



# Research Project Work Plan

<b>Project Title:</b>	<b>National Accessibility Evaluation</b>
<b>*MnDOT or LRRB Need Statement Number:</b>	
<b>*LRRB Knowledge Building Priority Number:</b>	<i>(if applicable)</i>
<b>Year 2:</b>	<b>\$377,500</b>
<b>Year 1:</b>	<b>\$435,000</b>
<b>Total Project Budget:</b>	<b>\$812,500</b>
<b>Year 2:</b>	<b>12 months</b>
<b>Year 1:</b>	<b>12 months</b>
<b>Total Project Duration:</b>	<b>24 months</b>
<b>Public Agency Champion (state, county, city, or township employee):</b>	<b>Deanna Belden (MnDOT)</b>
<b>Key Words (for cataloging):</b>	<b>accessibility</b>
<b>Date Submitted:</b>	<b>June 7, 2016</b>

## 1. Project Team:

- Principal Investigator:**  
 Name: Andrew Owen  
 Position Title: Senior Research Fellow  
 Organization/University: University of Minnesota  
 Phone: 612-624-7550  
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- Co-Investigator (if applicable):**  
 Name: David Levinson  
 Position Title: Professor  
 Organization/University: University of Minnesota  
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## 2. Proposal Summary (Abstract) and Objective(s):

This project has two main objectives. First, it will create a new, national Census block-level accessibility dataset that can be used by partners in local transportation system evaluation, performance management, planning, and research efforts. Second, it will produce and publish a series of annual reports describing accessibility to jobs by driving and by transit in metropolitan areas across America.

### Accessibility Dataset

This project will create a national Census-block level dataset describing accessibility to jobs from locations across the country, updated annually. Accessibility calculations will rely on detailed travel time calculations for both driving and transit, which will be implemented using commercially-available, GPS-based speed measurements and published transit schedules. Each Access Across America partner will have direct digital access to the accessibility datasets covering the jurisdictions of all partners. The data format will be such that the dataset can be easily accessed using popular software available on office computers.

### Annual Report



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The annual Access Across America report will provide summaries of the detailed accessibility datasets for the 50 largest metropolitan areas across America. This report will be released to national and local media outlets and supported by publicity and communications efforts. Partners will be recognized in the report for their sponsorship and support.

### 3. Potential Benefits, Users, and Implementation Opportunities:

Accessibility evaluation has applications in a variety of areas:

- Performance Management - Accessibility evaluation can directly measure a fundamental goal of transportation: connecting people to useful destinations. By tracking accessibility over time, transportation agencies at all levels of government can better understand how well their transportation networks support this goal. Accessibility evaluation can be applied to MAP-21 performance goals related to congestion, reliability, and sustainability. The reports produced by Task 4 of this project will track accessibility performance each year, and over time as the project progresses. Project partners can share the datasets produced by Task 3 of this project without restriction, including (for example) with municipal and county transportation departments.
- Scenario Evaluation and Analysis - Because they incorporate land use information, accessibility metrics can provide a more comprehensive picture of how investments will change users' ability to reach destinations. Transportation planning organization can use accessibility evaluation to help select between project alternatives and to prioritize investments. For example, a highway investment proposal could be evaluated by analyzing the current accessibility with the projected accessibility after the improvement. The datasets produced by Task 3 of this project will provide an annually-updated baseline dataset against which project proposals can be compared.
- Transportation and Land Use Research - Accessibility calculations can provide a valuable data source for transportation and land use research. Researchers at the University of Minnesota have employed accessibility in models of mode choice and other aspects of travel behavior, linked accessibility to residential property values, and used accessibility to explore the spatial relationship between jobs and worker locations. Project partners can share the datasets produced by Task 3 of this project with consultants and researchers as a component of contracted projects.
- Transportation Equity - Detailed accessibility evaluation can help reveal how the costs and benefits of transportation investments are distributed over space and society. Understanding the accessibility characteristics of different origins and destinations can help agencies make equitable decisions in transportation planning. The reports produced in Task 4 of this project will highlight spatial clusters of high and low accessibility changes. The datasets produced in Task 3 of this project can be used in equity analysis of accessibility and accessibility changes.

### 4. Summary of Research Methodology (Scope):

We undertake transportation projects to provide connectivity — the ability for people or things to physically travel — between locations, or to lower travel times where connectivity already exists. As long-term infrastructure investments, transportation systems are not built to satisfy individual trips at specific times, but rather to provide capacity that can be used to satisfy a huge variety of potential trips over the system's lifetime. This potential for interaction can be regarded as the fundamental product of transportation systems. Accessibility metrics directly reflect this potential by combining network travel times with the locations and value of the many origins and destinations served by a multimodal transportation system. Accessibility combines the simpler concept of mobility with an understanding that travel is driven by a desire to reach destinations.

