formal nonprofit organization and how they would manage its ongoing operations are unclear. It is unlikely that state agencies would be able to commit to the long-term payment of dues or to participating in fiduciary management of an outside group. One of the impediments of the railroad-agreement process today is the ongoing turnover among the agency participants. It is uncertain how board members and officers for a permanent body could be found.

Create a Joint Industry Committee

A variation on these options is to create a joint committee of members from the involved associations. AASHTO, the Association of American Railroads, and the American Railway Engineering and Maintenance of Way Association all have members who are interested in expediting the project agreement process. Each of the three organizations has committees and joint committees. They could form a joint committee that meets periodically to advance the state of practice in this field. All three have access to websites that could host materials relevant to the processes.

The advantages of this option are that it could be accomplished by the three organizations without need of approval by a federal agency or by TRB. The disadvantages are that it faces all the same limitations on travel as the AASHTO subcommittees or TRB committees. It also would rely on considerable effort by volunteers.

Create an Academic Institute

Within U.S. colleges and universities are hundreds of institutes devoted to the advancement of, and research in, a large number of disciplines. In the transportation sector alone are institutes in the areas of construction management, transportation planning, congestion analysis, pavement preservation, and highway safety. Many of these organizations are jointly funded by the universities, private-sector trade associations, the federal

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agencies, congressional earmarks, and federal research funds that state highway agencies pass through to the institutes.

One analogous institute is the National Center for Pavement Preservation at Michigan State University. It was established by Michigan State University and the Foundation for Pavement Preservation to lead collaborative efforts among government, industry, and academia in the advancement of pavement preservation. Its purpose is to advance and improve pavement preservation practices through education, research, and outreach.

A similar institute or center to promote the advancement of project agreements could be proposed to be housed at a neutral, engineering-focused university. Potential funding sources could be the state highway agencies through their extensive federally funded research programs, contributions from the engineering firms who design such projects, the railroads, and the federal highway and rail offices.

References

1. Lambert, D. M., and A. M. Knemeyer. We're in This Together. *Harvard Business Review,* Vol. 82, No. 12, Dec. 2004, pp. 114–122, 150.
2. Kanter, R. M. Collaborative Advantage: The Art of Alliances. *Harvard Business Review,* Vol. 72, No. 4, July–August 1994, pp. 96–108.
3. *DOT-Funded Positions and Other Support to Resource and Regulatory Agencies, Tribes, and Non-Governmental Organizations for Environmental Stewardship and Streamlining Initiatives.* AASHTO Center for Environmental Excellence, Washington, D.C., May 2005. http://environment.transportation.org/center/products_programs/dot_funded.aspx. Accessed March 10, 2010.
4. Surface Transportation Board. Surface Transportation Board Revises Its Cost of Capital Methodology. News release, Jan. 28, 2009. www.stb.dot.gov/newsrels.nsf/cee25ffbd056e9d1852565330043f0d6/3551c8b4a52126478525754c0072c406?OpenDocument. Accessed March 10, 2010.
5. AASHTO Joint Technical Committee on Design-Build. Current Design-Build Practices for Transportation Projects. http://designbuild.transportation.org/?siteid=63&pageid=1226. Accessed May 21, 2009.

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APPENDIX A

Railroad Processes for Addressing Agreements

Processes of Individual Railroads

The processes of each railroad vary to some degree. In the following sections, the processes of each of the five largest Class I railroads and of Amtrak are summarized. Because of the complexity of these processes and the large number of projects the railroads address, each of the Class I railroads has taken various steps to make them more predictable and routine. These steps include the following:

- Providing standard drawings for typical projects, such as structures, signals, and tracks;
- Providing standard agreements that include language they will accept without review;
- Providing standard applications and forms for typical projects or permits;
- Offering to develop master agreements that streamline routine functions; and
- Providing manuals on how to successfully navigate their processes.

CSX Public Projects Process

The CSX Corporation owns CSX Transportation (CSXT) and CSX Intermodal, which provide rail and intermodal service in 23 states, the District of Columbia, and two Canadian provinces. It operates more than 1,200 trains daily over 21,000 miles of track.

CSX Corporation has produced a public projects manual that offers guidance, standard agreements, and standard drawings to assist public agencies (*1*). It states the following:

> [T]he company wants to be a good neighbor in the states and communities where we operate. That is why we have prepared this information. We want to make it easier for communities to work with us when they have construction and improvement projects that may involve the CSXT railroad.
>
> . . . Accurate and timely communication of information between CSXT and these parties improves planning, relationships and successful completion of projects.
>
> The information in this manual is intended to improve communication and cooperation on construction and improvement projects that may involve the CSXT rail property. These tools explain important steps CSXT must follow including information required in connection with any public project proposal.

The manual includes the following:

- Contact lists;
- Requirements for preliminary engineering agreements;
- Explanation of payments and costs;
- Process for entry onto CSX property;
- Public road crossings and closures guidelines;
- Parallel road construction guidelines;
- Crossing warning devices guidelines;
- Quiet zone processes;
- Bicycle and pedestrian facilities rules;
- Painting requirements for CSX bridges;
- Overhead and undergrade bridge criteria;
- Insurance requirements;
- Flagging requirements;
- Grade crossing maintenance requirements;
- Standard preliminary engineering agreements;
- Standard construction agreements; and
- Special provisions during construction.

The manual also includes a set of key points for success, including the following:

- Start preliminary engineering reviews early in the project-development process.

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- Use CSX standard agreements, which reduce review time. These include the following:
  - Preliminary engineering agreement.
  - Construction agreement.
  - Special provisions for work on right-of-way.
- Complete a preliminary engineering agreement early.
- Arrange for payments to be made for engineering reviews.
- Provide as soon as possible initial concept information about the project.

The manual provides the policy rationale for CSX's requirements, as well as ready access to engineering requirements and engineering personnel necessary to develop a project. Its policy explanations address issues such as why the railroad needs to charge for reviews, why it requires rights-of-entry agreements, why it discourages new at-grade crossings, why it needs to be involved during parallel road construction, and why it has significant insurance requirements. Although it does not provide detailed schedules, it provides general guidance about time frames and costs for various types of projects and agreements, such as the following:

- Preliminary engineering for projects such as grade separations can accrue costs of up to $25,000 and can require up to 5 months of review time.
- Right-of-entry permits cost $750 and can take up to 6 weeks to process.
- Separate preliminary engineering agreements and payments are required for signal and warning device reviews.
- Once projects are approved for construction, up to 45 days may be necessary to schedule in-house flagging crews who must be present. Flagging typically costs $600 to $800 per day.

CSX also provides sample agreements for preliminary engineering, construction, and special provisions. It encourages public agencies to work from these documents when preparing agreements. The engineering and legal staff at CSX said their reviews of projects that are predicated on these standard agreements are routine and much faster than reviews of unique agreements. A standard agreement, they advise, can be routinely approved with a cursory review of any additional provisions, while a unique agreement requires a line-by-line review by busy legal staff.

The preliminary engineering agreement includes provisions such as the following:

- Acknowledgment that CSX and the public agency agree to cooperate on project reviews;
- Reviews do not imply that CSX will approve the project or agree to construction;
- CSX provides no implied consent regarding the adequacy of the project that eventually may be constructed;
- The estimated amount of reimbursement;
- Payment will be in full and in advance;
- The agency will make all reasonable efforts to get appropriation authority for the agreement;
- Provisions for termination by either party;
- Subconsultants can be used by both parties; and
- Standard "boilerplate" relating to severability, assignment to successors, and concurrence with governing statutes.

The construction agreement includes the same provisions, but also adds the following:

- A detailed description of the project;
- A description of the tasks required of the public agency;
- An estimate of expenses reimbursable to CSX;
- Assurances that the agency and contractor will acquire all needed environmental or legal permits and easements;
- CSX's ability to terminate the agreement or exclude the contractor from the right-of-way for any unsafe practice or condition;
- Insurance requirements of $5 million for commercial general liability, railroad protective liability of $5 million for a single incident, and a total of $10 million aggregate;
- Maintenance responsibilities of the parties after construction; and
- Indemnification for reckless or wrongful contractor actions.

The Special Provisions Appendix imposes the following additional requirements on the agency and contractor during the construction process:

- Nothing shall be construed to permit interference with railroad operations.
- CSX shall be notified 30 days in advance of the start of construction if flagging is required and 10 days in advance otherwise.
- Written authorization is required to begin work on railroad property.
- Contractor shall not deviate from plans without written approval.
- Equipment shall not cross tracks without approval.
- Contractor and agency shall not charge CSX for project delays.
- Equipment and materials shall not be stored on railroad property without approval.
- CSX inspects and approves construction on its property.
- The CSX safety manual will be followed.
- Blasting will be strictly controlled.
- Flagging will be provided and controlled by CSX, with adequate notification.

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- Utilities will be safely addressed.
- The project site will be restored to its original condition when complete.
- CSX reserves the right to eject the contractor for unsafe or noncompliant activities.

In addition to the process and legal requirements, CSX provides the most critical design parameters for typical types of projects. It provides guidance or standards for typical but important design issues, such as the following:

- Stationing or location information;
- Vertical and horizontal clearances both during construction and permanently;
- Geological testing information;
- Rigging and lifting requirements during construction;
- Crash wall guidance;
- Drainage guidance;
- Fencing;
- Shoring and excavation;
- Needed calculations;
- Demolition requirements;
- Pipe installation;
- Pedestrian overhead structures; and
- Undergrade bridge requirements.

Officials at CSX said in an interview that their intent was to provide public sponsors with the information they need to successfully matriculate a project and its agreement through the CSX process. They provided the standards and guidance in an effort to promote clarity and efficiency in the project-development process. CSX does not provide all of its design standards, but it says its standards do not vary significantly from the widely disseminated AREMA standards. Unique design considerations at specific locations can be addressed in preliminary consultations at the project concept stage or in preliminary submittals.

CSX officials said they encourage master and standard agreements for the ease of public agencies. CSX provides draft agreements with language that it will accept automatically. But they indicate that some states and localities have constraining statutes that may prohibit those governments from accepting all of the standard language. The CSX officials indicate that they have signed several master or standard agreements crafted by states that incorporate the state's legal issues. Whether the agreement is based on CSX language or local language, they encourage the use of standard agreements to save all the parties time and effort. They have experience with various legal strategies to reconcile the conflicts between state law and CSX's requirements. For instance, issues such as indemnification or insurance which the state cannot address can be shifted to the contractor, which does not have such legal prohibitions. Regardless of the details, CSX staff indicate that they encourage and pursue standard agreements to the extent possible. Having worked for more than a century with more than 25 states, they have broad experience in legal strategies to reach agreements.

CSX indicates that it relies heavily on outside consultants for review of projects. Its in-house engineering staff members function more as project and program managers, not as engineering reviewers. The widespread downsizing of railroad staffs has led to such outsourcing. The use of consultants also allows the accurate capturing of time and labor. Consultants track their time and the cost of that time can be assigned back to the public agency that requires the review.

Officials at CSX and all the railroads interviewed stressed the significant work volumes their staffs experience. Each of the five regional CSX divisions handles approximately 800 projects at one time. The CSX public projects staff has five principal engineers and a small administrative staff to handle all public projects. They and other railroads all readily acknowledge the typical lapses that occur in any organization because of overwork, changing priorities, staff vacations, and emergencies. However, they indicate that many project delays could be avoided by adherence to their standards and agreements.

CSX officials were complimentary of the typical public agency and the quality of their submittals. Although they do not have formal metrics on the matter, they estimate that no more than 5% of submittals are significantly substandard. They said that local agencies with less experience are the more likely sources of significant review comments, rework, and delay.

The CSX officials indicated that they challenge project sponsors to meet the railroad's optimal design standards, but they also recognize that they cannot always be met. Projects often are being constructed in areas with tight rights-of-way, difficult terrain, or adjacent constraints. In such cases, they said, they accommodate exceptions to their typical standards but in such a fashion as to protect railroad operations, assets, safety, and operational efficiency.

"When they can demonstrate it's impossible to meet our standards, then we say, 'Show us that and we'll see what else we can do,'" is how one CSX public projects official described their attitude.

They said that while they prefer overhead projects to completely span their rights-of-way, they realize that can lead to excess public expenses. While they will insist that future track needs are protected, they regularly provide permanent use of their rights-of-way for public projects.

They described their corporate attitude toward public projects as being driven by a recognition that they need to cooperate and accommodate public projects, while exposing their corporation to as little risk as possible. They do not want exposure to liability, additional costs, or constrained operating

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parameters because of a project that does not benefit their shareholders or customers.

They said their attitude toward public projects varies by type of projects. They acknowledged they do not encourage new, at-grade crossings. Those are at odds with both railroad and Federal Railroad Administration policy, which is to reduce the number of crossings. Projects that close or grade separate crossings they encourage as being in both the railroad's interests and in the interest of public safety.

They acknowledged that a common source of delay or disagreement is in the assigning of costs. Some, particularly local, agencies object to paying for reviews and submittals. Others disagree with the costs. CSX officials insisted that they do not try to profit from public projects but merely try to capture their true and total costs. If they do not assign those costs back to the project sponsor, they are then indirectly assigned to customers and shareholders. They noted that they can experience engineering review and legal costs of thousands of dollars on projects, and that those costs must be covered by someone.

The CSX officials were complimentary of states that closely track project submittals. They anecdotally described instances where some states did not respond to railroad comments for months, acknowledged that they had lost the comments, and asked for them to be resent. The CSX officials said that, for some states, the railroad could not discern a pattern of priority or schedule for projects. Other states, such as Michigan, Florida, and North Carolina, closely track project milestones. The CSX officials indicated that they were willing to participate in conference calls and meetings with states in order to keep all parties abreast of schedules, outstanding issues, and expected completion dates.

Norfolk Southern Railway

Norfolk Southern Railway (NS) operates approximately 21,000 miles of track in 22 eastern states. It coordinates highway projects through its Public Improvements office in Atlanta. It publishes an array of standards, permits, and guidelines on its website to promote understanding of its process and to make it easier for public agencies to comply with its design and construction standards.

NS has published typical timelines and steps for various types of projects (Table A.1). Its officials indicated they prepared these schedules in cooperation with public agencies so that the agencies could anticipate the lead time necessary for railroad review and concurrence. These time frames are predicated on the assumption that all submittals are complete and address railroad concerns.

NS emphasizes that up to 9 weeks can be trimmed from the project schedule if the public agency submits a project agreement early in the process. NS will review and process the agreement concurrent with the other reviews. It has developed model agreements that it will approve with minimal review.

These time frames indicate that a minimum of 12 weeks and up to a maximum of 40 weeks are necessary for internal railroad coordination and review. Between these weeks of

	Type of Project			
Steps in Process	**Grade Crossing**	**Parallel Encroachment**	**Overhead Grade Separation**	**Underpass Grade Separation**
Submit preliminary plans and request acknowledgment of plans	3 weeks	3 weeks	3 weeks	12 weeks
Receive railroad comments on preliminary plans	7 weeks	7 weeks	7 weeks	8 weeks
Receive comments on corrected plans	3 weeks	3 weeks	3 weeks	6 weeks
Receive railroad cost estimate	1 week	1 week	1 week	2 weeks
Receive project agreement approval from railroad	7 weeks	7 weeks	7 weeks	7 weeks
If railroad financial contribution is needed	5 weeks	5 weeks	5 weeks	5 weeks
Total railroad handling time	21 weeks without contribution; 26 weeks with contribution	21 weeks without contribution; 26 weeks with contribution	21 weeks without contribution; 26 weeks with contribution	35 weeks without contribution; 40 weeks with contribution

Source: Norfolk Southern Review Schedule for Public Improvement Projects (*2*).

Table A.1. Norfolk Southern Schedule for Project Reviews

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review, the public agency will be conducting its own project-development processes. As a result, the total coordination process for a complex project such as a grade separation could extend over several years.

To reduce the uncertainty in project development and to provide specificity for project developers, NS provides a comprehensive set of guidelines and standard drawings on its website (*3*). The guidance it provides includes overhead grade separation design criteria, underpass grade separation design criteria, guidelines for under track culverts, special provisions for protection of railway interests, and the schedule of review of grade separation projects.

NS provides permits for environmental rights of entry, nonenvironmental rights of access, and right of access within 50 feet of a railroad track, as well as all the appropriate points of contact for access information (*4*). It also provides applications for pipe and wire crossings of railroad rights-of-way (*5*).

A right-of-entry permit for engineering studies requires a $750 fee, exhibits illustrating the site, and assurances that all insurance, safety, and environmental provisions will be followed.

Pipeline and wire crossings or encroachments are managed through the DMJM Harris office in Philadelphia, now a subsidiary of AECOM. DMJM Harris is a national, full-service engineering firm that NS has under contract to review and process pipe and wire permits. It processes all agreements and reviews, while the final agreement and occupancy license is issued through NS. DMJM Harris reports the following timelines for review of pipe and wire projects:

- Within 30 days of an application, DMJM will provide comments, including the need for additional information or comments as to how to rectify an incomplete application. If revised plans are not received within 30 days, the application will be automatically canceled.
- If revised plans comply with NS standards, a draft agreement will be prepared and mailed within 30 days.
- If revised plans still are inadequate, additional comments will be provided within 2 weeks.
- On acceptance of adequate plans, the applicant will execute the license agreement and return it to DMJM with a check for the appropriate license fees and certificates of insurance. Draft agreements are valid for 60 days without an extension.
- NS will then execute the license, and the fully executed agreement will be returned to the applicant in approximately 1 week.

The application must include items such as accurate project description, mapping and geographic information, accurate right-of-way descriptions, photographs, and other materials sufficient to allow thorough comment. Fees range from $1,200 to $2,100, with additional costs for supplemental filings and amendments. These fees do not cover the cost of insurance, right-of-way, easements, and additional complex engineering reviews.

The period for the application process varies, depending on the quality of the submittal. A DMJM official indicated that the quality of most submittals generally is good. The most common problem is incomplete information, particularly concerning insurance. He estimated that a significant percentage of his staff's time spent on pipe and wire agreements is devoted to merely getting accurate information regarding basic aspects of insurance coverage. He said that issues such as incomplete or inaccurate names and addresses of insurers and beneficiaries consistently delay applications.

DMJM advises applicants that if their submittals are accurate and complete, transverse crossings applications can be completed in 30 days, longitudinal occupancy applications in 3 to 4 months, and complex projects dependent on their unique considerations. Generally, it assures applicants that it will respond to submittals within 30 days. The agreements may require typical railroad safety and protection clauses, including requirements that the applicant pay for flagging, inspection, and maintenance work related to the project.

In addition to the basic application information, NS provides 38 pages of design and construction guidance for pipeline projects. The guidance specifies the type of engineering details and calculations that NS requires to ensure its railroads' safety. Boring beneath a railroad can lead to subsidence of the tracks. Trenching can lead to cave-ins that can subside track. Flooding by storm water can erode track and structures. Some pipelines carry hazardous or flammable materials. All these complexities have led to specific engineering reviews that DMJM Harris conducts on behalf of NS. NS also advises that complex projects—particularly ones that require lengthy longitudinal encroachments—can require site visits and reviews. Such reviews add time and cost because of the scheduling and engineering time required.

NS provides another 23 pages of culvert guidance and 13 pages of guidance for wire, conduit, and cable encroachments and crossings.

A DMJM Harris representative who has worked closely with the pipe and wire process for many years said that applications proceed most quickly when they are handled by experienced personnel whom both DMJM and NS know. His opinion was that experienced people are more important than a particular process. DMJM and NS acknowledge that such projects can be routine and expeditious if the details are adequately addressed. When all parties are familiar with one another's proven expertise, reviews are faster, responses to comments are quicker, and each party will be more likely to accept the engineering judgment of the other. He said the interaction is based on both engineering expertise and personal trust among the parties—NS, DMJM, the applicant, and the applicant's engineer.

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The DMJM Harris representative said that successful applications for routine utility, drainage, or pipeline projects generally not only provide complete information but also present this information in the standard format and sequence that the railroad expects. Successful projects also include early railroad coordination, not coordination that occurs late in the project-development process.

He described a model process as being one in which knowledgeable engineering staff start the coordination process early, prepare complete submittals, and understand the needs of the railroads. He recommended that reliance on standard agreements, as opposed to customized or unique legal agreements, will save considerable time.

NS also provides 10 pages of overhead grade separation design criteria that address issues such as vertical and horizontal clearances, drainage, crash walls, excavation, erosion control, demolition, erection and hoisting, and plan requirements.

NS also provides requirements during construction, which are summarized under "Special Provisions for Protection of Railway Interests." It addresses issues such as the following:

- The railroad representative will have final authority over all issues of safety.
- Contractors will not begin work until written permission has been granted.
- Contractors shall not be allowed to interfere with railroad operations.
- Contractors need to pay for and provide railroad flagging services.
- The railroad shall inspect and approve all work.
- Special protections are taken during excavation and shoring to protect tracks and structures.
- Erection, demolition, and hoisting cannot impede the railroad operating envelopes and must be conducted with the approval of the railroad engineers.
- Blasting is strictly controlled.
- Materials and equipment will not be stored on rights-of-way without written permission.
- Materials and equipment cannot be hauled across tracks without written permission.
- Contractors cannot make delay claims against railroads because of railroad operations.
- Insurance will be provided in accordance with railroad requirements.
- Failure to comply with safety or insurance provisions can result in the contractor being expelled from the railroad property.

NS handles its public project reviews from its Atlanta Public Improvements Office. At any one time, NS has approximately 1,600 public projects pending. It estimates that 70% of submittals are adequate. Typical deficiencies involve lack of adequate clearances or problems with drainage plans. NS says it will share with public agencies the names of the engineering firms with which it works frequently. It advises public agencies to select one of those firms, as they are highly experienced in the details of NS specifications.

NS officials indicate that they provide extensive design and construction guidance on their website to clarify for public agencies what is required for a successful submittal. A major issue that they cannot reduce to guidance for every project is the needed horizontal clearances at a particular site for future track expansion. NS indicates that it strongly advises project sponsors to coordinate with them early, at the project concept stage. The officials say they will provide guidance as to their lateral clearance needs and will provide right-of-way maps early in the process. NS describes a "boots on the ground" philosophy regarding public projects. It wants to meet early, will meet on-site, and particularly wants to be on-site for preconstruction meetings on most projects.

NS strongly recommends a centralized railroad agreement office for state departments of transportation. It prefers working regularly with experienced, centralized state officials to dealing with individual DOT districts. Its officials indicate that district personnel are more likely to deal with the railroad process infrequently and tend to not develop the expertise that accrues to centralized personnel who interact with the railroads more often.

NS also strongly prefers to use standing master agreements for preliminary engineering and for construction standards. It provides its special provisions for protection of railway interests as the basis of standard language to be included in every construction project. Inclusion of these provisions simplifies and streamlines the development of project agreements.

BNSF Railway Process

BNSF Railway operates 32,000 miles of railway in 26 states, most of which is west of the Mississippi River. It is the nation's second largest railroad. Like NS and CSXT, BNSF Railway emphasizes its corporate policy to cooperate with public agencies on projects. It focuses its project-coordination efforts through its public projects division, based in Kansas City, Kansas. Unlike CSXT or NS, it has not published a public projects manual or design standards on its website. Its officials said they used to publish company design standards until they were named in a lawsuit brought by a design firm. The firm contended its errors and omissions on a project were based on outdated design standards it obtained from BNSF. Since then, BNSF has not published standards. Instead, it advises designers and public project sponsors to design projects to the standards of the American Railway Engineering and Maintenance-of-Way Association (AREMA). When the draft plans are submitted to BNSF, the railroad will provide detailed design standard comments on a case-by-case basis.

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BNSF reports that it relies on outreach to public agencies to develop effective lines of communication. Its Public Projects division attempts to schedule annual meetings with the department of transportation within each state it serves. These annual meetings and regular contacts with project sponsors about ongoing projects serve to provide open communication between the railroad and public agencies.

Its website includes contact information for the Public Projects division officials assigned to each state (*6*). It also provides applications and standard agreements for typical projects or permits (*7*), including the following:

- Access to BNSF property for environmental assessment needs;
- Standard roadway repaving projects;
- Crossing of tracks with oversized loads;
- Permits for pipe and wire crossings;
- Permits to construct or maintain culverts or other minor maintenance devices; and
- Temporary occupancy of right-of-way permits.

All the Class I railroads rely on private sector engineering firms for services such as plan review and construction engineering and inspection. In addition, BNSF outsources handling of the basic permits and agreements, including all of those listed above. The firm Staubach Global Services manages those permits and reviews for BNSF.

Staubach reports that the following are the standard processing times and fees for various permits and approvals:

- Access to right-of-way for environmental studies, such as borings or soil sampling: $350 per permit, with a processing time of up to 60 days if all application information is complete and accurate. An additional fee and additional time are required for each resubmittal caused by incomplete information.
- Permission to install or improve a culvert, drainage structure, or other routine appurtenance on or adjacent to railroad property: The permit has a $350 application fee and requires up to 60 days for processing and an engineering review. The average cost for the engineering review is $2,500.
- Roadway resurfacing projects: $350 fee, varying engineering reimbursement costs, and requires up to 60 days for processing.

The review process for a typical minor project, such as a resurfacing at or near a rail crossing, includes the following steps and time frame, according to Staubach:

1. The project sponsor sends application, drawings, and $350 fee to Staubach.
2. In 10 to 15 working days, Staubach forwards the application and preliminary drawing to engineering firm, which will prepare final drawings for the contract.
3. When the drawings are drafted by the engineering firm, plans are sent to the BNSF roadmaster for approval.
4. The roadmaster sends plans to applicant, who forwards a copy to Staubach.
5. The Staubach permits manager executes permit if all certification and payments are received.
6. The agency ensures that the contractor completes the online safety training course before commencing work.
7. The agency-applicant provides notice to the roadmaster 5 days before beginning the project.

The total process is estimated to take up to 60 days if filings are complete and accurate. If they are not, additional time is required to return files and to get complete application information.

BNSF public projects officials strongly recommend the following general steps and schedule:

- Conduct annual overview meetings in which the railroad and the public agency review processes in general and seek opportunities to improve communication and workflows.
- The following are recommended for specific projects:
  - A preproject scoping meeting in which the railroad and project sponsor discuss the project concept, location, special site conditions, and geometric needs of the railroad for that location.
  - A submittal at the 30% plan stage, which usually includes a line, grade, typical section for roadway; and a type, size, and estimate for structures.
  - A submittal at the 60% plan stage, which will include changes made to address the comments on the 30% plans.
  - A submittal at 90% completion when details such as drainage structures, right-of-way limits, utility relocations, and work limits are clear.
- BNSF wants to pay particular attention to details that are critical to the railroad, such as shoring around piers and foundations, demolition plans, and erection procedures.
- BNSF also encourages preconstruction meetings on all projects, but requires them on complex ones, such as grade separations and new alignment.

Internally, during its review process, the BNSF public projects team tracks these major milestones for each project: concept stage; diagnostics stage; estimates requested; estimates sent to agency; contract negotiated; contract returned to agency; and contracts signed. It reports that each of these seven steps requires about 30 days of internal processing time and review

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within the railroad. BNSF reports that it is difficult to estimate the average time for all reviews because of the great variation in the timing of submittals. It reports that some agencies can go years between submittals if projects are delayed for various reasons, such as a reduction in finances, changes in priorities, or environmental delays.

BNSF offers standard project agreements for most types of projects in order to help the public agency save time and money. The draft standard agreements include the standard clauses and considerations BNSF requires. They offer draft standard agreements for the following:

- Crossing surface installation projects;
- Highway–rail signal interfaces projects;
- Grade crossing signal installation agreements;
- Underpass projects; and
- Overpass agreements.

Joint BNSF Railway/Union Pacific Railroad Guidelines

One of the major innovations to assist public agencies was the joint development by BNSF and Union Pacific Railroad of guidelines for railroad grade separation projects. These are the two largest railroads, and they collectively dominate the large majority of rail traffic west of the Mississippi River. The joint guidelines provide a unique resource that benefits dozens of states and hundreds of communities that pursue grade crossings. It addresses a comprehensive array of processes, standards, timelines, and advice on how to develop a grade separation project for approval by the railroads. Because grade separation projects are among the most complex ones, the guidelines include many components that would be relevant to other projects as well. Included in the guidelines are the following:

- Purposes, definitions, and references.
- How to develop agreements and the minimum requirements for them.
- What is needed for submittals, including the following:
  - Designs;
  - Calculations;
  - Geotechnical;
  - Drainage;
  - Construction plans; and
  - As-built drawings.
- General requirements for the following:
  - Shooflies;
  - Track spacing;
  - Accommodating future tracks and access roads;
  - Structure types;
  - Temporary and permanent clearances;
  - Drainage and erosion; and
  - Construction oversight.
- Overhead structures:
  - Design plans;
  - Clearances;
  - Pier and abutment locations;
  - Lighting; and
  - Drainage and erosions.
- Underpass structures:
  - Materials requirements;
  - Acceptable deck types;
  - Sequences of construction; and
  - Temporary structures.
- A variety of standard drawings.

Agreements

The guidelines note that the applicant is responsible for all costs to plan, design, construct, and maintain the grade separation structure. The guidelines also put applicants on notice that they must comply with all of the railroad's construction practices and inspection procedures, and they must not interfere with any other facilities or utilities within the railroad right-of-way. Applicants are also responsible for all the railroad's costs associated with the review of plans and construction documents and with construction procedures.

Submittals

The guidelines note that review of submittals does not remove any liability or responsibility from the applicant for subsequent problems. They spell out requirements for engineering oversight, submittal schedules, design submittals, submittal of calculations, and stages for submittal. These stages include the following for a typical overhead structure:

- Submittal of conceptual plans with site pictures. Four weeks allowed for review.
- Submittal of 30% plans, which include responses to comments on conceptual plans, preliminary designs, shoofly specifications (a shoofly is a temporary bypass track built to accommodate construction on existing tracks), a drainage report, and construction phasing plans. Four weeks allowed for review.
- 100% plans, which include responses to all earlier comments. Four weeks allowed for review.
- Construction plans that address the following:
  - Shoring;
  - False work;
  - Demolition;
  - Erection;

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- Erosion control; and
- Construction phasing plans.

Underpass projects are much less common and are discouraged by the guidelines. Several additional design components are required, with an additional 6 weeks for review.

General Requirements

The guidelines require construction projects to create no interference with railroad operations. They recommend overpasses, because overpasses cause less interference to rail operations during construction than underpasses do. The guidelines also recommend the construction of shooflies if track interruption is necessary. They require maintaining existing track spacing and the widening of existing substandard spacing. The railroads require 20 feet minimum spacing between freight train tracks and 25 feet between freight and passenger lines.

A fundamental component of any conceptual planning is determining future needs for main tracks, sidings, and spur tracks for local development. The railroad may have specific plans for additional tracks for major, critical service routes. In other cases, transit or other passenger rail agencies may have long-range track needs. Additional clearances for future tracks, sidings, and access facilities are to be identified early in the conceptual stage of the project.

To the extent possible, the guidelines require piers and abutments to be outside of rights-of-way. If that is impossible because of the width of the right-of-way, then a minimum of at least 25 feet of horizontal clearance is required between the outside track and the nearest obstructing pier or abutment. This clearance allows for maintenance access or additional track. The minimum permanent vertical clearance is 23 ft 4 in. Lesser vertical and horizontal clearances during construction can be permitted.

The general guidance also notes that specific plans will need to be approved for shoring, demolition, erection, false work, drainage, vegetation, access roads, and a variety of specific considerations during construction. The railroad will require assurances that all those procedures are met during construction. In addition, it will require the following:

- Safety training for employees who are on site;
- The existence of and adherence to a formal safety plan;
- Appropriate flagging provided by or approved by the railroad;
- Adherence to all erection and demolition plans to ensure the safety of trains and track;
- Assurances that equipment, materials, false work, and other items do not interfere with the operating envelop; and
- Adherence to all environmental requirements.

BNSF public projects officials emphasize that they want to cooperate with public projects, as evidenced by their creation of an entire division to service these projects. However, they also note that BNSF tracks are a "34,000-mile storefront" for the company. Its right-of-way is finite, while its freight volume has steadily increased. After decades of track abandonments, BNSF is in a steady mode of expansion, particularly for important Pacific Rim intermodal traffic and coal shipments. Its overriding corporate concern has to be the protection of rights-of-way and operating envelopes so that immediate and long-term customer needs are met.

BNSF officials report that the biggest impediment to the efficient processing of agreements and review of plans is a lack of understanding of railroad standards and requirements. They strongly advise project sponsors to use one of the several firms that BNSF itself relies on. Another consistent problem is a lack of understanding of the need for flagging. Applicants, BNSF officials indicate, fail to anticipate the need for, cost of, or advance time required for flagging services.

An innovation BNSF offers is assistance with securing short-term railroad protective liability insurance. Firms can buy a rider on the BNSF policy for short-term insurance that may be needed for minor projects.

Union Pacific Railroad

Union Pacific Railroad (UP) is the nation's largest railroad company. It has 32,000 miles of track in 23 states. Its rail networks are the most far-flung in the nation, stretching from Louisiana to Chicago across the western two-thirds of the country, including the entire West Coast. Its Industry and Public Projects Division at its headquarters in Omaha, Nebraska, is the focal point for its interaction with a large number of public agencies across the western two-thirds of the nation.

Its website includes extensive information regarding applications for various permits, including environmental right-of-way access, pipe and wire easements, and drainage installation or modifications. However, its public projects team indicates that it does not publish generalized project-development guidelines or agreements because of the great diversity in public agency requirements that it faces across its vast system. It does not publish a single model agreement or model process for project reviews because of the significantly different legal and project-development requirements of the different states. It develops agreements on a state-by-state basis.

UP public project officials indicate that preliminary engineering agreements are usually included with construction and maintenance agreements, although preliminary engineering may be addressed often in a separate letter of agreement. It provides standard construction agreements, which it uses when agencies do not have their own standard agreements or when UP cannot accept the public agency's proposed agreement.

