SHRP2 Reliability L01
Integrating Business Processes to Improve Travel Time Reliability

AMPLIFIED WORK PLAN

Prepared for:
The National Academies
Strategic Highway Research Program II

Prepared by:
Kimley-Horn and Associates, Inc.
In association with PB Consult

April 8, 2008
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1. **Introduction**

This Amplified Work Plan provides an overview of the Kimley-Horn/PB Consult team’s approach to the research and documentation to fulfill the specifications for the Reliability L01, Integrating Business Processes to Improve Travel Time Reliability. This is one of several concurrent efforts under the SHRP2 Reliability Focus Area. This Amplified Work Plan to expands on the research plan and proposal (including clarifications and addendum) submitted by Kimley-Horn and Associates, Inc. (prime contractor) and PB Consult (subcontractor).

This Amplified Work Plan is comprised of the following sections:

- L01 Research Goals and Project Objectives
- Project Management and Team Organization
- Budget and Resource Management
- Schedule
- Quality Control/Quality Assurance Plan
- Scope and Research Plan
- Documentation and Configuration Management
- Risk Management

For each section of the Scope and Research Plan, critical path items have been included to serve as a summary of task objectives and activities. Deliverables are also identified for each task. Tasks and task durations are also outlined in a comprehensive project schedule included as an Attachment to this Amplified Work Plan.

2. **L01 Research Goals and Project Objectives**

This L01 effort is an integral part of the SHRP2 Reliability Focus Area, in that it establishes a baseline of knowledge of current agency business processes – and the integration of those processes – that have a significant impact on reliability. As Departments of Transportation (DOT) move toward more customer based performance metrics, network and travel time reliability begin to take a more prominent role among the cadre of potential measures on which a transportation management agency rates its own performance. With the strong focus on the Federal Congestion Initiative, agencies are in need of innovative approaches to dealing with congestion and delay, and travel time is a key measure of overall system operations. Tools and approaches that can improve reliability or improve an agencies response to negative impacts on travel time reliability can yield valuable benefits to an overall operations strategy. Integrating key processes can further demonstrate the positive impacts and operational influences.

The results of this effort will identify the core of operations business processes within transportation management that have day-to-day influence over operations and network performance and in turn, positive impacts on travel time reliability. This effort differs widely from other key research activities as part of the SHRP2 Reliability Focus Area, some of which are developing specific procedures, monitoring programs, or alternatives to traditional traffic management strategies. The L01 project is taking a very specific look at the processes that enable operational functions that directly influence and impact network and travel time reliability and where integration plays a significant part.

The outcomes of this effort are envisioned to assist transportation agency and authority managers in developing and integrating business processes with a very tangible goal in mind – improve travel time reliability. While these processes and their relationship to travel time reliability may initially seem
The intent is to map out clearly-defined paths toward successful integration of processes that have demonstrated to successfully enhance travel time reliability, and provide these managers and officers with guidance on how to apply them within their own agency and operations.

Key research objectives for SHRP2 L01 are to:

- Identify and document successful practices that integrate business processes to improve travel time reliability. This will be accomplished through researching available literature, identifying appropriate case studies, interviewing and documenting agencies that have demonstrated innovative approaches or integration strategies. An important research focus will be on those agencies that have integrated various business processes concerning factors that affect non-recurrent congestion, as those tend to have the most negative impact on reliability.
- Define key business processes within DOT and transportation operations that are linked to travel time reliability. Promote awareness of the “business process” concept within DOT operations, and demonstrate the relationship between integrated business processes and operational enhancements, namely travel time reliability;
- Demonstrate how strategies and business process integration activities successfully used by agencies can be transferred to other entities. The research and outcomes will also document the factors that could influence that transferability.
- Help agency managers identify where there are critical gaps in their current processes, and what strategies or mitigation measures can be employed to address those gaps as well as combine and integrate processes for increased reliability benefits. This provides a foundation for more detailed analytic and program application activities being conducted through other SHRP2 Reliability efforts.
- Coordinate L01 research activities with ongoing research within the SHRP2 Reliability Area in order to extract the most innovative case study examples. Leveraging the research activities among the multiple Reliability projects will serve to enhance the overall product of this focus area.

3. Project Management and Team Organization

3.1 Team Members, Reporting Structure and Roles

Kimley-Horn’s project team will be managed by Principal Investigator Pierre Pretorius, P.E., and Co-Principal Investigator Lisa Burgess. Mr. Pretorius and Ms. Burgess will be supported by a team of specialists from Kimley-Horn and our subconsultant PB Consult, as well as Kimley-Horn support staff. The team is organized into a Senior Advisory Panel and a Research Team.