This project will implement a measurement of accessibility to jobs across the entire U.S. For every



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Census block, it will calculate the number of jobs that can be reached, by driving or by transit, within various travel time thresholds. For example, from a given Census block it may be possible to reach 150,000 jobs by driving within 20 minutes, or to reach 75,000 jobs by transit within 30 minutes. This detailed dataset will be available to project partners, and an annual report will summarize the accessibility dataset for metropolitan areas across the country.

This project is comprised of the following major tasks on an annual basis:

1. Establish Technical Advisory Panel - Each project partner will be invited to nominate a representative to the TAP. The TAP's role will be to review the project's implementation to ensure that the project outputs will be useful to all partners, and to guide the project's evolution in response to potential advancements in data sources and evaluation methodology. TAP membership will be reviewed annually.
2. TAP Review of Project Methodology - The TAP will meet annually to review and comment on project methodology. TAP meetings will be scheduled and located to coincide with relevant conferences or professional meetings (such as AASHTO committee annual meetings or the annual TRB meeting). Teleconferencing participation options will also be provided.
3. Collect Input Datasets - Input datasets will be updated annually to reflect the most recent state of transportation and land use systems
4. Calculate Accessibility Dataset - Each year, accessibility data will be calculated using travel times and land use patterns for the trailing 12-month period.
5. Share the resulting/output dataset from the calculations with partner agencies.
6. Prepare and Publish Access Across America Report - The annual report will summarize the most recent accessibility dataset and comment on trends over the duration of the project.

## 5. Tasks Descriptions, Durations, Scheduled Dates, and Key Milestones:

**Task 1.1:** Communications and Technical Advisory Panel Management – Year 1 (complete)

**Task 1.2:** Communications and Technical Advisory Panel Management

**Description:** Each year, the University of Minnesota Center for Transportation Studies will maintain and update the Accessibility Observatory website and discussion list, publish research reports and summaries based on the products of Task 4, coordinate media relations for two campaigns (online media kit, press releases, e-mail announcements, social media posts), and arrange for quarterly meetings (three conference calls and one in-person meeting held each year) of the technical advisory panel (TAP). CTS will maintain a TAP membership list, invite TAP members to the meetings, develop meeting agendas, and distribute minutes of the meetings. CTS will also assist with the preparation of quarterly reports that will be presented at each TAP meeting. This budget does not include travel expenses for TAP members.

**Anticipated Start Date:** Jul 1, 2016

**Scheduled date to submit draft deliverable:** Apr 30, 2017

**Scheduled date for final task approval:** Jun 30, 2017

**Duration:** 12 months including the TAP review and comment period

**Deliverable:** Summary of all communications and Technical Advisory Panel activities for each year.

**Task 2.1:** Collect Input Datasets – Year 1 (complete)

**Task 2.2:** Collect Input Datasets – Year 2



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**Description:** The research team will collect up-to-date network and speed datasets describing the road and transit transportation networks in the study area, as well as destination counts at the block level or smaller resolution. The project team will coordinate with project partners to identify areas where transit schedule or other data are not available from local providers, and to encourage publication of missing data. The project team may offer limited assistance with creating or publishing missing data.

**Anticipated Start Date:** Jul 1, 2016

**Scheduled date to submit draft deliverable:** July 31, 2016

**Scheduled date for final task approval:** Sep 30, 2016

**Duration:** 3 months including the TAP review and comment period

**Deliverable:** Summary report of datasets collected.

## **Task 3.1:** Calculate Accessibility Datasets – Year 1

**Description:** The research team will calculate accessibility datasets using travel times and land use data collected in Task 2.1 to represent typical conditions in the previous calendar year.

**Anticipated Start Date:** Sep 1, 2015

**Scheduled date to submit draft deliverable:** Aug 31, 2016

**Scheduled date for final task approval:** Oct 31, 2016

**Duration:** 12 months including the TAP review and comment period

**Deliverable:** Accessibility datasets delivered to project partners.

## **Task 3.2:** Calculate Accessibility Datasets – Year 2

**Description:** The research team will calculate accessibility datasets using travel times and land use data collected in Task 2.2 to represent typical conditions in the previous calendar year.