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Its manager of industry and public projects (MIPP) is the initial contact with the public agency. This person serves as the project manager who negotiates the project and facilitates the interface between the agency and the various departments within the railroad, such as Real Estate, Design, and Operations. UP officials say they believe this arrangement provides consistency in the handling of projects. In addition, the single point-of-contact ensures that the project has a consistent manager as it moves through the various departments for review.

The process by which a project progresses through the review stages varies significantly depending on the project type. A signal project is reviewed by other offices than those that review grade separation projects. UP's standards differ significantly from the national AREMA standards. UP says that its higher volumes, greater speeds, and diverse terrains require more restrictive standards than would apply to short-line railroads, which generally rely on AREMA standards. It notes that its standards document, prepared jointly with BNSF, provides significant detail for project developers who need to identify UP requirements.

UP indicates that addressing public projects is a corporate priority, as reflected by the extensive staffing for them. It has a field staff of public project managers supported by staff in the track, structures, and signal design groups. The safety projects have a particularly high corporate focus and are supported by the entire organization.

As with the other Class I railroads, UP sees problems with project submittals. They fall into predictable categories, including the following:

- The use of consultants who are not familiar with UP requirements. Submittals do not address the requirements noted in the UP published guidelines.
- Unrealistic project schedules from the agencies. If the initial project schedule from the agency assumes an arbitrary schedule without the railroad's input, it likely will not be met.
- Provisions for UP future expansion, such as future track, access roadway, and spreading of existing tracks to 20-ft spacing, are not addressed. Encroachment onto UP right-of-way is assumed as being acceptable, which it is not.
- Projects do not provide for uninterrupted rail service during construction.
- Scope changes affect the track, railroad bridge alignment, location, or elevation, requiring the railroad to start over with the review process.
- Failure by the agency to get the railroad involved in discussions early in the project's development.
- Failure of agencies to deal with right-of-way issues.
- Lack of consideration by agencies regarding the effects of constraining railroad operations or right-of-way.
- Substandard designs or substandard materials.

UP officials indicate that public agencies use a variety of mechanisms for communicating with it. Some state DOTs have annual meetings with the railroads, such as in Iowa. There, the DOT brings together all its personnel involved in projects, including maintenance forces. Other states, such as Nebraska, Texas, Wisconsin, Colorado, and Illinois, have quarterly project-review meetings. Regardless of the details, UP officials say they encourage continuous communication.

UP officials say they frequently experience a lack of understanding among public agencies as to the length of times that are acceptable for railroad interruptions. They note that their system lacks the redundancy that highway networks have. A closure on one section of the railroad will have complicated ramifications for movements across the country. Rail system network computer simulations that model the effects of rail interruptions are so complex they cannot be run on desktop computers but require more powerful parallel processors. The impact analyses can estimate the amount of delay, and the subsequent costs of that delay to the entire network. UP has had experiences with public agencies that want to minimize project cost without an appreciation for how closures or interruptions can create significant costs for the railroad during construction.

Such issues are more common with cities and counties, because they have fewer projects and less experience with the railroads, UP officials indicate. Similarly, the smaller agencies often develop early project cost estimates that later prove to be inaccurate.

UP officials strongly recommend getting the railroad involved from the start of the planning process. Early involvement can identify where UP will require higher than the minimum design standards. UP frequently encounters local consultants designing to minimum standards and basing estimates and schedules on those minimums. If the design involves the mainline, UP officials may require more robust design than the minimums in the AREMA standards to compensate for the greater speed, tonnage, and grades that their trains must handle.

UP officials strongly recommend the following practices to improve the agreement and review processes:

- Select engineering firms with extensive railroad experience.
- Work from preapproved standard legal agreements.
- Begin the coordination process as early as practicable.
- Create regular and continuous lines of communication.
- Have a centralized point of contact at the highway agency.

UP reports that some of the DOTs have centralized points of contact, which they believe operate much more effectively than ones in which agreements are split among the DOT districts. When UP coordinates consistently with one team, it experiences fewer problems.

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UP reports that it tracks project submittals and provides comments within 45 to 60 days. It particularly tracks safety projects to keep them on schedule. For bridge projects, at-grade crossings, or parallel roadway work projects, it would like to see project coordination begin at the project concept stage. For safety projects, it would like to begin coordination with a preliminary engineering agreement. For quiet zone proposals, it would like to begin coordination when the community publishes a notice of intent to seek a quiet zone.

Kansas City Southern Railway

The Kansas City Southern Railway (KCSR), based in Kansas City, Missouri, operates 3,226 miles of track in 10 states from southern Texas and Louisiana north to Chicago and Minneapolis. Its parent company owns a connecting railroad in Mexico, giving it a significant presence in the Mexico-to-Canada NAFTA freight markets.

Being one of the smaller Class I railroads, KCSR does not have a public projects division. It handles public project reviews through its normal engineering divisions. Its officials indicate they will provide their design standards to public agencies whose consultants want them to determine how KCSR standards differ from AREMA standards. When submittals are received, the KCSR engineering staff give them a preliminary review and then assign them to one of several outside consulting firms that conduct a detailed review.

KCSR says it provides comments generally within 30 days and does not have a significant backlog of projects awaiting comment. It does not recommend extensive presubmittal coordination because it would prefer to have a set of preliminary plans to review as it makes its comments. The existence of plans, KCSR staff say, provides specificity about the project, which its consultants and its internal divisions can review in detail.

KCSR staff report experiencing the same types of issues that the larger railroads reported regarding submittals: plans sometimes fail to accommodate track expansion; local agencies do not want to pay for reviews or rights-of-way; design standards are not met; or that years pass between submittals. However, the KCSR officials indicate that their relatively "flat" table of organization, their ability to quickly send project reviews to consultants, and their lack of review backlog indicates that their current processes work effectively for conducting project reviews.

KCSR relies on outside consultants for several functions that other, larger railroads perform in-house. Track construction, flagging services, and inspection of construction are generally provided by outside contractors for KCSR.

One innovation that KCSR provides is standardized railroad protective liability (RPL) insurance. RPL is required in addition to standard insurance to protect the railroad from claims involving accidents that occur as a result of or during construction on or near the railroad. The inability of contractors to get protective liability insurance has been cited by some state DOTs as a problem. Also, railroads and their consulting engineers say that incomplete or inaccurate policies are a common cause of delay in approving project agreements.

KCSR has a standing agreement with CFR Risk Management, a regional insurance carrier that serves the southwestern United States. CFR provides a program of short-term railroad protective liability insurance policies that meets the requirements of KCSR. The railroad includes a link from its website to the insurance carrier's website, where contractors can find an insurance application and a rate schedule. For instance, protective liability coverage for a transverse installation of an overhead wire or an underground pipe can be obtained for $1,480 to $1,800. Longitudinal encroachment utility installations can be insured on a per-foot basis, with costs of up to $3,350 for up to 10,000 feet of installation. Installations greater than 10,000 feet require rating and approval.

Insurance can be provided for projects up to $10 million for many common types of construction and maintenance projects, including bridge painting, private grade crossings, grade crossing maintenance, bridge surface repair, borings, bridge inspection, and other similar work.

Amtrak

Amtrak operates 21,000 miles of track serving more than 500 destinations with its long-distance and commuter rail services. Amtrak coordination on public projects is complicated because of the electrification of its system, higher operating speeds, and the increased liability caused by passenger service. Not only must the usual concerns regarding rail safety and operations be addressed during construction but the electrical lines that serve its track must also be accommodated. The electrification issue has led Amtrak to identify a subset of prequalified consultants who not only can address its rail issues that are common to all railroads but who also are qualified to address the electrification issues. Amtrak is willing to share that list of consultants with public project sponsors who seek to conduct projects that interact with Amtrak rights-of-way. On some corridors, Amtrak trains run up to 150 mph, which not only increases the risk of derailment but also means that trains enter a construction zone much faster and with less warning than would be the case with slower, freight lines. Amtrak's busiest routes are on the crowded Northeast Corridor, which travels through some of the most densely populated regions of the country.

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The electrification and rail passenger concerns have led Amtrak to develop additional design and construction standards. Amtrak does not publish those standards but will share them on a case-by-case basis with design firms that are working on behalf of public agencies.

Amtrak strongly encourages the development of standard agreements and the use of standing coordination meetings, such as it has with the Massachusetts Turnpike and the Massachusetts Highway Department. It advises public agencies that coordinate with it on projects to appreciate its enhanced concerns about safety and indemnification. They note that Amtrak operates under federal statutes that created it. Those statutes prohibit it from subsidizing freight or local passenger service. They interpret that to mean they cannot contribute anything of value to serve projects that do not directly address its core mission. The corporate approach is that "but for your project" it would not have any additional cost for project reviews, right-of-way contributions, or interruptions in train schedules during construction of a project. As a result, Amtrak takes an absolute stance that it is prohibited from cost-sharing on projects or from providing free design or construction services.

References

1. *Public Project Information for Construction and Improvement Projects That May Involve the Railroad.* Public Projects Group, CSX Transportation, Jacksonville, Fla., 2009. www.csx.com/share/media/media/docs/CSX_Public_Project_Manual-REF21857-REF22268.pdf. Accessed April 1, 2010.
2. Norfolk Southern Corporation. Review Schedule for Public Improvement Projects. www.nscorp.com/nscportal/nscorp/Customers/Publications/pdf/SEC3_MISC4.pdf. Accessed Oct. 14, 2009.
3. Norfolk Southern Corporation. Guidelines for Design of Grade Separation Structures. www.nscorp.com/nscportal/nscorp/Customers/Publications/Design%20of%20Grade%20Separation%20Structures. Accessed April 1, 2010.
4. Norfolk Southern Corporation. Property Access. http://realestate.nscorp.com/nscrealestate/RealEstate/Real_Estate_Services/Property_Access. Accessed April 1, 2010.
5. Norfolk Southern Corporation. Wireline/Pipeline and Fiber Optics. http://realestate.nscorp.com/nscrealestate/RealEstate/Real_Estate_Services/Wireline_Pipeline_and_Fiber_Optics. Accessed April 1, 2010.
6. BNSF Railway. Public Projects. www.bnsf.com/tools/pubprojects. Accessed April 1, 2010.
7. BNSF Railway. Property Permits and Licenses. www.bnsf.com/markets/services/realestate/permitslicenses.html. Accessed April 1, 2010.

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APPENDIX B

Analysis of Survey Results

Survey of State and Local Agencies

A web-based survey was designed to query state and local transportation agencies about best practices, streamlined processes, and challenges in the relationship between state and local agencies and railroads. An e-mail message with a link to the survey was sent to each state department of transportation and to each member of the project advisory panel. Approximately 400 local transportation officials were sent an explanatory letter about the survey, which included a link to it.

The survey listed 27 suggested best practices that the team had identified during earlier research stages. It asked each respondent to indicate if they used any of the listed 27 practices and to rate their effectiveness. It also asked for additional best practices. The survey asked if the responding agency had any metrics to measure the effectiveness of agency best practices on railroad approval time frames or cost. It provided respondents the opportunity to do a self-assessment rating of their agency's performance in submitting plans and submittals that addressed railroad needs in review of projects. It requested agency perspectives on reasons for successful and unsuccessful project reviews. It provided an opportunity for responding agencies to list specific issues in coordination between railroads and highway agencies that needed to be addressed. It also asked agencies if they had problems with indemnification or liability insurance.

Overall there were 39 responses. Of these, 27 were from state departments of transportation, 11 were from cities, and one response was from a state commerce commission. The following section discusses the survey questions and the responses received.

Most respondents were DOT program managers, railroad coordinators, or local program managers (Figure B.1). The respondents were involved in multiple railroad coordination functions (Figure B.2). Most of the respondents (34) were involved with general roadway and bridge projects, followed by Section 130 project managers (23). Section 130 projects are federally funded rail safety projects, such as the installation of lights and gates. Figure B.2 shows that respondents covered all major functions; their responses should reflect perspectives in all the relevant subject areas.

More than 25% of the respondents handled more than 100 projects in the past 3 years, while more than 50% handled more than 30 projects (Figure B.3). This information indicates that the survey respondents were actively involved in projects with the railroads and that the feedback should provide a good representation of practices, agreements, and issues in the working relationship between railroads and local and state transportation agencies.

Agencies interact with multiple railroads. Figure B.4 shows that 20 respondents interact with the short-line railroads. Eighteen work with Union Pacific Railroad (UP), and 16 work with BNSF Railway. This may mean that the overall responses received through this survey may be more influenced by the interactions of agencies with the short lines and UP and BNSF.

Figure B.5 indicates that about 30% of the respondents were local agencies and the remaining were state agencies. The Illinois Commerce Commission is a non-DOT state agency that responded to the survey and has been counted as a state agency.

Effectiveness Rating of Various Best Practices

Table B.1 shows the best practices and their effectiveness. The practices with the top votes as "excellent" are shown bracketed in bold and in rank order in the "excellent" column. The top practices rated as "good" are also bracketed. In general, the most highly ranked practices related to communication and shared expectations. Six of the top eight most highly rated best practices related to having central points of contact, clear scopes for reviews, and frequent, ongoing communication.

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Figure B.1. Role of respondents.

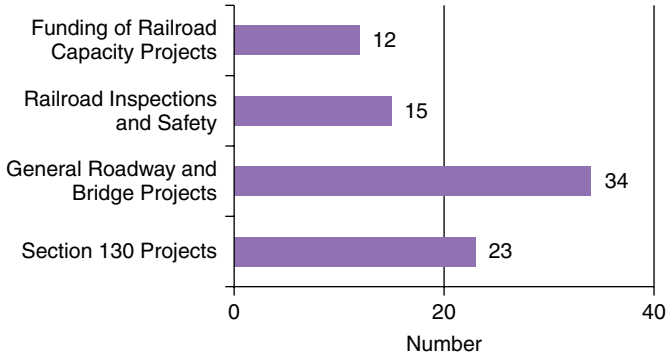

Figure B.2. Respondents' functions.

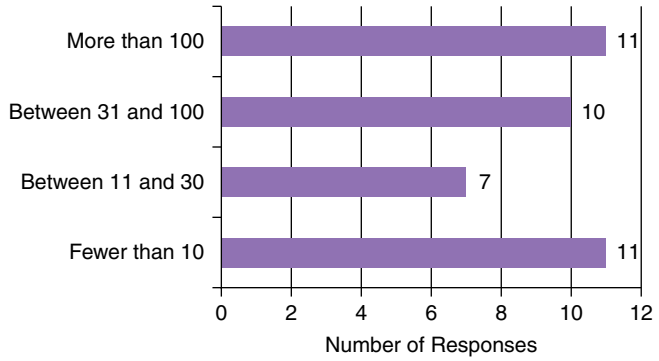

Figure B.3. Number of projects addressed.

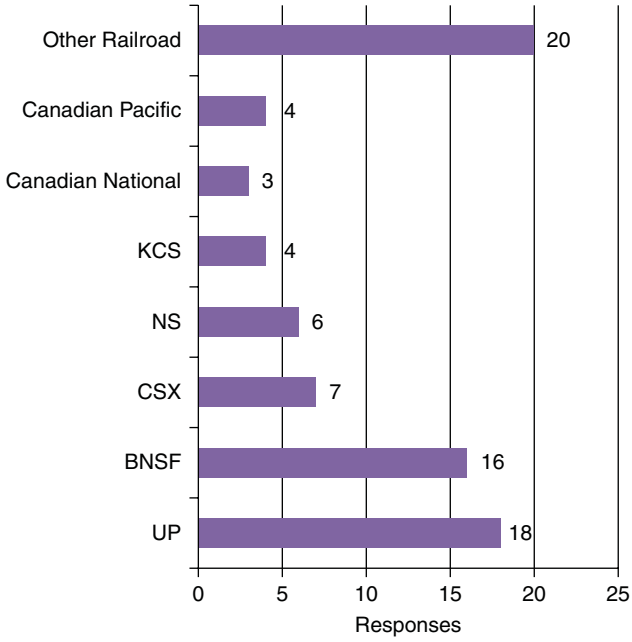

Figure B.4. Number of survey respondents who interact with each railroad.

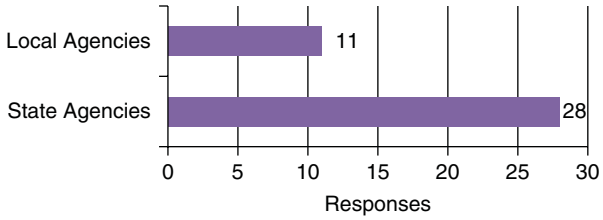

Figure B.5. State versus local responses.

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The top-ranked "acceptable" strategies also are highlighted with brackets.

Have a DOT Central Point of Contact

"Have a DOT Central Point of Contact" is one of two practices that tied for the most highly rated practice overall, with 22 respondents rating it as an "excellent" or "good" practice. This high ranking in the survey was validated in interviews with state DOTs. It was also rated high during discussions about best practices at the first advisory panel meeting and in interviews with state rail coordinators and with the railroad personnel.

Washington DOT has established a process of having a central point of contact who works with the districts to coordinate and prioritize agency projects and activities with the railroads. The district takes over the lead role once the project construction work begins. This model of operation ensures that all initial coordination and agreements are completed with the right people being involved at the right time. Once the project work begins, the district responsible for the project takes the lead and the central office point of contact plays a support role while still being actively involved with the project. This allows the district and the technical experts to work on the details of the project while the central point of contact remains informed about progress. By having the district lead the day-to-day project work, the agency ensures that additional approvals from central office do not add time to the project schedule or cause additional delays.

In this model, the central office handles all communication and coordination on project tasks, prioritizes project schedules, and ensures that agreements and approvals are on schedule while the district technical contacts work directly to resolve technical issues and keep the project work on schedule. This model enables the central point of contact to help with any additional coordination required between the central office and the railroad when required. Examples of agencies using this practice are the Florida, Nebraska, Iowa, Washington, Pennsylvania, Minnesota, Texas, New Mexico, and Ohio DOTs; the Arkansas Highway and Transportation Department; and the Illinois Commerce Commission.

Although the railroads were not asked to participate in the survey, in separate interviews the railroad personnel also strongly supported having a central point of contact in the DOTs.

Conduct Formal Crossing Diagnostics

The second of the two practices that tied for highest number of responses for an "excellent" practice was "Conduct Formal Crossing Diagnostics." This practice was one that the railroads also identified in interviews as a best practice. It was rated excellent by several states and local agencies. It relates to conduct of a specific safety diagnostic analysis of a crossing before lights, gates, and other safety measures are deployed. Although ranked as a good practice, the issue was not cited as a frequent cause of project delay.

Establish Ongoing Formal Communication Channels Between the Highway Agency and the Railroad

"Open Communication: Establish Ongoing Formal Communication Channels Between the Highway Agency and the Railroad" received the second highest number of responses as "excellent." In interviews with state transportation agencies, this practice was identified as one of the essential elements to successful workings between the railroads and the state transportation agencies.

This practice was listed as a reason for success of projects and reviews. Open communication was cited as one of the key elements for good working relationships between railroads and state transportation agencies. Agencies such as the Pennsylvania DOT and Washington DOT attributed meetings and ongoing communications to facilitating easier exchange of ideas, expediting revisions to agreements, expediting approvals, and building trust between the teams. Open communication was attributed as being especially helpful when the teams disagreed with each other on projects, schedules, agreements, billing, or processes. Some agencies in the survey and interviews noted that agency personnel sometimes avoided scheduling meetings to avoid confrontations when there was a difference of opinion or ideas between the teams.

One of the respondents in the survey noted, "Sometimes, an adversarial relationship develops between the railroad and the highway agency on some projects. Some DOT project managers try to avoid having to deal with the railroad, if possible." In agencies where open communication was integrated into the workings between agency and railroad personnel, both teams often found workable solutions to challenges.

Have One Empowered Railroad Point of Contact to Coordinate Project Issues

"Have One Empowered Railroad Point of Contact to Coordinate Project Issues" received the third highest number of response as "excellent." This also corroborated agency feedback during interviews that having multiple points of contact in the railroads created confusion and delays. It led to inconsistency in dealing with project issues and to waste of resources. Railroad personnel noted that this approach led to

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	Practice and Its Effectiveness	Excellent	Good	Acceptable	Poor	N/A
1	**Have DOT Central Point of Contact.** Have one empowered point of contact at DOT to coordinate railroad project issues.	12	10	7	3	5
2	**Conduct Formal Crossing Diagnostics.** Do not program a crossing project without a formal diagnostic study.	12	9	6	2	8
3	**Open Communication.** Establish ongoing formal communication channels between the highway agency and the railroad.	11	10	8	6	1
4	**Have One Railroad Point of Contact.** Have one empowered point of contact at the railroad to coordinate project issues.	10	13	6	5	3
5	**Require Early Scoping.** Require early predesign scoping on project concept between railroad and DOT.	9	14	7	3	5
6	**Have Preliminary Engineering Agreements.** Have formal agreements that allow railroads to be compensated for engineering advice during preliminary development—even if a project is not eventually constructed.	8	5	7	3	13
7	**Schedule Regular Meetings.** Have standing monthly or quarterly meetings—in person or via phone or video—to address project schedules with the railroads.	8	8	7	6	8
8	**Have Formal Points of Concurrence.** Establish agreed-on, regular points of coordination, review, and concurrence between DOT and railroad on projects.	8	16	5	4	4
9	**Use Experienced Engineering Firms.** Select only engineering firms that have extensive railroad experience.	4	12	10	1	10
10	**Standard Plan Notes.** Ensure railroad construction requirements are included in DOT plans.	5	12	10	1	9
11	**Require Preconstruction Meetings.** Require a preconstruction meeting between contractors, DOT, and railroad for any significant project.	5	10	13	1	6
12	**Hold Regional Conferences.** Bring neighboring states and railroads together to share best practices, common issues.	2	10	4	8	12
13	**Dedicate Personnel for Reviews.** Have dedicated personnel either in the railroad or with outside contract engineering firms to focus solely on highway project reviews.	6	10	13	3	5
14	**Coordinate Projects for Locals.** Have the DOT coordinate railroad reviews and submittals for the local governments.	2	9	11	5	9
15	**Ongoing Reviews.** Require reviews at the 30%, 60%, and 90% plan stage.	5	9	13	3	6
16	**Master Agreements.** Develop programmatic approaches between railroads and states.	6	8	8	3	12
17	**Standard Billing Agreements.** Have you streamlined or standardized the billing process with the railroads?	6	9	9	4	8
18	**Hold Annual Meeting.** At least annually have the DOT and railroad staffs meet to identify common needs, approaches.	7	7	6	7	9
19	**Enact Statutes to Close Crossings.** Enact state statutes that reward, encourage, or require closures whenever possible.	7	7	9	2	11
20	**Programmatic Right of Entry Agreements.** Develop standard agreements for routine right of entry for processes such as bridge inspections.	6	4	4	9	13
21	**Have Standard Review Times.** Have the DOT and railroad agree on standard review times for submittals.	5	6	7	7	11
22	**Prequalify Firms.** Develop additional prequalification for engineering firms to ensure they have railroad expertise.	0	6	10	1	18

Table B.1. Best Practices and Their Effectiveness

(continued on next page)

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	Practice and Its Effectiveness	Excellent	Good	Acceptable	Poor	N/A
23	**Education.** Require education for DOT project managers and other employees to ensure they understand railroad requirements.	2	6	14	3	11
24	**Produce Manuals.** Provide DOT staff procedure manuals on how to prepare acceptable railroad plans and submittals.	1	8	11	5	11
25	**Develop Escalation Procedures.** Have agreed-on escalation path to resolve issues that cannot be solved at lower staff level.	4	3	9	8	12
26	**Reengineer Section 130 Program.** Because railroad grade crossing countermeasures are often similar, reengineer the state's Section 130 process to standardize and streamline it between the DOT and the railroad.	2	6	7	5	16
27	**Use NHI Course.** Send staff to NHI course on railroad crossing projects.	0	4	9	7	16

Table B.1. Best Practices and Their Effectiveness (continued).

railroad staff receiving calls from state agency personnel regarding projects about which they had no knowledge. Often the railroad person receiving the call had no involvement or information about the project and would have to redirect the calls. Besides being a waste of time, it often led to confusion and difficulty in prioritizing project needs and often caused project delays.

The business model of the railroad did not involve having separate engineering and technical staff devoted to public projects. Often the same divisions within the railroads worked on both public and internal projects. Most Class I railroads have a public project manager who coordinates the work between the agencies and the railroads. Prioritization of project work was also done by the public project manager, an area outside the railroad technical team. Because of this separation of the railroad technical team, direct calls to them from state and local transportation agency staff often did not result in good responses. Having an empowered railroad point of contact helped coordinate public works within the different areas of the railroad and made for smoother and quicker information flow. Agencies that had a single or few designated points of contact with the railroads reported it was easier to revise schedules and project priorities if a situation required shuffling of priorities.

Require Early Scoping

"Require Early Scoping" received the fourth highest number of responses as "excellent." This practice enables both sides to bring up differences and concerns early in the process. It was also one factor that helped eliminate or change alternatives that either railroads or the agencies had strong reservations about. It often helped minimize the so-called "being held hostage to last-minute decisions," in which concessions are demanded late in a project when the project sponsor cannot afford further delays. One of the agencies in the survey noted, "When comments and needs are expressed early and are consistent throughout the development of the project, [it] leads to a more successful outcome."

Preliminary Engineering Agreements

Three practices tied for the fifth highest number of responses rated as "excellent." One of the three is the practice of having preliminary engineering agreements that allow railroads to be compensated for engineering advice during preliminary development, even if the project is not eventually constructed. At the advisory panel meeting, there was much brainstorming and discussion about this practice and overwhelming support to change the regulations that covered how and when railroads could be compensated for preliminary engineering work. The advisory panel in its first meeting discussed the fact that the railroads as a private business had to charge for the hours of work done irrespective of the final decision to construct a project. Several states have said FHWA will not allow compensating the railroads until the final agreement is signed. Many projects in the preliminary stages never get to construction or have a final agreement signed. Railroads never get compensated for such work. One of the railroads discussed having hundreds of thousands of dollars of uncompensated expenses attributed to its public projects division as a result.

The participants at the advisory panel meeting felt that in view of the project objective to smooth relationships and devise mitigation strategies to improve the workings between railroads and local and state transportation agencies, this issue needed to be resolved and a better and simpler mechanism to compensate railroads for preliminary engineering work needed to be devised.

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Railroads, like other private businesses, are accountable for profitability of their unit and operations. There is a natural inclination to focus on work that brings in revenue versus work that will not be compensated. The state agency representatives as well as the railroads felt strongly that the inability to pay for preliminary engineering reviews was one cause of discordance and delays between railroads and transportation agencies. FHWA officials indicated later that they are initiating a review of the policy.

Schedule Regular Meetings

"Schedule Regular Meetings" is the second of the three practices that received the fifth highest number of responses as "excellent." This was also identified as a good practice during interviews with the Class I railroads. The railroads identified this practice as one of the factors in expediting reviews and approvals on projects. They noted that the frequency of the conference calls varied from biweekly to monthly to quarterly depending on the maturity and progress of projects. These scheduled calls helped address project issues and schedules and enabled timely correction on activities that were off-schedule.

Have Formal Points of Concurrence

"Have Formal Points of Concurrence" is the last of three practices that received the fifth highest number of responses as "excellent." This practice helps to ensure adequate communication and shared understanding of progress by both railroads and the highway agencies. Generally, the points of coordination and concurrence were recommended to be at the preliminary planning stage, at 30% plan completion, 60% completion, and 90% completion. These four stages allow for early agreement on the preliminary concept scope, and then further concurrence as that general scope translates into an increasingly detailed set of project plans.

Top Five Practices Rated "Good"

The following practices rated as the top five "good" practices:

1. Have formal points of concurrence;
2. Require early scoping;
3. Have one railroad point of contact;
4. Use experienced engineering firms; and
5. Standard plan notes included in DOT plans.

Three of the five top practices that were rated "good" practices were also among the top rated "excellent" practices. "Use Experienced Engineering Firms" was rated "good" by a third of the respondents. This practice was unanimously supported by the six Class I railroads that were interviewed as well. They repeatedly noted that one of the most common causes of project delays and disagreements is receiving incomplete or unacceptable plans from an engineering firm that is unfamiliar with the railroads. They noted that local communities often hire local engineering firms, which are not always experienced with railroad practices.

The issue of including standard plan notes involves incorporating into bid documents standard "boilerplate" railroad requirements that can involve issues such as flagging, maintenance of traffic during construction, adherence to railroad safety standards, and other such standard requirements. When railroads and the highway agencies agree on such standard language, it can be included in all project agreements and bid documents without requiring additional legal review. The standardization saves time on project reviews and reduces legal costs. Such standard provisions also clarify the bid process by informing contractors as to what requirements they can expect during construction. Not only did the highway agencies rate this as a good practice, it was repeatedly endorsed by the railroad public project personnel and the railroad attorneys.

Overall Highest Recommended Practices

Following is a list of the top five practices with the highest number of combined responses for "good" or "excellent" rating.

1. Have one railroad point of contact and have formal points of concurrence;
2. Require early scoping;
3. Have one empowered DOT central point of contact;
4. Open communication: Establish ongoing formal communication channels between the highway agency and the railroad; and
5. Conduct formal crossing diagnostics before programming a crossing project.

Lowest-Scoring Practices

Three practices received the lowest scores when combining the total number of responses rating a practice as "good" or "excellent":

1. Use National Highway Institute courses;
2. Prequalify firms; and
3. Develop escalation procedures.

A National Highway Institute course on highway/railroad grade crossing is offered. It includes instruction on managing different types of grade crossing projects.

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The issue of prequalification involved the concept of developing an additional set of qualifications for firms to be considered for highway/railroad projects. Nearly all firms that propose on highway projects need to be prequalified by their state highway agencies. This suggestion was that an additional set of prequalifications should be developed to further screen out firms that do not have explicit expertise in dealing with the railroads. Such additional prequalification had been suggested by some railroad personnel.

The issue of escalation procedures is common in "partnering," but was not highly rated by the survey respondents. It involves understanding how long project reviews or other decisions are to take. If participants cannot reach agreement on project issues within a set period, they would have to escalate the issue to higher level officials within their organizations. The strategy is incorporated into partnering agreements to let both sides understand at what point an impasse is no longer acceptable and the issue should be elevated for resolution.

Other Identified Best Practices

Respondents were given the opportunity to identify other best practices that they may have developed in addition to the 27 suggested in the survey. The following summarizes the 24 additional best practices that respondents reported they have developed.

Staff Expertise, Mature Processes, and Dedicated Railroad Personnel

- **Iowa DOT:** Iowa has developed an effective primary highway crossing surface program implemented with an experienced staff.
- **Washington DOT:** It funds a public project position at a railroad to work primarily on WSDOT projects. Washington DOT suggests this same strategy could involve more than one state sharing costs for a manager housed at the railroad.
- **Nebraska DOT:** It developed a productive relationship with a dedicated person at the railroad with whom they work on a daily basis.
- **City of Colorado Springs:** It pays for a private consultant selected by the railroad to review city plans.

Use of Technology

- **Georgia DOT:** It uses electronic plan submissions to avoid lost plans. It is also working toward master agreements to streamline processes, including preliminary engineering and construction payments.
- **North Dakota:** It scans agreements into PDF form for review by the railroad legal departments and reports that the practice reduces processing time.

Standard Agreement and Memorandum of Understanding

- **Illinois DOT:** It reports that master agreements have helped reduce the processing times of agreements, although there still are delays in approval of bridge plans and returning signed agreements.
- **Montana DOT:** It is currently in the early stages of developing a memorandum of understanding (MOU) with BNSF. This MOU will define standard railroad agreements and project review and approval times.
- **Louisiana DOT:** It has a master agreement for at-grade crossings that helps its coordination process.

Regular Meetings and Open Communication

- **Minnesota DOT:** It reports that it tries to maintain good relationships by meeting as frequently as possible with the railroads.
- **Louisiana DOT:** It reports that it is essential to maintain good and ongoing communication with the railroads.
- **Alaska DOT:** It notes that its good communications with its railroad and the fact that it has only one railroad to deal with makes good coordination possible.
- **Arizona DOT:** It reports that it hosts monthly meetings with the railroad, involving state and local government agencies to assist on their projects. It also interacts with other state agencies and road authorities to help them understand the railroad coordination process.
- **Florida DOT:** It notes that it pursues open communication and good working relationships between its department and railroads.
- **Nebraska DOT:** It reports that the major best practice is to have good communication with the railroads.

Early Coordination and Contact with Railroad

- **South Carolina DOT:** It recommends getting early coordination and comments from railroads.
- **California DOT:** It recommends the following: get early involvement of the railroad's public projects staff; provide railroad *only* with plans that show impacts to its facilities; describe projects thoroughly to complement the plans; and hold regular meetings on the progress of all projects in all phases of Section 130 funding.
- **Oregon DOT:** It recommends early contact with the railroads during scoping and at the beginning of projects. Start any right-of-way process as early as possible.

Other

- **Minnesota DOT:** It reports that it always does diagnostics at railroad grade crossings and involves the railroad and, if possible, the local road authority.

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- **City of St. Paul, Minnesota:** It has a standard special provision for construction of roadway bridges over railroads that clearly defines what the contractor is required to do to satisfy safety requirements of the railroads.

Performance Measures

A common finding throughout the project has been that few agencies have performance measures regarding project railroad reviews. The lack of measures has prevented the quantitative testing of strategies, performance, and effectiveness. Qualitatively, there appears to be consensus as to the effectiveness of many strategies.

In the survey, respondents were asked to list if they had performance metrics related to the process of developing project agreements. Although three agencies reported they had measures, they did not report what they were, and the project team was not successful in obtaining them.

Agencies' Assessment of Their Performance

Out of 39 respondents, nine assessed their agency's performance in submitting plans that meet the review needs of the railroads as "excellent." Another 25 rated their performance "good," five said their performance was "acceptable," and none scored themselves "poor."

Reasons for Success

Respondents were asked in an open-ended question to list the primary reason that successful project reviews are successful. It should be noted that "success" was not defined but rather was left to the respondents to define on the basis of their own judgment. Most of the responses were brief, as is common in surveys. No attempts are made here to elaborate or infer additional details; rather, the responses are reproduced almost verbatim.

