STATE OF MINNESOTA
WORK ORDER CONTRACT

Project Identification: Traffic Flow, Road User and Business Impacts of the Collapse of the I-35W Bridge over the Mississippi River

This Work Order Contract is issued under the authority of State of Minnesota, Department of Transportation (Mn/DOT) Contract No. 89261 between the state of Minnesota acting through its Commissioner of Transportation ("Mn/DOT") and Regents of the University of Minnesota, Address: Office of Sponsored Projects Administration, 450 McNamara Alumni Center, 200 Oak Street Southeast, Minneapolis, Minnesota 55455 ("University") and is subject to all applicable provisions and covenants of that Master Contract, which are incorporated herein by reference.

The University will furnish all products and perform all services defined in the Article 2, Scope of Work and Deliverables.

Work Order Contract

1 Term of Work Order Contract:
   1.1 Effective Date: The date that all required signatures are obtained by Mn/DOT, pursuant to Minnesota Statutes Section 16C.05, subdivision 2. The University must not begin work under this Work Order Contract until all required signatures have been obtained and the University has been notified, in writing, to begin such work by Mn/DOT’s Authorized Representative.
   1.2 Final Task Completion Date: July 31, 2010, as outlined in Exhibit A, Project Schedule.
   1.3 Expiration Date: September 30, 2010, or when all obligations have been satisfactorily fulfilled, which ever occurs first.
   1.4 Exhibits: Exhibits A through D are attached and incorporated into this Work Order Contract.

2 Scope of Work and Deliverables:
   2.1 This entire scope of work falls under Activity Code 6265.
   2.2 The University, who is not a state employee, will complete the work described in Exhibit A.
   2.3 For research Contracts, the University will follow the Technical Advisory Panel (TAP) Guidelines in the completion of this Work Order Contract, which can be found at the following website: http://www.research.dot.state.mn.us/tap/TAPGuidelines.pdf.
   2.4 Deliverables are the work products created or supplied by the University pursuant to the terms of this Work Order Contract. Deliverables to be provided for under this Work Order Contract by the University are described in Exhibit A.

3 Items Provided and/or Completed by Mn/DOT:
   3.1 After authorizing the University to begin work, Mn/DOT will furnish any data or material in its possession relating to the project that may be of use to the University in performing the work.
   3.2 All such data furnished to the University, will remain the property of Mn/DOT and will be promptly returned upon Mn/DOT’s request or upon the expiration or termination of this Work Order Contract.
   3.3 The University will analyze all such data furnished by Mn/DOT. If the University finds any such data to be incorrect or incomplete, the University will bring the facts to the attention of Mn/DOT before proceeding with the part of the project affected. Mn/DOT will investigate the matter, and if it finds that such data is incorrect or incomplete, it will promptly determine a method for furnishing corrected data. Delay in furnishing data will not be considered justification for an adjustment in compensation.
   3.4 See Exhibit A for additional information on Mn/DOT’s Assistance.
4 Consideration of Payment:

4.1 Mn/DOT will pay for all services performed by the University on a Lump Sum basis. The University will submit
Invoices for tasks completed after receipt of the Deliverable Approval Form from Mn/DOT.

4.2 See Exhibit B for the approved budget for this Work Order Contract.

4.3 The University must use the “Request for Mn/DOT Travel Authorization” form set forth in Exhibit C when
requesting to incur travel costs under this Work Order Contract.

4.4 The University will submit invoices for payment in accordance with the following schedule and in the
corresponding amounts:

<table>
<thead>
<tr>
<th>Task Completion</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Completion of Task 1:</td>
<td>$9,023.00</td>
</tr>
<tr>
<td>At Completion of Task 2:</td>
<td>$120,301.00</td>
</tr>
<tr>
<td>At Completion of Task 3:</td>
<td>$60,151.00</td>
</tr>
<tr>
<td>At Completion of Task 4:</td>
<td>$6,015.00</td>
</tr>
<tr>
<td>At Completion of Task 5:</td>
<td>$4,010.00</td>
</tr>
<tr>
<td>At Completion of Task 6:</td>
<td>$1,002.00</td>
</tr>
</tbody>
</table>

4.5 Mn/DOT's total obligation for all compensation and reimbursements to the University will be $200,502.00.

5 Terms of Payment:

5.1 The University will use the format set forth in Exhibit D when submitting Invoices.

5.2 The University will submit an original invoice to Mn/DOT's Authorized Representative listed below and a copy
of the invoice to Ann McLeLLan, Research Services Section, Mail Stop 330, 395 John Ireland Boulevard, St. Paul,
Minnesota 55155, or their successors.