The team organization is shown in Figure 1. Roles and responsibilities for key team members are presented in Table 1 immediately following.
Figure 1 - Project Management and Team Organization

![Project Management and Team Organization Diagram]

Table 1 - Team Roles and Responsibilities

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Est. Hours</th>
<th>Roles, Functions and Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Investigators</td>
<td></td>
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</tr>
<tr>
<td>Pierre Pretorius</td>
<td>216</td>
<td>- Oversee and direct project activities, including internal Research Team coordination and management</td>
</tr>
<tr>
<td>Lisa Burgess</td>
<td>780</td>
<td>- Interface and coordination with SHRP2 Program Manager and SHRP2 Program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Coordinate efforts of Subcontractor</td>
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<tr>
<td></td>
<td></td>
<td>- Develop case study criteria and identify potential case study candidates</td>
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<tr>
<td></td>
<td></td>
<td>- Research and interview selected case studies</td>
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<tr>
<td></td>
<td></td>
<td>- Coordinate technical and quality reviews with Sr. Advisory Panel</td>
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<tr>
<td></td>
<td></td>
<td>- Facilitate L01 Workshop</td>
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<tr>
<td></td>
<td></td>
<td>- Develop and review draft and final reports</td>
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<tr>
<td></td>
<td></td>
<td>- Responsible for reporting requirements to SHRP2 Program</td>
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<tr>
<td></td>
<td></td>
<td>- Responsible for assuring deliverable compliance with SHRP2 documentation requirements</td>
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### Senior Advisory Panel

<table>
<thead>
<tr>
<th>Name</th>
<th>Contact</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Benditz</td>
<td>38</td>
<td>• Assist Research Team with developing case study criteria</td>
</tr>
<tr>
<td>Anush Nejad</td>
<td>44</td>
<td>• Provide support to Research Team to identify potential case study candidates</td>
</tr>
<tr>
<td>KK Saxena</td>
<td>16</td>
<td>• Provide technical and quality reviews of case study documentation</td>
</tr>
<tr>
<td>Bryan Patterson</td>
<td>16</td>
<td>• Provide technical and quality reviews of draft and final reports</td>
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</tbody>
</table>

### Research Team – Kimley-Horn

<table>
<thead>
<tr>
<th>Name</th>
<th>Contact</th>
<th>Responsibilities</th>
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<tbody>
<tr>
<td>Melissa Hewitt</td>
<td>202</td>
<td>• Review literature and available documentation</td>
</tr>
<tr>
<td>Alan Toppen</td>
<td>250</td>
<td>• Develop case study criteria and identify potential case study candidates</td>
</tr>
<tr>
<td>Alyssa Phaneuf</td>
<td>210</td>
<td>• Research and interview selected case studies</td>
</tr>
<tr>
<td>Jeff Dale</td>
<td>160</td>
<td>• Prepare case study summaries, including process graphics</td>
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<td></td>
<td>• Provide support to L01 Workshop</td>
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<td></td>
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<td>• Develop and provide peer reviews of draft and final reports</td>
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</table>

### Research Team – PB Consult (Subcontractor)

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<thead>
<tr>
<th>Name</th>
<th>Contact</th>
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</thead>
<tbody>
<tr>
<td>Steve Lockwood</td>
<td>42</td>
<td>• Provide support to case study candidate identification</td>
</tr>
<tr>
<td>Alan Lubliner</td>
<td>72</td>
<td>• Provide a link to complementary activities currently underway with L06 research effort</td>
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<td></td>
<td></td>
<td>• Support case study research and interviews</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide technical input and quality reviews of case study documentation, Synthesis and Guidance</td>
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### Kimley-Horn Support Staff

<table>
<thead>
<tr>
<th>Name</th>
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<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>338</td>
<td>• Project accounting and administration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Word processing, administrative support</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Graphics and desktop publishing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Information Technology support</td>
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### 3.2 Project Communications

#### 3.2.1 Communicating with SHPR2 Program Manager

Kimley-Horn’s Principal Investigators will have primary communication responsibility with the SHRP2 Program Manager. Communications will include:

- Monthly progress reports to submit to the SHRP2 Program Manager.
- Quarterly project updates to note the status of key activities and identify any relevant project outcomes to date.
- Monthly conference calls will be scheduled with the SHRP2 Program Manager as a means of establishing regular project communications. Additional Research Team members may also participate. Meeting summaries will be prepared and distributed.

Two in-person meetings with SHRP2 staff will be held during the course of the L01 research effort. One of these meetings will be held in Washington DC, and the location of the other meeting will be determined upon discussion with SHRP2 staff.

Two interim meetings with the TCC/project panel will also be held at NAS facilities. The first meeting will be held in April 2008. The second meeting is expected in the October/November 2008 timeframe. Specific dates will be coordinated with the SHRP2 Program Manager.
The Principal Investigators will coordinate communications and reviews of documents with the TCC through the SHRP2 Program Manager. Review time for key deliverables is reflected in the project schedule shown in the Attachment to this Amplified Work Plan.

3.2.2 Communicating with Other SHRP2 Project Contractors

L01 Principal Investigators recognize the importance of coordinating among other SHRP2 efforts, as there are many synergies to be realized among the various assignments under the Reliability Focus area in particular, and the SHRP2 program on a larger scale. PB Consult, currently the lead contractor for L06, will provide valuable input at key points in the L01 development. Other Reliability contractors will also be contacted so that we can keep apprised of their key findings and exchange pertinent information about our team’s key findings. Communication will take place primarily via conference call and during in-person contractor meetings of the SHRP2 program.

A potential area for coordination would be to discuss the feasibility of a webinar that would combine some of the concurrent Reliability projects. This will be discussed further with the SHRP2 Program Manager.