The responses reiterated the oft-stated opinion that a successful project review process requires early coordination, timely submittals, ongoing coordination, and experienced participants. Following are the open-ended responses categorized by topics.

Early Coordination and Submittals

- **Missouri DOT:** Timely submittals with enough information to decide approval.
- **Oregon DOT:** Early coordination and plan review, which is required by Oregon law.
- **Arizona DOT:** Early coordination with railroad and project designers.
- **Minnesota DOT:** It is always better to deal with issues at the beginning of the design process. When this doesn't happen, it is difficult to redesign the projects to meet railroad standards.
- **Montana DOT, Right-of-Way Bureau, Utilities Section:** Successful project reviews are successful when there is
  - Early submittal of the project designs and standard agreements to the railroad.
  - Prompt responses, negotiations, and execution of standard agreements from all parties (DOT and railroad).
- **California DOT:** Early involvement of railroad. Negotiate to keep the railroad whole while being a good steward of agency resources.
- **Texas DOT:** Predesign meeting with project stakeholders to clearly establish between the highway agency and the railroad company design parameters, constraints, and expectations.
- **Arkansas Highway and Transportation Department:** Meet in a timely manner. All parties understand what their role is in the job.
- **City of San Jose, Department of Transportation:**
  - Review process is begun well in advance of proposed construction.
  - Follow up (with e-mails or phone calls) is done after plans are sent out for review. Clarification is provided if needed.
  - Funding is secured, so that reviewers know the project will be done.

Early, Detailed Submittals

- **Florida DOT:** Detailed work descriptions and plans are provided to the railroads, plus follow-up correspondence and phone calls ensure success.
- **Idaho DOT:** When comments and needs are expressed early and are consistent throughout the development of the project, [it] leads to a more successful outcome.
- **Nebraska Department of Roads:** We have staff in the rail area that review plans first and then work with our roadway and bridge staff for further reviews and then meet with railroad representatives as needed.
- **Caltrans:** There are no reviews per se. Review done by constant teamwork until contracts are signed and then ongoing teamwork until the final bills are paid.
- **Georgia DOT:** Completeness of plans and thorough review by railroad.
- **City of Colorado Springs:** Project reviews are successful when the comments are clear and indicate the basis behind the comment. For example, citing the standards or criteria behind the comments is helpful to the submitter.

Dedicated Resources and Knowledgeable Staff Involvement

- **Iowa DOT:** Iowa DOT works to involve the right people in project reviews, including the railroads, local highway authorities and DOT staff.

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- **Washington State DOT:** Designers are knowledgeable about railroad design and coordination requirements. There are as few points of contact between the agency and railroad as possible to promote consistency and predictability. Railroad has a clear and accurate assessment of the priority level for the project.
- **City of Overland Park, Kansas:** It reports it is adequately staffed so that the proper amount of time can be spent on reviews.
- **City of Salem, Oregon:** Projects are successful when the railroad gives adequate time and attention to reviewing and commenting on plans received from local agencies.

Relationship, Ongoing Communications, and One Point of Contact

- **Pennsylvania DOT:** Ongoing communication.
- **North Dakota DOT:** Communication.
- **Texas DOT:** Open communication and consultation between highway and railroad design engineers during the project development process.
- **City of St. Paul, Department of Public Works:** Have a personal point of contact on both sides to work out issues.
- **Alaska DOT&PF:** Usually involves a small number of players and the same players. So everyone knows each other and is used to working together.
- **Arizona DOT:** Understanding process and good working relationship with railroad.

Regulations and Master Agreements

- **Louisiana DOTD:** The railroads' master agreements for at-grade crossings are important. It helps to have a special person handle a larger area than go through each local engineer's office for each job.
- **Illinois Commerce Commission:** As a regulatory agency, the ICC has certain rules that railroads must follow with regard to filing plans and cost information for review and approval.

Unsuccessful or Delayed Project Reviews

When asked to identify what tends to result in unsuccessful reviews, 32 responses were received. Perhaps predictably, the responses were generally the opposite of the ones cited as leading to successful projects. The most typical problems cited were a lack of responsiveness by the railroads, changing project requirements, staff turnover, and related issues that tended to prevent the timely and consistent review of submittals.

Many of the comments are negative toward the railroads. It should be noted that the railroads were not given a comparable opportunity to comment anonymously about highway agencies. The railroads were interviewed and many were candid about shortcomings they experience in highway agency submittals. However, the railroads were careful not to appear critical of individual agencies and thus tempered many of their comments so as to not to offend particular state or local departments. In these comments, references to specific railroads were deleted, as were the names of the commenting agencies.

Delayed Agreements, Incomplete Submittals, and Late Coordination

- Project submittals are transmitted to the incorrect railroad office within the company. Some projects are delayed, awaiting local government commitments to improve adjacent facilities.
- Untimely submittals that do not include enough information.
- There probably are reasons but the railroad's response is very slow.
- Not beginning coordination early enough.
- Different people use different approaches. Lack of consistency within the railroad company and within different parts of the DOT on the same issue.
- Railroad not responding in a timely manner to plan reviews. Sometimes railroad does not provide complete plan review response.
- Unrealistic time frame for the project.
- Delay in getting response from railroads.
- Project reviews appear to be slow or delayed due to the number of people that need to approve the reviews. One person in the chain can delay the reviews because they are too busy to deal with them in a timely manner.

Scheduling and Timelines, Slow Responses, and Delayed Feedback and Comments

- Projects are unsuccessful when the railroad is "too busy," "that is not my responsibility, you need to talk to . . . ," or never heard from during the plan review stage.
- Slow reviews by railroads, slow cooperation by railroads.
- Not done in a timely fashion.
- Delays in obtaining railroad agreements and right-of-way.
- The primary reason for delay: The railroad does not respond promptly.
- The timelines of the DOT and railroads sometimes do not move at the same pace. Changes are difficult to get done quickly.
- Inconsistent comments and an ever-changing target. Lack of comment by railroads is sometimes a problem.
- Railroads have been unwilling to provide a strict timeline for project review. Most timelines contain minimum time frames but no maximum time. This makes it impossible

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for the transportation agency to adhere to a fixed project schedule.

Disagreement and Changes to Plans or Agreements

- Late plan changes can delay process since right-of-way cannot then be changed.
- Lack of consultation between highway and railroad design engineers during the project development process.
- The railroad tries to change standard agreement language.
- Usually a railroad will make some demand that the state cannot agree to, which involves agency attorneys, and the resulting negotiations delay the project.
- Railroad company changing or revising design guidelines during the project development process or after the railroad has given preliminary approval of the design.

Communication, Trust, and Relationship

- Sometimes an adversarial relationship develops between the railroad and the highway agency on some projects. Some DOT project managers try to avoid having to deal with the railroad if possible.
- Lack of communication.
- Lack of internal communication.

Lack of Predesign Meetings, Disagreement on Design, and Roles and Responsibilities

- Disagreement over signal designs. Identifying roles and responsibilities during construction (including railway construction).
- Not conducting a predesign meeting with project stakeholders to clearly establish design parameters, constraints, and expectations.

Staff Turnover and Lack of Knowledge

- The local engineer may not be familiar with a railroad type job and may not respond as quickly as for a "normal" job. Also, the railroad may take a while to bill. Also, it takes a while for the railroad job to fully go through the audit review.
- Turnover of staff at railroad and road agencies.

Issues with Funding and Indemnification

- Railroads have historically required complete indemnification of liability even for their own negligence. To us as a public agency, we find this to be an absurd requirement of their legal staff. We have been forced to condemn our right to construct. The judge throws out the indemnification, but it does not result in a formal agreement. We end up paying (high) fees for flagging and whatever the railroad decides to bill for. Since these costs are not identified up front, the feds may not reimburse the local agency for these expenses. On our latest job, the city paid out $750,000 in flagging costs on a $5.5 million bridge.
- There is a lack of desire on the part of the railroad to adapt quickly to change (like the implementation of quiet zones).
- Uncertainty exists regarding the viability or funding of a project.
- No follow-up is initiated.

Additional Issues

The final item on the survey asked respondents to "identify what specific issues you would most like to see addressed in regard to the coordination between highway agencies and railroads." The most frequently cited issues referred to railroad insurance and force account costs; delays in railroad reviews; perceived demands by the railroads for plan changes; and a general sense of heavy-handedness by the railroads. Several respondents called for mandatory project-review timelines to be required in federal statutes. This issue and the issue of railroad insurance costs are addressed in Review of Federal Regulations (see pp. 40–47). They are referred to only briefly here. The general comments revealed more of the negative sentiments that highway agencies express privately about the highway–railroad agreement process. As has been stressed repeatedly in this research, because there are so few metrics regarding project schedules or the quality of submittals, it is not possible to independently measure the validity of these complaints. However, the complaints are quite common and appear to occur throughout the country.

Force Account Work, Billing, and Insurance

The comments regarding railroad force account work were common in the survey and in interviews with the states. The railroad labor agreements call for work on the railroad associated with highway projects to be performed by railroad forces. The railroads bill for the crews' direct time, materials, and equipment and all overhead. In addition to the costs involved, the highway projects also must provide lead time for railroad crews to be available to conduct the work. This has led to sporadic complaints of highway agencies facing contractor delay charges because railroads have not completed their portion of work on time. Highway agencies also have complained about receiving poor documentation on bills from railroads, undocumented costs, and costs for work they believe to be "betterments."

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The following comments represent the sentiments expressed by some state and local respondents:

- Railroads should treat the public's money with the same care with which they would spend their own money.
- Railroad companies should acknowledge that highway capacity improvement projects that cross or affect existing railroads have public benefits, including benefits to the same freight network of which the railroads are a part.
- Railroads should not expect indemnification for railroad negligence.
- Railroads should acknowledge that highway agencies have a right to construct or maintain their bridges.
- Railroads should be judicious in requiring high insurance limits and only require them when absolutely necessary.
- Local governments should receive federal support when dealing with railroads.
- Railroads should provide prompt, accurate, itemized bills for work completed.

Timeliness of Reviews

A major theme throughout the project has been the timeliness of reviews. This theme appeared frequently in the open-ended comments.

- Time, time, time. Changes to design from inception of the project until execution of the agreement. Often, a design that is acceptable in the preliminary stages is not acceptable to the railroad at the 90% design level. This change over time is very difficult for a state transportation agency. Often the change is due to a policy issue that has changed for the railroad.
- More rapid and consistent response by railroads.
- Development of a timeline for project review that is upheld.
- Defined timelines to get tasks completed. Prompt responses from railroad companies.
- Better response time from the railroads for the agreements and right-of-way process.
- A general issue . . . is that the railroad ignores our request, or takes too long to respond. We try to take into account their nonresponsiveness, but sometimes that's not possible.
- Timely response. We have experienced projects that by the time railroad gets to the agreement, the project has had to slip in our program and have had funding lapses waiting on the railroad.
- More timely response during the design and construction phases.
- Hire more public projects staff. Streamline railroad process for engineering and legal reviews, including establishing a mechanism where the reviewer is prompted to contact the agency if there are questions or concerns regarding a submittal.
- DOTs should be able to hire structure engineers to review railroad bridge plans in-house to expedite review. The structure engineers will have to be approved by the railroad.
- For simple projects such as replacing a crossing signal, it seems that one reason for delay is that the railroad needs to have the signal built for the project. These signals are nearly all the same and every railroad should be able to keep a supply of these in a central location so the extra time to have a signal built would not be necessary.
- The problem with DOT projects that impact railroads lies in communication and understanding of railroad operation, maintenance, and internal administration. Cost estimates are not well explained.
- Generally, we get along with all of the railroads; it's just their slow response time which can adversely affect a letting schedule.
- We need a consistent time frame so that some sort of planning can be used to help protect the public at problem crossings.

Community Relations

- The railroad needs to be more concerned with local agency projects. Often there is little help provided during the design stage, and requests for changes are made during construction. In addition, they show very little concern for local community issues when they perform maintenance and upgrades to their system.
- Railroads need to be more friendly to the local people.
- The current process seems to be skewed in favor of the railroads. Changes to create a more balanced process would be desirable.
- The process is very one-sided. The railroads control the schedule and the design. There is absolutely no room for negotiation. Often, due to time constraints, state agencies must agree to railroad demands in terms of design changes and bridge ownership. These issues have cost the states a lot of additional money and potential delay to projects. In one case, a railroad refused to follow a schedule in an agreement, which resulted in our governor getting involved to keep a project "on track." In another instance, a contractor was paid a $500,000 delay claim because the railroad would not install a crossing in accordance with the schedule. Railroads will not sign an agreement with any penalty clause, so there is no recourse when these situations occur.

Survey Summary and Conclusions

The survey results illustrate the dichotomy that has been apparent throughout this project. Both the railroads and the highway agencies agree generally about which strategies work best to expedite project agreements. Both sides have taken

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steps to incorporate these best practices into their processes. Despite this common basis of agreement, there still are persistent complaints from state and local highway agencies of lengthy reviews, nonresponsiveness from the railroads, and arbitrary insistence on additional costs to accommodate railroad needs. These complaints give the impression that such problems are widespread. However, at the same time, when state officials in rail divisions of highway agencies are interviewed, they indicate that they have good working relationships with their railroads and that most project agreements proceed smoothly.

The degree to which problems and delays occur remains elusive. To date, most highway agencies and railroads have not documented baselines for project reviews or tracked the degree of deviation from those baselines. It is apparent that state and local highway officials express consistent dismay over the agreement process, but the actual percentage of projects that are delayed remains unclear. Only four of 39 respondents reported having any metrics regarding the agreement process, and those four entities could not readily produce their metrics.

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APPENDIX C

Model Agreements

Background

The model agreements in this appendix represent composites incorporating provisions of model agreements collected from various highway agencies and railroads. Included are additional provisions intended to institutionalize the model practices that have been described elsewhere in this report. These models draw heavily from existing agreements, such as those used by the Iowa, Florida, and Illinois DOTs and the Idaho Transportation Department. The Iowa DOT has successfully used model agreements with Union Pacific Railroad and BNSF Railway, the two largest railroads nationally. The wide acceptance of its agreements provides a tested example of sample agreements agreeable to both the railroads and the highway agencies.

It is not expected that any of the proposed model agreements would be accepted verbatim by a highway agency and the railroads with which it operates. However, these agreements provide a comprehensive list of provisions that, if adopted, would streamline the agreement process while protecting the rights and obligations of both the highway agencies and the railroads. These are offered as generic, basic structures that can be modified to meet the legal requirements and accepted contracting processes of individual agencies and railroads.

The following are provided:

- **Partnering Memorandum of Understanding.** This nonbinding agreement is offered as a shared statement-of-intent for how the highway agency and the railroad choose to coordinate. It is intended to clarify common understandings, outline expected performance, create shared vocabulary, and create a shared definition of success. Its usefulness includes requiring both parties to clearly define their expectations and to preserve continuity of performance despite continual turnover of staff.
- **Master Project Agreement.** This legally binding agreement summarizes the "boilerplate" that is common to nearly all individual project agreements. Its acceptance by both parties allows its provisions to be incorporated by reference into all following agreements, thereby minimizing time and effort. The master project agreement also can be the contractual vehicle for the highway agency to fund activities at the railroad, such as paying for dedicated personnel, authorizing preliminary engineering reviews, or compensating the railroad for general staff activities conducted in support of the partnering process.
- **Preliminary Engineering Agreement.** Foundational to most projects is the conduct of preliminary engineering activities, such as the review of plans, the coordination of field reviews, the sharing of design provisions, and the review of calculations and other design inputs. The model preliminary engineering agreement is intended to expedite the authorization of preliminary engineering on any typical project. It is set up so that brief project details can be inserted into a standard preliminary engineering agreement to quickly authorize engineering reviews to begin.
- **Resurfacing Agreements.** Two standard resurfacing agreements are provided: one for federally funded projects and one for state-funded projects. These agreements standardize and simplify the common need to resurface highway sections that include railroad crossings. The crossing surfaces create unique issues that require the railroad to use its forces or its contractors to improve the crossing surface to create smooth transitions to the adjacent pavement sections.
- **Highway Overpass Agreement.** Less common than preliminary engineering or resurfacing projects, but still relatively frequent, are projects that build new or repair existing overhead railroad structures. These projects can create particularly important safety and operational requirements because of the need for construction personnel and equipment to

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function immediately adjacent to or above the operating envelop of the active rail line. The overhead structure agreement includes standard provisions to streamline and make routine the development of agreements to allow overhead work.

- **Warning Devices Agreement.** Warning devices—for example, gates and lights—are regularly installed, maintained, improved, and replaced. A standard agreement between the highway agency and the railroad makes such projects routine and expedites the process.
- **Pipe and Wire Agreement.** This type of agreement is required for the installation, construction, or maintenance of drainage pipes, pipelines, utility lines, and other linear structures that intersect a railway. The frequency of pipe and wire projects has led to standardized agreements and approaches to construction and maintenance.

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Partnering Memorandum of Understanding

The partnering memorandum of understanding (MOU) is intended to clarify the way in which the highway agency and the railroad choose to conduct their project-review activities. There are several benefits to developing a formal memorandum of understanding, including the following:

- The act of agreeing on language that explains how the project-agreement process should work requires both parties to agree on a commonly recognized process that they acknowledge to be efficient, logical, and mutually beneficial.
- The MOU can serve as a training tool for new staff, or for staff who only occasionally are involved with railroad/highway coordination efforts.
- It creates a common set of expectations and common definitions for both parties.
- It creates a sense of legitimacy and formality to both parties' efforts to cooperate. Such legitimacy can be useful to the involved staff personnel on both sides as they seek the cooperation of co-workers to continue the ongoing efforts to expedite and streamline the review process.
- It is not a contract or a legally binding commitment; therefore, an MOU can be executed at lower levels of the organization. Although not legally binding, such an MOU serves the role of providing clarity and understanding for the highway and railroad liaison personnel as to how they choose to interact with one another.
- MOUs and other formal documents serve to create a structure in which a formal process-improvement or continuous-improvement ethos can thrive. The MOU provides a baseline of performance against which actual ongoing performance can be measured.
- The act of developing an MOU requires both parties to formally express a desire to cooperate, which provides a foundation for future cooperative activities.

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MEMORANDUM OF UNDERSTANDING
BETWEEN
THE _____ DEPARTMENT OF TRANSPORTATION
AND
THE _____ CORPORATION

THIS MEMORANDUM OF UNDERSTANDING is entered into this _____ day of _____, 20_____, between the _____ Department of Transportation and the _____ Corporation.

Section 1: Background and Objectives

WHEREAS, the _____ Department of Transportation, hereinafter called the DEPARTMENT, desires to efficiently and economically administer highway improvement projects that involve railroad properties;

WHEREAS, the _____ Corporation, hereinafter called the RAILROAD, desires to cooperate with the DEPARTMENT on highway improvement projects that affect railroad rights-of-way;

WHEREAS, the DEPARTMENT and the RAILROAD, jointly known as the PARTIES, recognize the mutual benefits to public safety and efficiency that result from the operation of the public highway network and the national railroad network;

WHEREAS, both recognize the importance of maintaining the safety of the traveling public at all times, particularly when highway improvement and maintenance projects involve railroad rights-of-way;

WHEREAS, the PARTIES recognize the importance of maintaining at all times the safe, reliable, and predictable operations of the RAILROAD;

WHEREAS, both recognize that mutually identified project management and project review practices can reduce both the project review times and project review costs of projects that involve highways and railroads;

WHEREAS, both the RAILROAD and the DEPARTMENT expect, through the normal course of highway improvement and maintenance activities, that the DEPARTMENT will desire to repeatedly execute legal agreements, contracts, the approval of engineering plans, specifications, and estimates in the pursuit of an annual program of highway maintenance and improvement;

WHEREAS, the PARTIES desire to execute such agreements, contracts, engineering plans, specifications, and estimates in an expeditious and cost-effective manner while preserving the full rights of both PARTIES;

WHEREAS, both PARTIES experience staff turnover with the concurrent loss of experience that they seek to address by documenting their understandings, agreements, and mutually agreed-upon practices into a body of institutional knowledge;

WHEREAS, both PARTIES acknowledge that the other PARTY incurs significant expense in terms of staff time, professional fees, and project delays when agreements are not approved in a timely fashion.

NOW, THEREFORE, be it resolved that the DEPARTMENT and the RAILROAD enter into this MEMORANDUM OF UNDERSTANDING on _____ to commemorate and memorialize their intention to coordinate their activities involving highway and railroad project agreements to the common benefit of both PARTIES, the taxpayer, and the RAILROAD'S shareholders.

Section 2: Partnering

Both PARTIES agree to operate in a cooperative fashion of Partnering, which includes both PARTIES' acknowledgment of the rights, responsibilities, and institutional obligations of the other while also attempting to positively and constructively assist the other with the development of agreements, plans, specifications, and estimates to enable the ongoing maintenance and repair of highway facilities.

Section 3: Appointment of Liaisons

A. Both PARTIES agree to respectively appoint an employee, herein called the LIAISON, who will serve as the primary point of contact for their respective organizations and will, in regard to highway projects involving railroads, serve to coordinate all activities between the two organizations.
B. The LIAISONS in both agencies shall agree to coordinate efforts to identify a mutually agreeable process by which all activities necessary to effectuate a highway project involving the railroads shall be identified, documented, and mutually agreed to by both PARTIES.

Section 4: Preliminary Project Notice

A. The DEPARTMENT agrees that, as early as reasonably possible during the course of developing a highway improvement project or maintenance activity that involves a railroad right-of-way, it will give prompt notice to the RAILROAD of its proposed project or activity. This first notice shall be known as the Preliminary Project Notice.

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B. The Preliminary Project Notice will be at the stage of initially programming or officially entering into activities within the DEPARTMENT to encumber funds, receive federal approval, begin formal planning activities, or otherwise commencing the expenditure of significant staff time or preliminary development activities on a proposed highway improvement project or maintenance activity that involves a railroad property.
C. The Preliminary Project Notice will include information regarding the type, location, timing, schedule, and estimated cost of the project or maintenance activity. The type, nature, and estimated timing of RAILROAD reviews, comments, approvals, or participation requested by the DEPARTMENT will be included in the preliminary notice.
D. Within 30 calendar days of receipt of the DEPARTMENT'S Preliminary Project Notice, the RAILROAD will respond by acknowledging the receipt of the DEPARTMENT'S notification. The RAILROAD will attempt in its response to advise the DEPARTMENT as to whether it has known intentions at the location or proximate to the location of the project or maintenance activity that would necessitate the alteration or expansion of its railroad facilities that could require a significantly different highway cross section, bridge type, bridge size and span length, vertical or horizontal clearance, substantial utility relocation, or alteration of drainage structures that could cause the highway cross section or bridge type to be significantly different from what exists at the time of the Preliminary Project Notice.
E. The DEPARTMENT acknowledges in this MEMORANDUM OF UNDERSTANDING that such notice from the RAILROAD is a nonbinding preliminary notice for which the RAILROAD has no subsequent liability of any kind. Both PARTIES acknowledge that the RAILROAD'S plans subsequently may change during the course of the project's development and that the preliminary notice shall not restrict the RAILROAD'S ability to later provide notice of its need to alter the proposed highway cross section, bridge type, span length, span type, drainage structure, utilities, or other features of the proposed project. The DEPARTMENT acknowledges that the preliminary notice of RAILROAD intentions may be incomplete and may be subsequently altered by additional information, plans, business developments, local zoning, local development, customer requirements, or other factors that could cause the parameters of the preliminary RAILROAD notice to change.

Section 5: Preliminary Engineering Agreements

A. Subsequent to the Preliminary Project Notice and prior to further development of the project or maintenance activity which could require RAILROAD review, comment, or approval, the DEPARTMENT and RAILROAD shall enter into a PRELIMINARY ENGINEERING AGREEMENT. This PRELIMINARY ENGINEERING AGREEMENT shall include mutually agreeable provisions for compensating the RAILROAD for its expenses in relation to the review of plans, specifications, and estimates. Both PARTIES commit themselves to a good-faith effort to develop a mutually agreeable standard PRELIMINARY ENGINEERING AGREEMENT that can be used to efficiently and economically authorize PRELIMINARY ENGINEERING activities.
B. The RAILROAD commits to developing a PRELIMINARY ENGINEERING process that compensates for the RAILROAD'S actual direct and indirect costs but that does not include profit or other costs beyond actual direct and indirect costs.
C. The RAILROAD agrees to retain all records of its PRELIMINARY ENGINEERING costs related to such agreements for a period of at least three years and to provide the DEPARTMENT access to those records for periodic audits of its costs as agreed to by both PARTIES.

Section 6: Project Tracking Process

A. The DEPARTMENT and RAILROAD mutually agree that a Project Tracking Process will be used to inform the PARTIES, assess the status, identify pending notifications, enumerate outstanding issues, and track milestones relevant to the approval of DEPARTMENT projects that involve the RAILROAD. The Project Tracking Process will be documented and agreed to in writing by both PARTIES as an addendum to this MEMORANDUM OF UNDERSTANDING.
B. The DEPARTMENT agrees that it will publish a Project Development Process, known as the PDP, which will be a written description of the stages of development through which various categories of projects progress from programming to construction closeout. At a minimum, the DEPARTMENT will publish Project Development Processes for projects including:
   a. Resurfacing projects that involve railroad rights-of-way;
   b. The construction of overpass projects in which highways are grade separated above railroad rights-of-way;
   c. The maintenance or repair of projects that pass over railroad rights-of-way;
   d. Parallel encroachment projects in which parallel or adjacent highways are repaired, improved, or maintained and that encroach on or involve railroad rights-of-way; and
   e. Safety improvement projects in which lights, gates, or other safety appurtenances are installed at highway/railroad crossings.
C. Both PARTIES agree that the Project Tracking Process will at a minimum include a process for documenting project status at each stage of the Project Development Process for various categories of projects that involve railroad rights-of-way.
D. The Project Tracking Process will exist in an electronic format that is accessible to both PARTIES for the mutual understanding of the status of each project under development that involves railroad rights-of-way.

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Section 7: Central Repository

A. The DEPARTMENT and RAILROAD mutually agree to have the records of all pending projects, their status, outstanding issues, expected construction dates, and other information from the Project Tracking Process included in a Central Project Repository created by the DEPARTMENT. The Central Project Repository will be an electronic document storage and retrieval system that includes a record of all pending projects and all past projects developed since the creation of the Central Project Repository.
B. The function of the Central Project Repository will be to provide a complete and accessible record of each highway project that involves a railroad. The DEPARTMENT shall provide "read only" access to the RAILROAD LIAISON and other mutually agreed personnel of the RAILROAD so that the RAILROAD can remain apprised of project-status information for projects requiring RAILROAD approvals. Past agreements, project plans, construction drawings, and other records shall be retained in the Central Repository to serve as a record of past decisions and also as a resource for the PARTIES to rely on when developing new projects.

Section 8: Project Status Conferences

A. The DEPARTMENT and RAILROAD mutually agree that a Project Status Conference will be conducted at a mutually agreeable time approximately every 30 days to discuss the status, progress, pending notifications, outstanding issues, and other information relevant to the pending projects under development by the DEPARTMENT that involve the RAILROAD.
B. The Project Status Conference can be conducted in person or by electronic means at the mutual consent of the PARTIES. Both PARTIES mutually agree to provide all necessary information and availability of personnel to address project status issues pertinent at the time of the Project Status Conference.

Section 9: Timely Responses

A. Both PARTIES agree that each will attempt to provide responses to questions, submittals, notices, requests, and comments within 30 calendar days. Both PARTIES agree to attempt to the best of their reasonable ability to provide responses to proposed agreements within 60 days.
B. Both PARTIES agree that they will track actual performance in the Project Tracking Process as to the response time for questions, submittals, notices, requests, comments, and proposed AGREEMENTS. These actual response times in comparison to desired response times may later be subject to discussion and process-improvement efforts by the PARTIES.

Section 10: Stages for Review

Both PARTIES agree to identify the desired stages of project review and coordination that they mutually agree to for various types or categories of projects. The DEPARTMENT will submit to the RAILROAD appropriate and available engineering plans regarding projects and proposed maintenance activities at least at the milestones—as practical and appropriate for the individual projects—of:

a. Preliminary Project Notice;
b. 30% plan completion;
c. 60% plan completion;
d. 90% plan completion;
e. Prior to contractor authorization; and
f. Project completion.

Section 11: Staff Training

A. The DEPARTMENT shall require all highway design staff and consultant engineers who serve as principal design engineers on projects that involve the RAILROAD to be familiar with and experienced in the design standards as published, if any, of the RAILROAD. The DEPARTMENT agrees to provide training to project-development personnel on the basic railroad provisions to be incorporated into the various categories of projects that involve the RAILROAD.
B. Likewise, the RAILROAD will make available its appropriate personnel for training deemed appropriate by the DEPARTMENT staff for the RAILROAD personnel to be familiar with the processes, practices, and expectations of the DEPARTMENT.

Section 12: Escalation Procedure

A. As provided in Section 9, the RAILROAD will make all reasonable attempts to provide relevant and complete comments within 30 days to all project submittals and within 60 days on all proposed agreements.
B. Both PARTIES agree to develop an Escalation Procedure to resolve issues that have not been resolved within the time frames stated above. This Escalation Procedure is acknowledged by both PARTIES to be a constructive and reasonable means by which issues that cannot be resolved by the DEPARTMENT and RAILROAD LIAISONS within

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the agreed-upon milestones can be promptly addressed. Both PARTIES acknowledge that the inability of either PARTY to meet the agreed-upon milestones does not by itself represent an act of bad faith. Also, both PARTIES acknowledge that the implementation of the Escalation Procedure to resolve an issue does not constitute a breach of the spirit of Partnering in which both have agreed to operate. Both acknowledge that the reliance on the Escalation Procedure is an efficient and timely means to resolve an issue that may involve complexities or levels of authority that cannot be addressed by the LIAISONS in a timely manner.

Section 13: Performance Measurement

A. Both PARTIES agree to jointly develop a process and reporting format for compiling from the Project Tracking Process records of the desired and actual review and response times for comments, questions, engineering drawings, legal agreements, and other correspondence submitted by the DEPARTMENT to the RAILROAD and from the RAILROAD to the DEPARTMENT.
B. Both PARTIES also agree to develop a process to track the actual times from the Preliminary Project Notice to the various stages of project development, including the following:
   a. Authorization of PRELIMINARY ENGINEERING AGREEMENT;
   b. Response to 30% plan submittals;
   c. Response to 60% plan submittals;
   d. Response to 90% plan submittals;
   e. Response to contractor notification;
   f. Response to project completion; and
   g. Other milestones as mutually agreed to by both PARTIES.
C. Both PARTIES agree that the time frames to produce these reviews and comments will be recorded and used as the basis for measurement of the success of the Partnering process. Both PARTIES acknowledge that the measuring of such milestones is a constructive and mutually beneficial process. Both PARTIES agree to use the data for self-evaluation of their own processes, practices, procedures, training programs, business processes, and other activities that affect the highway/railroad project review process.
D. The LIAISONS from the DEPARTMENT and the RAILROAD shall address in their monthly meetings the accuracy of the current performance measures and take continuous actions to keep the performance data current. The LIAISONS shall take steps as mutually agreed upon to meet the time frames for comments, reviews, approvals, and other actions within their respective control.

Section 14: Annual Meeting

A. The DEPARTMENT and the RAILROAD agree to meet with appropriate personnel in a joint meeting at least annually to identify successful practices and process-improvement opportunities. Both PARTIES will convene at a mutually agreed upon time and location. Each PARTY will identify agenda topics that it believes are pertinent to the continuous improvement of the project-review and project-approval process. Both PARTIES agree to provide the necessary and relevant personnel to discuss and advance adoption of continued innovations, practices, processes, agreements, standards, and specifications that can result in the continued improvement of the project review process.
B. Both PARTIES agree to produce minutes of the annual joint meeting that clearly identify areas of possible process improvement. The identification of follow-up activities shall be noted with the identification of individuals assigned to pursue the process improvements.
C. Both PARTIES commit themselves to an ongoing effort of Continuous Improvement, which is hereby defined as an iterative series of steps that are taken with the intention to further reduce the cost, time, and administrative effort of the Project Review Process without reducing the quality of engineering plans, legal agreements, audit records, infrastructure conditions, or public safety while meeting the legal requirements of both PARTIES.
D. The Annual Meeting will be approached by both PARTIES as a forum for the identification of Continuous Improvement opportunities. Both PARTIES also agree to use the Annual Meeting to identify any changes in statutes, regulation, and DEPARTMENT or RAILROAD processes that could affect the agreed-upon Project Review Process.

Section 15: Standard Agreements

A. The RAILROAD and the DEPARTMENT mutually agree to take good-faith efforts to develop a series of STANDARD PROJECT AGREEMENTS. These STANDARD PROJECT AGREEMENTS will incorporate the usual and customary legal provisions and protections that both PARTIES would reasonably expect to include in such agreements that are required to effectuate construction and maintenance activities of highways which involve railroads. The PARTIES mutually agree to develop these STANDARD AGREEMENTS to reduce their costs, to reduce legal review times, to standardize their approaches, and to generally streamline the development of agreements necessary for the effectuation of highway/railroad construction projects and maintenance activities.

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B. The PARTIES expect to attempt to develop for their mutual benefits the following agreements:
   a. A MASTER AGREEMENT that includes standard provisions and protections which address insurance requirements, preliminary engineering, indemnification, due notice, contractor requirements, flagging, and other provisions that are usually and customarily common to all projects;
   b. A PRELIMINARY ENGINEERING AGREEMENT that includes standard contractual provisions for the authorization of preliminary engineering activities and for the payment, audit, and review of the subsequent engineering activities;
   c. A RESURFACING AGREEMENT that includes the usual and customary provisions necessary for the conduct of highway resurfacing projects that affect highway/railroad grade crossings;
   d. A GRADE SEPARATION AGREEMENT that includes usual and customary provisions common to legal agreements necessary for the construction of highway structures that separate a highway over a railroad right-of-way;
   e. A GRADE CROSSING SAFETY AGREEMENT that includes the usual and customary provisions necessary to effectuate a project to improve the safety of a highway-railroad grade crossing by means of installation of warning lights, safety gates, or other devices;
   f. A PIPE AND WIRE AGREEMENT that includes the usual and customary provisions necessary to install, maintain, remove, or otherwise affect utility devices such as pipes, pipelines, utility lines, overhead wires, or other similar appurtenances that may exist on railroad rights-of-way.