6 The University’s Designated Personnel:

6.1 The University's Principal Investigator for this Work Order Contract will be:

Name: David Levinson, Associate Professor
Address: University of Minnesota
Department of Civil Engineering, Room 138 CivE
500 Pillsbury Drive Southeast, Minneapolis, Minnesota 55455
Phone: 612-625-6354
Fax: 612-626-7750
E-Mail: levin031@umn.edu

6.2 The University’s Co-Principal Investigator for this Work Order Contract will be:

Name: Henry Liu, Assistant Professor
Address: University of Minnesota
Department of Civil Engineering, 122 CivE
500 Pillsbury Drive Southeast, Minneapolis, Minnesota 55455
Phone: 612-625-6347
E-Mail: henryliu@umn.edu

7 Other Designated Personnel:

7.1 Mn/DOT’s Technical Liaison for this Work Order Contract will be:

Name: Rabinder Bains, Economic Policy Analyst (or his/her successor)
Address: Minnesota Department of Transportation
Office of Investment Management, Mail Stop 440
395 John Ireland Boulevard, St. Paul, Minnesota 55155-1899
Phone: 651-366-3732
Fax: 651-366-3790
E-Mail: rabinder.bains@dot.state.mn.us
7.2 Mn/DOT’s Administrative Liaison for this Work Order Contract will be:
Name: Alan Rindels, Senior Engineer (or his/her successor)
Address: Minnesota Department of Transportation
Research Services Section, Mail Stop 330
395 John Ireland Boulevard, St. Paul, Minnesota 55155-1899
Phone: 651-366-3779
Fax: 651-366-3789
E-Mail: alan.rindels@dot.state.mn.us

7.3 Mn/DOT’s Authorized Representative for this Work Order Contract will be:
Name: Ashley Duran, Contract Administrator (or his/her successor)
Address: Minnesota Department of Transportation
Consultant Services Section, Mail Stop 680
395 John Ireland Boulevard, St. Paul, Minnesota 55155-1899
Phone: 651-366-4627
Fax: 651-366-4770
E-Mail: ashley.duran@dot.state.mn.us

8 Additional Provisions
NONE

STATE ENCUMBRANCE VERIFICATION
Individual certifies that funds have been encumbered as required by Minn. Stat. 16A.15 and HCC.05
By: [Signature]
Date: 6/11/08
CFMS Contract No.: B15523

DEPARTMENT OF TRANSPORTATION
(with delegated authority)
By: [Signature]
Title: Director, Research Services Section
Date: 6/10/08

UNIVERSITY OF MINNESOTA
By: [Signature]
Title: Assoc. V.P. for Research
Date: 6/10/08

COMMISSIONER OF ADMINISTRATION
By: [Signature]
Date: 6/12/08
EXHIBIT A
SCOPE OF SERVICES

TRAFFIC FLOW, ROAD USER AND BUSINESS IMPACTS OF THE COLLAPSE OF THE I-35W BRIDGE OVER THE MISSISSIPPI RIVER

BACKGROUND
There is little or no available background information pertinent to this research, as this project was designed in response to the unusual circumstances presented by the bridge collapse.

OBJECTIVE
The problem to be addressed in this research project is to understand how travelers’ behavior and the performance of transportation networks have evolved in response to a major disruption. This includes understanding how travelers’ choices (e.g. route, mode, destination, departure time, decision to telecommute) were exercised during the bridge closure and again after the reopening, and also how flows on the transportation network evolved (or did not) toward equilibrium. As a result of this research, it is expected to have a fuller understanding of how individuals respond to major disruptions in their daily travel patterns. This result could guide future decisions regarding the choices of whether to close a highway link entirely during a major construction project or to leave it partially open to traffic.