3.2.3 Team Communications

The Research Team will meet bi-weekly, and will include advisory panel and subconsultant participation when applicable. These will serve as project status meetings to review action items and project schedule, identify critical dependences or additional coordination requirements, and discuss overall status of the research effort and specific tasks. Conference calls will be utilized to allow maximum participation by Research Team and Senior Advisory Panel. More frequent team meetings may be convened during deliverable development.

Principal Investigators will coordinate and facilitate these team meetings, will document Research Team meeting issues, action items and deadlines and distribute to the Research Team and the Senior Advisory Panel.

Subcontractor coordination and communications are the responsibility of the PI’s. This includes contract issues, communicating deadlines, involving subcontractors in document development and review, involving subcontractors in Research Team teleconferences (when and as appropriate) and obtaining insights from parallel Reliability research efforts currently underway by subcontractor. Tasks, research expectations and deadlines will be communicated to the subcontractor in a timely manner.

4. Budget and Resource Management

The PI’s will be responsible for reviewing the Project Effort Reports on a twice monthly basis. Effort reports document hours and effort incurred per task and per individual. The PI’s will be responsible for tracking effort and budget against the project work plan, and for making appropriate adjustments to staff, schedule or other parameters for controlling project costs. All Kimley-Horn staff are required to use electronic timesheets, and tasks will be assigned specific task numbers so that effort can be tracked on a task-by-task basis as well as an overall project effort basis. Time charged to tasks is consolidated through the management information system to generate project effort reports on a bi-weekly basis. The PI’s can, at any time, view hours that have been charged to a task. Research Team members are required to identify time charged on a daily basis. This information enables the PI’s to continuously monitor the status of project cost, cost control effectiveness, and schedule.
5. Schedule

Pierre Pretorius and Lisa Burgess will be charged with monitoring task and project schedules. Project schedule will be a key focus area for the bi-weekly team meetings, and will include a review of current task activities, milestones completed, next steps, and resources required to meet schedule and milestone commitments.

A schedule has been developed in Microsoft Project and will be stored in the project directory on the network. This schedule is included as an Attachment to this Amplified Work Plan.

6. Quality Control/Quality Assurance Plan

For this assignment, we will implement several internal project quality controls, as well as a comprehensive quality/technical review process of key deliverables and project documentation. All members of the Research Team and Senior Advisory Panel will be provided with a copy of the Amplified Work Plan, following review and concurrence by SHRP2 staff. This will ensure that all team members are apprised of project management processes, schedule, and research plan.

The PI’s will hold a kickoff meeting with key team members to:

- Review the Amplified Work Plan;
- Clearly define the scope;
- Outline task responsibilities;
- Review the research plan;
- Establish schedules and assignments; and
- Identify project milestones and goals.

This research project for the L01 Reliability Area is a very collaborative effort, and the quality review process will include several steps:

- Research Team will provide peer reviews of the various case study documents. For each phase of the research effort a QC/QA review will be conducted internally (within the project team) or through a peer review process as one of several checks to make sure that the project deliverable is not only technically correct, but also consistent with the SHRP2 objectives.
- The Senior Advisory Panel will also serve in a technical and quality assurance review capacity. Kimley-Horn’s formal QC/QA program is based upon assigning experienced, senior professionals who are otherwise qualified to manage a similar project to serve in this independent quality control role.
- PB Consult will also be called upon for reviews to capitalize on the synergies between the L01 effort and the L06 research project for which they are the prime consultant.
- Technical editors will review documentation for grammar, spelling, style and consistency.
- QC Reviews are included with the project schedule shown in the attachment.

The Final Report will be prepared in accordance with the formatting, organization and style requirements outlined in the Author Guidelines for SHRP2 Reports (February 13, 2007), or later version if applicable.

PI’s Pierre Pretorius and Lisa Burgess will have final responsibility for deliverables meeting high quality standards, technical accuracy, and consistency with SHRP2’s expectations.
7. Scope and Research Plan

The following scope of research tasks includes the amended Research Plan; these amendments were the result of clarifications requested by SHRP2 to the original Research Plan, and the addition of a Summary of Critical Path Items. Task 0 from the original Research Plan is addressed within section 1 – 6 of this Amplified Work Plan. Figure 2 on the following page shows the relationship of key tasks, products from each task, and a high-level timeline for tasks. A more detailed task schedule is included in the project schedule in the Attachment to this Amplified Work Plan.

Reviews by the SHRP2 Program Manager and other members of the TCC are indicated as separate subtasks within the project schedule. Time for internal QC reviews as well as SHRP2 staff review time has been built in to the overall timeframe for the L01 research.

Task 1 – Literature Review

Summary of Critical Path Items:

- Prepare definition of Business Process and Business Process Integration in the context of transportation operations, and specifically travel time reliability.
- Establish operational categories to guide research focus. Research and document agency business process integration that have had a positive effect on travel time reliability (including potential international examples and private sector).
- Coordinate with PB Consult to obtain information on L06 that could provide guidance with this research effort.
- Summarize (in sufficient detail) potential case studies for further consideration, including agency activities and/or processes that could demonstrate integration strategies that make a quantifiable connection to improved travel time reliability. These will include domestic as well as international examples.
- Prepare annotated bibliography of resources identified.
- Conduct internal QC review.
- Submit to SHRP2 Program Manager for review and discussion.
- Incorporate/address feedback.