Section 16: Update of Memorandum

A. Both PARTIES agree to review the provisions of this MEMORANDUM OF UNDERSTANDING on a biennial basis, or sooner at the request of either PARTY.
B. Both PARTIES agree to make good-faith efforts to amend, rescind, and append provisions as mutually identified for the continuous improvement of the highway/railroad agreement process, as necessitated by the adoption of new statutes, regulations, business practices, market conditions, or other factors.

Section 17: Preemption and Exclusivity

A. Nothing in this MEMORANDUM OF UNDERSTANDING is to be interpreted as abrogating, supplanting, invalidating, amending, or otherwise altering any statute, regulation, contract, policy, executive order, labor agreement, court decree, or other binding requirement on either the DEPARTMENT or the RAILROAD. Nothing in this MEMORANDUM OF UNDERSTANDING shall be construed to obligate either PARTY to any contract, expense, liability, obligation, contingency, or liability not expressed in this MEMORANDUM OF UNDERSTANDING.
B. Both PARTIES acknowledge that this MEMORANDUM OF UNDERSTANDING is a statement of intent to clarify the roles, responsibilities, practices, and schedules that both desire to pursue in order to mutually and continually improve the highway/railroad project review process.

Signed this _____ day of _____ 20_____ by:

RAILROAD	DEPARTMENT
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____

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Master Project Agreement

The master project agreement includes standard legal provisions that are common to nearly all projects and incorporates them into one overall agreement between the railroad and the highway agency. Through this agreement, the highway agency agrees to make these provisions common to all projects and maintenance activities that involve railroad rights-of-way. Through this means, the railroad can expedite reviews of individual agreements, because it is assured that its basic concerns already have been programmatically addressed on all projects with the highway agency. As a result, the railroad and highway agency need to only negotiate details unique to a particular project.

The master project agreement also can be a means by which ongoing payments to the railroad can be made for activities that may not be unique to any particular project. Costs for partnering activities, engineering reviews of standard drawings, or the development of training programs are examples of costs that could be covered in a master project agreement without having to be assigned to a specific project.

The master project agreement is intentionally designed to stand apart from the partnering memorandum of understanding. The partnering MOU generally describes how the agency and railroad liaisons operate and interact with each other. The activities covered by the MOU generally occur at a lower staff level and do not require legally binding contracts, exchange of payments, or incurring of obligations by either party. Therefore, the partnering activities in the MOU express means by which the parties intend to interact for their mutual benefit.

In the master project agreement, legally binding commitments are made. They relate to the payment of fees for preliminary engineering, the agreement to impose contract provisions on construction contractors, and the obligation of the highway agency to perform certain functions on a regular basis. Therefore, the master project agreement is a legal mechanism to allow for the expenditure of funds and the imposition of binding agreements.

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MASTER AGREEMENT FOR STATE AND
LOCAL HIGHWAY IMPROVEMENTS INVOLVING RAILROADS

This Master Agreement is entered into on this _____ day of _____ 20_____ between the _____ Department of Transportation and the _____ Corporation, to be known individually in this Agreement as the "DEPARTMENT" and the "RAILROAD," respectively, or to be known jointly as the PARTIES.

Section 1: Background

WHEREAS, the DEPARTMENT is duly authorized by the statutes of the State of _____ to plan, build, and maintain a state highway network for the safety, convenience, and economic well-being of the state's citizenry, communities, and businesses, as well as serving as a vital link in a national highway network;

WHEREAS, the RAILROAD is a duly authorized corporation that operates railroad facilities which are essential to the movement of freight and passengers, both within the State of _____ and as part of a transcontinental rail network;

WHEREAS, the highways maintained by the DEPARTMENT routinely intersect either above, below, or at-grade to the facilities of the RAILROAD;

WHEREAS, both the DEPARTMENT and the RAILROAD agree to cooperate to ensure the safe, efficient, and economical movement of people and freight along both the highway and railroad networks;

WHEREAS, both the DEPARTMENT and the RAILROAD agree that it is in the best interests of the taxpayers of the State of _____ and the shareholders and customers of _____ that the DEPARTMENT and the RAILROAD proceed expeditiously, economically, and comprehensively with projects to improve crossings involving highways and railroads;

WHEREAS, the DEPARTMENT and the RAILROAD anticipate that increasing volumes of passenger and freight traffic are likely on both the highway and the railroad network;

WHEREAS, the DEPARTMENT and the RAILROAD agree that each project that improves or maintains a highway–railroad crossing requires the careful consideration of important engineering, safety, environmental, right-of-way, utility, hydrologic, and railroad-operating considerations;

WHEREAS, the DEPARTMENT and the RAILROAD agree that each project requires a project agreement to ensure the ability of both entities to conduct their required due diligence and to ensure mutual understanding;

WHEREAS, the DEPARTMENT and the RAILROAD agree that they routinely are exchanging compensation, rights-of-way, staff expenses, engineering expenses, legal fees, and other assets in the course of their project negotiations, their planning, their mutual consultations, their construction, and their maintenance activities addressing highway–railroad crossings;

WHEREAS, the DEPARTMENT and the RAILROAD desire to enter into this MASTER AGREEMENT for their mutual benefit and for the benefit of the taxpayers of _____, the traveling public, the communities served by both PARTIES, and the customers and shareholders of the RAILROAD.

NOW, THEREFORE, the DEPARTMENT and RAILROAD agree to be parties to this MASTER AGREEMENT, which shall consist exclusively of the provisions enumerated below.

Section 2: Applicability of Statutes

1. *Nondiscrimination*

The RAILROAD and all of its agents who participate in the project shall comply with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 USC 2000d–42 USC 2000d-4, and all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of Secretary, Part 21—to the end that no person in the United States shall discriminate on the basis of race, color, national origin, or sex. Also, no person shall be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity in the performance of this AGREEMENT. The RAILROAD shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DEPARTMENT-assisted contracts. Failure by the RAILROAD to carry out these requirements is a material breach of this AGREEMENT, which may result in termination of this contract or such other remedy as deemed appropriate.

2. *Ethics Requirements*

The RAILROAD and all of its agents who participate in this project shall comply with the State of _____ statutes and requirements as expressed in Amendment _____ governing the conduct of behavior of government employees and the vendors, contractors, agents, and other parties with whom they directly or indirectly do business on behalf of the State of _____.

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Section 3: Preliminary Engineering

1. *Definition*

"Preliminary engineering" shall be defined for the purposes of this agreement as all activities related to the planning, design, review, evaluation, environmental consideration of, legal review of, public involvement for, or consultation involving a specific highway maintenance or construction project or program of projects that would result in some physical or operational effect on any facilities under the ownership or effective control of the RAILROAD.

2. *Standard Agreements*

The PARTIES agree to adopt a specific and mutually agreeable STANDARD PRELIMINARY ENGINEERING AGREEMENT that will address the provision of preliminary engineering reviews by the RAILROAD for projects of the DEPARTMENT, and to address compensation to the RAILROAD for those reviews and all related activities. The STANDARD PRELIMINARY ENGINEERING AGREEMENT shall contain the standard provisions, protections, and procedures that are mutually agreeable to the PARTIES as they relate to preliminary engineering reviews. The STANDARD PRELIMINARY ENGINEERING AGREEMENT can be modified by inclusion of a general description of the individual project to be addressed for preliminary engineering.

3. *Timely Agreements*

The PARTIES agree to execute a PRELIMINARY ENGINEERING AGREEMENT upon notification by the DEPARTMENT to the RAILROAD that a project may affect railroad rights-of-way, operations, or equipment. The PARTIES agree that they will attempt to execute a PRELIMINARY ENGINEERING AGREEMENT within 30 days of adequate notification of the RAILROAD by the DEPARTMENT. Adequate notification will consist of formal transmittal by letter of summary information as to the location, type, scope and duration of the project requiring review, as well as a copy or reference to the STANDARD PRELIMINARY ENGINEERING AGREEMENT.

4. *Auditable Records*

The RAILROAD will keep accurate and auditable records regarding its preliminary engineering expenses that will be made available on request to the DEPARTMENT or its designees or to representatives from the FEDERAL HIGHWAY ADMINISTRATION. The RAILROAD agrees to provide sufficiently detailed statements of its expenses no more frequently than every thirty (30) days and no less than every ninety (90) days during the course of the preliminary development phase of the project.

5. *Prompt Payment*

The DEPARTMENT shall reimburse the RAILROAD for its complete preliminary development expenses, including both direct costs and suitable and customary indirect or overhead expenses. The DEPARTMENT will reimburse the RAILROAD within 30 days of submittal of a complete and accurate billing.

6. *Standard Rates*

The PARTIES agree to attempt to develop to the best of their reasonable ability standard billable rates that are intended to simplify both the estimating of preliminary engineering expenses and the auditing of the preliminary engineering reimbursement submittals. These rates can be reviewed for amendment on at least an annual basis on a request by one of the PARTIES. These rates shall be devised in accordance with eligible overhead expenses as included within the Federal Acquisition Regulations System as published by U.S. General Services Administration and applicable to Federal Aid transportation projects funded by programs in Title 23 of the U.S. Code. In addition to reporting its actual direct rates and overhead rates, the RAILROAD shall include full but succinct accounting of actual expenses related to travel, materials, documentation, personnel, or other expenses directly attributable to the preliminary engineering review.

7. *Timely Responses*

The RAILROAD shall attempt to make every reasonable effort to provide formal comments to the DEPARTMENT within thirty (30) calendar days of receipt of a preliminary engineering submittal for review.

8. *Limitations*

Approval of a STANDARD PRELIMINARY ENGINEERING AGREEMENT does not obligate either PARTY to the construction, funding, or approval in any way of the project, maintenance activity, or action described in the agreement.

9. *Process Review and Improvement Mechanism*

The RAILROAD agrees to provide personnel to meet at least annually with the DEPARTMENT to review the timeliness of submittals and responses and to consider remedies to improve the reliability and predictability of preliminary engineering reviews.

Section 4: Project Agreements

1. *Individual Project Approvals*

The PARTIES agree to approve a separate PROJECT AGREEMENT before any individual project proceeds from preliminary engineering into construction. Similarly, the PARTIES agree that the DEPARTMENT shall not conduct or

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have anyone conduct on its behalf any maintenance or construction activities involving railroad rights-of-way without specific, written approval of the RAILROAD. Any needed or proposed changes to construction plans identified after the initial RAILROAD approval shall require the review and approval by the RAILROAD.

2. *Special Construction Provisions*

The DEPARTMENT agrees that the SPECIAL PROVISIONS FOR CONSTRUCTION shall be included in all construction documents, plans, and specifications. These SPECIAL PROVISIONS will be updated periodically by the RAILROAD, which shall give the DEPARTMENT at least six (6) months' notice before requiring the modified SPECIAL PROVISIONS to be included in construction documents, plans, and specifications.

The DEPARTMENT agrees that it will allow no contractors, in-house forces, or any other party to enter railroad rights-of-way or to proceed in any manner that would affect railroad property or operations without at least thirty (30) days' advance notification to the RAILROAD.

3. *Financial Obligation*

The DEPARTMENT agrees that its construction and maintenance activities shall not obligate the RAILROAD to incur any expenses beyond those specifically required by Section _____ of Title 23 of the U.S. Code and by state statute _____, or those required by any order of a state _____ Commission, or which are included in an agreement between the PARTIES.

4. *Flagging*

The DEPARTMENT agrees to notify the railroad in writing at least thirty (30) days in advance of activities on or immediately adjacent to RAILROAD property. In the event that the RAILROAD determines that "flagging" services will be required for the safety of railroad operations, the DEPARTMENT shall bear the cost of such flagging operations, including indirect and overhead costs. The RAILROAD will make every reasonable effort to provide flagging to accommodate the construction or maintenance schedule called for in the project plans. Both PARTIES agree to cooperate and to require the cooperation of any contractors, in-house forces, or other individuals under their direction in regard to the safe and prompt provision of flagging services. The RAILROAD acknowledges that the provision of timely flagging services is necessary for the timely and economical execution of public projects. The DEPARTMENT acknowledges that the railroad must reasonably allocate limited flagging services across its network. Both PARTIES agree to cooperate as to the timeliness and availability of flagging services. The DEPARTMENT agrees to halt construction activities if flagging services become temporarily unavailable, without seeking redress for construction-delay claims or other claims. Both PARTIES agree that the timeliness and effectiveness of flagging services will be reviewed periodically and that steps will be considered to remedy repeated delays in projects caused by a lack of flagging resources.

5. *Insurance*

The DEPARTMENT agrees to require as part of any contract documents, plans, or specifications that the contractor shall provide railroad protective liability insurance in the amount of $5,000,000 for combined single limit per occurrence of bodily injury, death, and property damage, with an aggregate limit of $10,000,000 applying separately annually, as set forth in Federal-Aid Policy Guide, Chapter 1, Subchapter G, Part 646, Subpart A (23 CFR 646A). The form of the insurance and its carrier shall be acceptable to the Parties, both individually and jointly. The PARTIES agree annually to review the amount of required insurance to mutually agreed-upon general limits. Both PARTIES acknowledge that the RAILROAD may require different limits than those cited in this paragraph, depending on the risks of the project, maintenance activity, or operation.

6. *Selection of Design Engineers*

The PARTIES acknowledge that the DEPARTMENT is bound by federal and state statutes and regulations regarding a Qualifications-Based Consultant Selection Process. Within the provisions of those requirements, the DEPARTMENT agrees to include as a primary qualification in regard to selecting suitable consulting engineering services the specific qualifications of candidate firms to prepare plans, designs, and documents specifically regarding railroads. The past railroad experience and railroad expertise of the prospective engineering firms shall be specifically considered in the selection of firms. Both PARTIES agree to share information regarding which firms they consider to be particularly qualified as a result of their demonstrated experience with railroad design, construction, and engineering. If the DEPARTMENT relies on in-house engineering expertise to prepare plans, documents, or estimates, it shall ensure the in-house personnel are suitably experienced with railroad design, construction, and engineering. Particular consideration shall be given to the expertise of design engineers in critical aspects such as shoring, construction staging to ensure continuity of railroad operations, the railroad operating envelop, lateral and vertical clearances, railroad structure design, railroad hydraulics, and railroad signaling.

7. *Preconstruction Meetings*

The DEPARTMENT shall offer to the RAILROAD a preconstruction meeting with the DEPARTMENT'S contractor and supervisory personnel prior to commencement of construction activities. The time and location of the preconstruction meeting shall be selected at the mutual convenience of the PARTIES.

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8. *Safety Training*

The RAILROAD shall identify suitable safety training to be required of all DEPARTMENT personnel and all of the DEPARTMENT'S contractor's personnel who will be present on or immediately adjacent to railroad rights-of-way.

9. *Control of Worksite*

Both PARTIES agree that the RAILROAD Roadmaster or designee shall have control over all aspects of the construction or maintenance operations that will have any effect on RAILROAD property, the operation of trains, the safe conduct of railroad operations, or that will have any effect on utilities or other assets on railroad rights-of-way. The RAILROAD Roadmaster or designee shall have the right to halt any construction activities he deems to be unsafe. The railroad or its designees shall be held harmless from claims of delay by the contractor.

10. *Inspection*

The RAILROAD shall provide, solely at DEPARTMENT expense, construction engineering personnel, either in-house or contracted, to perform construction inspection of the project for items relevant to the railroad operations, equipment, or facilities. The DEPARTMENT, likewise, will provide at its sole expense suitably qualified construction inspection personnel to ensure compliance with all provisions of plans, specifications, materials requirements, design standards, and other provisions of the PROJECT AGREEMENT, the project plans, the SPECIAL PROVISIONS, or other necessary requirements and standards.

11. *Easement and Right of Entry*

The RAILROAD shall provide the state a temporary easement and right of entry to the railroad rights-of-way necessary to complete the project, and the RAILROAD will provide approval for the crossing of tracks necessary for the project. All access and track crossings shall be under the review and approval of the Roadmaster or his designee. The right of entry and easement shall expire at the completion of the project.

The limits to the right of entry will be strictly interpreted as those limits set forth in the project plans. Any access to property outside of the physical limit or schedule of the approved plans shall require a separate right-of-entry permit, with any provisions attached as a result.

12. *Rights-of-Way*

The PARTIES will effect a separate and specific agreement regarding transfer of rights-of-way or granting of easements necessary for each project. Except as cited in this paragraph, the RAILROAD shall not be required to donate any rights-of-way, easement, right of entry, occupancy permit, or other property interest or instrument of value. Its financial participation shall be limited by relevant sections of the U.S. Title 23, applicable state statutes, or the specific orders of any lawfully recognized board or commission with jurisdiction over the railroads within the state.

13. *Project Completion*

Within thirty (30) days of the completion of construction or maintenance activities, the RAILROAD may require a post-construction inspection to ensure that all construction, materials, equipment, supplies, means, and methods were executed in accordance with the approved plans. The contractor or the DEPARTMENT will guarantee to the RAILROAD'S satisfaction that all equipment, materials, debris, vegetation, or other items produced for the project or maintenance activities shall be removed. All RAILROAD property shall be restored to its original or agreed-upon condition as specified in the PROJECT AGREEMENT. The DEPARTMENT shall provide the RAILROAD with a set of as-built final plans, complete with accurate stationing in the fashion suitable to the RAILROAD.

14. *Maintenance Responsibilities and Access*

The maintenance responsibilities for the project shall be described in the PROJECT AGREEMENT. When necessary repair, maintenance, or inspection of the facility is later required, and which necessitates access to RAILROAD rights-of-way, a separate PROJECT AGREEMENT will be developed by the PARTIES. However, the State will at all times have access within the confines of the permanent easement for structures that pass over RAILROAD properties for the purposes of inspection, maintenance, repair, removal of debris, snow and ice control, and other activities necessary for the safe operation of a public roadway or for the maintenance of the structure. The DEPARTMENT will provide 30 days' notice if any of its maintenance, inspection, or repair activities will occur within 50 feet of the RAILROAD'S operating envelope.

15. *Indemnification*

The PARTIES shall indemnify the other for individual negligent liability and will share joint liability. The DEPARTMENT will include language in its contracts that state that if a DEPARTMENT contractor is solely liable for an act that results in loss, liability, or damages to the RAILROAD, the contractor shall be required to indemnify the RAILROAD for such loss, liability, or damages. If the loss, liability, or damages result from concurrent negligence by the RAILROAD, the contractor shall indemnify the RAILROAD only to the extent of the contractor's responsibility for such loss, liability, or damages.

Section 5: Maintenance Activities

The DEPARTMENT agrees to notify the RAILROAD of any maintenance activities on the DEPARTMENT'S roadways or facilities that will require its forces or contractors to operate within 50 feet of RAILROAD rights-of-way. The DEPARTMENT also agrees to notify the RAILROAD if any other activities could affect: RAILROAD properties or equipment, including but not limited to signaling; traffic control devices on approaches to railroad at-grade crossings; drainage

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structures, including inflows or outfalls or any activity that will increase drainage discharge into RAILROAD facilities; the operation of any cranes within 100 feet of railroad operations; the use or storage of an explosive or hazardous materials within 100 feet of railroad operations. In no cases will the DEPARTMENT allow its forces or contract forces to cross RAILROAD property without a suitable RAILROAD permit, except at duly designated public or private crossings.

Section 6: Billing and Audits

1. *Records and Audits*

The RAILROAD shall maintain accurate and auditable records for expenses related to preliminary engineering reviews, construction engineering, flagging, force account work conducted by RAILROAD forces, contractor expenses for work on the RAILROAD property necessary for DEPARTMENT projects, and for any other expenses that will be subject to reimbursement by the DEPARTMENT. The RAILROAD will make such records available on demand of the DEPARTMENT or any State or Federal auditor in accordance with the U.S. Federal Highway Administration's Federal-Aid Policy Guide, Part 140 and Part 646, as applicable. The RAILROAD will fully cooperate with any audit or review of the payment records conducted on behalf of the DEPARTMENT, the Federal Highway Administration, or any authorized state auditing office that has pertinent jurisdiction over the DEPARTMENT.

2. *Payment Schedules*

The RAILROAD may submit invoices for reimbursement not less than every thirty (30) days and no more than one hundred twenty (120) days after the incurring of an expense. Any submittal for reimbursement submitted more than one hundred twenty (120) days after the incurring of the actual expense shall not be considered by the DEPARTMENT, unless a specific time extension has been granted by the DEPARTMENT.

3. *Prompt Payment*

The DEPARTMENT agrees to provide reimbursement within thirty (30) days of receipt of all invoices that are complete, accurate, and comply with the Federal-Aid Policy Guide, Part 140 and Part 646, and that comply with any other provisions of agreements between the RAILROAD and the DEPARTMENT.

4. *Determination of Railroad Benefit*

The PARTIES agree that if a project subject to the PROJECT AGREEMENT represents an ascertainable benefit as defined in the Federal-Aid Policy Guide, Chapter 1, Subchapter G, Part 646, the RAILROAD will financially participate as required in that Subchapter.

5. *Simplified Payment*

The PARTIES agree to seek opportunities to simplify the reimbursement process to the extent they are agreeable to both PARTIES, acceptable under Federal Highway Administration guidelines, and authorized under other applicable statutes and requirements. The PARTIES agree to develop "lump sum" payment schedules for recurring items such as flagging services, the installation of grade crossing warning devices, costs necessary for the pavement and ride-surface repair of at-grade crossings, and other recurring costs as authorized in Federal-Aid Policy Guide, Subchapter G, Part 646B, Attachment 3, of July 6, 2005. The PARTIES agree to identify such simplified payment schedules that are to the mutual convenience of both PARTIES and that satisfy the due diligence under which both PARTIES are required to operate.

Section 7: Amendments

1. *Agreement Timeline*

This AGREEMENT shall be in effect for two (2) years from the date of its acceptance by the PARTIES as evidenced by the signature of the duly authorized representatives of the DEPARTMENT and the RAILROAD. The PARTIES concur that the agreement can be cancelled with ninety (90) days' notice provided by either PARTY. Cancellation of the AGREEMENT shall not rescind or invalidate earlier PROJECT AGREEMENTS, permits, or approvals.

2. *Modifications*

The PARTIES agree to consider amendments to the AGREEMENT on at least an annual basis as the PARTIES identify mutually agreeable methods to improve the agreement, simplify the review process, adopt new specifications, or respond to new statutes, regulations, or requirements.

As witnessed below, the PARTIES hereto have caused this AGREEMENT to be executed effective as to the latter of the dates of signature below:

Name	Name
Title	Title
Date	Date

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Preliminary Engineering Agreement

The preliminary engineering agreement is a standard contract that includes the provisions controlling authorization by the highway agency to the railroad for compensation of the railroad's cost of providing comments and reviews of proposed plans. It includes the standard provisions and only needs to have project descriptions inserted for it to be complete.

The quick authorization of preliminary engineering activities is essential to expedite reviews. The railroads generally contract for reviews with on-call consulting firms. The firms cannot begin incurring costs until they have an executed agreement from the railroad. The railroad, in turn, cannot begin compensating the consultant reviewer until it has contract approval from the highway agency. By making the authorization of preliminary engineering reviews routine, the parties can quickly get consultant reviewers under contract so that reviews and mutual consultations can begin.

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PRELIMINARY ENGINEERING AGREEMENT

This Preliminary Engineering Agreement ("AGREEMENT") is made and entered into this _____ day of _____, 20_____, by and between the State of _____, Department of Transportation, hereinafter called the "DEPARTMENT," and _____ [Railroad Company], hereinafter called the "RAILROAD."

WITNESSTH:

WHEREAS, the DEPARTMENT proposes to engage in certain projects for the construction, reconstruction, or other change of portions of the State's road system that will cross the right-of-way and/or track(s) of the RAILROAD at various locations throughout the State;

WHEREAS, the DEPARTMENT is in the preliminary stages of work and is requesting the RAILROAD to proceed with certain necessary engineering and/or design services for the Project;

WHEREAS, it is deemed in the best public interest for the RAILROAD, as owners of the facilities, to prepare specifications and estimates for the above described improvements;

WHEREAS, the DEPARTMENT is obligated to reimburse the RAILROAD for all or part of the costs incurred by the RAILROAD undertaking specified work as described in Attachment A;

WHEREAS, nothing contained in this AGREEMENT shall oblige the RAILROAD to perform work that, in its opinion, is not relevant to the RAILROAD'S participation in the Project.

NOW THEREFORE, in consideration of the terms, conditions, covenants, and performance contained herein or attached and incorporated and made part hereof, the parties MUTUALLY AGREED AS FOLLOWS:

Section 1: Ethical Standards

The "State-Required Ethical Standards Governing Contract Procurement," attached hereto as Attachment B, is hereby made a part of this AGREEMENT.

Section 2: Legal Framework

The Project herein contemplated shall be subject to all appropriate State and Federal laws, regulation, orders, and approvals pertaining to all agreements, plans, estimates, specifications, award of contract, acceptance of work, and procedure in general.

Section 3: Standard Title VI Assurances

The RAILROAD shall comply with all applicable State and Federal laws, rules, ordinances, regulations, and orders. The RAILROAD and all of its agents who participate in the Project shall comply with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 USC 2000d–42 USC 2000d-4, and all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of Secretary, Part 21—to the end that no person in the United States shall discriminate on the basis of race, color, national origin, or sex. Also, no individual be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity in the performance of this AGREEMENT. The RAILROAD shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DEPARTMENT-assisted contracts. Failure by the RAILROAD to carry out these requirements is a material breach of this AGREEMENT, which may result in termination of this contract or such other remedy as deemed appropriate.

Section 4: Work by Railroad

The RAILROAD will provide all the work, labor, equipment, and materials necessary to complete the plans, specifications, and estimates (PS&E) necessary to perform the work as described in Attachment A.

Section 5: Work by the Department

The DEPARTMENT shall furnish or cause to be furnished, at its expense, all the labor, materials, and work equipment required to perform and complete:

1. The preliminary engineering work required for preparation of plans, specifications, and special provisions; and
2. Incidental work necessary to complete the item(s) hereinabove specified.

Section 6: Commencement of Work

The RAILROAD agrees not to commence work until receipt of notice to begin work in writing by the DEPARTMENT, and that reimbursement will be limited to those costs incurred subsequent to the date of such notification.

Section 7: Plans, Specifications, and Estimates Documents

Upon completion of the PS&E work, the RAILROAD shall submit PS&E documents to the DEPARTMENT for review and approval.

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Section 8: Cost and Expense Accounting

The RAILROAD shall keep an accurate and detailed account of the actual cost and expense as incurred by it, or for its account, in the performance of the work it herein agrees to perform.

Section 9: Estimate

The estimated cost of the above work by the RAILROAD is approximately $_____ (the "Estimate" as amended or revised). In the event the RAILROAD anticipates that actual Reimbursable Expenses may exceed such Estimate, it shall provide the DEPARTMENT with the revised Estimate of total Reimbursable Expenses for the DEPARTMENT'S approval and confirmation that sufficient funds have been appropriated to cover the total Reimbursable Expenses as reflected in the revised Estimate. RAILROAD may elect, by delivery of notice to the DEPARTMENT, to immediately cease all further Engineering Work unless and until the DEPARTMENT provides such approval and confirmation.

Section 10: Reimbursable Expenses

The DEPARTMENT shall reimburse the RAILROAD for all costs and expenses incurred by the RAILROAD in connection with the Preliminary Engineering Work as detailed in the Estimate. This will include, without limitation:

1. All out-of-pocket expenses;
2. Travel and lodging expenses;
3. Telephone, facsimile, and mailing expenses;
4. Costs for equipment, tools, materials, and supplies;
5. Sums paid to consultants and subcontractors by the RAILROAD; and
6. RAILROAD labor, together with RAILROAD labor overhead percentages established by the RAILROAD pursuant to applicable laws (collectively, "Reimbursable Expenses").

Section 11: Billing and Invoicing

Following the execution of this AGREEMENT and written authorization to proceed with the work, the RAILROAD, for performance of its work as outline in this AGREEMENT, hereby

1. Agrees to submit invoices to the DEPARTMENT for Reimbursable Expenses. Invoices are not to be submitted more frequently than one (1) per month. The progressive invoices may be rendered on the basis of an estimated percentage of the work completed by the RAILROAD.
2. A final and detailed invoice for all incurred costs shall be submitted by the RAILROAD to the DEPARTMENT within one (1) year of Project completion, and the DEPARTMENT shall pay all eligible amounts of such bill, less progress payments previously made.

Section 12: Payment Terms

Following the execution of this AGREEMENT and written authorization to proceed with the work, and on submission of invoices for work done by the RAILROAD as outlined in this AGREEMENT:

1. The DEPARTMENT shall remit payment to the RAILROAD within thirty (30) days following delivery to the DEPARTMENT of such proper invoice or, if later, the payment date (if any) set forth in the Payment Schedule.
2. In the event that the DEPARTMENT fails to pay the RAILROAD any sums due the RAILROAD under this AGREEMENT: (1) the DEPARTMENT shall pay the RAILROAD interest as permitted by applicable laws on the delinquent amount until paid in full; and (2) the RAILROAD may elect, by delivery of notice to the DEPARTMENT: (A) to immediately cease all further work on the Project, unless and until the DEPARTMENT pays the entire delinquent sum, together with accrued interest; and/or (B) to terminate this AGREEMENT.
3. It is agreed that payment of any invoices will not constitute agreement as to the appropriateness of any item and that at the time of final audit all required adjustments will be made and reflected in a final payment. In the event that such final audit reveals an overpayment to the RAILROAD, the RAILROAD agrees to refund such overpayment to the DEPARTMENT.
4. All invoices from the RAILROAD shall be delivered to the DEPARTMENT in accordance with Section 11 of this AGREEMENT. All payments by the DEPARTMENT to the RAILROAD shall be made by certified check and mailed to the following address or such other address as designated by the RAILROAD'S notice to DEPARTMENT:
   [Address of the RAILROAD]

Section 13: Audit Requirement

The RAILROAD shall maintain, for a minimum of three (3) years after the completion of the contract, adequate books, records, and supporting documents to verify the amounts, receipts, and use of all disbursements of funds passing in conjunction with the contract. The contracts and all books, records, and supporting documents will be available for review and audit by the Auditor General and other DEPARTMENT auditors. The RAILROAD agrees to cooperate fully with any audit conducted by Auditor General and other state auditors and to provide full access to all relevant materials. Failure to maintain the books, records, and supporting documents required by this section shall establish a presumption in favor of the DEPARTMENT for the recovery of any funds paid by the DEPARTMENT under the contract for which adequate books, records, and supporting documentation are not available to support their purported disbursement.

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Section 14: Appropriations

The DEPARTMENT represents to the RAILROAD that at the time this AGREEMENT was executed, funds were available for the Project.

1. The DEPARTMENT shall use its best efforts to obtain appropriations necessary to cover Reimbursable Expenses encompassed by subsequent Estimates approved by the DEPARTMENT.
2. The DEPARTMENT shall promptly notify the RAILROAD in the event that the DEPARTMENT is unable to obtain such additional appropriations. It is agreed and understood by both parties that the obligations described in this AGREEMENT are subject to _____ State's Code on appropriations.
3. However, this AGREEMENT shall cease immediately, without penalty to or payment by the DEPARTMENT, should the State General Assembly or Federal Highway Administration fail to appropriate or otherwise make available funds for the Project, and this AGREEMENT will become NULL and VOID, except that the DEPARTMENT shall reimburse the RAILROAD for all costs incurred by the RAILROAD prior to the notice of cancellation.

Section 15: Termination by Department

The DEPARTMENT may terminate this AGREEMENT, for any reason, by delivery of notice to RAILROAD. Such termination shall become effective upon the expiration of fifteen (15) calendar days following delivery of notice to the RAILROAD or such later date designated by the notice.

In the event that delays or difficulties arise in securing federal approval, or in acquiring rights-of-way, or in settling damages or damage claims, or for other cause which in the opinion of the DEPARTMENT renders it impractical to proceed with the Project, the DEPARTMENT may serve formal notice of cancellation on the RAILROAD and this AGREEMENT shall thereupon become NULL and VOID, except that the DEPARTMENT shall reimburse the RAILROAD for all costs incurred by the RAILROAD prior to the notice of cancellation.

The DEPARTMENT may terminate this AGREEMENT as provided pursuant to Section 14.

Section 16: Termination by Railroad

The RAILROAD may terminate this AGREEMENT as provided pursuant to Section 12.

Section 17: Consequences of Termination

If the AGREEMENT is terminated by either party pursuant to any Section in this AGREEMENT or any other provision of this AGREEMENT, the parties understand that it may be impractical for them to immediately stop the Engineering Work. Accordingly, they agree that in such instance a party may continue to perform Engineering Work until it has reached a point where it may reasonably and safely suspend the Engineering Work. The DEPARTMENT shall reimburse the RAILROAD pursuant to this AGREEMENT for the Engineering Work performed, plus all costs reasonably incurred by the RAILROAD to discontinue the Engineering Work and all other costs the RAILROAD incurred as a result of the Project up to the time of full suspension of the Engineering Work. Termination of this AGREEMENT or Engineering Work on the Project, for any reason, shall not diminish or reduce the DEPARTMENT'S obligation to pay the RAILROAD for Reimbursable Expenses incurred in accordance with this AGREEMENT. In the event of the termination of this AGREEMENT or the Engineering Work for any reason, the RAILROAD'S only remaining obligation to the DEPARTMENT shall be to refund to the DEPARTMENT payments made to the RAILROAD in excess of Reimbursable Expenses in accordance with Section 2.

Section 18: Subcontracts

The RAILROAD shall be permitted to engage consultants and subcontractors to perform all or any portion of the Engineering Work.