**Anticipated Start Date:** Sep 1, 2016

**Scheduled date to submit draft deliverable:** Oct 31, 2016

**Scheduled date for final task approval:** Dec 31, 2016

**Duration:** 4 months including the TAP review and comment period

**Deliverable:** Accessibility datasets delivered to project partners.

## **Task 4.1:** Prepare Accessibility Reports – Year 1

**Description:** The research team will prepare reports summarizing and describing accessibility patterns in the jurisdictions of each project partner, as well as a single national “Access Across America” report for each mode. The research team will provide the participating agencies a copy of the national reports at least two weeks in advance of their being released to the public. Local reports will be delivered directly to project partners, and the national report will be published and publicized to national media outlets.

**Anticipated Start Date:** Nov 1, 2015

**Scheduled date to submit draft deliverable:** Aug 31, 2016

**Scheduled date for final task approval:** Oct 31, 2016

**Duration:** 12 months including the TAP review and comment period

**Deliverable:** National “Access Across America” reports; local reports for each project partner.

## **Task 4.2:** Prepare Accessibility Reports – Year 2

**Description:** The research team will prepare reports summarizing and describing accessibility patterns in the jurisdictions of each project partner, as well as a single national “Access Across America” report for each mode. The research team will provide the participating agencies a copy of the national reports at least two weeks in advance of their being released to the



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public. Local reports will be delivered directly to project partners, and the national report will be published and publicized to national media outlets.

**Anticipated Start Date:** Nov 1, 2016

**Scheduled date to submit draft deliverable:** Dec 31, 2016

**Scheduled date for final task approval:** Feb 28, 2017

**Duration:** 4 months including the TAP review and comment period

**Deliverable:** National “Access Across America” reports; local reports for each project partner.

## Task 5.1: TAP Review of Results and Methodology – Year 1

**Description:** After each year’s data and report publication is complete, the project TAP will meet to review and comment on project methodology and scope. The research team will collect feedback from the TAP members, with a focus on continually improving the data, reporting, usefulness, and scope of the project. TAP members will have an opportunity to share local experiences in the use of accessibility data. This TAP meeting will be scheduled and located to coincide with relevant conferences or professional meetings (such as AASHTO committee annual meetings or the annual TRB meeting). Teleconferencing participation options will also be provided.

**Anticipated Start Date:** Feb 1, 2016

**Scheduled date to submit draft deliverable:** Aug 31, 2016

**Scheduled date for final task approval:** Oct 31, 2016

**Duration:** 9 months including the TAP review and comment period

**Deliverable:** TAP meeting minutes and proposed enhancements for next data/reporting update

## Task 5.2: TAP Review of Results and Methodology – Year 2

**Description:** After each year’s data and report publication is complete, the project TAP will meet to review and comment on project methodology and scope. The research team will collect feedback from the TAP members, with a focus on continually improving the data, reporting, usefulness, and scope of the project. TAP members will have an opportunity to share local experiences in the use of accessibility data. This TAP meeting will be scheduled and located to coincide with relevant conferences or professional meetings (such as AASHTO committee annual meetings or the annual TRB meeting). Teleconferencing participation options will also be provided.

**Anticipated Start Date:** Feb 1, 2017

**Scheduled date to submit draft deliverable:** Feb 28, 2017

**Scheduled date for final task approval:** Mar 31, 2017

**Duration:** 2 months including the TAP review and comment period

**Deliverable:** TAP meeting minutes and proposed enhancements for next data/reporting update

## Task 6.1: Compile Report, Technical Advisory Panel Review and Revisions – Year 1

**Description:** A draft report will be prepared, following MnDOT publication guidelines, to document project activities, findings and recommendations, potential implementation opportunities, illustrative projects, and benefits to participating agencies. This report will need to be reviewed by the Technical Advisory Panel (TAP), updated by the Principal Investigator to incorporate technical comments, and then approved by Technical Liaison before this task is considered complete. The draft report and comments will be reviewed and discussed at the appropriate quarterly TAP meeting, held via teleconference (or at the annual in-person TAP meeting if scheduling allows). TAP members may be consulted for clarification or discussion of comments.





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**Anticipated Start Date:** Mar 1, 2016

**Scheduled Date to Submit Draft Report:** Aug 31, 2016

**Schedule Date for Final Report Approval:** Oct 31, 2016

**Duration:** 8 months

**Deliverables:** A Draft Report and Final Report Approved for Publication and presentation slides

## **Task 6.2:** Compile Report, Technical Advisory Panel Review and Revisions – Year 2

**Description:** A draft report will be prepared, following MnDOT publication guidelines, to document project activities, findings and recommendations, potential implementation opportunities, illustrative projects, and benefits to participating agencies. This report will need to be reviewed by the Technical Advisory Panel (TAP), updated by the Principal Investigator to incorporate technical comments, and then approved by Technical Liaison before this task is considered complete. The draft report and comments will be reviewed and discussed at the appropriate quarterly TAP meeting, held via teleconference (or at the annual in-person TAP meeting if scheduling allows). TAP members may be consulted for clarification or discussion of comments.