The team will research and review available documentation applicable to business processes and the factors that influence travel time reliability. This literature review serves several purposes:

- Gain an understanding of the current awareness of agency business processes related to operations and travel time reliability impacts
- Identify where there are examples of agencies integrating business processes that have a positive impact on travel time reliability
- Identify potential participant agencies or programs for the workshop to be conducted as part of this project
Figure 2 - Task Flow Diagram and Key Task

KEY TASKS

Task 0  Project Management, Communications and Coordination

Task 1  Literature Review

Task 2  Case Study Criteria

Task 3  Recommend Case Studies

Task 4  Case Studies and

Task 5  Workshop

Task 6  Synthesis of Findings

Task 7  Guidance Document on Business Process

Task 8  Draft and Final

PRODUCTS

- Criteria for selecting case studies
- Candidate case study sites/programs
- Final case study sites
- Interview protocols

- Case study interviews
- Interview summaries
- Business process diagrams from case study sites
- Draft Case Studies

- Workshop coordination and attendee coordination
- Workshop materials prep and distribution
- Facilitation for workshop

- Integrate findings from documents, workshop
- Strawman set of integrated business processes
- Proposed process diagrams
- Interim draft

- Interim draft of Guidance Document
- Summary presentation draft
- Webinar coordination and facilitation
- Final Guidance Document

- Draft Final Report
- Final Report
- Appendices
- Electronic/hard copy

TIMELINE

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<th></th>
<th>Feb. -June, 08</th>
<th>July - Oct., 08</th>
<th>April - Dec., 08</th>
<th>Dec., 08 - Feb., 09</th>
<th>Feb. - May, 09</th>
<th>May - Aug., 09</th>
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A related and concurrent literature search will strive to identify potential case studies. This effort will focus more on if or how integrated business processes have had an influence on enhancing travel time reliability. To accomplish this, the Research Team will potentially need to tie together several different sources from one or more programs to be able to draw those conclusions. The Research Team will obtain input from PB Consult as well as other SHRP2 Reliability contractors. In addition to domestic public sector transportation programs, the Research Team shall also expand the literature search to identify potential international examples. International case study candidates may be identified as part of the April 2008 SHRP2 TCC meeting with international representatives. Where available, the Research Team will identify potential literature or documentation about private sector perspectives and issues related to travel time reliability.

The Research Team will summarize and document the literature review, and develop an annotated bibliography that identifies key aspects that are particularly relevant to this effort. To streamline review and discussion about the findings, the team will develop appropriate categories for the review. These are envisioned to include, but not be limited to:

- Operations Programs
- Incident Management and Incident Reporting
- Freeway Operations
- Arterial Management Systems
- Road Weather Management Programs
- Freight and Goods Movement
- Work Zone Management
- Planned Special Events
- Strategic/Business Planning – including Regional and Statewide
- Business Processes involved in DOT operations programs
- Performance Monitoring
- Regional Planning

**Task 1 Deliverables:**

- Annotated bibliography of available domestic and international literature
- Summary of findings
- Compendium of available research

**Tasks 2 and 3 – Case Study Criteria and Recommended Case Studies**

**Summary of Critical Path Items:**

- Prepare a set of criteria to evaluate case study alternatives, and review criteria with SHRP2 Program Manager.
- Map candidate list of potential case studies to criteria. Provide a relative assessment as to how the candidate case study provides insight into or supports the research objectives (high, medium, low).
- Review criteria mapping and initial assessment among Research Team and members of the Senior Advisory Panel. Obtain consensus on recommendations to take forward to SHRP2 Program Manager for Review. Target number of potential case studies = 15.
- Develop summary and justifications for recommended case studies. Conduct QC review, and provide to SHRP2 Program Manager.
Develop interview protocols and a ‘strawman’ for how case study interview results will be documented. This includes overall format for narrative as well as business process diagramming.

Review recommendations with SHRP2 (and potentially members of the TCC), and obtain feedback and develop a final list of recommended case studies.

Based on the findings in Task 1 the Research Team will identify a set of criteria for identifying appropriate case studies for further documentation and analysis. The criteria should span several different aspects of operations and operational decision making, but an overarching component will be to what extent various business processes have been applied and/or integrated to improve travel time reliability.

Criteria and criteria categories will be formatted in a matrix, and then potential case study areas will be mapped to those criteria. Using the results from the initial mapping, case study applicability will be categorized in terms of high, medium and low impact to the overall research effort. Ideally, recommended case studies will focus on the ‘high’ and potentially ‘medium’ impact programs; there may be unique aspects off the ‘medium’ and ‘low’ impact programs that could and should be featured within the overall context of the research. Following the two-step analysis, it may be necessary to revisit the criteria to ensure that our team is hitting the mark with applicable and available information.

Measures will be developed that can be applied to the case studies to identify to what extent the business process integration has (or has not) had a positive impact on improved travel time reliability. These measures will serve as an assessment and evaluation tool to identify where successful integration has demonstrated to improve travel time reliability.