Section 19: Notices

All notices, consents, and approvals required or permitted by this AGREEMENT shall be in writing and shall be deemed delivered upon personal delivery, upon the expiration of three (3) days following mailing by first-class U.S. mail, or upon the next business day following mailing by a nationally recognized overnight carrier, to the parties at the addresses set forth below, or such other addresses as either party may designate by delivery of prior notice to the other party:

If to Railroad:

Attention: Name of Railroad Person
Address of Railroad

If to Department:

Attention: Name of Department Person
Address of Department

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Section 20: Liability

No liability shall attach to the DEPARTMENT or to the RAILROAD by reason of entering into this AGREEMENT except as expressly provided herein.

Section 21: Preliminary Engineering Request

The RAILROAD was hereby requested by the DEPARTMENT to perform preliminary engineering for the _____ project and authorized to accrue costs by letter dated _____.

Section 22: Successors and Assigns

This AGREEMENT shall be binding on the parties hereto, their successors, and assigns. The RAILROAD shall provide written notice to the DEPARTMENT of any assignment of this AGREEMENT.

In WITNESS WHEREOF, the parties hereto have caused this AGREEMENT to be executed in duplicate counterparts, each by its duly authorized officers and each of which shall be considered as an original, as of the date of this AGREEMENT.

Executed by the RAILROAD and the DEPARTMENT, this _____ day of _____, 20_____.

Attest:

RAILROAD	STATE OF _____
	DEPARTMENT OF TRANSPORTATION
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____

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ATTACHMENT A

Work undertaken by the RAILROAD is described below:

1. The preparation or review and approval of preliminary and final engineering and design plans, specifications, drawings, and other documents pertaining to the Project.
2. The preparation of cost estimates for the RAILROAD'S work in connection with the Project.
3. The review of construction cost estimates, site surveys, assessments, studies, and related construction documents submitted to the RAILROAD by DEPARTMENT for the Project ("Engineering Work"). Engineering Work may also include: (1) office reviews, (2) field reviews, (3) attendance at hearings and meetings, and (4) preparation of correspondence, reports, and other documentation in connection with the Project.

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ATTACHMENT B

STATE-REQUIRED ETHICAL STANDARDS GOVERNING CONTRACT PROCUREMENT

The certifications hereinafter made by the RAILROAD are each a material representation of fact. The DEPARTMENT may terminate the agreement if it is later determined that the RAILROAD rendered a false or erroneous certification.

A list of relevant DEPARTMENT standards is presented below.

Examples:

State Law on Bribery

Bid Rigging/Bid Rotating

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Resurfacing Agreements

Resurfacing projects are among the most common and routine types of projects regularly conducted by highway agencies. When resurfacing projects cross a railway, the construction activities need to be coordinated with the railroad so that a smooth transition results between the roadway surface and the railway. Generally, highway agencies and their contractors are not permitted by railroad labor agreements to conduct work on railroad rights-of-way. Therefore, the work on the crossing itself needs to be coordinated with the railroad's forces. The highway agencies and railroads often share the cost of the crossing improvement, or at least coordinate the efforts to minimize disruption to traffic and to economize on their respective efforts.

These standard agreements address resurfacing projects that are paid for with federal and state funds.

The original agreement signed for a construction or rehabilitation project involving a road that crosses a railway will have within it language that addresses resurfacing of the roadway. The department is required to schedule the resurfacing of the existing roadway with the railroad ahead of time. The communication normally includes providing a work statement and a cost estimate of work to be done.

Often the department will schedule resurfacing work for multiple crossings at the same time. Some of these projects may involve local highway authorities, such as cities and counties. The model agreement makes the agreement processes less complicated, allowing the department to do these multiple projects through a simple agreement. A template for such an agreement is shown under the section Resurfacing Agreement Using Federal Funds.

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Resurfacing Agreement Using Federal Funds

FEDERAL AID
GRADE CROSSING SURFACE REPAIR PROJECTS

FORCE ACCOUNT AGREEMENT
INVOLVING
THE DEPARTMENT, RAILROADS, AND LOCAL HIGHWAY AUTHORITIES

For the construction of surface improvements at the railroad crossing located on Railroad's track and for reimbursement under 23 USC 130.

County: _____ Road: _____

Project No.: _____

DIRECT ALL COMMUNICATIONS REGARDING THIS PROJECT TO:

HIGHWAY AUTHORITY [if the local highway authority is involved in the resurfacing of the roadway and grade crossing]

Contact Person: _____

Address: _____

Office Telephone Number: _____ Office e-mail _____

RAILROAD

Contact Person: _____

Address: _____

Office Telephone Number: _____ Office e-mail _____

DEPARTMENT

Contact Person: _____

Address: _____

Office Telephone Number: _____ Office e-mail _____

AGREEMENT SUBMITTAL: Complete and return all three (3) fully executed Agreements to

_____ [address]
for each crossing project.

Include:

Exhibit A: Work Statement
Exhibit B: Cost Estimate

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GRADE CROSSING SURFACE REPAIR PROJECTS
USING FEDERAL FUNDS

AGREEMENT

This AGREEMENT between _____ [Local Highway Authority], hereinafter referred to as the HIGHWAY AUTHORITY, and _____ [Railroad Company], hereinafter referred to as the RAILROAD, and the State of _____, Department of Transportation, hereinafter referred to as the DEPARTMENT, is entered into on this _____ day of _____, 20_____.

The HIGHWAY AUTHORITY and the RAILROAD agree to repair the at-grade crossing located at _____ and further agree as follows:

Section 1: Work Statement and Performance

The RAILROAD and the HIGHWAY AUTHORITY have determined the extent of the repair to be performed at this crossing, including railway, railway approach modifications, and replacement of existing sidewalks and/or recreational trails. This repair shall conform to the RAILROAD'S and the HIGHWAY AUTHORITY'S standards. The agreed work, generally described in the Work Statement identified as Exhibit A attached hereto and made part of this agreement, is to be performed by RAILROAD forces, except that the RAILROAD may subcontract performance of the road approach work or other required incidental work. In the absence of specific RAILROAD standards, BNSF/Union Pacific Railroad common crossing standards shall be used as guidance.

The HIGHWAY AUTHORITY will be responsible for having existing sidewalk(s) and/or trail(s) replaced by a contractor or their own forces, in accordance with the Americans with Disabilities Act requirements. In the absence of specific HIGHWAY AUTHORITY standards that are acceptable to the RAILROAD, the DEPARTMENT'S Standard Road Plan shall be used. The detectable warning is to be installed twelve (12) feet from the edge of the nearest rail. The project will include the cost of an additional two (2) feet of sidewalk and/or recreational trail, or additional sidewalk to the nearest sidewalk and/or additional recreational trail to the nearest recreational trail joint, whichever is less, beyond the detectable warning. Any additional new sidewalk and/or recreational trail beyond that point will be paid by the HIGHWAY AUTHORITY and will not be part of this project.

Truncated domes are the only detectable warnings allowed by ADA Accessibility Guidelines. Grooves, exposed aggregates, and other design intended for use as detectable warning are not considered equivalent facilitation and do not comply with ADA requirements.

Section 2: Cost Estimate

The estimated cost of the project work is itemized in Exhibit B attached hereto and made part of this AGREEMENT.

Section 3: Work Start and Completion

The RAILROAD shall begin the construction of the project as soon as possible after the signing of this AGREEMENT and shall complete the project within eighteen (18) months. Costs incurred prior to the DEPARTMENT signing the AGREEMENT are not reimbursable under this AGREEMENT. Cost incurred more than eighteen (18) months after the DEPARTMENT signs this AGREEMENT will also not be reimbursable under this agreement, unless the RAILROAD has requested in writing, prior to expiration of the AGREEMENT, and received from the DEPARTMENT a written extension of time for completion. The DEPARTMENT shall have complete discretion and shall be the sole authority to grant or deny extensions. Cost incurred for work after the extension time will not be reimbursed.

Section 4: Traffic Control

The roadway will be closed during repair. Exhibit A describes specific closure conditions. The HIGHWAY AUTHORITY is responsible for the establishment of and payment for traffic control (e.g., barricades, signing, detours, detour damage, and runarounds).

The RAILROAD will advise the HIGHWAY AUTHORITY Contact Person:

1. A minimum of sixty (60) days before the approximate starting date to allow the HIGHWAY AUTHORITY to implement detour.
2. Fourteen (14) days before the actual starting date to allow the HIGHWAY AUTHORITY adequate time to provide and install appropriate signs on the detour.

Section 5: Work Notification

The RAILROAD will notify the HIGHWAY AUTHORITY and the DEPARTMENT'S Contact Person no later than fourteen (14) days prior to the start of its work at the crossing. The DEPARTMENT shall be given ample opportunity to document the materials, equipment, and labor necessary to complete the project. The DEPARTMENT and HIGHWAY

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AUTHORITY shall have the right to inspect the project work at any time. The HIGHWAY AUTHORITY shall perform on-site inspection of the project work each day.

Section 6: Project Completion

The RAILROAD shall notify the DEPARTMENT and the HIGHWAY AUTHORITY in writing after the RAILROAD has completed the required work. The DEPARTMENT shall arrange an inspection with the RAILROAD and the HIGHWAY AUTHORITY in order for all parties to determine whether the project work has been completed in accordance with the terms of this AGREEMENT or Amendments thereto. Pavement markings and stop lines shall be placed by the HIGHWAY AUTHORITY as required by the Highway Manual on Uniform Traffic Control Devices for Streets and Highways. If the existing traffic control devices at a multiple-track highway-rail grade crossing become improperly placed or inaccurate because of removal of some of the tracks, the existing devices shall be relocated and/or modified at RAILROAD expense pursuant to the Manual on Uniform Traffic Control Devices, Part 8. Relocation of the traffic control devices will be completed prior to removal of the detour. When the work has been completed in accordance with the AGREEMENT, the RAILROAD, HIGHWAY AUTHORITY, and DEPARTMENT shall sign a Certificate of Completion and Acceptance form at the project site following inspection.

Section 7: Reimbursable Costs

The RAILROAD will keep an accurate and detailed account of actual and necessary reimbursable costs incurred under this AGREEMENT. Replacement of existing sidewalk(s) and/or recreational trail(s) and subcontracted work costs shall be included in the RAILROAD billing. The cost of labor, materials, all associated additives, and subcontracted expenses will be cost reimbursable, and shall be billed on a force account common basis in accordance with Title 23, Code of Federal Regulations, Part 140, Subpart I. The cost of railroad equipment, equipment rental, accounting, accounting additives, and bill reproduction are reimbursable, but shall not be included directly in the force account billing. Those costs shall be billed as an additive amount equal to nine (9) percent off the total force account and billed less audit exceptions. The cost of preliminary project engineering, construction inspection, track inspection, relocation of existing signals, signal wires and switches, or the construction of runarounds will not be eligible as project reimbursable costs.

Section 8: Cost Sharing

The RAILROAD and the HIGHWAY AUTHORITY each shall pay twenty (20) percent of the reimbursable costs defined in Section 7 for work described in Exhibit A. It is understood the DEPARTMENT will use Federal Aid 23 USC 130 funds to reimburse the RAILROAD for sixty (60) percent of the total eligible costs for this project. The DEPARTMENT'S Certificate of Audit shall establish eligible reimbursable project costs.

Section 9: Progressive Payments

The RAILROAD may submit accurate progressive bills to the DEPARTMENT and HIGHWAY AUTHORITY for material, labor, and any subcontracted cost included in Exhibit B for each crossing location. The billing for materials shall be for those materials that have been delivered to the project location or specifically purchased and delivered to the RAILROAD for use on the project. The DEPARTMENT and HIGHWAY AUTHORITY may make progressive payments to the RAILROAD for one hundred (100) percent of each party's billed participation, or the HIGHWAY AUTHORITY may elect to retain a percentage of their billed participation.

Section 10: Final Billing

Upon completion of the project, the RAILROAD shall submit an accurate, final, and complete itemized billing in three (3) counterparts. The final bill shall include a summary of all incurred costs.

Section 11: Final Payment

The DEPARTMENT, upon receipt of the final bill and Certificate of Completion and Acceptance form, shall review and forward the final bill to the DEPARTMENT'S Office of Audits for final audit. The DEPARTMENT shall notify the HIGHWAY AUTHORITY of the reimbursable amount after final audit. The DEPARTMENT and HIGHWAY AUTHORITY shall make payment to the RAILROAD equal to sixty (60) percent and twenty (20) percent, respectively, of the final reimbursable amount, less previous payment. The RAILROAD shall promptly reimburse the DEPARTMENT and the HIGHWAY AUTHORITY the amount of any overpayments.

Section 12: Maintenance and Abandonment

Upon completion of the project, the RAILROAD shall maintain the crossing surface to provide a safe and sufficient crossing for vehicular travel. If the track is removed from both sides of the crossing, the RAILROAD shall remove the surface material, rail, and cross ties from the crossing and shall restore the roadway void to the satisfaction of the

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HIGHWAY AUTHORITY, all at RAILROAD expense. If the existing traffic control devices at a multiple-track highway-rail grade crossing become improperly placed or inaccurate because of removal of some of the tracks, the existing devices shall be relocated and/or modified at RAILROAD expense pursuant to the Manual on Uniform Traffic Control Devices, Part 8. Future maintenance of the sidewalk(s) and the detectable warning device will not be the responsibility of the RAILROAD.

Section 13: Standard Title VI Assurances

The RAILROAD shall comply with all applicable State and Federal laws, rules, ordinances, regulations, and orders. The RAILROAD and all of its agents that participate in the project, shall comply with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 USC 2000d–42 USC 2000d-4, and all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of Secretary, Part 21—to the end that no person in the United States shall, on the grounds of race, color, national origin, or sex, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving financial assistance from the DEPARTMENT.

Section 14: Successors and Assigns

This AGREEMENT shall be binding on all successors and assigns. The RAILROAD shall provide written notice to the HIGHWAY AUTHORITY and the DEPARTMENT of any assignment of this AGREEMENT.

Section 15: Project Contact Person

All notices consents, communications, and approvals required to complete work required by this AGREEMENT shall be made to the Contact Persons and the Departments specified on the cover page of this AGREEMENT.

Section 16: Integration and Amendment

This AGREEMENT and its exhibits constitute the entire Agreement between the DEPARTMENT, the RAILROAD, and the HIGHWAY AUTHORITY concerning this project. If the DEPARTMENT determines that a substantial change is to be made in the project work described in Exhibit A, the DEPARTMENT will furnish the written approval of the change.

Section 17: Termination for Convenience

In the event of nonappropriation of federal funds, the DEPARTMENT may terminate this AGREEMENT in whole or in part when the DEPARTMENT, HIGHWAY AUTHORITY, and the RAILROAD agree that the continuation of the Project would not produce beneficial results commensurate with future disbursement of federal funds. The DEPARTMENT, HIGHWAY AUTHORITY, and the RAILROAD shall agree upon the termination conditions. The RAILROAD shall not incur new obligations after the effective date of the termination and shall cancel as many outstanding obligations as reasonably possible. The DEPARTMENT will allow full credit to the RAILROAD for the DEPARTMENT'S share of the noncancelable obligations allowable under the AGREEMENT and properly incurred by the RAILROAD prior to termination.

Section 18: Merged Documents

This AGREEMENT may be executed and delivered in three (3) or more counterparts, each of which so executed and delivered shall be deemed to be an original, and all shall constitute but one and the same instrument.

Section 19: Nonseverability

If any section, provision, or part of this AGREEMENT shall be found to be invalid or unconstitutional, such judgment shall not affect the validity of any section, provision, or part thereof not found to be invalid or unconstitutional.

Section 20: Indemnification

Nothing in this AGREEMENT is intended to be construed as a requirement for an indemnification against the sole negligence of the RAILROAD, its officers, employees, or agents. Moreover, for any work performed in the State of_____, the DEPARTMENT will require its contractor to indemnify the RAILROAD and any other railroad company occupying or using the RAILROAD'S right-of-way or line of railroad against all loss, liability, and damages, including environmental damages, hazardous materials damages, penalties, or fines that may be assessed for, caused by, or the result of the contractor's negligence; provided, however, that if such loss, liability, damage, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors. Likewise, if such loss, liability, damage, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or

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agents and (b) the DEPARTMENT'S officers, employees, or agents, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT's officers, employees, or agents.

IN WITNESS WHEREOF the RAILROAD, the HIGHWAY AUTHORITY, and the DEPARTMENT hereto have caused this AGREEMENT to be executed by their duly authorized officers as of the dates indicated below.

Executed by the RAILROAD this

_____ day of _____, 20_____

Name of Railroad

By _____

Name and Title

Executed by the HIGHWAY AUTHORITY this

_____ day of _____, 20_____

Name of Highway Authority

By _____

Name and Title

Executed by the DEPARTMENT this

_____ day of _____, 20_____

Name of Department

By _____

Name and Title

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EXHIBIT A

WORK STATEMENT

FEDERAL-AID RAIL/HIGHWAY CROSSING SURFACE REPAIR

County: _____ Meeting Date: _____

Highway Authority: _____ Railroad: _____

State Crossing No.: _____ Location: _____

1. **Crossing(s) Reconstructed**
   A. The RAILROAD will reconstruct _____ crossings of _____ total feet that include _____ feet of concrete surface material through the traveled roadway and _____ feet of concrete surface material through the shoulder, sidewalk, and/or trail area. As a minimum, the crossing must extend beyond the edge of the traveled roadway and through the shoulder if not curbed.
   B. Existing rail weight through crossing(s): _____ (Number)

2. **Traffic Controls** (mark with an X)

   ☐ A highway runaround will be constructed to permit two-lane traffic during repair.
   ☐ The highway will be closed for _____ days during repair.

   NOTE: The HIGHWAY AUTHORITY is responsible for placement and cost of barricades, signing, detours, detour damage, and runarounds.
   A. The RAILROAD shall advise the HIGHWAY AUTHORITY Contact Person:
      1. A minimum of sixty (60) days before the approximate starting date to allow the HIGHWAY AUTHORITY to implement the detour.
      2. Fourteen (14) days before the actual starting date to allow the HIGHWAY AUTHORITY adequate time to provide and install appropriate signs on the detour.

   The RAILROAD shall also advise the State Project Inspector fourteen (14) days before the actual starting date.

3. **Track Elevation Relative to Existing Road Pavements** (mark with an X)

   ☐ Tracks will be constructed to meet existing road grade.
   ☐ Roadway will be reconstructed to meet a proposed new track grade (roadway work is not covered by this AGREEMENT).
   ☐ Tracks will be elevated _____ inches above the adjacent roadway, requiring a taper (complete item 4A and 4B).

   In any event, the PARTIES must provide a smooth crossing.

4. **Roadway Work:** Must be sufficient to provide a smooth crossing
   A. Taper Length (estimated)

   An East foot taper on the _____ side of the crossing and a West foot taper on the ___ side of the crossing, requires _____ of HMA material (estimated). Taper length should not exceed twenty-five (25) feet for each inch of track rise. Approach shall comply with HIGHWAY AUTHORITY specifications.

   This work will be completed by (mark with an X)

   ☐ Railroad forces ☐ Railroad's Contractor
   ☐ Highway Authority forces ☐ Highway Authority's Contractor

   B. Track Opening in the Roadway (mark with an X)

   ☐ Existing track opening will be maintained.
   ☐ Track opening of _____ feet will be required involving the following described roadway modification. Estimated HMA tonnage: _____.

   This work will be completed by (mark with an X)

   ☐ Railroad forces ☐ Railroad's Contractor
   ☐ Highway Authority forces ☐ Highway Authority's Contractor

5. **Existing Sidewalk(s) and/or Recreational Trail Replacement by Highway Authority**

   The quadrants requiring upgrades to meet ADA requirements (mark with an X)

   Sidewalk (5′ width required)

   ☐ NE __ (feet) ☐ SE __ (feet) ☐ NW __ (feet) ☐ SW __ (feet)

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Recreational Trail (10′ width)

☐ NE __ (feet) ☐ SE __ (feet) ☐ NW __ (feet) ☐ SW __ (feet)

This work will be completed by (mark with an X)

☐ Railroad forces ☐ Railroad's Contractor
☐ Highway Authority forces ☐ Highway Authority's Contractor

6. **Crossing(s) Permanently Retired and Removed**
   A. RAILROAD will retire and remove _____ number of crossing(s).
   B. Voids in pavement will be filled with _____ material requiring _____ unit(s).

   This work will be completed by (mark with an X)

   ☐ Railroad forces ☐ Railroad's Contractor
   ☐ Highway Authority forces ☐ Highway Authority's Contractor

7. **Drainage** (mark with an X)
   A. ☐ Present drainage is adequate.
   B. ☐ Drainage work required. Specify work to include materials and outlet.
   C. ☐ Clean all four (4) quadrants for good surface drainage.

8. **Additional Construction and Traffic Control Conditions** (e.g., road closure limitations)

   Construction at this crossing included with this project, and not described above. Only ACC or PCC will be placed one (1) foot from the railroad surface material.

9. **Signature Block**

   Signatures indicate agreement on all items on Work Statements.

If the AGREEMENT is not reached at the field meeting, HIGHWAY AUTHORITY should hold the form and set target resolution date.

Name of RAILROAD:	Name of HIGHWAY AUTHORITY:
Name and Title of Representative:	Name and Title of Representative:
Date:	Date:
Signature:	Signature:
Name of State Project Manager:	Office Phone:

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Resurfacing Agreement Using State Funds

GRADE CROSSING SURFACE REPAIR PROJECTS

FORCE ACCOUNT AGREEMENT
INVOLVING
THE DEPARTMENT, RAILROADS, AND LOCAL HIGHWAY AUTHORITIES

For the construction of surface improvements at the railroad crossing located on Railroad's track.

County: _____

Road: _____ Project No.: _____

DIRECT ALL COMMUNICATIONS REGARDING THIS PROJECT TO:

HIGHWAY AUTHORITY

Contact Person: _____

Address: _____

Office Telephone Number: _____ Office e-mail _____

RAILROAD

Contact Person: _____

Address: _____

Office Telephone Number: _____ Office e-mail _____

DEPARTMENT

Contact Person: _____

Address: _____

Office Telephone Number: _____ Office e-mail _____

AGREEMENT SUBMITTAL: Complete and return all three (3) fully executed Agreements to

_____ [address]

for each crossing project.

Include:

Exhibit A: Work Statement
Exhibit B: Cost Estimate

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GRADE CROSSING SURFACE REPAIR PROJECTS
USING STATE FUNDS

AGREEMENT

This AGREEMENT between _____ [Local Highway Authority], hereinafter referred to as the HIGHWAY AUTHORITY, and _____ [Railroad Company], hereinafter referred to as the RAILROAD, and the State of _____, Department of Transportation, hereinafter called the DEPARTMENT, is entered into on this _____ day of _____, 20_____.

The HIGHWAY AUTHORITY and the RAILROAD agree to repair the at-grade crossing located at _____ and further agree as follows:

Section 1: Work Statement and Performance

The RAILROAD and the HIGHWAY AUTHORITY have determined the extent of the repair to be performed at this crossing, including railway, railway approach modifications, and replacement of existing sidewalks and/or recreational trails. This repair shall conform to the RAILROAD and the HIGHWAY AUTHORITY standards. The agreed work, generally described in the Work Statement identified as Exhibit A attached hereto and made part of this agreement, is to be performed by RAILROAD forces, except that the RAILROAD may subcontract performance of the road approach work or other required incidental work. In the absence of specific RAILROAD standards, BNSF/Union Pacific Railroad common crossing standards shall be used as guidance.

The HIGHWAY AUTHORITY will be responsible for having existing sidewalk(s) and/or trail(s) replaced by a contractor or their own forces, in accordance with the Americans with Disabilities Act requirements. In the absence of specific DEPARTMENT standards that are acceptable to the railroad, the DEPARTMENT'S Standard Road Plan shall be used. The detectable warning is to be installed twelve (12) feet from the edge of the nearest rail. The project will include the cost of an additional two (2) feet of sidewalk and/or recreational trail, or additional sidewalk to the nearest sidewalk and/or additional recreational trail to the nearest recreational trail joint, whichever is less, beyond the detectable warning. Any additional new sidewalk and/or recreational trail beyond that point will be paid by the HIGHWAY AUTHORITY and will not be part of this project.

Truncated domes are the only detectable warnings allowed by ADA Accessibility Guidelines. Grooves, exposed aggregates, and other design intended for use as detectable warning are not considered equivalent facilitation and do not comply with ADA requirements.

Section 2: Cost Estimate

The estimated cost of the project work is itemized in Exhibit B attached hereto and made part of this AGREEMENT.

Section 3: Work Start and Completion

The RAILROAD shall begin the construction of the project as soon as possible after the signing of this agreement and shall complete the project within eighteen (18) months. Costs incurred prior to the DEPARTMENT signing the AGREEMENT are not reimbursable under this AGREEMENT. Cost incurred more than eighteen (18) months after the DEPARTMENT signs this AGREEMENT will also not be reimbursable under this agreement, unless the RAILROAD has requested in writing, prior to expiration of the AGREEMENT, and received from the DEPARTMENT a written extension of time for completion. The DEPARTMENT shall have complete discretion and shall be the sole authority to grant or deny extensions. Cost incurred for work after the extension time will not be reimbursed.

Section 4: Traffic Control

The roadway will be closed during repair. Exhibit A describes specific closure conditions. The HIGHWAY AUTHORITY is responsible for the establishment of and payment for traffic control (e.g., barricades, signing, detours, detour damage, and runarounds).

The RAILROAD will advise the HIGHWAY AUTHORITY Contact Person:

1. A minimum of sixty (60) days before the approximate starting date to allow the HIGHWAY AUTHORITY to implement the detour.
2. Fourteen (14) days before the actual starting date to allow the HIGHWAY AUTHORITY adequate time to provide and install appropriate signs on the detour.

Section 5: Work Notification

The RAILROAD will notify the HIGHWAY AUTHORITY and the DEPARTMENT'S Contact Person no later than fourteen (14) days prior to the start of its work at the crossing. The DEPARTMENT shall be given ample opportunity to document

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the materials, equipment, and labor needed to complete the project. The DEPARTMENT and HIGHWAY AUTHORITY shall have the right to inspect the project work at any time. The HIGHWAY AUTHORITY shall perform on-site inspection of the project work each day.

Section 6: Project Completion

The RAILROAD shall notify the DEPARTMENT and the HIGHWAY AUTHORITY in writing after the RAILROAD has completed the required work. The DEPARTMENT shall arrange an inspection with the RAILROAD and the HIGHWAY AUTHORITY in order for all parties to determine whether the project work has been completed in accordance with the terms of this AGREEMENT or Amendments thereto. Pavement markings and stop lines shall be placed by the HIGHWAY AUTHORITY as required by the Highway Manual on Uniform Traffic Control Devices for Streets and Highways. If the existing traffic control devices at a multiple-track highway-rail grade crossing become improperly placed or inaccurate because of removal of some of the tracks, the existing devices shall be relocated and/or modified at RAILROAD expense pursuant to the Manual on Uniform Traffic Control Devices, Part 8. Relocation of the traffic control devices will be completed prior to removal of the detour. When the work has been completed in accordance with the AGREEMENT, the RAILROAD, HIGHWAY AUTHORITY, and DEPARTMENT shall sign a Certificate of Completion and Acceptance form at the project site following inspection.

Section 7: Reimbursable Costs

The RAILROAD will keep an accurate and detailed account of actual and necessary reimbursable costs incurred under this AGREEMENT. Replacement of existing sidewalk(s) and/or recreational trail(s) and subcontracted work costs shall be included in the RAILROAD billing. The cost of labor, materials, all associated additives, and subcontracted expenses will be reimbursable, and shall be billed on a force account common basis in accordance with Title 23, Code of Federal Regulations, Part 140, Subpart I. The cost of railroad equipment, equipment rental, accounting, accounting additives, and bill reproduction are reimbursable, but shall not be included directly in the force account billing. Those costs shall be billed as an additive amount equal to nine (9) percent off the total force account and billed less audit exceptions. The cost of preliminary project engineering, construction inspection, track inspection, relocation of existing signals, signal wires and switches, or the construction of runarounds will not be eligible as project reimbursable costs.

Section 8: Cost Sharing

The RAILROAD and the HIGHWAY AUTHORITY each shall pay twenty (20) percent of the reimbursable costs defined in SECTION 7 for work described in Exhibit A. It is understood the DEPARTMENT agrees to use _____ state funds to pay the remaining sixty (60) percent of the total eligible costs for this project.

Section 9: Progressive Payments

The RAILROAD may submit accurate progressive bills to the DEPARTMENT and HIGHWAY AUTHORITY for material, labor, and any subcontracted cost included in Exhibit B for each crossing location. The billing for materials shall be for those materials that have been delivered to the project location or specifically purchased and delivered to the RAILROAD for use on the project. The DEPARTMENT and HIGHWAY AUTHORITY may make progressive payments to the RAILROAD for one hundred (100) percent of each party's billed participation, or the HIGHWAY AUTHORITY may elect to retain a percentage of their billed participation.

Section 10: Final Billing

Upon completion of the project the RAILROAD shall submit an accurate, final, and complete itemized billing in three (3) counterparts. The final bill shall include a summary of all incurred costs.

Section 11: Final Payment

The DEPARTMENT, upon receipt of the final bill and Certificate of Completion and Acceptance form, shall review and forward the final bill to the DEPARTMENT'S Office of Audits for final audit. The DEPARTMENT shall notify the HIGHWAY AUTHORITY of the reimbursable amount after final audit. The DEPARTMENT and HIGHWAY AUTHORITY shall make payment to the RAILROAD equal to sixty (60) percent and twenty (20) percent, respectively, of the final reimbursable amount, less previous payment. The RAILROAD shall promptly reimburse the DEPARTMENT and the HIGHWAY AUTHORITY the amount of any overpayments.

Section 12: Maintenance and Abandonment

Upon completion of the project, the RAILROAD shall maintain the crossing surface to provide a safe and sufficient crossing for vehicular travel. If the track is removed from both sides of the crossing, the RAILROAD shall remove the surface material, rail, and cross ties from the crossing and shall restore the roadway void to the satisfaction of the HIGHWAY AUTHORITY, all at RAILROAD expense. If the existing traffic control devices at a multiple-track highway-rail

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grade crossing become improperly placed or inaccurate because of removal of some of the tracks, the existing devices shall be relocated and/or modified at RAILROAD expense pursuant to the Manual on Uniform Traffic Control Devices, Part 8. Future maintenance of the sidewalk(s) and the detectable warning device will not be the responsibility of the RAILROAD.

Section 13: Standard Title VI Assurances

The RAILROAD shall comply with all applicable State and Federal laws, rules, ordinances, regulations, and orders. The RAILROAD and all of its agents that participate in the project shall comply with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 USC 2000d–42 USC 2000d-4, and all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of Secretary, Part 21—to the end that no person in the United States shall, on the basis of race, color, national origin, or sex, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity in the performance of this AGREEMENT.

Section 14: Successors and Assigns

This AGREEMENT shall be binding on all successors and assigns. The RAILROAD shall provide written notice to the HIGHWAY AUTHORITY and the DEPARTMENT of any assignment of this AGREEMENT.

Section 15: Project Contact Person

All notices, consents, communications, and approvals required to complete work required by this AGREEMENT shall be made to the Contact Persons and the Departments specified on the cover page of this AGREEMENT.

Section 16: Integration and Amendment

This AGREEMENT and its exhibits constitute the entire Agreement between the DEPARTMENT, the RAILROAD, and the HIGHWAY AUTHORITY concerning this project. If the DEPARTMENT determines that a substantial change is to be made in the project work described in Exhibit A, the DEPARTMENT will furnish the written approval of the change.

Section 17: Termination for Convenience

In the event of nonappropriation of federal funds, the DEPARTMENT may terminate this AGREEMENT in whole or in part, when the DEPARTMENT, HIGHWAY AUTHORITY, and the RAILROAD agree that the continuation of the Project would not produce beneficial results commensurate with future disbursement of federal funds. The DEPARTMENT, HIGHWAY AUTHORITY, and the RAILROAD shall agree upon the termination conditions. The RAILROAD shall not incur new obligations after the effective date of the termination and shall cancel as many outstanding obligations as reasonably possible. The DEPARTMENT will allow full credit to the RAILROAD for the DEPARTMENT'S share of the noncancelable obligations allowable under the AGREEMENT and properly incurred by the RAILROAD prior to termination.

Section 18: Merged Documents

This AGREEMENT may be executed and delivered in three (3) or more counterparts, each of which so executed and delivered shall be deemed to be an original, and all shall constitute but one and the same instrument.

Section 19: Nonseverability

If any section, provision, or part of this AGREEMENT shall be found to be invalid or unconstitutional, such judgment shall not affect the validity of any section, provision, or part thereof not found to be invalid or unconstitutional.

Section 20: Indemnification

Nothing in this AGREEMENT is intended to be construed as a requirement for an indemnification against the sole negligence of the RAILROAD, its officers, employees, or agents. Moreover, for any work performed in the State of _____, the DEPARTMENT will require its contractor to indemnify the RAILROAD and any other railroad company occupying or using the RAILROAD'S right-of-way or line of railroad against all loss, liability, and damages, including environmental damages, hazardous materials damages, penalties, or fines that may be assessed for, caused by, or the result of the contractor's negligence; provided, however, that if such loss, liability, damage, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S contractor or the contractor's employees, agents or subcontractors. Likewise, if such loss, liability, damage, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents

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and (b) the DEPARTMENT'S officers, employees, or agents, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S officers, employees, or agents.

IN WITNESS WHEREOF the RAILROAD, the HIGHWAY AUTHORITY, and the DEPARTMENT hereto have caused this AGREEMENT to be executed by their duly authorized officers as of the dates indicated below.