**Anticipated Start Date:** Mar 1, 2017

**Scheduled Date to Submit Draft Report:** Mar 31, 2017

**Schedule Date for Final Report Approval:** May 31, 2017

**Duration:** 3 months

**Deliverables:** A Draft Report and Final Report Approved for Publication and presentation slides

## **Task 7.1:** Editorial Review and Publication of Final Report – Year 1

**Description:** During this task the Approved Report will be processed by MnDOT's Contract Editors. The editors will review the document to ensure it meets the publication standard. This task must be completed within the Contract time because the editors will provide editorial comments and request information from the Principal Investigator.

**Scheduled Start Date:** Sept 30, 2016

**Scheduled End Date:** Nov 30, 2016

**Duration:** 2 months (required)

**Deliverables:** Final Published Report and presentation slides

## **Task 7.2:** Editorial Review and Publication of Final Report – Year 2

**Description:** During this task the Approved Report will be processed by MnDOT's Contract Editors. The editors will review the document to ensure it meets the publication standard. This task must be completed within the Contract time because the editors will provide editorial comments and request information from the Principal Investigator.

**Scheduled Start Date:** May 1, 2017

**Scheduled End Date:** Jun 30, 2017

**Duration:** 2 months (required)

**Deliverables:** Final Published Report and presentation slides

## **(Task 8 was not included in Year 1)**

### **Task 8.2:** Identify and Implement Annual Project Enhancements – Year 2

**Description:** In consultation with the TAP, the project team will identify opportunities to enhance the project by improving existing deliverables or adding new deliverables. The project team will implement these enhancements over the course of each project year, beginning in year 2.



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**Anticipated Start Date:** July 1, 2016

**Scheduled date to submit draft deliverable:** Feb 28, 2017

**Scheduled date for final task approval:** Apr 30, 2017

**Duration:** 10 months including the TAP review and comment period

**Deliverable:** Project enhancements and a report summarizing their development and results.

## Key Milestones:

Key Milestones	Target Date	Description
1. TAP kickoff meeting	July 2015	Review project goals, data sources, and deliverables, set tentative quarterly TAP update schedule
2. Year 1 TAP review meeting	January 2016	TAP meeting to review annual data and reports; share local data use experiences; identify project enhancements for next annual data/report update
3. Year 2 kickoff meeting	July 2016	Review project goals, data sources, and deliverables; set tentative quarterly TAP update schedule
4. Year 2 TAP review meeting	January 2017	TAP meeting to review annual data and reports; share local data use experiences; identify project enhancements for next annual data/report update

6. **Budget Details:**  
(See attached spreadsheet)

## 7. Budget Justification

Travel: Estimated 4 trips per year to meet with project partners, develop new partners, and present project progress and results at professional and academic conferences. Travel to TAP annual meetings. US destinations TBD.

Computing services: lease of cloud computing resources from Amazon Web Services (or similar) to calculate accessibility data and store results. Subscription to MapBox to generate and display maps for reports and for the website.

Computer workstation/server: data storage for input datasets and national-scope geospatial data for creating reports and maps. Annual storage upgrades and expansions as necessary. Located in UMN CECE department.

## 8. Overview of Project Schedule and Budget:



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#Months	Year'1												Year'2												Budget	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun		
Task'1.1	X	X	X	X	X	X	X	X	X	X	X	X													\$39,160	
Task'2.1	X	X	X																						\$137,384	
Task'3.1			X	X	X	X	X	X	X	X	X	X	X	X	X	X									\$55,384	
Task'4.1					X	X	X	X	X	X	X	X	X	X	X	X									\$73,845	
Task'5.1								X	X	X	X	X	X	X	X	X									\$36,922	
Task'6.1									X	X	X	X	X	X	X	X									\$55,384	
Task'7.1											X	X	X	X	X	X	X								\$36,921	
Task'1.2													X	X	X	X	X	X	X	X	X	X	X	X	\$33,880	
Task'2.2													X	X	X										\$131,459	
Task'3.2															X	X	X	X							\$33,946	
Task'4.2																	X	X	X	X						\$33,946
Task'5.2																			X	X						\$16,973
Task'6.2																				X	X	X			\$25,459	
Task'7.2																						X	X		\$16,973	
Task'8.2													X	X	X	X	X	X	X	X	X	X			\$84,864	
																									TOTAL	\$812,500