Fifteen potential case studies will be identified, with a goal of preparing 8 to 10 full case studies later in Task 4. Interview protocols for conducting the case studies will be developed in this task, including potential contacts, key themes, specific questions and overall interview process to be conducted as part of the next task. A strawman for how interview results will be documented will also be prepared for review by SHRP2 staff and the project panel.

Criteria will be reviewed and discussed with the SHRP2 Program Manager at two points in this task, including the initial set of criteria as well as the final justifications. Any challenges or issues raised in identifying potential case study areas, or in the applicability of the criteria can then be addressed.

The Research Team will establish a format for diagramming that is capable of mapping data flows, illustrating decision points, shows where process integration occurs, as well as illustrates critical inputs/outputs that can be tied to travel time reliability. Diagrams must be capable of showing entities that are responsible for certain actions and processes, as well as how the action can translate into a business process that can be linked to travel time reliability; it must also show specifically the integration of processes to support travel time reliability. Some examples that will be considered include:

- **Business Process Modeling Notation** - provides for a standardized way of depicting business processes within a work flow. Standard objects are used representing events, activities, sequences, associations, and others.
- **Unified Modeling Language** – a number of potential diagramming options, including Activity Diagrams, Deployment Diagrams and others that could potentially illustrate process integration.
- **Event Driven Process Chain/Diagram** – shows business processes as chains of functions, events, and connections.
- **Cross-Function Flow Charts** – typically used when one or more entity within an agency has responsibility for a certain function (or process), or contributes to a certain function (or process).
IBM – business process engineering principles and models provide several examples that are primarily process oriented, but may also show integration and decision points.

Examples of these business process diagramming methodologies will be assembled, described and circulated to team members for review and discussion on how to best illustrate the DOT business processes and their specific integration points. The team will develop a consensus-based recommendation for the most appropriate diagramming approach given the research objectives. This will be reviewed and discussed, along with potential diagramming alternatives, with the SHRP2 Program Manager.

Task 2 and 3 Deliverables:

- Case Study Criteria and Criteria Matrix
- Recommended Case Studies and Documentation
- Interview Protocols and Strawman Documentation Format/Procedure
- Recommended business processing diagramming methodologies and conventions

Task 4 – Case Studies and Analysis

Summary of Critical Path Items:

- Finalize interview protocol, develop final outline and questionnaire, establish high-level diagram (for reference during interviews) and circulate to Research Team.
- Assign Research Team members to case study sites; initiate contact with appropriate individuals at the case study site; provide contacts with preliminary information about the research objectives, specific information the team is seeking from them, and provide sufficient lead time prior to interview.
- Conduct interviews, document discussions with an emphasis on business processes. Include narrative and begin mapping process based on input from the case study representatives.
- Follow up with case study participants for their review and feedback to ensure the Research Team has accurately captured their process information. Revise as needed.
- Circulate findings internally for review. Research Team to participate in a conference call and web-based meeting to review and discuss findings across the team (including subcontractor).
- Preliminary update to SHRP2 Program Manager about initial findings, trends, issues, and notable outcomes.
- Review and revise initial round of findings, based on discussion among team, SHRP2 feedback; follow up as needed with case study participants if there are remaining questions or gaps within the case study.
- Finalize detailed business process diagrams and case study narrative. Also develop ‘higher level’ process diagrams that would be suitable for executives and decision makers in the context of a summary.
- Analyze and document case study findings in terms of common themes, unique or innovative approaches, and successful sustaining models. Also document any key benefits of process integration that might go beyond travel time reliability.
- Conduct QC review and provide to SHRP2 Program Manager.
- Update case studies based on comments and feedback.
Using the feedback from SHRP2 staff and the project panel, the team will document 8 to 10 case studies focused on highlighting integrated business processes to support enhanced travel time reliability. The interviews and summaries that occur during this task represent the foundation for the workshop, Synthesis, Guidance and Final Report, and the Research Team needs to be proactive and thorough in capturing relevant details when interviewing and following up with case study sites.

Case studies will be documented in a format that is relatively consistent, although provide for enough flexibility to showcase unique features or aspects of the case study presented. An initial framework for the case study presentation includes:

- Key Organizations (Lead, significant partners);
- Geographic location/areas covered;
- Relative time periods (identify milestone implementations if available);
- Key aspects of non-recurrent congestion (7 focus areas), major activities and operations within the case study area, and systems involved, with a focus on identifying specific business processes;
- Discussion on how and when business processes were integrated – describe process, ‘triggers’ and outcomes – identify the tangible and demonstrable impacts to improved travel time reliability. Also identify the entities involved (decision makers, implementers, essential external partners and others);
- Identify if there were other benefits to integrating business processes – travel time reliability is the primary objective for these case studies, but if there were additional benefits experienced or realized as a result, these should be noted;
- Agency policies, legislation, regulation or other procedures that affect (positively or negatively) the business process integration. Identify where there were enabling policies or legislation, as well as gaps; and
- Case studies need to capture pertinent data sources, steps/process, decision points and integration points, who/what entity is responsible – need to show in the context of a business process flow diagram. Identify durations, also identify any processes that were changed or put in place to enable the integration of business processes.