Executed by the RAILROAD this

_____ day of _____, 20_____

Name of Railroad

By _____

Name and Title

Executed by the HIGHWAY AUTHORITY this

_____ day of _____, 20_____

Name of Highway Authority

By _____

Name and Title

Executed by the DEPARTMENT this

_____ day of _____, 20_____

Name of Department

By _____

Name and Title

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EXHIBIT A

WORK STATEMENT

STATE-FUNDED RAIL/HIGHWAY CROSSING SURFACE REPAIR

County: _____ Meeting Date: _____

Highway Authority: _____ Railroad: _____

State Crossing No.: _____ Location: _____

1. **Crossing(s) Reconstructed**
   A. The RAILROAD will reconstruct _____ crossings of _____ total feet that include _____ feet of concrete surface material through the traveled roadway and _____ feet of concrete surface material through the shoulder, sidewalk, and/or trail area. As a minimum, the crossing must extend beyond the edge of the traveled roadway and through the shoulder if not curbed.
   B. Existing rail weight through crossing(s): _____ (Number)

2. **Traffic Controls** (mark with an X)

   ☐ A highway runaround will be constructed to permit two-lane traffic during repair.
   ☐ The highway will be closed for _____ days during repair.

   NOTE: The HIGHWAY AUTHORITY is responsible for placement and cost of barricades, signing, detours, detour damage, and runarounds.

   A. The RAILROAD shall advise the HIGHWAY AUTHORITY Contact Person:
      1. A minimum of sixty (60) days before the approximate starting date to allow the HIGHWAY AUTHORITY to implement the detour.
      2. Fourteen (14) days before the actual starting date to allow the HIGHWAY AUTHORITY adequate time to provide and install appropriate signs on the detour.

   The RAILROAD shall also advise the State Project Inspector fourteen (14) days before the actual starting date.

3. **Track Elevation Relative to Existing Road Pavements** (mark with an X)

   ☐ Tracks will be constructed to meet existing road grade.
   ☐ Roadway will be reconstructed to meet a proposed new track grade (roadway work is not covered by this AGREEMENT).
   ☐ Tracks will be elevated _____ inches above the adjacent roadway, requiring a taper (complete item 4A and 4B).

   In any event, the PARTIES must provide a smooth crossing.

4. **Roadway Work:** Must be sufficient to provide a smooth crossing

   A. Taper Length (estimated)

   An East foot taper on the _____ side of the crossing and a West foot taper on the _____ side of the crossing, requires _____ of HMA material (estimated). Taper length should not exceed twenty-five (25) feet for each inch of track rise. Approach shall comply with HIGHWAY AUTHORITY specifications.

   This work will be completed by (mark with an X)

   ☐ Railroad forces ☐ Railroad's Contractor
   ☐ Highway Authority forces ☐ Highway Authority's Contractor

   B. Track Opening in the Roadway (mark with an X)

   ☐ Existing track opening will be maintained
   ☐ Track opening of _____ feet will be required involving the following described roadway modification. Estimated HMA tonnage: _____.

   This work will be completed by (mark with an X)

   ☐ Railroad forces ☐ Railroad's Contractor
   ☐ Highway Authority forces ☐ Highway Authority's Contractor

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5. **Existing Sidewalk(s) and/or Recreational Trail Replacement by Highway Authority**

   The quadrants requiring upgrades to meet ADA requirements (mark with an X)

   Sidewalk (5′ width required)

   ☐ NE __ (feet) ☐ SE __ (feet) ☐ NW __ (feet) ☐ SW __ (feet)

   Recreational Trail (10′ width)

   ☐ NE __ (feet) ☐ SE __ (feet) ☐ NW __ (feet) ☐ SW __ (feet)

   This work will be completed by (mark with an X)

   ☐ Railroad forces ☐ Railroad's Contractor
   ☐ Highway Authority forces ☐ Highway Authority's Contractor

6. **Crossing(s) Permanently Retired and Removed**

   A. RAILROAD will retire and remove _____ number of crossing(s).
   B. Voids in pavement will be filed with _____ material requiring _____ unit(s).

   This work will be completed by (mark with an X)

   ☐ Railroad forces ☐ Railroad's Contractor
   ☐ Highway Authority forces ☐ Highway Authority's Contractor

7. **Drainage** (mark with an X)

   A. ☐ Present drainage is adequate.
   B. ☐ Drainage work required. Specify work to include materials and outlet.
   C. ☐ Clean all four (4) quadrants for good surface drainage.

8. **Additional Construction and Traffic Control Conditions** (e.g., road closure limitations)

   Construction at this crossing included with this project and not described above. Only ACC or PCC will be placed one (1) foot from the railroad surface material.

9. **Signature Block**

   Signatures indicate agreement on all items on Work Statements.

If the AGREEMENT is not reached at the field meeting, HIGHWAY AUTHORITY should hold the form and set target resolution date.

Name of RAILROAD:	Name of HIGHWAY AUTHORITY:
Name and Title of Representative:	Name and Title of Representative:
Date:	Date:
Signature:	Signature:
Name of State Project Manager:	Office Phone:

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Highway Overpass Agreement

The following agreement addresses the construction or reconstruction of highway structures over railways. These projects tend to be complex in terms of coordination issues. Among the issues that need to be addressed are the length of span, the number of future tracks to be accommodated, elevation above roadway, and a variety of considerations during the construction process. Such projects require the construction of embankments and piers adjacent to the railway and the installation of beams above the active railway. These activities require strict control of construction activities and close coordination among the highway agency, the railroad, and the contractor.

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RAILROAD–HIGHWAY AGREEMENT FOR OVERPASS

This Agreement ("AGREEMENT") is made and entered into this _____ day of _____, 20_____, by and between the _____ Department of Transportation, hereinafter called the "DEPARTMENT," and _____ [Railroad Company], hereinafter called the "RAILROAD."

WITNESSTH:

WHEREAS, the RAILROAD owns and operates a line of railroad in and through the City/County of _____, in the State of _____;

WHEREAS, the DEPARTMENT proposes to construct an overpass structure that crosses over the RAILROAD'S rail line, Bridge Number _____, at milepost _____, in _____ County;

WHEREAS, said construction requires the construction of a new structure (Bridge Number _____) to separate the grades of track of the RAILROAD and the highway at the point hereinbefore mentioned (said Structure and any and all work related to the construction of the proposed Overpass and the necessary approaches thereto, are hereinafter referred to as the Project);

WHEREAS, the RAILROAD desires to cooperate with the DEPARTMENT in the construction of the Project by permitting the construction and future maintenance of the Project over its track and right-of-way and the performance of other services as may be required that do not interfere with the RAILROAD'S use and enjoyment of the right-of-way;

WHEREAS, the RAILROAD desires to cooperate with the DEPARTMENT in the construction of the Project with the understanding that the DEPARTMENT will be solely responsible for the cost of constructing and maintaining the new bridge and bearing all other costs and expenses associated with the Project.

NOW, THEREFORE, in consideration of the mutual covenants and agreement of the PARTIES contained herein, the receipt and sufficiency of which are hereby acknowledged, the PARTIES agree as follows:

Section 1: Scope of Work

The RAILROAD, the DEPARTMENT, and/or their Contractor agree to perform the work, including but not limited to construction of said Structure; the necessary earthwork to effect the clearance, grading, drainage, and paving of the highway; the sodding, seeding, and planting of slopes; the highway guardrails; the preliminary engineering; and the construction engineering required, as detailed in Exhibit A.

Section 2: Railroad Obligations

1. The RAILROAD hereby grants to the DEPARTMENT, its successors, and its assigns, upon and subject to the terms and conditions set forth in this AGREEMENT, a Right of Entry and Use as necessary over the portion of the RAILROAD'S right-of-way as indicated in Exhibit B to construct the Project in accordance with the plans and specifications indicated in Exhibit A approved by the RAILROAD herein. Unless noted otherwise in this AGREEMENT, the RAILROAD reserves its rights, and the rights of any others who have obtained or may obtain permission or authority from the RAILROAD, to do the following:
   A. Operate, maintain, renew, and/or relocate any and all existing railroad track or tracks, wires, pipelines, and other facilities of like character upon, over, or under the surface of said right-of-way;
   B. Construct, operate, maintain, renew, and/or relocate upon said right-of-way, without limitation, such facilities as the RAILROAD may from time to time deem appropriate, provided such facilities do not materially interfere with the DEPARTMENT'S use of the said Structure (Overpass); and
   C. Otherwise use or operate the right-of-way as the RAILROAD may from time to time deem appropriate, provided such use or operation does not materially interfere with the DEPARTMENT'S use of the said Structure (Overpass).

   The term of the Temporary Construction Easement (identified in Exhibit B) shall commence on the date of the DEPARTMENT'S Notice to Proceed to the RAILROAD, pursuant to Section 3.13 herein, and terminate one (1) year thereafter; however, the term of the Temporary Construction Easement may be extended upon written approval from the RAILROAD. *The Temporary Construction Easement is for construction of the Project only and shall not be used by DEPARTMENT for any other purpose.*

   In the event the DEPARTMENT is evicted by anyone owning or claiming title to or any interest in said right-of-way, the RAILROAD will not be liable to the DEPARTMENT for any damages, losses, or expenses of any nature whatsoever. The granting of similar rights to others, subsequent to the date of this AGREEMENT, will not impair or interfere with the rights herein granted to the DEPARTMENT. The Temporary Construction Easement and related rights given by the RAILROAD to the DEPARTMENT in this provision are without warranty of title of any kind, expressed or implied, and no covenant of warranty of title will be implied from the use of any word or words herein contained.
2. Provided the DEPARTMENT is in compliance with the terms and conditions of this AGREEMENT, the RAILROAD, upon receiving payment detailed in Exhibit C, will grant to the DEPARTMENT, its successors, and its assigns, an easement (hereinafter referred to as "Easement") in substantially the same form as Exhibit B attached hereto and by this reference made a part hereof pursuant to the terms and conditions of this AGREEMENT. The Easement will include a Footing

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Easement and a Slope Easement as shown in Exhibit B, a Temporary Construction Easement as identified in Exhibit B, and additional square feet as indicated in Exhibit C to allow the DEPARTMENT to work on construction and other work necessary to complete the Project.

The DEPARTMENT agrees to pay the RAILROAD the sum of $ _____ for a one-year term, and the DEPARTMENT agrees to pay the RAILROAD the sum of $ _____ as detailed in Exhibit C as compensation for the combined Footing, Slope, and Temporary Construction Easements.

3. The RAILROAD will furnish all labor, materials, tools, and equipment for the RAILROAD work required for the construction of the Project, with estimated costs as shown in Exhibit D attached hereto and made a part hereof. The work will include
   A. Preliminary engineering, design, and contract preparation;
   B. Changes in communication and signal lines, interlocking, and signal apparatus;
   C. Furnishing of flagging services and other protective services necessary for the safety of the RAILROAD'S personnel and property and for the operation of its trains during construction of the Project; and
   D. Furnishing engineering and inspection as required or deemed necessary by the RAILROAD in connection with the construction of the Project.

   In the event that construction of the Project has not commenced within six (6) months following the effective date of this AGREEMENT, the RAILROAD may, in its sole and absolute discretion, revise the cost estimates set forth in Exhibit D. In such event, RAILROAD shall provide to the DEPARTMENT its revised cost estimates highlighting all changes that are made. Any item of work incidental to the items listed in Exhibit D but not specifically mentioned therein may be included as a part of this AGREEMENT upon written approval by the DEPARTMENT, whose approval of which will not be unreasonably withheld. The RAILROAD shall be reimbursed for its actual costs by the DEPARTMENT for each category of Railroad Work identified in Exhibit D.
4. The RAILROAD will do all Railroad Work set forth in Section 2.3 above and detailed in Exhibit D with the RAILROAD'S own employees working under railroad labor agreements or with contractor(s), if necessary, and on an actual-cost basis.
5. The DEPARTMENT agrees to reimburse the RAILROAD for work of an emergency nature caused by the DEPARTMENT or the DEPARTMENT'S contractor in connection with the Project that the RAILROAD deems is reasonably necessary for the immediate restoration of railroad operations or for the protection of persons or RAILROAD property. Such work may be performed by the RAILROAD without prior approval of the DEPARTMENT, and the DEPARTMENT agrees to fully reimburse the RAILROAD for all such emergency work.
6. The RAILROAD will submit progressive invoices detailing the cost incurred on Railroad Work performed by the RAILROAD under this AGREEMENT in the construction of the Project, within thirty (30) days and no later than one hundred twenty (120) days of completion of work. The DEPARTMENT will pay all undisputed parts of the said progressive invoices within thirty (30) days of receipt and promptly notify the RAILROAD of all disputed billings.
7. Upon completion of the Project, a final and complete billing of all actual incurred costs and expenses, ascertained in accordance with the provisions of 23 CFR, Chapter I, Subchapter B, Part 140, Subpart I, as supplemented and amended, which by this reference is incorporated in this AGREEMENT, shall be made at the earliest practical date by the RAILROAD. The DEPARTMENT shall pay the final invoice within ninety (90) days of receipt of said final invoice.

Section 3: Department Obligations

In consideration of the herein covenants and conditions to be fulfilled by the RAILROAD and the faithful performance thereof, the DEPARTMENT agrees as follows:

1. To furnish to the RAILROAD plans and specifications for the Structure. Said plans, together with _____ [number] copies of calculations and _____ [number] copies of specifications in _____ Units, must be submitted in PDF format to the RAILROAD for approval prior to commencement of any construction. The RAILROAD will give the DEPARTMENT its final written approval of the plans and specifications substantially in the form of Exhibit E attached to this AGREEMENT and made a part hereof. After approval of the plans and specifications by the RAILROAD, said plans and specifications will become part of this AGREEMENT and shall thereby be incorporated herein.
2. Any approval of the plans and specifications by the RAILROAD shall in no way obligate the RAILROAD with respect to the finished product design and/or construction. Any approval by the RAILROAD shall mean only that the plans and specifications meet the subjective standards of the RAILROAD, and such approval by the RAILROAD shall not be deemed to mean that the plans and specifications or construction is structurally sound and appropriate or that such plans and specifications meet applicable regulations, laws, statutes, or local ordinances and/or building codes.
3. The DEPARTMENT must make any required application and obtain all required permits and approvals for the construction of the Project.
4. The DEPARTMENT must provide for and maintain minimum vertical and horizontal clearances as required and approved by the RAILROAD as part of the plans and specifications for the Project.
5. The DEPARTMENT must acquire all rights-of-way necessary for the construction of the Project.
6. The DEPARTMENT must make any and all arrangements to secure the relocation of wire lines, pipelines, and other facilities owned by private persons, companies, corporations, political subdivisions, or public utilities other

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than the RAILROAD which may be necessary to relocate in any manner whatsoever due to the construction of the Project.

7. The DEPARTMENT must construct the Project in substantial conformance with the plans and specifications accepted or approved by the RAILROAD pursuant to Section 2.1 herein and do all work ("Department's Work") provided for in the plans and specifications for the Project as shown in Exhibit A, except Railroad Work that will be performed by the RAILROAD hereunder. The principal elements of Department's Work are as follows:
   A. Construction of the Structure in accordance with the plans and specifications approved by the RAILROAD pursuant to Section 2.1 herein;
   B. All necessary grading and paving, including backfill of excavations and restoration of disturbed vegetation on the RAILROAD'S right-of-way;
   C. Provide suitable drainage, both temporary and permanent;
   D. Job site cleanup, including removal of all construction materials, concrete debris, surplus soil, refuse, contaminated soils, asphalt debris, litter, and other waste materials to the reasonable satisfaction of the RAILROAD; and
   E. Conduct required environmental testing and appropriate disposal of all soils and groundwater removed from the RAILROAD property during the construction of the Project, in accordance with RAILROAD policy and State and Federal rules and regulations.
8. The DEPARTMENT shall furnish all labor, materials, tools, and equipment in performing the work it agrees to perform herein. All work of construction with respect to the Project shall be undertaken by the DEPARTMENT or the DEPARTMENT'S contractor(s) and shall be performed at such times as not to endanger or interfere with the safe and timely operation of the RAILROAD'S track and other facilities.
9. In order to prevent damage to the RAILROAD'S trains and property, the DEPARTMENT shall require its contractor(s) to notify the RAILROAD'S Roadmaster at least thirty (30) calendar days before commencing work on or over RAILROAD property or near the RAILROAD'S tracks.
10. The DEPARTMENT will not commence work until it gives the RAILROAD'S Manager of Public Projects listed in Exhibit F not less than thirty (30) days prior written notice of such commencement. The notice will state the date that the DEPARTMENT requests construction activities to begin.
11. The DEPARTMENT'S contractor shall notify the RAILROAD'S Roadmaster at least thirty (30) calendar days before initially commencing work requiring a RAILROAD flagman. Any such work occurring subsequent to the work for which the 30-day notice was provided shall require at least seventy-two (72) hours' notice to the RAILROAD'S Roadmaster.
12. The DEPARTMENT or its contractor(s) must submit _____ [number] copies in PDF format of any plans (including calculations in _____ Units) for proposed shoring, falsework, or cribbing to be used over, under, or adjacent to the RAILROAD'S tracks to the RAILROAD'S Manager of Public Projects, listed in Exhibit F, for approval.
13. The DEPARTMENT must give the RAILROAD'S Manager of Public Projects, as listed in Exhibit F, a written Notice to Proceed with the Railroad Work. The RAILROAD will not begin the Railroad Work (including, without limitation, procurement of supplies, equipment, or materials) until a written Notice to Proceed is received from the DEPARTMENT.
14. The DEPARTMENT must notify RAILROAD'S Manager of Public Projects, listed in Exhibit F, in writing, of the completion date of the Project within thirty (30) days after project completion. The DEPARTMENT will also notify the RAILROAD'S Manager of Public Projects in writing of the date on which DEPARTMENT and/or its contractor(s) desire to meet with the RAILROAD for the purpose of conducting final inspection of the completed Overpass.
15. The DEPARTMENT must include the following provisions in any contract with its contractor(s) working on the Project:
   A. The contractor is placed on notice that fiber optic, communication, and other cable lines and systems (collectively, the "Lines") owned by various telecommunications companies may be buried on the RAILROAD'S property or right-of-way. The contractor shall be responsible to contact the RAILROAD'S designated Engineering Representative as shown in Exhibit F and/or the telecommunications companies to determine whether there are any Lines located within the Project boundaries that could be damaged or their service disrupted due to the construction of the Project. The contractor must also use all reasonable methods when working in the RAILROAD right-of-way or on RAILROAD property to verify the location of all identified Lines as well as determine if any other Lines may exist.
   B. Failure to mark or identify these Lines will be sufficient cause for the DEPARTMENT'S Engineer to stop construction at no cost to the DEPARTMENT or the RAILROAD until these items are completed.
   C. In addition to the liability terms contained elsewhere in this AGREEMENT, the contractor hereby indemnifies, defends, and holds harmless the RAILROAD for, from, and against all cost, liability, and expense whatsoever (including, without limitation, attorney's fees and court costs and expenses) arising out of or in any way contributed to by any act or omission of the contractor, its subcontractors, agents, and/or employees that cause or in any way or degree contribute to (1) any damage to or destruction of any lines by the contractor and/or its subcontractors, agents, and/or employees on RAILROAD'S property or within RAILROAD'S right-of-way, (2) any injury to or death of any person employed by or on behalf of any telecommunications company and/or its contractor, agents, and/or employees on the RAILROAD'S property or within the RAILROAD'S right-of-way, and/or (3) any claim or cause of action for alleged loss of profits or revenue by, or loss of service by, a customer or user of such telecommunication company(ies). Any obligation to indemnify, defend, and hold harmless the RAILROAD pursuant to this provision shall not apply to costs, liability, and expenses caused by the sole negligence of the RAILROAD, its agents,

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employees, successors, or assigns. Where such costs, liability, and expenses are caused by or result from the concurrent negligence of: (a) the RAILROAD, its agents, employees, successors, or assigns and (b) the contractor, its agents, or employees, this indemnity provision shall be valid and enforceable only to the extent of the negligence of the contractor or its agents or employees.

D. As between the contractor and the RAILROAD, the contractor shall be responsible to coordinate the rearrangement of any lines within the RAILROAD'S right-of-way determined to interfere with the construction of the Project. The contractor must cooperate fully with any company performing these rearrangements.

16. Except as otherwise provided below in this Section, all construction work performed hereunder by the DEPARTMENT for the Project will be pursuant to a contract or contracts to be let by the DEPARTMENT, and all such contracts must include the following:
    A. All work performed under such contract or contracts within the limits of the RAILROAD'S right-of-way shall be performed in a good and workmanlike manner, in accordance with plans and specifications approved by the RAILROAD.
    B. Changes or modifications during construction that affect safety or RAILROAD operations shall be subject to the RAILROAD approval.
    C. No work shall be commenced within the RAILROAD'S right-of-way until each of the contractors employed in connection with said work shall have (1) executed and delivered to RAILROAD a Right-of Entry Agreement and (2) delivered to and secured the RAILROAD'S approval of the insurance.
    D. To facilitate scheduling for the Project, the DEPARTMENT shall have its contractor give the RAILROAD representative (Roadmaster) four (4) weeks' advance notice of the proposed times and dates for proposed work windows. The RAILROAD and the DEPARTMENT'S contractor will make all efforts to establish mutually agreeable work windows for the Project. The RAILROAD has the right at any time to revise or change the work windows due to train operations, service obligations, or other operating requirements of the railway. The RAILROAD will give the DEPARTMENT two (2) weeks' advance notice of all nonemergency schedule changes. The RAILROAD cannot be responsible for any additional costs and expenses resulting from a change in work windows or the inability to schedule work windows as requested.
17. The DEPARTMENT and its contractors, as part of any contract for work to be performed on or about the RAILROAD'S right-of-way, shall indemnify and save harmless the RAILROAD against any and all damage to or destruction of property whatsoever, or injury to or death of persons whomsoever, arising from or as a result of work on the Project (hereafter collectively "Claims"), which shall include but not be limited to interference with the normal movement of trains; whether such Claims are caused by or result from work performed by the DEPARTMENT, its contractors, or by the RAILROAD doing work at the DEPARTMENT'S direction and expense. Should the DEPARTMENT or its contractor's operations result in such Claims, the DEPARTMENT shall reimburse the RAILROAD therefore.
18. Nothing in this AGREEMENT is intended to be construed as a requirement for an indemnification against the sole negligence of the RAILROAD, its officers, employees, or agents. Moreover, for any work performed in the State of _____, the DEPARTMENT will require its contractor to indemnify the RAILROAD and any other railroad company occupying or using the RAILROAD'S right-of-way or line of railroad against all loss, liability, and damages, including environmental damages, hazardous materials damages, penalties, or fines that may be assessed for, caused by, or the result of the contractor's negligence; provided, however, that if such loss, liability, damages, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors. Likewise, if such loss, liability, damages, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT officers, employees, or agents, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S officers, employees, or agents.

Section 4: Joint Obligations

In consideration of the premises, the parties hereto mutually agree to the following:

1. All work contemplated in this AGREEMENT must be performed in a good and workmanlike manner and each portion must be promptly commenced by the party obligated hereunder to perform the same and thereafter diligently prosecuted to conclusion in its logical order and sequence. Furthermore, any changes or modifications during construction that affect the RAILROAD will be subject to the RAILROAD'S approval prior to the commencement of any such changes or modifications.
2. The DEPARTMENT must require its contractor(s) to reasonably adhere to the Project's construction schedule for all work. The parties hereto mutually agree that the RAILROAD'S failure to complete the Railroad Work in accordance with the construction schedule due to inclement weather, unforeseen railroad emergencies including those related to scheduling and operations, or other conditions beyond the RAILROAD'S reasonable control, will not constitute a breach of this AGREEMENT by the RAILROAD and will not subject the RAILROAD to any liability. Regardless of the requirements of the construction schedule, in the event of an unforeseen railroad emergency, the RAILROAD reserves the right to reallocate all or a portion of its labor forces assigned to perform the Railroad Work when the RAILROAD

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believes such reallocation is necessary to provide for the immediate restoration of railroad operations of the RAILROAD or its affiliates or to protect persons or property on or near any RAILROAD-owned property or any related railroad. The RAILROAD will not be liable for any additional costs or expenses of the Project resulting from any such reallocation of its labor forces. The parties mutually agree that any reallocation of labor forces by the RAILROAD pursuant to this provision and any direct or indirect consequences or costs resulting from any such reallocation will not constitute a breach of this AGREEMENT by the RAILROAD.

3. The RAILROAD will have the right to stop construction work on the Project if any of the following events take place: (1) the DEPARTMENT (or any of its contractors) performs the work in a manner contrary to the plans and specifications approved by the RAILROAD; (2) the DEPARTMENT (or any of its contractors), in the RAILROAD'S opinion, prosecutes the work in a manner that is hazardous to RAILROAD personnel, property, facilities, or the safe and expeditious movement of railroad traffic; or (3) the insurance is canceled prior to the completion of the Project. The work stoppage will continue until all necessary actions are taken by the DEPARTMENT or its contractor(s) to rectify the situation to the satisfaction of the RAILROAD'S Division Engineer or designee listed in Exhibit F or until insurance coverage is purchased and is valid for the period of the Project and has been delivered to and accepted by the RAILROAD. Any such work stoppage under this provision will not give rise to any liability on the part of the RAILROAD. The RAILROAD'S right to stop the work is in addition to any other rights the RAILROAD may have, including, but not limited to, actions or suits for damages or lost profits. In the event that the RAILROAD desires to stop construction work on the Project, the RAILROAD agrees to immediately attempt to notify the DEPARTMENT Project Manager listed in Exhibit F by telephone and will notify the DEPARTMENT Project Manager in writing.
4. The DEPARTMENT shall supervise and inspect the operations of all DEPARTMENT contractors to ensure compliance with the plans and specifications and the terms of this AGREEMENT. If it is determined by the RAILROAD that the DEPARTMENT'S contractor is not acting in accordance with these requirements and the RAILROAD believes the situation is not being corrected in an expeditious manner, the RAILROAD shall immediately notify the DEPARTMENT so that the DEPARTMENT can take appropriate corrective action.
5. In addition to the terms and conditions set forth elsewhere in this AGREEMENT, the RAILROAD and the DEPARTMENT agree to the following terms upon completion of construction of the Project:
   A. The DEPARTMENT will own and maintain, at its sole cost and expense, the Overpass, including the highway approaches and the appurtenances thereto, lighting, drainage, and any access roadway up to any gate to RAILROAD property installed pursuant to this AGREEMENT. If the RAILROAD determines in good faith that emergency maintenance work on the Overpass is needed for the immediate restoration of railroad operations or for the protection of persons or RAILROAD property, such work may be performed by the RAILROAD without prior approval of the DEPARTMENT. The RAILROAD will notify the DEPARTMENT of the emergency work and the necessity for it at its earliest opportunity. The RAILROAD shall maintain records regarding the emergency work performed and the costs incurred in accordance with generally accepted accounting principles and practices. Said records shall be made available to the DEPARTMENT for audit on request during normal business hours, for a period of three (3) years after final payment is made to the RAILROAD for the emergency maintenance work. Except for the emergency work as described herein, no maintenance work will be performed on the Overpass by RAILROAD without prior written approval from the DEPARTMENT.
   B. The DEPARTMENT must, at the DEPARTMENT'S sole cost and expense, keep the Overpass painted and free from graffiti.
   C. The DEPARTMENT must apply and maintain vertical clearance signs that consistently and accurately describe the minimum actual vertical clearance from the bottom of the Overpass to the top of the rails below.
   D. The DEPARTMENT shall conduct inspections of the Overpass every two (2) years and provide inspection reports to the RAILROAD. The RAILROAD shall promptly provide the DEPARTMENT a right of entry to perform such inspections.
   E. It is expressly understood by the DEPARTMENT and the RAILROAD that any right to install utilities will be governed by a separate permit or license agreement between the PARTIES hereto.
   F. The DEPARTMENT shall make efforts to keep Overpass and surrounding areas clean and free from birds, pigeons, scavengers, vermin, creatures, and other animals.
   G. If the DEPARTMENT (including its contractors and agents) or the RAILROAD, on behalf of the DEPARTMENT, performs (1) alterations or modifications to the Structure/Overpass, or (2) any maintenance or other work on the Overpass with heavy tools, equipment, or machinery at ground surface level horizontally within 25′-0″ of the centerline of the nearest track, or (3) any maintenance or other work outside the limits of the deck of the Overpass vertically above the top of the rail, the DEPARTMENT or its contractors and/or agents must procure and maintain the following insurance coverage:
      i. Railroad Protective Liability insurance naming only the RAILROAD as the Insured with coverage of at least $5,000,000 per occurrence and $10,000,000 in the aggregate. The policy must be issued on a standard ISO form CG 00 35 10 93 and include the following:
         a. Endorsed to include the Pollution Exclusion Amendment (ISO form CG 28 31 10 93).
         b. Endorsed to include the Limited Seepage and Pollution Endorsement.
         c. No other endorsements restricting coverage may be added.

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d. The original policy must be provided to the RAILROAD prior to performing any work or services under this AGREEMENT.

ii. As used in this paragraph, "RAILROAD" includes the RAILROAD and the subsidiaries, successors, assigns, and affiliates of each.

iii. If the above work is performed by DEPARTMENT forces, a Railroad Protective Liability Insurance Policy will not be required, since the DEPARTMENT is self-insured.

6. Except in the event of an emergency and for maintenance on the deck of the Structure/Overpass, the DEPARTMENT must notify and obtain prior authorization from the RAILROAD'S Manager of Public Projects before entering RAILROAD right-of-way for maintenance or future alteration or reconstruction purposes, which authorization shall not be unreasonably withheld or delayed. If the alteration or reconstruction work is contracted, the DEPARTMENT will require its contractor(s) to comply with the obligations in favor of the RAILROAD.
7. The RAILROAD may, at its expense, make future changes or additions to the railroad components under the Overpass if necessary or desirable, in the RAILROAD'S sole discretion, including, without limitation, the following: (1) the right to raise or lower the grade or change the alignment of its tracks, (2) the right to lay additional track or tracks, or (3) the right to build other facilities in connection with the operation of its railroad. Such changes or additions must not change or alter the highway components of the Overpass. If it becomes necessary or desirable in the future to change, alter, widen, or reconstruct the highway components of the Overpass to meet AREMA horizontal clearance and/or crashworthiness standards and/or any DEPARTMENT requirements related to railroad projects, the cost of such work, including any cost incidental to alteration of railroad or highway facilities made necessary by any such changes to the Overpass, shall be paid for by the DEPARTMENT.
8. The DEPARTMENT may, at the DEPARTMENT'S sole expense, alter or reconstruct the Overpass if necessary or desirable, due to traffic conditions or pedestrian or other recreational traffic, provided, however, that any such alteration or reconstruction must not encroach further upon or occupy the surface of the RAILROAD'S right-of-way without obtaining the RAILROAD'S prior written consent and the execution of a supplement to this AGREEMENT or the completion of a separate written agreement.
9. Any books, papers, records, and accounts of the PARTIES hereto relating to the work hereunder or the costs or expenses for labor and material connected with the construction will at all reasonable times be open to inspection and audit by the agents and authorized representatives of the PARTIES hereto, as well as the State of _____ and the Federal Highway Administration, for a period of three (3) years from the date of final payment under this AGREEMENT.
10. The covenants and provisions of this AGREEMENT are binding on and inure to the benefit of the successors and assigns of the parties hereto. Notwithstanding the preceding sentence, neither party hereto may assign any of its rights or obligations hereunder without the prior written consent of the other party. Provided, that the DEPARTMENT may transfer or assign its interest in this AGREEMENT to any other public agency or public entity as permitted by law, provided that such successor or assignee has assumed all the obligations, duties, and liabilities of the DEPARTMENT under this AGREEMENT then in effect, and has provided the RAILROAD with reasonable assurances of its legal and financial authority to honor and perform the same.
11. In the event that construction of the Project does not commence within three (3) years of the Effective Date, this AGREEMENT will become null and void.
12. Neither termination nor expiration of this AGREEMENT will release either party from any liability or obligation under this AGREEMENT, whether of indemnity or otherwise, resulting from any acts, omissions, or events happening prior to the date of termination or expiration.
13. To the maximum extent possible, each provision of this AGREEMENT will be interpreted in such a manner as to be effective and valid under applicable law. If any provision of this AGREEMENT is prohibited by, or held to be invalid under, applicable law, such provision will be ineffective solely to the extent of such prohibition or invalidity and the remainder of the provision will be enforceable.
14. This AGREEMENT (including exhibits and other documents, manuals, and so forth incorporated herein) is the full and complete agreement between the RAILROAD and the DEPARTMENT with respect to the subject matter herein and supersedes any and all other prior agreements between the PARTIES hereto.
15. Any notice provided for herein or concerning this AGREEMENT must be in writing and will be deemed sufficiently given when sent by certified mail, return receipt requested, to the PARTIES at the following addresses:

RAILROAD	DEPARTMENT
Contact Name: _____	Contact Name: _____
Address: _____	Address: _____
_____	_____
City: _____ State: _____	City: _____ State: _____
Contact Number: _____	Contact Number: _____

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16. No modification or amendment to this AGREEMENT shall be valid until the same is provided in writing and executed with the same formalities as were attendant to the AGREEMENT.

IN WITNESS WHEREOF, the parties hereto have caused this MASTER AGREEMENT to be executed in duplicate by their proper officers thereunto duly authorized, as of the day and year first herein written.

RAILROAD (Federal Tax ID #_____)	DEPARTMENT
By: _____	By: _____
Title: _____	Title: _____

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EXHIBIT A

DETAILED PLAN OF STRUCTURE/OVERPASS
FOR PROJECT

Note: The plans will include structure, grading, paving, drainage, and fence.

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EXHIBIT B

DETAILED PLANS HIGHLIGHTING
RIGHT-OF-WAY AND TEMPORARY EASEMENTS
REQUIRED FOR PROJECT

Note: These plans will highlight and color code plans in Exhibit A to show the easement, slope, footing, and temporary construction easement and additional square feet to allow the Department to work on construction and will include square feet for other necessary work.

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EXHIBIT C

COST ESTIMATE FOR
TEMPORARY EASEMENT, INCLUDING FOOTING EASEMENT

The estimated cost of easement includes a Footing Easement of _____ square feet, highlighted in red in Exhibit B, and a Slope Easement of _____ square feet, designated in blue in Exhibit B.

For the Temporary Construction Easement, highlighted in green (_____ square feet) in Exhibit B, the DEPARTMENT agrees to pay the RAILROAD the sum of $ _____ for a one-year term.