SCOPE
The scope of the project work includes the collection of data related to travel behavior responses to the bridge collapse. As outlined previously, this involves the collection of Global Positioning System (GPS) based location data from a sample of instrumented vehicles, in addition to paper and electronic surveys, designed to infer travelers’ decisions about travel mode, departure time, route choice and other key dimensions of travel behavior. Participants, whose ages will range from 25-65, will be recruited using flyers and postings on electronic bulletin boards serving residents in the Twin Cities. The participant sample will be representative of the Twin Cities commuting public who travel in corridors affected by the I-35W Bridge Collapse (i.e. they either use the bridge or use a route that is a detour for the bridge). These data will be used in later stages to summarize the impacts of the bridge closure on transportation system performance and to understand whether travel behavior adjustments made during the bridge closure remain permanent or revert back to pre-collapse conditions. Observed changes in traffic flows, along with model-based estimates, will be used to produce an estimate of road user costs resulting from the bridge collapse.

Mn/DOT ASSISTANCE
This project will require assistance from Mn/DOT staff in obtaining highway traffic flow data and up-to-date information on construction schedules for the new I-35W Bridge.

WORK PLAN

Task 1: Research Synthesis
Researchers will prepare a synthesis of research relating to major planned and unplanned disruptions to transportation networks. In addition to cases of bridge failure, unplanned disruptions might include earthquakes or transit strikes. Planned disruptions might include major bridge or freeway closings or other major planned events, such as hosting of the Olympic Games. The synthesis should focus on the methods of data collection and analysis employed (e.g. survey instruments and modeling approaches, if used), along with the types of transportation-related impacts observed.

Deliverable(s): 10-15 Page Research Synthesis; Matrix of Analysis Tasks and Research Products, submitted early on in the task, which will guide the development of the data collection and data analysis phase of this research project

Duration: 1 Month
Estimated Task Completion Date: July 31, 2008

Task 2: Travel Behavior Survey and GPS Data Collection
The data collection phase will contain the bulk of the project work. During this task, researchers will administer three types of data collection efforts: 1) Collection of GPS tracking data, report generation and associated user surveys, 2) Collection of paper and internet-based survey data gauging travel behavior in the post-bridge reconstruction phase, and 3) Collection of other aggregate data relating to freeway and arterial traffic flows, traffic control and transit ridership. Interim meetings will be scheduled to discuss the format of the travel behavior survey instrument, as well as the preliminary findings from the survey and the GPS data collection efforts. The survey instruments involved in this task must be distributed in a timely manner, so as to capture the travel choices made during the appropriate frame of reference (e.g. before vs. after bridge reconstruction).

Delivery(s): Short Report, describing data collection procedures and relation to overall research methodology; Presentations, submitted at key points in project development to discuss the travel behavior survey and preliminary findings from the survey and GPS data collection efforts; Periodic Updates, to the Administrative and Technical Liaisons, made in order to track project status and answer any questions that arise in the course of project development

Duration: 18 Months

Estimated Task Completion Date: December 31, 2009

Task 3: Data Analysis
Following collection of the various aggregate and disaggregate data sets, analysis of the travel behavior and traffic flow elements of the bridge collapse and reconstruction will be carried out. As outlined in the Summary of Research Methodology section, this generally involves summarizing the travel behavior impacts of the bridge closure and its eventual reconstruction, modeling flows on the transportation network with an without the I-35W Bridge link the determine the amount of diversion in terms of road and use costs.

The researchers will schedule interim meetings to discuss preliminary survey findings and GPS data.

Delivery(s): Task Report, describing the results of analysis; Presentations, scheduled to report survey results and GPS data summaries before and after bridge reconstruction is complete; Periodic Updates, to the Administrative and Technical Liaisons, made in order to track project status and answer any questions that arise in the course of project development

Duration: 18 Months

Estimated Task Completion Date: February 28, 2010

Task 4: Draft Final Report Preparation
The University will prepare a draft final report, following Mn/DOT’s publication guidelines, to document project activities, findings and recommendations. The University will submit this report through the publication process for technical and editorial review.

Delivery(s): Draft Final Report

Duration: 1 Month

Estimated Task Completion Date: March 31, 2010
Task 5: Final Report Completion
The University will incorporate the technical and editorial review comments from the review process into the document, as appropriate. The University will consult the reviewers for clarification or discussion of comments. The University will prepare the final report and submit it for publication.

**Deliverable(s):** Final Report

**Duration:** 4 Months

**Estimated Task Completion Date:** July 31, 2010

Task 6: Project Organization
The researchers will be responsible for various organizational tasks during the course of this project. These may potentially include: preparation and submittal of meeting minutes, meeting agendas and organization of project-related meetings.