The Research Team will utilize available literature, as well as information obtained from interviews and conversations with transportation management representatives in each area. Phone interviews will be conducted with appropriate staff at each representative agency, which could include operations managers, maintenance managers, administrator/chief administrator/commissioner level staff, and others as appropriate. Members of the Research Team will be assigned specific case study areas, and it will be their responsibility to coordinate with the interviewees to schedule conference call interviews and provide the interviewees with pertinent background information ahead of the conference call.

As part of a detailed internal meeting with the Research Team, all team members assigned to case study interviews will discuss and review the interview protocols, strawman for documenting processes and review timeframes for scheduling and completing interviews and associated summaries.

Using information from the literature and individual conversations, the team will map out business processes and flows that to illustrate the relationship of the various components of the process, including data inputs, decision points, functional aspects affected, and other elements as appropriate. The Research Team will use Visio to document various processes and flows in an easy-to-follow and consistent manner, and in a format agreed to by the SHRP2 Program Manager in the previous task.

The team will adhere to SHRP2 publication requirements so that business process diagrams will be able to be easily integrated with supporting documentation as part of the technical deliverables. We will also
prepare high-level summaries of each of these to provide a ‘top-level’ view suitable for decision makers. Examples of higher-level diagrams are shown below:
Another component to the case study documentation is to assess the effectiveness or impact of business process integration on travel time reliability or improved travel time reliability. Through the course of the discussions, there may be additional benefits derived from integrating various business processes, but the team will keep the focus of this analysis on travel time reliability. The measures previously developed in task 2 will provide a starting point, as well as provide a level of consistency in the analysis.

Case studies will be summarized and circulated back to the interviewed areas prior to submitting to SHRP2 staff and the project panel for review. It will be essential to get agreement on the accuracy of these case studies, as they provide the majority of the background material for the Task 5 workshop and subsequent project deliverables. An internal review and discussion (via Web conference) with the PI’s, Research Team, and PB Consult will be convened to discuss findings and review draft case study documents prior to submitting to the SHRP2 Program Manager.

The PI’s and key members of the Research Team will schedule a teleconference with the SHRP2 Program Manager to discuss the findings, review case studies and business process diagrams.

**Task 4 Deliverables:**

- Case study interview summaries, including business process and data flow diagrams
- High level business process and data flow diagrams
- Updated case study summaries based on feedback and comments from SHRP2.

**Task 5 – Workshop**

**Summary of Critical Path Items:**

- **Identify date and location for workshop (October/November 2008) in coordination with SHRP2 Program Manager.** Date and location need to be identified in April/May 2008.
- **Develop Workshop Plan, including potential attendees/invitees, agenda and objectives, what materials would need to be developed (invites, workshop presentations and materials, etc.), and critical milestones for the workshop planning.** Review with SHRP2 Program Manager.
- **Distribute invites and coordinate with participants for travel arrangements/logistics to workshop.** Anticipate up to 16 participants (excluding Research Team members)
- **Develop workshop materials, including agenda, objectives, summary of findings from case studies, analysis document and diagrams.**
- **Coordinate with PB Consult about L06 Institutional aspects, as they relate to business process integration that should be discussed with workshop participants.**
- **Facilitate workshop, to include presentations, discussions, potential break-out groups, and other strategies.** Document and summarize workshop discussion and outcomes.

Within the first two to three months of the project, the team will begin coordinating with SHRP2 Program Manager to begin identifying workshop logistics, including a target timeframe and location. A Workshop Plan will be developed and will be updated as more details are firmed up. Over the next several months, and as the case studies and concepts evolve, the team will continue to refine the Workshop Plan to include invitees, timeframes and critical milestones, advanced preparation material and other logistics. An initial target timeframe for the workshop would be in months 9-10 of the study (approximately October/November 2008). This will provide ample time for case study development, as well as allow important outputs from the workshop to be incorporated into the draft Guidance document.
Consideration will be given to other known industry events in scheduling this workshop, so that the attendees will not have to balance multiple travel requests. Known events within this timeframe that could potentially pose a conflict with the L01 workshop include:

- AASHTO Annual Meeting, October 16-20 in Hartford, CT
- ITS World Congress/ITS America is scheduled for November 16-20 in New York City;
- TRB’s AHB 10 Committee Planning for Operations conference, early December, Washington DC

The PI’s will coordinate with the SHRP2 Program Manager to identify a suitable date and location. This coordination will occur in April/May 2008 to allow for ample time for workshop planning. Locations to initially be explored include NAS facilities in Washington, DC, Wood’s Hole, MA and Irvine, CA; others may be explored and identified.

Objectives of the workshop are to:

- Bring together industry peers to review and provide perspective on the case study findings;
- Provide insights and consensus on business process integration methodologies that could be carried forward into the Synthesis and Guidance documents. This includes anecdotal information from participant experiences about measures, processes and integration efforts within their own agencies/regions, and trends within their organizations that could foster enhanced integration of various process;
- Obtain input from a variety of perspectives including management/administrator level as well as operations-focused peers;
- It is anticipated that workshop attendees will be in the range of 12-16 participants (excluding the project team);
- Generate discussion about different methods various agencies have pursued to integrate business processes, and which of those methods were successful. Unsuccessful attempts, as well as key barriers to business process integration, will also be a part of the discussion. Potential institutional and organizational barriers may be identified through the L06 project, and these will be brought to the L01 workshop for discussion and feedback; and
- Obtain information about the benefits experienced, or potential benefits, of integrating multiple business processes to improve travel time reliability.