The DEPARTMENT agrees to pay the RAILROAD the sum of $ _____ as compensation for the combined Footing, Slope, and Temporary Construction Easements.

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EXHIBIT D

WORK REQUIRED BY THE RAILROAD ON THE PROJECT

Note: This Exhibit will include cost estimates for work to be done by the Railroad.

Preliminary engineering, design, and contract preparation, costing $ _____.

Changes in communication and signal lines, interlocking and signal apparatus, costing $ _____.

Furnishing of flagging services and other protective services necessary for the safety of the RAILROAD'S personnel and property and for the operation of its trains during construction of the Project, costing $ _____.

Furnishing engineering and inspection as required by the RAILROAD in connection with the construction of the Project, costing $ _____.

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EXHIBIT E

APPROVAL BY THE RAILROAD OF THE PROJECT

The RAILROAD hereby approves the plans and specifications and Temporary Easement and other work detailed in Exhibit A and Exhibit B.

RAILROAD

(Federal Tax ID #_____)

By: _____

Title: _____

Date: _____

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EXHIBIT F

DEPARTMENT AND RAILROAD
DESIGNATED CONTACTS FOR THE PROJECT

Note: This Exhibit will list contacts for the Railroad and the Department.

RAILROAD'S MANAGER OF PUBLIC PROJECTS

Railroad: _____

Name: _____

Contact Phone: _____

RAILROAD'S ENGINEERING REPRESENTATIVE

Railroad: _____

Name: _____

Contact Phone: _____

DEPARTMENT PROJECT MANAGER

Name: _____

Contact Phone: _____

Mailing Address: _____

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Warning Devices Agreement

Warning devices, such as lights and gates or flashing warning lights, are a common type of item needing regular maintenance, improvement, replacement, or installation. To make the repairs routine and to expedite the process, a standard warning devices agreement between the highway agency and the railroad is common. The following model agreement addresses installation, repair, and upkeep of warning devices.

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RAILROAD–HIGHWAY MASTER AGREEMENT
FOR WARNING DEVICES

This Master Agreement ("MASTER AGREEMENT") is made and entered into this _____ day of _____, 20_____, by and between the _____ Department of Transportation, hereinafter called the "DEPARTMENT," and _____ [Railroad Company], hereinafter called the "RAILROAD."

WITNESSTH:

WHEREAS, the RAILROAD owns and operates a line of railroad in and through the City/County of _____, in the State of _____.

WHEREAS, the DEPARTMENT wants to progressively upgrade the safety at railway–highway crossings by installing warning devices throughout the State of _____. In order to expedite the processing of applications for these safety improvements and processing of related agreements, it is the desire of the DEPARTMENT and the RAILROAD to enter into this MASTER AGREEMENT setting out the general terms and conditions under which the improvements shall be provided, with the understanding that supplements to this MASTER AGREEMENT will be issued and executed from time to time covering specific installations in the form marked Exhibit A, attached hereto and hereby made a part hereof (the "Supplement" or "Supplements").

WHEREAS, the RAILROAD desires to cooperate with the DEPARTMENT in the installation of these grade crossing warning devices that both parties agree to accomplish through the use of Federal Section 130 and/or State funds.

WHEREAS, the local public authority, if applicable, having jurisdiction of the highway or street crossing is referred to in this MASTER AGREEMENT and each Supplement as the "LOCAL AUTHORITY."

NOW, THEREFORE, in consideration of the mutual covenants and agreement of the parties contained herein, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

Section 1: Scope of Work

The RAILROAD will provide all the work, labor, material, and services to install the warning devices, hereinafter called "signals," at the locations described in the applicable Supplement.

The LOCAL AUTHORITY shall perform those services necessary to facilitate the processing of all documents required for orderly progress of the project in accordance with the policies and procedures of the State of _____ and the Federal-Aid Policy of the Federal Highway Administration.

The LOCAL AUTHORITY, where applicable, shall install without expense to the RAILROAD advance warning signs, standard pavement markings for railroad crossings, and guardrail or barriers to protect the signal from highway traffic when such protection is required.

Section 2: Notice from the Department

The DEPARTMENT will provide, at project expense, notice to the RAILROAD of the proposed project. The notice will contain a description of the site, a detailed plan showing the locations of warning devices to be installed, improvement proposed, funding sources proposed, and a request to the RAILROAD to prepare plans and estimates for the work involved.

Section 3: Railroad Obligations

A. The RAILROAD shall, at project expense, furnish all labor, material, and equipment necessary for the project, and shall install warning signals and/or crossing surface of the type and at the location described in the applicable Supplement, subject to the terms and conditions of this MASTER AGREEMENT and the applicable Supplement.
B. The RAILROAD shall also furnish, at project expense, such detailed plans, specifications, and estimates of cost that may be required in addition to those prepared by the State. The plans, specifications, and estimates shall become a part of the applicable Supplement.
C. The position of the crossing improvements shall be established jointly by representatives of the DEPARTMENT and the RAILROAD.
D. The RAILROAD shall not begin installation of the crossing improvements until authorization is received from the DEPARTMENT. The RAILROAD shall notify the DEPARTMENT at least forty-eight (48) hours prior to the commencement of the improvements. The RAILROAD shall notify the DEPARTMENT in writing of the date when all work is completed. At the completion of all work, representatives of the DEPARTMENT and the RAILROAD will conduct a joint inspection of the crossing improvements.

Section 4: Department or Local Authority Obligations

A. Unless otherwise provided in Section 4B, the DEPARTMENT, at project expense, shall (1) furnish all supervision, labor, materials, and equipment that are needed to install and thereafter maintain advance warning signs, standard

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pavement markings, guardrails, or barriers to protect warning devices from highway traffic and, if applicable, shall resurface and align the crossing approaches to the alignment of the new rail crossing and (2) provide all necessary traffic control, barricades, and detour signing for crossing work.

B. If a LOCAL AUTHORITY has jurisdiction of the highway or street and will have the responsibility to perform the work described in Section 4A or any other work set forth in this MASTER AGREEMENT or shall be responsible for any other obligations under this MASTER AGREEMENT, the DEPARTMENT in a separate agreement with the LOCAL AUTHORITY shall require the LOCAL AUTHORITY to perform such work and/or be responsible for such obligations and shall require the LOCAL AUTHORITY to comply with the terms and conditions contained in this MASTER AGREEMENT and in the respective Supplement.

C. All work performed by the DEPARTMENT or the LOCAL AUTHORITY shall be in compliance with the current Manual on Uniform Traffic Control Devices.

Section 5: Maintenance by Railroad

A. Upon completion of installation, the warning devices shall be operated and maintained by and at the expense of the RAILROAD, provided, however, that the RAILROAD'S agreement herein to operate and maintain said warning devices shall not prejudice the RAILROAD from having the benefit and advantage of Federal, State, or other public funds that may become available to pay or contribute to the cost of operation and maintenance of warning devices at highway–railway grade crossings.

B. The portion of the crossing surface between the track tie ends shall be maintained by and at the expense of the RAILROAD. If, in the future, the DEPARTMENT or the LOCAL AUTHORITY elects to have the surfacing material between the track tie ends replaced with paving or some surfacing material other than timber planking, the RAILROAD, at the DEPARTMENT'S or the LOCAL AUTHORITY'S expense, shall install such replacement surfacing.

Section 6: Maintenance by Local Authority

The LOCAL AUTHORITY will maintain the advance warning signs, the standard pavement markings for railroad crossings, and protecting barriers or guardrails at the LOCAL AUTHORITY'S expense. However, in the event that any existing or future legislation makes Federal, State, or other funds available for the operation, maintenance, repair, or replacement of signals at grade crossings, the LOCAL AUTHORITY shall cooperate with the RAILROAD to secure said funds for the operation, maintenance, repair, or replacement of the signals installed pursuant hereto. This agreement may be supplemented and amended as necessary for operation and maintenance of said warning devices and their appurtenances.

Section 7: Repair or Replacement of Damaged or Obsolete Facility

In the event that said warning devices or their appurtenances installed under any Supplement are damaged, and if after a diligent effort by the RAILROAD, documented in writing, the item for damages proves uncollectible from the person or persons responsible for such damage, or in the event the RAILROAD and the DEPARTMENT agree that said warning devices cannot be maintained or by virtue of their obsolescence require replacement, then in either event cost of repair of said warning devices or cost of reinstallation of new warning devices shall be borne by the parties hereto in the same participation ratio as the cost of the original installation. The DEPARTMENT will not assume any liability for further damage or participate in any flagging or other costs on account of the warning devices being inoperative due to damage or replacement.

If the damage to said warning devices is caused by highway traffic, the DEPARTMENT or LOCAL AUTHORITY, as applicable, will cooperate with the RAILROAD in determining the location and identification of the parties responsible for such damage to the extent of making accident records available to the RAILROAD.

If the said warning devices cannot through age be maintained or require replacement because of obsolescence, then the cost of replacing the said warning devices shall be negotiated by the LOCAL AUTHORITY and the RAILROAD as specified in the participation Exhibit A, with such State, Federal, or other public funds as may be available at the time that such replacement becomes necessary.

Section 8: Disposition of Signal No Longer Required

A. In the event that said warning devices are no longer required at the grade crossing and the RAILROAD and the DEPARTMENT/LOCAL AUTHORITY agree that they are not obsolete, the DEPARTMENT will take ownership and arrange to have them relocated to some other grade crossing. The division of costs of said relocation shall be agreed upon between the RAILROAD and DEPARTMENT/LOCAL AUTHORITY, as applicable, prior to such removal.

B. If for any reason the warning devices shall no longer be required at the grade crossing and in the opinion of the RAILROAD and DEPARTMENT/LOCAL AUTHORITY, as applicable, the warning devices are obsolete, the RAILROAD may remove the said warning devices and credit the DEPARTMENT/LOCAL AUTHORITY, as applicable, the value of salvage recovered less cost of removal.

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Section 9: Working on Railroad Property

A. The DEPARTMENT, when working on any RAILROAD property, will comply with the terms and conditions set forth in Exhibit E, attached hereto and hereby made a part hereof, and will also require, in its separate contract with the LOCAL AUTHORITY and/or the DEPARTMENT'S Contractor (as such term is defined in Paragraph B below), that the LOCAL AUTHORITY and/or Contractor also comply with the terms and conditions contained in Exhibit E.
B. The term "Contractor" as used in this MASTER AGREEMENT or in any Supplement shall mean the contractor or contractors hired by the DEPARTMENT or the LOCAL AUTHORITY to perform any work on the RAILROAD'S property and shall also include the Contractor's subcontractors and the Contractor's and subcontractor's respective employees, officers, and agents and others acting under its or their authority.

Section 10: Funding and Audit

A. The project will be funded in conformity with Federal Highway Administration regulations adopted for safety improvement projects authorized in the Transportation Equity Act for the 21st Century, its revisions, or amendments. All bills rendered by the RAILROAD and paid by the DEPARTMENT/LOCAL AUTHORITY will be subject to audit and approval by the Federal Highway Administration ("FHWA"). Reimbursement shall be in accordance with provisions of the Federal-Aid Policy Guide, provided, however, that the use of said Federal-Aid Policy Guide as a guideline for reimbursement between the parties hereto shall not be construed as a condition precedent to the DEPARTMENT'S obligation to pay the RAILROAD for work performed by it. If the DEPARTMENT desires to secure reimbursement from the FHWA for all phases of the work performed by the RAILROAD, it is the responsibility of the DEPARTMENT to ensure that the interpretation of the Federal-Aid Policy Guide will permit Federal participation in the cost and expense of work that, pursuant to each Supplemental, is to be performed by the RAILROAD at the expense of the DEPARTMENT.
B. If the DEPARTMENT requires the services of a consultant, the DEPARTMENT shall be responsible for audit of the consultant's records to determine eligible federal aid costs on the project. The report of said audit shall be in the DEPARTMENT'S files and made available to the State or Federal government. An audit shall be conducted by the DEPARTMENT'S internal Audit office in accordance with generally accepted auditing standards as issued by the U.S. Government Accountability Office.
C. All project records in support of all costs incurred and expenditures shall be open to inspection by the DEPARTMENT and the FHWA at the RAILROAD'S offices, during normal business hours, and shall be retained and made available by the RAILROAD for such inspection for a period of not less than three (3) years from the date of final billing from the RAILROAD.

   Any overpayment of federal money in ineligible items of cost found as a result of the audit will be reimbursed by the RAILROAD to the DEPARTMENT or LOCAL AUTHORITY, as applicable, for the amount of such overpayment. All such excess funds will be reimbursed to the FHWA.

Section 11: Billing and Payments

A. The RAILROAD will submit progressive itemized invoices detailing the actual cost incurred by the RAILROAD in carrying out work to be performed under this MASTER AGREEMENT and each Supplement to the LOCAL AUTHORITY or DEPARTMENT, as applicable. Work shall include cost of labor, materials, and other services as shown in the estimate of cost furnished by the RAILROAD and accepted by the LOCAL AUTHORITY or DEPARTMENT, as applicable. The LOCAL AUTHORITY or DEPARTMENT, as applicable, shall pay all undisputed parts of said progressive invoices within thirty (30) days and no later than one hundred twenty (120) days of receipt of invoices. The DEPARTMENT will promptly notify the RAILROAD of all disputed billings.
B. A final and complete billing of all actual incurred costs and expenses, ascertained in accordance with the provisions of 23 CFR, Chapter I, Subchapter B, Part 140, Subpart I, as supplemented and amended, which by this reference is incorporated in this MASTER AGREEMENT, shall be made within one (1) year of completion of project by the RAILROAD. The DEPARTMENT/LOCAL AUTHORITY agrees to make final payment of eligible costs listed in the final invoice within ninety (90) days of receipt of said final invoice.

Section 12: Preliminary Engineering Costs

The DEPARTMENT and the RAILROAD acknowledge that the cost of preliminary engineering incurred prior to approval of the specific project by the FHWA is ineligible for reimbursement with Federal funds and will therefore be reimbursed with State funds if incurred after the DEPARTMENT'S request for preparation of estimates.

Section 13: Separate Agreement with the Local Authority

If a grade crossing improvement project is to be undertaken at a crossing at which the highway or street is subject to the jurisdiction of the LOCAL AUTHORITY instead of the DEPARTMENT, the DEPARTMENT shall enter into a separate agreement with the LOCAL AUTHORITY whereby the LOCAL AUTHORITY shall assume responsibility for the obligations set forth herein as applicable to the LOCAL AUTHORITY with jurisdiction over the highway or street.

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Section 14: Nondiscrimination Provision

If the RAILROAD enters into contract or agreement with a contractor to perform any of the work under this MASTER AGREEMENT or Supplement, the provisions of the Civil Rights Act of 1964 will apply and become a part of the Supplement for the project by reference.

Section 15: Successors or Assigns

This MASTER AGREEMENT and each Supplement shall be binding on and inure to the benefit of the parties hereto, their successors, and assigns.

Section 16: Indemnification

Nothing in this MASTER AGREEMENT is intended to be construed as a requirement for an indemnification against the sole negligence of the RAILROAD, its officers, employees, or agents. Moreover, for any work performed in the State of _____, the DEPARTMENT will require its contractor to indemnify the RAILROAD and any other railroad company occupying or using the RAILROAD'S right-of-way or line of railroad against all loss, liability, and damages, including environmental damages, hazardous materials damages, penalties, or fines that may be assessed for, caused by, or the result of the contractor's negligence; provided, however, that if such loss, liability, damages, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors. Likewise, if such loss, liability, damages, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT'S officers, employees, or agents, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S officers, employees, or agents.

IN WITNESS WHEREOF, the parties hereto have caused this MASTER AGREEMENT to be executed in duplicate by their proper officers thereunto duly authorized, as of the day and year first herein written.

RAILROAD

(Federal Tax ID #_____)

By: _____

Title: _____

Date: _____

DEPARTMENT

By: _____

Title: _____

Date: _____

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EXHIBIT A

SUPPLEMENT TO RAILROAD–HIGHWAY MASTER AGREEMENT BETWEEN
_____ TRANSPORTATION DEPARTMENT
AND
_____ RAILROAD
FOR GRADE CROSSING WARNING DEVICES
INVOLVING FEDERAL SECTION 130 FEDERAL AID FUNDS

Project Name: _____

Project No.: _____ (the "Project") DOT No.: _____

Railroad Subdivision: _____ Railroad Milepost: _____

Hwy, Road, or Street: _____ (the "Crossing")

City: _____ County: _____

A. _____Transportation Department ("DEPARTMENT") and _____ Railroad Company ("RAILROAD") entered into a RAILROAD–HIGHWAY MASTER AGREEMENT ("MASTER AGREEMENT") dated _____.
B. As provided in the MASTER AGREEMENT, the DEPARTMENT and the RAILROAD are to enter into supplements to the MASTER AGREEMENT covering each Section 130 project.
C. This supplement to the MASTER AGREEMENT ("Supplement") is being executed by the DEPARTMENT and the RAILROAD [*add if applicable:* City of _____, County of _____ (the "LOCAL AUTHORITY")] to provide for the Project improvements described in this Supplement that are to be completed at the crossing described above pursuant to the terms and conditions of the MASTER AGREEMENT.
D. Listed below are the proposed improvements with cost estimates. The RAILROAD'S force account estimate(s) is attached as Exhibit B, and wiring diagram (if required) is attached as Exhibit D, and are hereby made a part of this Supplement. All work and the financing thereof shall be subject to the terms and provisions of the MASTER AGREEMENT.
E. Description of Improvement: _____

_____

Estimated Total Cost	Federal Funds	State Funds	Local Funds	Railroad Funds
$	$	$	$	$

F. The [DEPARTMENT] [LOCAL AUTHORITY] shall be responsible for reimbursing the RAILROAD for railroad flagging costs relating to any work performed by the State, LOCAL AUTHORITY, or Contractor.

RAILROAD

(Federal Tax ID # _____)

By: _____

Title: _____

Date: _____

DEPARTMENT

By: _____

Title: _____

Date: _____

LOCAL AUTHORITY [*add if applicable*]

By: _____

Title: _____

Date: _____

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EXHIBIT B

RAILROAD

DETAILED FORCE
ACCOUNT COST ESTIMATE

Type of Work	Labor	Non-Labor	Total
1. Install Warning Devices (Type)			
a. Freight Material Handling			
b. Equipment Rental			
c. Expenses			
d. Salvage			
e. Other			
2. Engineering and Accounting			
3. Liability Insurance			
4. Labor Surcharge			
5. Other Work by Railroad			
☐ Yes ☐ No **EXHIBIT C** attached hereto			
6. **Total Project Costs**			

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EXHIBIT C

RAILROAD

OTHER WORK [IF REQUIRED]
COST ESTIMATE

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EXHIBIT D

RAILROAD

DETAILED WIRING DIAGRAM [IF REQUIRED]

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EXHIBIT E

TERMS AND CONDITIONS RELATING TO
WORKING ON THE RAILROAD'S PROPERTY

1. The RAILROAD, at its determination, may provide inspection, security, flagging, or other protective services as necessary for the protection of the RAILROAD'S property or operations whenever there are DEPARTMENT, LOCAL AUTHORITY, or Contractor activities or work on the RAILROAD'S property.
2. All work to be done by the DEPARTMENT, LOCAL AUTHORITY, and any Contractor on RAILROAD property shall be done in a manner satisfactory to the RAILROAD. The work shall be performed diligently and completed within a reasonable time or within such period of time as may be specified in writing by the RAILROAD. The authorized representative of the RAILROAD shall have final authority in all matters affecting safe and timely train operations.
3. No Project work on any RAILROAD property shall commence until the DEPARTMENT, LOCAL AUTHORITY, or Contractor has provided fifteen (15) days' advance notice to the RAILROAD representative and at least fifteen (15) days' advance notice for any work to be performed within twenty-five (25) feet of any railway track, or where such work, personnel, or equipment will be near enough to any track that an equipment extension (such as, but not limited to, a crane boom) will reach to within twenty-five (25) feet of any track. No work of any kind shall be performed, and no person, equipment, temporary structures, machinery, tools, materials, or vehicles shall be located, operated, placed, or stored within twenty-five (25) feet of any railway track at any time, for any reason, unless and until the RAILROAD has given approval of such use and a RAILROAD flagger is available at the job site to provide flagging protection. When it becomes necessary for the RAILROAD to bulletin and assign an employee to a flagging position in compliance with union collective bargaining agreements, the DEPARTMENT, LOCAL AUTHORITY, or Contractor must provide the RAILROAD a minimum of five (5) days' notice prior to the cessation of the need for a flagman. If five (5) days' notice of cessation is not given, the DEPARTMENT or the LOCAL AUTHORITY will be required to pay flagging charges for the five (5)-day notice period required by union agreement to be given to the employee, even though flagging is not required for that period. An additional fifteen (15) days' notice must then be given to the RAILROAD if flagging services are needed again after such five (5)-day cessation notice has been given to the RAILROAD.
4. The work performed by the DEPARTMENT, LOCAL AUTHORITY, or Contractor shall be done at such time and in such manner as not to damage any railway tracks or interfere with (1) the timely and safe movement of the RAILROAD'S trains and on-track maintenance equipment or (2) the installations or operations of the RAILROAD'S tenants, unless mutually agreed upon prior to any such work activity.
5. The RAILROAD reserves the right to stop, by an oral directive followed by a written notice, any DEPARTMENT, LOCAL AUTHORITY, or Contractor activities or operations on RAILROAD property that, at the RAILROAD'S determination, could or is creating an imminent hazard to RAILROAD property or operations. After stopping any activity or operation, the RAILROAD is to notify the DEPARTMENT, LOCAL AUTHORITY, and Contractor in writing of the required modification to activities or operations, along with recommended protective services that will be provided by the RAILROAD to allow Project construction to continue.
6. Work on the job site shall not cease without the RAILROAD'S written consent and subject to such reasonable conditions as the RAILROAD may specify. It is understood that the RAILROAD'S tracks at and in the vicinity of the work will be in use during progress of the work and that movement or stoppage of rail traffic, including track maintenance equipment, may cause delays in the work of the Project. The DEPARTMENT and/or LOCAL AUTHORITY hereby assume the risk of any such delays and agree that no claims for damage on account of any delay shall be made against the RAILROAD.
7. The DEPARTMENT or LOCAL AUTHORITY, at its own expense, shall adequately police and supervise all work to be performed by the Contractor. The responsibility of the DEPARTMENT or LOCAL AUTHORITY for safe conduct and adequate policing and supervision of the Project shall not be lessened or otherwise affected by the RAILROAD'S collaboration in performance of any work, or by the presence at the job site of the RAILROAD'S representatives, or by compliance by the DEPARTMENT or LOCAL AUTHORITY with any requests or recommendations made by such representatives.
8. All Project work shall be performed in compliance with all applicable Federal, DEPARTMENT, and local laws and regulations affecting the Project work, including, without limitation, all applicable Federal Railroad Administration regulations.
9. The DEPARTMENT, LOCAL AUTHORITY, or Contractor shall telephone the RAILROAD during normal business hours (_____, except holidays) at _____ [also include a 24-hour, 7-day number for emergency calls] to determine if fiber optic cable is located within the job site area on RAILROAD property. If there are fiber optic cables on such property, the Contractor will telephone the telecommunications company(ies) involved, arrange for a cable locater, and make arrangements for relocation or other protection of the fiber optics, at Project expense, prior to beginning any work on RAILROAD property.
10. The DEPARTMENT, LOCAL AUTHORITY, and Contractor, at no expense to the RAILROAD, shall provide and maintain suitable facilities for draining the highway and its appurtenances, and shall not suffer or permit drainage

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water therefore to flow or collect on property of the RAILROAD. The DEPARTMENT and LOCAL AUTHORITY shall provide adequate passageway for the waters of any streams, bodies of water, and drainage facilities (either natural or artificial, including water from the RAILROAD'S culvert and drainage facilities), so that said waters may not, because of any facilities or work of the Contractor, be impeded, obstructed, diverted, or caused to back up, overflow, or damage the property of the RAILROAD or any part thereof, or the property of others. The Contractor shall not obstruct or interfere with existing ditches or drainage facilities.

11. Upon completion of work, the DEPARTMENT, LOCAL AUTHORITY, and Contractor shall remove from RAILROAD property all machinery, equipment, surplus materials, and rubbish and leave such property in a condition satisfactory to the RAILROAD.
12. The DEPARTMENT, LOCAL AUTHORITY, and Contractor shall remedy any damage to the RAILROAD property and the RAILROAD'S tenants' property caused by itself during Project activities or the failure to perform activities, and in the event the Contractor or its insurance carrier(s) fail to repair or restore the same.
13. Safety of personnel, property, rail operations, and the public is of paramount importance in the prosecution of the work performed by DEPARTMENT, LOCAL AUTHORITY, or Contractor. The DEPARTMENT, LOCAL AUTHORITY, or Contractor shall be responsible for initiating, maintaining, and supervising all safety, operations, and programs in connection with its work on RAILROAD property.
14. The DEPARTMENT and LOCAL AUTHORITY shall protect and hold harmless the RAILROAD and the RAILROAD'S tenants from and against all loss, liability, and damage arising from activities of the DEPARTMENT or LOCAL AUTHORITY on RAILROAD property during and after Project work.
15. The DEPARTMENT and LOCAL AUTHORITY shall provide, without expense to the RAILROAD and the RAILROAD'S tenants, a minimum of $500,000 of liability insurance for bodily or personal injury, death, or property damage or loss as a result of any one occurrence or accident, regardless of the number of persons injured or the number of claimants during Project work.
16. The DEPARTMENT'S or LOCAL AUTHORITY'S contract with the Contractor shall require the Contractor to indemnify, defend, and hold harmless the RAILROAD, its officers, agents, and employees from and against any loss, damages, claims, actions, penalties, fines, costs, and expenses, including, without limitation, court costs and reasonable attorney's fees, which may result from (1) injury to or death of any person, including the RAILROAD'S and Contractor's officers, agents, and employees, as well as any other person, and/or (2) damage to or loss or destruction of property whatsoever, including the RAILROAD'S and the Contractor's property or property in their care or custody or any other property (hereinafter collectively "Loss") when the Loss is due to or arises from the Contractor's work or other acts or omissions on RAILROAD property, except to the extent that the Loss is caused by the sole negligence of the RAILROAD. The RAILROAD shall have the right to file a lawsuit or claim directly against the Contractor in connection with the provisions of this Section.
17. The DEPARTMENT'S or LOCAL AUTHORITY'S Contractor shall not store material or park equipment and vehicles on RAILROAD property when not in use in the Project.
18. The DEPARTMENT or LOCAL AUTHORITY shall ensure that the payment bond(s) it obtains from the Contractor for the Project includes the payment of any mechanic's or materialmen's liens filed by the Contractor against any property of the RAILROAD. If such bonds are not sufficient for such liens to be released, the DEPARTMENT or LOCAL AUTHORITY shall immediately pay off such liens so that such liens are released and not enforced.
19. Any utility lines constructed on RAILROAD property by or under authority of the DEPARTMENT or LOCAL AUTHORITY for the purpose of conveying electric power or communications incidental to the DEPARTMENT'S or LOCAL AUTHORITY'S use of RAILROAD property for highway purposes shall be constructed in accordance with specifications and requirements of the RAILROAD, and in such manner as to not adversely affect any communication or signal lines of the RAILROAD or its licenses now or hereafter located on the property.
20. Before commencing any work on any RAILROAD property, the Contractor will provide the RAILROAD and the DEPARTMENT or LOCAL AUTHORITY with the insurance binders, policies, certificates, and/or endorsements set forth in Exhibit F of this AGREEMENT. All insurance correspondence, binders, policies, certificates, and/or endorsements shall be sent to:

RAILROAD	DEPARTMENT [OR LOCAL AUTHORITY]
Attention: _____	Attention: _____
Address: _____	Address: _____
_____	_____
City: _____ State: _____	City: _____ State: _____

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EXHIBIT F

INSURANCE REQUIREMENTS FOR CONTRACTOR
AS SPECIFIED BY RAILROAD

The Contractor shall, at its sole cost and expense, procure and maintain until Project completion the following insurance coverage:

A. **Commercial General Liability** insurance. Commercial general liability (CGL) with a limit of not less than $5,000,000 each occurrence and an aggregate limit of not less than $6,000,000. CGL insurance must be written on ISO occurrence form CG 00 01 12 04 (or a substitute form providing equivalent coverage).
B. **Business Automobile Coverage** insurance. Business auto coverage written on ISO form CA 00 01 (or a substitute form providing equivalent liability coverage), with a limit of not less than $1,000,000 per occurrence.
C. **Workers' Compensation and Employers' Liability** insurance. Coverage must include but not be limited to:
   ☐ Contractor's statutory liability under the workers' compensation laws of the Department of _____ of the State of _____.
   ☐ Employers' Liability (Part B) with limits of at least $500,000 each accident, $500,000 disease policy with a limit of $500,000 per employee.

   If the Contractor is self-insured, evidence of state approval and excess workers' compensation coverage must be provided. Coverage must include liability arising out of the U.S. Longshoremen's and Harbor Workers' Act, the Jones Act, and the Outer Continental Shelf Land Act, if applicable.
D. **Railroad Protective Liability** insurance. The Contractor must maintain Railroad Protective Liability insurance written on ISO occurrence form CG 00 35 12 04 (or a substitute form providing equivalent coverage) on behalf of the RAILROAD as named insured, with a limit of not less than $2,000,000 per occurrence and an aggregate of $6,000,000. This information must be submitted to the RAILROAD before the work may be commenced.
E. **Umbrella or Excess** insurance. If the Contractor utilizes umbrella or excess policies, these policies must "follow form" and afford no less coverage than the primary policy.
F. **Pollution Liability** insurance. Pollution Liability coverage must be included when the scope of the work as defined in the AGREEMENT includes installation, temporary storage, or disposal of any "hazardous" material that is injurious in or upon land, the atmosphere, or any watercourses, or may cause bodily injury at any time.

   Pollution Liability coverage must be written on ISO form Pollution Liability Coverage Form Designated Sites CG 00 39 12 04 (or a substitute form providing equivalent liability coverage), with limits of at least $5,000,000 per occurrence and an aggregate limit of $10,000,000.

   If the scope of work as defined in this AGREEMENT includes the disposal of any hazardous or nonhazardous materials from the job site, the Contractor must furnish to the RAILROAD evidence of pollution legal liability insurance maintained by the disposal site operator for losses arising from the insured facility accepting the materials, with coverage in minimum amounts of $1,000,000 per loss, and an annual aggregate of $2,000,000.

Other Requirements

G. All policy(ies) required above (except workers' compensation and employers' liability) must include the RAILROAD as "Additional Insured" using ISO Additional Insured Endorsements CG 20 26 and CA 20 48 (or substitute forms providing equivalent coverage). The coverage provided to the RAILROAD as additional insured shall, to the extent provided under ISO Additional Insured Endorsements CG 20 26 and CA 20 48, provide coverage for the RAILROAD'S negligence whether sole or partial, active or passive, and shall not be limited by the Contractor's liability under any indemnity provisions under which the Contractor is to indemnify the RAILROAD under this Project.

   The Contractor shall not assign or subcontract its contract with the DEPARTMENT or LOCAL AUTHORITY for this Project, or any interest therein, without the written consent of the DEPARTMENT or LOCAL AUTHORITY. The Contractor shall be responsible for the acts and omissions of all subcontractors. Before the Contractor commences any work, the Contractor shall, except to the extent prohibited by law: (1) require each of its subcontractors to include the Contractor as "Additional Insured" in the subcontractor's Commercial General Liability and Business Automobile policies with respect to all liabilities arising out of the subcontractor's performance of work on behalf of the Contractor by endorsing these policies with ISO Additional Insured Endorsements CG 20 26 and CA 20 48 (or substitute forms providing equivalent coverage); (2) require each of its subcontractors to endorse the subcontractor's Commercial General Liability Policy with Contractual Liability—Railroads, ISO form CG 24 17 10 01 (or a substitute form providing equivalent coverage), for the job site; and (3) require each of its subcontractors to endorse the subcontractor's Business Automobile Policy with Coverage for Certain Operations in Connection with Railroads, ISO form CA 20 70 10 01 (or a substitute form providing equivalent coverage), for the job site.
H. Punitive damages exclusion, if any, must be deleted (and the deletion indicated on the certificate of insurance), unless (1) insurance coverage may not lawfully be obtained for any punitive damages that may arise under this agreement or (2) all punitive damages are prohibited by all states in which this agreement will be performed.

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I. The Contractor waives all rights against the RAILROAD and its agents, officers, directors, and employees for recovery of damages to the extent these damages are covered by the workers' compensation and employers' liability or commercial umbrella or excess liability insurance obtained by the Contractor as required by this AGREEMENT.
J. Prior to commencing the work, the Contractor shall furnish the RAILROAD with a certificate(s) of insurance, executed by a duly authorized representative of each insurer, showing compliance with the insurance requirements in this AGREEMENT.
K. All insurance policies must be written by a reputable insurance company acceptable to the RAILROAD or with a current Best's Insurance Guide Rating of A- and Class VII or better, and authorized to do business in the State of _____.
L. The fact that insurance is obtained by the Contractor will not be deemed to release or diminish the liability of the Contractor, including, without limitation, liability under the indemnity provisions of this MASTER AGREEMENT. Damages recoverable by the RAILROAD from the Contractor or any third party will not be limited by the amount of the required coverage.
M. Nothing in this AGREEMENT is intended to be construed as a requirement for an indemnification against the sole negligence of the RAILROAD, its officers, employees, or agents. Moreover, for any work performed in the State of _____, the DEPARTMENT will require its contractor to indemnify the RAILROAD and any other railroad company occupying or using the RAILROAD'S right-of-way or line of railroad against all loss, liability, and damages, including environmental damages, hazardous materials damages, penalties, or fines that may be assessed for, caused by, or the result of the contractor's negligence; provided, however, that if such loss, liability, damage, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors. Likewise, if such loss, liability, damage, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT officers, employees, or agents, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S officers, employees, or agents.