Since this task will apply to all meetings, it’s duration will cover the full amount of time allocated to this project.

**Deliverable(s):** Meeting Minutes, from each meeting of the project’s Technical Advisory Panel

**Duration:** 25 Months

**Estimated Task Completion Date:** July 31, 2010

### PROJECT SCHEDULE

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EXHIBIT B
ESTIMATED BUDGET

TRAFFIC FLOW, ROAD USER AND BUSINESS IMPACTS OF THE COLLAPSE OF THE I-35W BRIDGE
OVER THE MISSISSIPPI RIVER

BUDGET BY LINE ITEM:

Salary Costs: $64,787.00
Principal Investigator $ 17,448.00
Co-Principal Investigator $ 3,909.00
Co-Investigator $ 12,698.00
Research Associate $ 2,708.00
Research Assistant $ 28,024.00

Fringe Costs: $25,582.00
Principal Investigator $ 5,304.00
Co-Principal Investigator $ 1,203.00
Co-Investigator $ 3,866.00
Research Associate $ 823.00
Research Assistant $ 14,386.00

Subcontractor Costs: $100,000.00
Vehicle Monitoring Technologies, Inc. $ 100,000.00

Supply Costs: $630.00
Miscellaneous Supplies $ 630.00

Travel Costs: $2,000.00
To Annual Conferences $ 2,000.00

Other Expense Costs: $7,503.00
Printing/Duplicating/Photocopy $ 1,000.00
Postage $ 1,000.00
Mailing $ 503.00
Recruitment and Retention of Subjects $ 5,000.00

WORK ORDER CONTRACT AMOUNT $200,502.00

Budget by Task Breakdown:

Task 1 $ 9,023.00
Task 2 $120,301.00
Task 3 $ 60,151.00
Task 4 $ 6,015.00
Task 5 $ 4,010.00
Task 6 $ 1,002.00

Work Order Contract Amount $200,502.00

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REQUEST FOR Mn/DOT TRAVEL AUTHORIZATION

NOTE: Submit, in duplicate, to your university sponsored programs administration for approval. Mn/DOT must receive at least 2 weeks prior to travel date.

TO: Research Financial Services Manager
    Minnesota Department of Transportation
    395 John Ireland Boulevard, Mail Stop 330
    St. Paul, Minnesota 55155-1899

Date: ______________________

Mn/DOT Contract Number: ______________ Work Order Number: ______________

University Acct. Number: ______________

Project Title: ______________________

Principal Investigator(s): ______________________

Name(s) of Project Personnel Traveling: ______________________

Connection to Project: ______________________

Total Estimated Expense: ______________ Date(s) of Travel: ______________

Destination: ______________________

Purpose of Travel: ______________________

Benefit of Travel to Project: ______________________

I hereby request approval for travel as described above:

________________________________________
Principal Investigator

Approved:

Mn/DOT Authorized Official

________________________________________
Authorized University Official

________________________________________
Research Services Section

Date: ______________________

________________________________________
Date: ______________________
EXHIBIT D
INVOICE FORM

TRAFFIC FLOW, ROAD USER AND BUSINESS IMPACTS OF THE COLLAPSE OF THE I-35W BRIDGE OVER THE MISSISSIPPI RIVER

INVOICE NO. 

Mn/DOT Contract No. 89261 Work Order No. 102
Expiration Date: September 30, 2010
Billing Quarter: 
Invoice Date: 

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<th>Lump Sum Amount: Task 1</th>
<th>Total Contract Amount</th>
<th>Total Billing to Date</th>
<th>Amount Previously Billed</th>
<th>Billed This Invoice</th>
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<tr>
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<td>$9,023.00</td>
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<tr>
<td>Lump Sum Amount: Task 6</td>
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<td>$1,002.00</td>
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<td><strong>$200,502.00</strong></td>
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Total Amount Due This Invoice:

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**Box For Research Services Section Use Only**

Payment Breakdown

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<th>Line</th>
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</tbody>
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I certify that the above statement is correct and payment has not been received.

Signature: ____________________________
Print Name: __________________________
Title: ________________________________
Billing Address: ______________________
Telephone: __________________________

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Mn/DOT’s Research Services Section Approval:
Signature ___________ Date ____________

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Mn/DOT’s Authorized Representative Approval:
Signature ___________ Date ____________