The team will look to workshop participants to provide input and feedback on the case study findings, as well as how some of the process integration (and outcomes) could be applied to other agencies and areas. To make the most effective use of time and interaction at the workshop, materials to be provided to participants ahead of time include:

- Project background and definitions of key concepts;
- Case studies and flow diagrams;
- Initial hypotheses on recommended processes and integration strategies;
- Documented benefits found from literature and individual discussions; and
- Brief summaries of other related efforts, including SHRP2 activities, relevant performance monitoring activities and others as deemed appropriate.

The team will facilitate the workshop and prepare workshop proceedings, including a summary of key discussion points and issues.

**Task 5 Deliverables:**

- Workshop preparatory materials
- Travel and logistics organization
Task 6 – Synthesis of Findings

Summary of Critical Path Items:

- Develop plan for synthesizing findings among Research Team; compile feedback from workshop participants; and develop annotated outline for Synthesis document.
- Provide annotated outline of Synthesis to SHRP2 Program Manager.
- Coordinate with PB Consult and contractor for L03 to incorporate relevant inputs to the Synthesis process.
- Extract tangible recommendations from the case study findings, and propose a strawman set of integrated business processes for discussion. Include proposed process diagrams (based on successful integration strategies identified in the case studies).
- Prepare interim draft for internal review and QC.
- Submit interim draft to SHRP2 Program Manager for review and discussion. Coordinate with SHRP2 Program Manager for a review discussion with TCC members and other reviewers as determined by the SHRP2 Program Manager.

Following the case study review and workshop discussions, the Research Team will combine and synthesize the findings and results from the previous tasks, and begin developing recommendations and parameters for integrating business process to improve travel time reliability. An annotated outline will be developed and provided to the SHRP2 Program Manager for review and discussion prior to proceeding with developing the draft document.

This synthesis will look at the full range of impacts and influences to business process integration, including:

- Relationships to operational functions and programs;
- Relationship and linkages to other planning processes, including project programming and budgeting;
- Current ‘status’ of business process integration – starting at the ground level, working within established business processes or perhaps justifications for revising or enhancing business processes; and
- Gaps that limit decision making and business processes specifically related to travel time reliability (these could include data, performance monitoring programs, etc.).

This synthesis will incorporate the key findings from throughout the process, including where integration of certain processes have resulted in positive impacts to travel time reliability, institutional factors or barriers to business process integration, as well as draw from SHRP2 L03 to identify key reliability measures that agencies could incorporate. PB Consult will provide review and input to this task.

The Research Team will develop a strawman set of integrated business processes, and supplement these with some specific examples where these processes and integration of these processes has proven successful. This synthesis will be organized such that it draws from the case studies to provide tangible recommendations, illustrates proven concepts, or in some cases, “forward-thinking” process approaches. It will be very important that the document clearly identify key steps, dependencies, and relationships to other programs or processes.
This will be delivered as an interim draft to the SHRP2 Program Manager for discussion and comment. It will lay out the key themes and concepts, business processes and process integration examples and strategies, as well as institutional barriers or issues impacting this level of integration. It is envisioned that the case studies will serve as an Appendix to the Synthesis document, and will be summarized and referenced throughout. A draft report will be prepared as part of Task 8 that will incorporate the initial feedback from SHRP2 staff, project panel and other peer reviewers.

**Task 6 Deliverables:**

- Annotated outline and draft process graphics
- Interim Draft Synthesis and Business Process Integration Report

**Task 7 – Guidance Document on Business Process Integration for Travel Time Reliability**

**Summary of Critical Path Items:**

- **Develop annotated outline for Guidance Document (audience is primarily decision makers, high-level managerial staff within state/local DOTs).**
- **Provide to SHRP2 Program Manager for review and feedback.**
- **Develop presentation summarizing process and key outcomes.**
- **Prepare interim draft of Guidance document for internal review and QC.**
- **Coordinate with NTOC on potential for Webinar (potential broader webinar to feature other Reliability efforts – discuss with SHRP2 Program Manager).**
- **Submit interim draft to SHRP2 Program Manager for review and discussion. Coordinate with SHRP2 Program Manager for a review discussion with TCC members.**
- **Revise and finalize the Guidance document based on feedback and comments.**

The Guidance document will be among the most widely circulated of the L01 research effort. It needs to provide a succinct summary of the business process integration discussed in the interim draft, as well as document relevant points from the case studies. This document needs to be developed with a particular audience as the focus – decision makers, transportation management agency commissioners/chief officers, and other high-level managerial staff within state and local DOTs, regional planning authorities and organizations, and other similar transportation operations entities. The intent for this Guidance document is that it can be widely distributed and utilized as part of the SHRP2 program, as well as through the FHWA Office of Operations, AASHTO, and others.