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Pipe and Wire Agreement

Agreements known generically as pipe and wire agreements are among the most commonly executed between highway agencies and railroads. These agreements are necessary whenever there is maintenance, construction, or installation of drainage pipes, pipelines, utility lines, or other linear structures that intersect a railway. The maintenance, construction, or installation of a device or structure above, adjacent to, or beneath a railway raises numerous safety concerns for the railroad. However, the frequency of pipe and wire projects has led to standardization of the agreements and of the approaches to the construction and maintenance of such structures or devices. Following is a model agreement for pipe and utility crossings.

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RAILROAD–HIGHWAY MASTER AGREEMENT
FOR PIPE AND/OR WIRE ACTIVITIES

This Master Agreement ("MASTER AGREEMENT") is made and entered into this _____ day of _____, 20_____, by and between the _____ Department of Transportation, hereinafter called the "DEPARTMENT," and _____ [Railroad Company], hereinafter called the "RAILROAD."

WITNESSTH:

WHEREAS, the DEPARTMENT proposes to engage in certain projects for the construction, reconstruction, or other change of portions of the DEPARTMENT'S road system that will cross the right-of-way and/or track(s) of the RAILROAD at various locations throughout the State of _____;

WHEREAS, the DEPARTMENT may be involved in (1) installation of new culvert, pipe, and wire, (2) adding to existing culvert, pipe, and wire, or (3) adjustment and relocation of culvert, pipe, and wire throughout the State of _____;

WHEREAS in order to expedite the processing of applications for these utility projects and the preparation of agreements, it is the desire of the DEPARTMENT and the RAILROAD to enter into this MASTER AGREEMENT setting out the general terms and conditions under which the improvements shall be provided, with the understanding that supplements to this MASTER AGREEMENT will be issued and executed from time to time covering specific installations in the form marked Exhibit A, attached hereto and hereby made a part hereof (the "Supplement" or "Supplements").

NOW, THEREFORE, it is mutually agreed by and between the parties hereto as follows:

Section 1: Federal-Aid Policy Guide

All work, procedures in general, plans, estimates of cost, specifications, and statements of work for projects authorized under this MASTER AGREEMENT and each Supplement shall be prepared in such form and detail as to enable the DEPARTMENT to comply with the Federal-Aid Policy Guide as published in 23 CFR 140, Subpart I, and 23 CFR 646, Subparts A and B. The DEPARTMENT and the RAILROAD shall be governed by the applicable provisions of the Federal-Aid Policy Guide and any special provisions agreed to herein concerning this MASTER AGREEMENT and each Supplement.

Section 2: Work Performed by the Railroad

The RAILROAD will determine if the work requires flagging. All required flagging will be provided by the RAILROAD at project expense.

The RAILROAD shall also furnish, at project expense, such detailed plans, specifications, and estimates of cost that may be required in addition to those prepared by the RAILROAD at the request of the DEPARTMENT. The plans, specifications, and estimates shall become a part of the applicable Supplement.

The position of the new utilities and additions to existing utilities shall be established jointly by representatives of the DEPARTMENT and the RAILROAD.

Section 3: Notice from Department

The DEPARTMENT shall not begin work until authorization is received from the RAILROAD.

The DEPARTMENT shall notify the RAILROAD at least forty-eight (48) hours prior to the commencement of the improvements. The DEPARTMENT shall notify the RAILROAD in writing of the date when all work is completed. At the completion of all work, representatives of the DEPARTMENT and the RAILROAD will conduct a joint inspection of the crossing improvements.

The DEPARTMENT shall furnish, at project expense, notice to the RAILROAD of proposed crossing improvements. Project notice shall contain a description of the site, a detailed plan showing location of the improvements proposed, funding sources proposed, and a request for the RAILROAD to prepare plans and estimates for the work involved.

Section 4: Work Performed by Department or Local Authority

Unless otherwise provided, the DEPARTMENT, at project expense, shall (1) furnish all supervision, labor, materials, and equipment that are needed to install and thereafter maintain the utility and (2) provide all necessary traffic control, barricades, and detour signing for utility work described in Exhibit A.

If a LOCAL AUTHORITY has jurisdiction of the highway or street and will have the responsibility to perform the work described or any other work set forth in this MASTER AGREEMENT or shall be responsible for any other obligations under this MASTER AGREEMENT, the DEPARTMENT, in a separate agreement with the LOCAL AUTHORITY, shall require the LOCAL AUTHORITY to perform such work and/or be responsible for such obligations and shall also require

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the LOCAL AUTHORITY to comply with the terms and conditions contained in this MASTER AGREEMENT and in the respective Supplement.

All work performed by the DEPARTMENT or the LOCAL AUTHORITY shall be in compliance with the current Manual on Uniform Traffic Control Devices.

Section 5: Maintenance of Utilities

The utilities shall be maintained by and at the expense of _____ [insert name of entity responsible for the utility or pipe], provided, however, that the RAILROAD'S agreement herein to operate and maintain said utilities shall not prejudice the RAILROAD from having the benefit and advantage of Federal, DEPARTMENT, or other public funds that may become available to pay or contribute to the cost of maintenance of warning devices at highway–railway grade crossings.

Section 6: Change in Ownership

It is the DEPARTMENT'S responsibility to inform the RAILROAD in writing of any change in name, ownership, or address.

Section 7: Noncompliance

Noncompliance by the DEPARTMENT, LOCAL AUTHORITY, and/or the DEPARTMENT'S Contractor with any terms of the Utility Accommodation policy (Exhibit E) may be considered as a cause for discontinuance of construction or operations until compliance is assured. Continued noncompliance will result in the revocation of the license. The cost of any work required by the RAILROAD in the removal of noncomplying construction will be assessed against the DEPARTMENT.

Section 8: Application Forms

The DEPARTMENT will use the Application Form set forth in Exhibit C to provide details of the pipes to be used in the project. The DEPARTMENT will use the Application Form set forth in Exhibit D to provide details of wires to be used in the project. Exhibit C and Exhibit D are attached hereto and are hereby made part of this MASTER AGREEMENT.

Section 9: Working on Railroad Property

The DEPARTMENT, when working on any RAILROAD property, including, but not limited to, working on utilities, will comply with the terms and conditions set forth in Exhibit B, attached hereto and hereby made a part hereof, and will also require, in its separate contract with the LOCAL AUTHORITY and/or the DEPARTMENT'S Contractor (as such term is defined in this section below), that the LOCAL AUTHORITY and/or Contractor also comply with the terms and conditions contained in Exhibit B.

The term "Contractor" as used in this MASTER AGREEMENT or in any Supplement shall mean the contractor or contractors hired by the DEPARTMENT or the LOCAL AUTHORITY to perform any work on the RAILROAD'S property and shall also include the Contractor's subcontractors and the Contractor's and subcontractor's respective employees, officers, agents, and others acting under its or their authority.

Section 10: Billing the Department and the Department's Payment to the Railroad

The DEPARTMENT shall pay to the RAILROAD within forty-five (45) days after receipt of itemized bills of cost incurred by the RAILROAD in carrying out the work to be performed by the RAILROAD under the provisions of this MASTER AGREEMENT. The RAILROAD'S estimate of costs will be attached as an exhibit to each Supplement.

Within one hundred eighty (180) days of completion of the utility work on the project, the RAILROAD shall submit a final bill to the DEPARTMENT for all actual costs of the RAILROAD'S work less any previous payments received. All bills rendered by the RAILROAD and paid by the DEPARTMENT will be subject to audit and approval by the Federal Highway Administration ("FHWA"). Reimbursement shall be in accordance with provisions of the Federal-Aid Policy Guide, provided, however, that the use of said Federal-Aid Policy Guide as a guideline for reimbursement between the parties hereto shall not be as a condition precedent to the DEPARTMENT'S obligation to pay the RAILROAD for work performed by it. If the DEPARTMENT desires to secure reimbursement from the FHWA for the work performed by the RAILROAD, it is the responsibility of the DEPARTMENT to ensure that the interpretation of the Federal-Aid Policy Guide will permit Federal participation in the cost and expense of work that, pursuant to each Supplemental, is to be performed by the RAILROAD at the expense of the DEPARTMENT. All project records in support of all costs incurred and expenditures shall be open to inspection by the DEPARTMENT and the FHWA at the RAILROAD'S offices in _____, during normal business hours, and shall be retained and made available by the RAILROAD for such inspection for a period of not less than three (3) years from the date of final billing from the RAILROAD.

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Section 11: Separate Agreement with Local Authority

If a utility project is subject to the jurisdiction of the LOCAL AUTHORITY instead of the DEPARTMENT, the DEPARTMENT shall enter into a separate agreement with the LOCAL AUTHORITY whereby the LOCAL AUTHORITY shall assume responsibility for the obligations set forth herein as applicable to the LOCAL AUTHORITY with jurisdiction over the highway or street.

Section 12: Civil Rights Act

If any work by the RAILROAD is performed by other than RAILROAD forces, the provisions of the Civil Rights Act of 1964 will apply and become a part of the Supplement for a particular project by reference.

Section 13: Successors and Assigns

This MASTER AGREEMENT and each Supplement shall be binding on and inure to the benefit of the parties hereto, their successors, and assigns.

Section 14: Indemnification

Nothing in this agreement is intended to be construed as a requirement for an indemnification against the sole negligence of the RAILROAD, its officers, employees, or agents. Moreover, for any work performed in the State of _____, the DEPARTMENT will require its contractor to indemnify the RAILROAD and any other railroad company occupying or using the RAILROAD'S right-of-way or line of railroad against all loss, liability, and damages, including environmental damages, hazardous materials damages, penalties, or fines that may be assessed for, caused by, or the result of the contractor's negligence; provided, however, that if such loss, liability, damages, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors. Likewise, if such loss, liability, damages, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT'S officers, employees, or agents, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S officers, employees, or agents.

IN WITNESS WHEREOF, the parties hereto have caused this MASTER AGREEMENT to be executed in duplicate by their proper officers thereunto duly authorized, as of the day and year first herein written.

RAILROAD	DEPARTMENT
(Federal Tax ID #_____)	By: _____
By: _____	Title: _____
Title: _____	Date: _____
Date: _____	

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EXHIBIT A

SUPPLEMENT TO
RAILROAD–HIGHWAY MASTER AGREEMENT BETWEEN
_____ TRANSPORTATION DEPARTMENT
AND
_____ RAILROAD
FOR INSTALLING NEW, ADDING TO, OR REPLACING EXISTING
PIPE AND/OR WIRE

Project Name: _____

Project No.: _____ (the "Project") DOT No.: _____

Key No.: _____

Railroad Subdivision: _____ Railroad Milepost: _____

Hwy, Road, or Street: _____ [Location]

City: _____ County: _____

A. _____ Transportation Department ("DEPARTMENT") and _____ Railroad Company ("RAILROAD") entered into a RAILROAD–HIGHWAY MASTER AGREEMENT ("MASTER AGREEMENT") dated _____.
B. As provided in the MASTER AGREEMENT for pipe and wire projects, the DEPARTMENT and the RAILROAD are to enter into supplements to the MASTER AGREEMENT.
C. This supplement to the MASTER AGREEMENT ("Supplement") is being executed by the DEPARTMENT and the RAILROAD [*add if applicable:* City of _____, County of _____ ("LOCAL AUTHORITY")] to provide for the Project improvements described in this Supplement that are to be completed at the location described above pursuant to the terms and conditions of the MASTER AGREEMENT.
D. Listed below are the proposed improvements, with cost estimates. The DEPARTMENT'S detailed plan is attached as Exhibit 1 and made a part of this Supplement. The RAILROAD'S force account estimate(s) and wiring diagram (if required) are attached as Exhibit 2 and made a part of this Supplement. All work and the financing thereof shall be subject to the terms and provisions of the MASTER AGREEMENT.
E. Description of Work: _____
_____

Estimated Total Cost	Federal Funds	State Funds	Local Funds	Railroad Funds
$	$	$	$	$

F. The [DEPARTMENT] [Local Authority] shall be responsible for reimbursing the RAILROAD for railroad flagging costs relating to any work being performed by the DEPARTMENT, LOCAL AUTHORITY, or the Contractor.

RAILROAD

(Federal Tax ID # _____)

By: _____

Title: _____

Date: _____

DEPARTMENT

By: _____

Title: _____

Date: _____

LOCAL AUTHORITY [*add if applicable*]

By: _____

Title: _____

Date: _____

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EXHIBIT B

TERMS AND CONDITIONS RELATING TO
WORKING ON THE RAILROAD'S PROPERTY

1. The RAILROAD, at its determination, may provide inspection, security, flagging, or other protective services as necessary for the protection of the RAILROAD'S property or operations whenever there are DEPARTMENT, LOCAL AUTHORITY, or Contractor activities or work on the RAILROAD'S property.
2. All work to be done by the DEPARTMENT, LOCAL AUTHORITY, and any Contractor on RAILROAD property shall be done in a manner satisfactory to the RAILROAD. The work shall be performed diligently and completed within a reasonable time or within such period of time as may be specified in writing by the RAILROAD. The authorized representative of the RAILROAD shall have final authority in all matters affecting safe and timely train operations.
3. No Project work on any RAILROAD property shall commence until the DEPARTMENT, LOCAL AUTHORITY, or Contractor has provided fifteen (15) days' advance notice to the RAILROAD representative and at least fifteen (15) days' advance notice for any work to be performed within twenty-five (25) feet of any railway track, or where such work, personnel, or equipment will be near enough to any track that an equipment extension (such as, but not limited to, a crane boom) will reach to within twenty-five (25) feet of any track. No work of any kind shall be performed, and no person, equipment, temporary structures, machinery, tools, materials, or vehicles shall be located, operated, placed, or stored within twenty-five (25) feet of any railway track at any time, for any reason, unless and until the RAILROAD has given approval of such use and a RAILROAD flagger is available at the job site to provide flagging protection. When it becomes necessary for the RAILROAD to bulletin and assign an employee to a flagging position in compliance with union collective bargaining agreements, the DEPARTMENT, LOCAL AUTHORITY, or Contractor must provide the RAILROAD a minimum of five (5) days' notice prior to the cessation of the need for a flagman. If five (5) days' notice of cessation is not given, the DEPARTMENT or the LOCAL AUTHORITY will be required to pay flagging charges for the five (5)-day notice period required by union agreement to be given to the employee, even though flagging is not required for that period. An additional fifteen (15) days' notice must then be given to the RAILROAD if flagging services are needed again after such five (5)-day cessation notice has been given to the RAILROAD.
4. The work performed by the DEPARTMENT, LOCAL AUTHORITY, or Contractor shall be done at such time and in such manner as not to damage any railway tracks or interfere with (1) the timely and safe movement of the RAILROAD'S trains and on-track maintenance equipment or (2) the installations or operations of the RAILROAD'S tenants, unless mutually agreed upon prior to any such work activity.
5. The RAILROAD reserves the right to stop, by an oral directive followed by a written notice, any DEPARTMENT, LOCAL AUTHORITY, or Contractor activities or operations on RAILROAD property that, at the RAILROAD'S determination, could or is creating an imminent hazard to RAILROAD property or operations. After stopping any activity or operation, the RAILROAD is to notify the DEPARTMENT, LOCAL AUTHORITY, and Contractor in writing of the required modification to activities or operations, along with recommended protective services that will be provided by the RAILROAD to allow Project construction to continue.
6. Work on the job site shall not cease without the RAILROAD'S written consent and subject to such reasonable conditions as the RAILROAD may specify. It is understood that the RAILROAD'S tracks at and in the vicinity of the work will be in use during progress of the work and that movement or stoppage of rail traffic including track maintenance equipment, may cause delays in the work of the Project. The DEPARTMENT and/or LOCAL AUTHORITY hereby assume the risk of any such delays and agree that no claims for damage on account of any delay shall be made against the RAILROAD.
7. The DEPARTMENT or LOCAL AUTHORITY, at its own expense, shall adequately police and supervise all work to be performed by the Contractor. The responsibility of the DEPARTMENT or LOCAL AUTHORITY for safe conduct and adequate policing and supervision of the Project shall not be lessened or otherwise affected by the RAILROAD'S collaboration in performance of any work, or by the presence at the job site of the RAILROAD'S representatives, or by compliance by the DEPARTMENT or LOCAL AUTHORITY with any requests or recommendations made by such representatives.
8. All Project work shall be performed in compliance with all applicable Federal, DEPARTMENT, and local laws and regulations affecting the Project work, including, without limitation, all applicable Federal Railroad Administration regulations.
9. The DEPARTMENT, LOCAL AUTHORITY, or Contractor shall telephone the RAILROAD during normal business hours (_____, except holidays) at _____ [also include a 24-hour, 7-day number for emergency calls] to determine if fiber optic cable is located within the job site area on RAILROAD property. If there are fiber optic cables on such property, the Contractor will telephone the telecommunications company(ies) involved, arrange for a cable locater, and make arrangements for relocation or other protection of the fiber optics, at Project expense, prior to beginning any work on RAILROAD property.
10. The DEPARTMENT, LOCAL AUTHORITY, and Contractor, at no expense to the RAILROAD, shall provide and maintain suitable facilities for draining the highway and its appurtenances, and shall not suffer or permit drainage

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water therefore to flow or collect on property of the RAILROAD. The DEPARTMENT and LOCAL AUTHORITY shall provide adequate passageway for the waters of any streams, bodies of water, and drainage facilities (either natural or artificial, including water from the RAILROAD'S culvert and drainage facilities), so that said waters may not, because of any facilities or work of the Contractor, be impeded, obstructed, diverted, or caused to back up, overflow, or damage the property of the RAILROAD or any part thereof, or the property of others. The Contractor shall not obstruct or interfere with existing ditches or drainage facilities.

11. Upon completion of work, the DEPARTMENT, LOCAL AUTHORITY, and Contractor shall remove from RAILROAD property all machinery, equipment, surplus materials, and rubbish and leave such property in a condition satisfactory to the RAILROAD.
12. The DEPARTMENT, LOCAL AUTHORITY, and Contractor shall remedy any damage to the RAILROAD property and the RAILROAD'S tenants' property caused by itself during Project activities or the failure to perform activities, and in the event the Contractor or its insurance carrier(s) fail to repair or restore the same.
13. Safety of personnel, property, rail operations, and the public is of paramount importance in the prosecution of the work performed by DEPARTMENT, LOCAL AUTHORITY, or Contractor. The DEPARTMENT, LOCAL AUTHORITY, or Contractor shall be responsible for initiating, maintaining, and supervising all safety, operations, and programs in connection with its work on RAILROAD property.
14. The DEPARTMENT and LOCAL AUTHORITY shall protect and hold harmless the RAILROAD and the RAILROAD'S tenants from and against all loss, liability, and damage arising from activities of the DEPARTMENT or LOCAL AUTHORITY on RAILROAD property during and after Project work.
15. The DEPARTMENT and LOCAL AUTHORITY shall provide, without expense to the RAILROAD and the RAILROAD'S tenants, a minimum of $500,000 of liability insurance for bodily or personal injury, death, or property damage or loss as a result of any one occurrence or accident, regardless of the number of persons injured or the number of claimants during Project work.
16. The DEPARTMENT'S or LOCAL AUTHORITY'S contract with the Contractor shall require the Contractor to indemnify, defend, and hold harmless the RAILROAD, its officers, agents, and employees from and against any loss, damages, claims, actions, penalties, fines, costs, and expenses, including, without limitation, court costs and reasonable attorney's fees, which may result from (1) injury to or death of any person, including the RAILROAD'S and Contractor's officers, agents, and employees, as well as any other person, and/or (2) damage to or loss or destruction of property whatsoever, including the RAILROAD'S and the Contractor's property or property in their care or custody or any other property (hereinafter collectively "Loss") when the Loss is due to or arises from the Contractor's work or other acts or omissions on RAILROAD property, except to the extent that the Loss is caused by the sole negligence of the RAILROAD. The RAILROAD shall have the right to file a lawsuit or claim directly against the Contractor in connection with the provisions of this Section.
17. The DEPARTMENT'S or LOCAL AUTHORITY'S Contractor shall not store material or park equipment and vehicles on RAILROAD property when not in use in the Project.
18. Before commencing any work on any RAILROAD property, the Contractor will provide the RAILROAD and the DEPARTMENT or LOCAL AUTHORITY with the insurance binders, policies, certificates, and/or endorsements set forth in Exhibit B-1 of this AGREEMENT. All insurance correspondence, binders, policies, certificates, and/or endorsements shall be sent to:

RAILROAD

Attention: _____

Address: _____

_____

City: _____ State: _____

DEPARTMENT [OR LOCAL AUTHORITY]

Attention: _____

Address: _____

_____

City: _____ State: _____

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EXHIBIT B-1

INSURANCE REQUIREMENTS FOR
CONTRACTOR AS SPECIFIED BY RAILROAD

The Contractor shall, at its sole cost and expense, procure and maintain until Project completion the following insurance coverage:

A. **Commercial General Liability** insurance. Commercial general liability (CGL) with a limit of not less than $5,000,000 each occurrence and an aggregate limit of not less than $6,000,000. CGL insurance must be written on ISO occurrence form CG 00 01 12 04 (or a substitute form providing equivalent coverage).
B. **Business Automobile Coverage** insurance. Business auto coverage written on ISO form CA 00 01 (or a substitute form providing equivalent liability coverage) with a limit of not less $1,000,000 per occurrence.
C. **Workers' Compensation and Employers' Liability** insurance. Coverage must include but not be limited to:
   ☐ Contractor's statutory liability under the workers' compensation laws of the Department of _____ of the State of _____.
   ☐ Employers' Liability (Part B) with limits of at least $500,000 each accident, $500,000 disease policy with a limit of $500,000 per employee.
   If the Contractor is self-insured, evidence of state approval and excess workers' compensation coverage must be provided. Coverage must include liability arising out of the U.S. Longshoremen's and Harbor Workers' Act, the Jones Act, and the Outer Continental Shelf Land Act, if applicable.
D. **Railroad Protective Liability** insurance. The Contractor must maintain Railroad Protective Liability insurance written on ISO occurrence form CG 00 35 12 04 (or a substitute form providing equivalent coverage) on behalf of the RAILROAD as named insured, with a limit of not less than $2,000,000 per occurrence and an aggregate of $6,000,000. This information must be submitted to the RAILROAD before the work may be commenced.
E. **Umbrella or Excess** insurance. If the Contractor utilizes umbrella or excess policies, these policies must "follow form" and afford no less coverage than the primary policy.
F. **Pollution Liability** insurance. Pollution Liability coverage must be included when the scope of the work as defined in the AGREEMENT includes installation, temporary storage, or disposal of any "hazardous" material that is injurious in or upon land, the atmosphere, or any watercourses, or may cause bodily injury at any time.
   Pollution Liability coverage must be written on ISO form Pollution Liability Coverage Form Designated Sites CG 00 39 12 04 (or a substitute form providing equivalent liability coverage), with limits of at least $5,000,000 per occurrence and an aggregate limit of $10,000,000.
   If the scope of work as defined in this AGREEMENT includes the disposal of any hazardous or nonhazardous materials from the job site, the Contractor must furnish to the RAILROAD evidence of pollution legal liability insurance maintained by the disposal site operator for losses arising from the insured facility accepting the materials, with coverage in minimum amounts of $1,000,000 per loss, and an annual aggregate of $2,000,000.

Other Requirements

G. All policy(ies) required above (except workers' compensation and employers' liability) must include the RAILROAD as "Additional Insured" using ISO Additional Insured Endorsements CG 20 26 and CA 20 48 (or substitute forms providing equivalent coverage). The coverage provided to the RAILROAD as additional insured shall, to the extent provided under ISO Additional Insured Endorsements CG 20 26 and CA 20 48, to provide coverage for the RAILROAD'S negligence whether sole or partial, active or passive, and shall not be limited by the Contractor's liability under any indemnity provisions under which the Contractor is to indemnify the RAILROAD under this Project.
   The Contractor shall not assign or subcontract its contract with the DEPARTMENT or LOCAL AUTHORITY for this Project, or any interest therein, without the written consent of the DEPARTMENT or LOCAL AUTHORITY. The Contractor shall be responsible for the acts and omissions of all subcontractors. Before the Contractor commences any work, the Contractor shall, except to the extent prohibited by law: (1) require each of its subcontractors to include the Contractor as "Additional Insured" in the subcontractor's Commercial General Liability and Business Automobile policies with respect to all liabilities arising out of the subcontractor's performance of work on behalf of the Contractor by endorsing these policies with ISO Additional Insured Endorsements CG 20 26 and CA 20 48 (or substitute forms providing equivalent coverage); (2) require each of its subcontractors to endorse the subcontractor's Commercial General Liability Policy with Contractual Liability—Railroads, ISO form CG 24 17 10 01 (or a substitute form providing equivalent coverage), for the job site; and (3) require each of its subcontractors to endorse the subcontractor's Business Automobile Policy with Coverage for Certain Operations in Connection with Railroads, ISO form CA 20 70 10 01 (or a substitute form providing equivalent coverage), for the job site.
H. Punitive damages exclusion, if any, must be deleted (and the deletion indicated on the certificate of insurance), unless (1) insurance coverage may not lawfully be obtained for any punitive damages that may arise under this agreement or (2) all punitive damages are prohibited by all states in which this agreement will be performed.

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I. The Contractor waives all rights against the RAILROAD and its agents, officers, directors, and employees for recovery of damages to the extent these damages are covered by the workers' compensation and employers' liability or commercial umbrella or excess liability insurance obtained by the Contractor as required by this agreement.

J. Prior to commencing the work, the Contractor shall furnish the RAILROAD with a certificate(s) of insurance, executed by a duly authorized representative of each insurer, showing compliance with the insurance requirements in this AGREEMENT.

K. All insurance policies must be written by a reputable insurance company acceptable to the RAILROAD or with a current Best's Insurance Guide Rating of A- and Class VII or better, and authorized to do business in the State of _____.

L. The fact that insurance is obtained by the Contractor will not be deemed to release or diminish the liability of the Contractor, including, without limitation, liability under the indemnity provisions of this MASTER AGREEMENT. Damages recoverable by the RAILROAD from the Contractor or any third party will not be limited by the amount of the required insurance coverage.

M. Nothing in this AGREEMENT is intended to be construed as a requirement for an indemnification against the sole negligence of the RAILROAD, its officers, employees, or agents. Moreover, for any work performed in the State of _____, the DEPARTMENT will require its contractor to indemnify the RAILROAD and any other railroad company occupying or using the RAILROAD'S right-of-way or line of railroad against all loss, liability, and damages, including environmental damages, hazardous materials damages, penalties, or fines that may be assessed for, caused by, or the result of the contractor's negligence; provided, however, that if such loss, liability, damage, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S contractor or the contractor's employees, agents, or subcontractors. Likewise, if such loss, liability, damage, penalties, or fines are caused by or result from the concurrent negligence of (a) the RAILROAD or the RAILROAD'S officers, employees, or agents and (b) the DEPARTMENT officers, employees, or agents, such indemnity shall be valid and enforceable only to the extent of the negligence of the DEPARTMENT'S officers, employees, or agents.

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EXHIBIT C

Note: This example is based on a BNSF Pipeline Crossing Application.

Application for Pipeline Crossing or Longitudinal Encroachment Related to Highway Project			
Form available at www:insertwebaddress@railroad.com			Date:
Legal name of applicant:			
Address:			
Phone:			
Fax:			
Applicant contact:		Telephone:	
Nature of encroachment or type of pipeline:			
Location of encroachment (include log points)	Section:	Range:	Milepost:
Nearest public road crossing:			
Is this crossing within a public right-of-way?	If so, name of right-of-way owner:		
Point of contact for right-of-way owner:		Phone:	Fax:
Address of ROW owner:			
Contents of pipeline:		Carrier:	
Pipe dimensions:	Length of pipe (feet):	Interior diameter:	
If a longitudinal encroachment, describe limits and nature of encroachment:			
If perpendicular encroachment, describe limits and nature of crossing:			
Name and address of contractor:			
Phone number:			
Request date of installation:			
Estimated days needed for construction:			
Installation method: ☐ Open trench ☐ Jacking ☐ Boring			
Minimum depth of pipeline below top of rail:			
Attach as reference set of plans, including all dimensions, specifications, and construction methods.			
Pipeline Details	Pressure:	Number of vents:	Pipe material:
Rate Pipe PSI:	Case material:	Customers served by pipeline:	
Name of protective liability carrier for contractor:			
Surety bond amount required (to be determined by railroad):			
Name, address, and telephone of bond underwriter:			
Applicant's acknowledgment of its responsibility to pay for required flagging services: ☐			
Maintenance agreement included: ☐ Yes ☐ No			
Type of organization for which this relocation is required: ☐ Private company ☐ Public highway agency ☐ Municipality ☐ Other			
Is this relocation related to a federally funded project? ☐ Yes ☐ No ☐			
Special circumstances: List any unusual or complicating circumstances that may affect the approach, duration, or difficulty of project.			
Signature of Applicant			
Print name : _____		Signature: _____	
Title: _____		Date: _____	

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EXHIBIT D

Application for Wire Line Crossing for Highway Agency Project			
Form available at: www:insertwebaddress@railroad.com	Date:		
Legal name of applicant:			
Address:	State:	City:	Zip:
Telephone:			
Fax:			
Type of Crossing:	☐ Perpendicular	☐ Longitudinal	
Type of utility: ☐ Electric	☐ Telephone	☐ Other If other, explain:	
Location of crossing	Nearest public roadway:	Railroad milepost:	
Owner of utility:			
Utility's address:	City:	State:	Zip:
Utility contact:	Contact's phone:		
Contractor to perform installation:			
	Address:		
	Contractor point of contact:		
	Telephone:		
Are plans included with application? ☐ Yes ☐ No	Are plans available? ☐ Yes ☐ No		
Encroachment location: ☐ Above rails ☐ Below rails			
Proposed vertical clearance above top of rail:			
Poles or appurtenances on RR property? ☐ Yes ☐ No If yes, type:			
Location of appurtenances:			
If below, what is depth beneath top of rail?			
Installation method: ☐ Open trench ☐ Jacking ☐ Boring			
Installation plans included: ☐ Yes ☐ No			
If under, type of conduit:	If over, type of wire:		
Name, address of protective liability carrier for contractor	Name:		
	Address:		
	City:	State:	Zip:
	Phone:	Fax:	
Amount of surety bond provided and underwriter	Amount:	Carrier:	
Maintenance agreement attached: ☐ Yes ☐ No			
Requested date of installation:	Estimated days of installation:		
Contractor acknowledges need to schedule and pay for flagging: ☐			
Type of organization for which this relocation is required: ☐ Private company ☐ Public highway agency ☐ Municipality ☐ Other			
Is this relocation related to a federally funded project? ☐ Yes ☐ No			
Special circumstances: List any unusual or complicating circumstances that may affect the approach, duration, or difficulty of project.			
Signature:	Title:		
Print name:			
Date:			

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EXHIBIT E

UTILITY LICENSE AGREEMENT REQUIREMENTS

1. General: Utility License Agreements are required when utility facilities are installed, relocated, removed, or maintained along or across all RAILROAD property. If liability insurance is required, then evidence of adequate liability insurance is to be on file with the RAILROAD for each agreement.
2. Applications: Approved requests to install, maintain, relocate, or remove a utility within the property of the RAILROAD shall be authorized by a Utility License Agreement. The applications for Utility License Agreements, along with plans for the proposed installation, shall be submitted to the RAILROAD and approved before construction has commenced.
3. Location:
   A. Utility lines shall be located so as to avoid or minimize the need for adjustments for future railroad improvements and to permit access to the utility lines for their maintenance with minimum interference to railroad traffic.
   B. Pipelines shall be installed under tracks by boring, jacking, or in some cases, open-trenching. WATER JETTING IS NOT PERMITTED.
   C. Where practical, pipelines carrying liquefied petroleum gas shall cross the railway where the tracks are carried on an embankment.
   D. All high-pressure pipelines (greater than 60-psi internal pressure), except those in public roads, shall be prominently marked at the property line (on both sides of the track for undercrossings) by signs that state the size of the line and its depth.

   Example:

   CAUTION: 30-inch diameter high-pressure gas main 7 feet deep.
4. Design Considerations:
   A. The design of any utility installation will be the responsibility of the Utility Owner. An installation within the RAILROAD property must be reviewed and approved by the RAILROAD with regard to location and the manner of adjustment. This includes the measures to be taken to preserve the safety and flow of rail traffic, structural integrity of the roadway or structure, ease of maintenance, and the integrity of the utility facility. Utility installations on, over, or under RAILROAD property shall conform with requirements contained herein and/or, as a minimum, the appropriate requirements outlined in the following:
      i. Safety Rules for the Installation and Maintenance of Electric Supply and Communication Lines, National Electrical Safety Code.
      ii. Title 49 CFR Part 192, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards and Amendments.
      iii. Title 49 CFR Part 195, Transportation of Liquids by Pipelines and Amendments.
      iv. American Society for Testing and Materials (ASTM) Specifications, latest edition.
      v. Manual on Uniform Traffic Control Devices, with revisions.
      vi. Rules and Regulations for Public Water Systems, latest edition, published by the appropriate State Health Department.
   B. All utility installations on, over, or under RAILROAD property shall be of durable materials designed for long service life and relatively free from routine servicing and maintenance. Conformance with current applicable material specifications and codes is mandatory.
   C. References given to any publication, manual, or specification are intended to be the most current edition. If a conflict occurs between any publication, manual, or specification, the most restrictive provision of said publication, manual, or specification will be used.
   D. For all boring and jacking installations under main and passing tracks greater than 26 inches in diameter and at a depth of between 5.5 and 10.0 feet below top of tie, a geotechnical study will need to be conducted to determine the presence of granular material and/or high water table elevation, at the sole expense of the Permittee. The study will include recommendations and a plan for a procedure to prevent failure and a collapse of the bore. Generally, core samples are to be taken near the ends of tie at the proposed location, at least as deep as the bottom of the proposed horizontal bore. Test results must be reviewed and approved by the RAILROAD or its agent prior to boring activities commencing. The RAILROAD reserves the rights, based on test results, to require the Permittee to select an alternate location, or to require that additional engineering specifications be implemented, at the sole expense of the Permittee, in order to utilize existing location.

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ISBN 978-0-309-12888-9

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