Developing the Guidance document will be a collaborative effort in that it will require attention to content, layout, key themes, and careful focus on the target audience. The Guidance document shall:

- Clearly and succinctly lay out key concepts, step-by-step processes, and demonstrate applicability to DOT operations scenarios;
- Identify key outcomes and demonstrate the benefits of applying a comprehensive integration approach to bringing together key business processes to improve travel time reliability;
- Include demonstrated and documented results experienced from other areas, including performance measures and performance monitoring strategies and how to tie those in to bigger-picture organizational management approaches;
- Provide a direct correlation between the recommended processes and integration strategies with ‘real-world’ success stories and case studies; and
- Identify where certain ‘actors’ or roles fit within a business process (such as operations managers), and provide guidance on how to involve those staff in developing an integrated approach within their agency.
Creative and other technical support staff will be brought in to the Guidance development. This is envisioned to be a very iterative process to develop this Guidance to be sure the Research Team accurately and succinctly captures key points and processes. The Research Team will review Guidance concepts and guiding principles with the SHRP2 Program Manager and members of the TCC (as appropriate) via teleconference.

The Research Team will develop a PowerPoint presentation summarizing the Guidance document. This can be utilized by SHRP2 staff, the project panel, FHWA representatives and others to present the overall project, concepts and recommended strategies. The team will also explore hosting a webinar through NTOC. Options for a webinar will also be explored, as this is a powerful outreach tool to promote availability of the document, talk participants through the contents and concepts, as well as provide time for some interaction and questions from participants. This format has been successfully used for a wide range of guidance documents and research efforts, and we would encourage partnering with NTOC to explore a webinar option.

**Task 7 Deliverables:**

- Draft Layout and Outline for Guidance Document for review
- Draft and Final Guidance Document
- Companion PowerPoint presentation
- Webinar, including presentation

**Task 8 – Draft and Final Report**

**Summary of Critical Path Items:**

- **Develop outline for Final Report**
- **Document the research process, applicability and relationship to other SHRP2 Reliability efforts, provide summary of Synthesis and Guidance, and clearly identify innovative concepts and approaches as identified in the research and workshop discussions.**
- **Provide draft for review and comment by SHRP2 Program Manager and TCC.**
- **Revise based on feedback.**
- **Provide electronic and hard copy final deliverables in accordance with SHRP2 format and style requirements.**

The Research Team will update the Task 6 interim draft Synthesis report, as well as bring together key pieces of the Guidance document into a comprehensive draft final report. This draft final report will include an abstract, executive summary, SHRP2 program background (and specifically a summary of the Reliability Focus Area), and demonstrate the relationship of the L01 project to other SHRP2 Reliability efforts. The draft report is to be organized and written so as to systematically lay out the key steps, concepts, outcomes and recommendations. Appendices will be included to support the narrative and content of the report.

The focus of the Final Report is to capture where and how key business processes are successfully being integrated. It needs to summarize the methodology and key steps, as well as identify where these practices are providing demonstrated, positive impacts to travel time reliability. The Final Report will tie together findings from the literature review, case study interviews and documentation, outcomes from the workshop, key concepts and processes identified in the Synthesis document, as well as key points from the Guidance document.
An electronic copy and a hard copy of the Draft report will be provided to SHRP2 staff for circulation and review. A conference call with the SHRP2 Program Manager and members of the review panel will be convened to discuss comments and recommended changes. Upon receipt of comments and review input, the Research Team will finalize the draft and submit a Final Report to SHRP2.

The report will be organized to be easily transferred to .pdf format for posting on the SHRP2 website, and for circulation to interested entities. The document will be prepared in accordance with SHRP2 format requirements and style guide.

**Task 8 Deliverables:**

- Draft Final Report – electronic copy and hard copy
- Final Report and Appendices – electronic copy and four hard copies

**8. Documentation and Configuration Management**

The Final Report will be prepared in accordance with the formatting and style requirements outlined in the *Author Guidelines for SHRP2 Reports* (February 13, 2007), or later version if applicable.

The Research Team shall use Microsoft Word for preparation of files to be submitted to SHRP2. Adobe .pdf files will also be utilized to allow for merging of documents and to retain the integrity of electronic drafts that are circulated. Final electronic deliverables will conform to SHRP 2 document requirements.

Electronic files associated with the L01 project shall be stored on the Kimley-Horn network in the designated project directory. This will provide a centralized resource of project documentation that is accessible to all Research Team members on the Kimley-Horn network.

FTP sites shall be used when there is a need to share large files or a series of multiple files. Two secure FTP sites are established for sharing electronic files with this research effort:

1) Internal – this is accessible only to Kimley-Horn staff that are on logged in to the network

2) External – this FTP site will be accessible to subcontractors, SHRP2 staff and others that are provided with the link and password via e-mail.

**9. Risk Management**

Kimley-Horn’s effort reporting, electronic time keeping and castahead process allow PI’s Pierre Pretorius and Lisa Burgess to have the resources to closely monitor effort on a task-basis as well as by staff member. Bi-weekly formal team communications will help to ensure that everyone on the project team is aware and accountable for specific project milestones and activities. Regular communications with the SHRP2 Program Manager will also ensure that our efforts are on track and meeting expectations, and any issues or challenges our team is experiencing will be promptly communicated.

A centralized resource for project communications, style guides, access to the Research Plan and Amplified Work Plan, as well as storing all project-related information will minimize risk of duplication and streamline configuration management. All project team members are to be provided with:

- Electronic file information (server and project number)
- *Author Guidelines for SHRP2 Reports*
- Internal FTP site link
- External secure FTP site link