### 9. Fiscal Year Funding Split:

Fiscal Year	Timeframe	List tasks according to scheduled completion dates	Budget
FY16	7/1/2015 – 6/30/2016	2.1	\$137,384
FY17	7/1/2016 – 6/30/2017	1.1, 1.2, 2.2, 3.1, 3.2, 4.1, 4.2, 5.1, 5.2, 6.1, 6.2, 7.1, 7.2, 8.2	\$675,116
<b>TOTAL</b>			<b>\$812,500</b>

### 10. Administrative Requirements:

A work order will be issued under the terms and conditions of the Master Contract between the State of Minnesota and the University. The proposal submitted to MnDOT must comply with the terms and conditions of the Master Contract. It is understood that PIs, through the University Authorized Representative for the Master Contract, are aware of the Master Contract requirements for budgeting, quarterly progress reporting, final deliverables, invoicing, reimbursement of travel expenses and payments. A copy of the Master Contract can be obtained from your Office of the Sponsored Projects or Program Administration or from your contracting office.

For the Minnesota State College and University System – a work order will be issued under the terms and conditions of the Interagency Agreement between MnDOT and the University.

In addition, it is expected that the PIs will make themselves available to meet with MnDOT Research Services staff, if necessary, to formally review the project progress on semi-annual basis. In most cases this will occur if the project falls behind schedule. PIs shall prepare necessary documentation and information to facilitate meaningful project reviews.

### 11. Matching Funds, In-Kind or other Contributions:

None.





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## **12. Intellectual Property/Trade Secret Information:**

None.

## **13. Agency Assistance (MnDOT or other):**

This project includes a subaward to TomTom North America, Inc. TomTom will collect and process GPS-based speed data for use in calculating accessibility by auto.

## **14. References:**

Owen, A. and Levinson, D. (2012). Annual accessibility measure for the Twin Cities metropolitan area. Technical Report 2012-34, Minnesota Department of Transportation.

Owen, A. and Levinson, D. (in press). Modeling the commute mode share of transit using continuous accessibility to jobs. Transportation Research Part A.

Owen, A. and Levinson, D. (2014). Access across America: Transit 2014 (CTS Report 14-11). University of Minnesota Center for Transportation Studies.

Owen, A. and Levinson, D. (2014). Access across America: Transit 2014 methodology (CTS Report 14-12). University of Minnesota Center for Transportation Studies.

<b>Year 2 Budget</b>		
<b>BUDGET BY LINE ITEM</b>	<b>DESCRIPTION</b>	<b>Budget</b>
<b>Salaries</b>		
Andrew Owen, Senior Research Fellow	Principal investigator. 75% effort.	\$ 55,865
David Levinson, Professor	Co-investigator. 10% effort.	\$ 12,264
Brendan Murphy, Researcher	Software development, data collection, data analysis. 80% effort.	\$ 46,680
Graduate Research Assistant	Data collection, data analysis, report preparation. 50% effort.	\$ 25,709
Undergraduate Research Assistant	Data collection, report preparation. 1260 hours.	\$ 16,380
<b>CTS Salaries</b>		
Leadership & Management		\$ 14,613
Project Delivery & Coordination		\$ 2,300
Communications & Information		\$ 3,794
Contract Admin & Support		\$ 964
Undergraduate Student		\$ 870
<b>Fringe Benefits</b>		
Andrew Owen	Fringe rate: 31.8%	\$ 17,765
David Levinson	Fringe rate: 31.8%	\$ 3,900
Brendan Murphy	Fringe rate: 27.4%	\$ 12,790
Graduate Research Assistant	Fringe rate: 74.4% (includes tuition during academic year)	\$ 19,118
<b>CTS Fringe Benefits</b>		
Leadership & Management		\$ 4,647
Project Delivery & Coordination		\$ 600
Communications & Information		\$ 990
Contract Admin & Support		\$ 252
Undergraduate Student		\$ -
<b>Non-Salary</b>		
Equipment		
Supplies		
Computing services	Cloud computing - Amazon EC2 or similar	\$ 20,000
Computer workstation/server	Software development, data processing, data storage	\$ 1,800
Refreshments or supplies	Refreshments for annual meetings	\$ 850
License speed data (CA)	Licensed from commercial vendor	\$ 15,000
License speed data (FL)	Licensed from commercial vendor	\$ 15,000
License speed data (IA)	Licensed from commercial vendor	\$ 10,000

License speed data (MN)	Licensed from commercial vendor	\$ 10,000
License speed data (NC)	Licensed from commercial vendor	\$ 12,000
License speed data (VA)	Licensed from commercial vendor	\$ 12,000
License speed data (AR)	Licensed from commercial vendor	\$ 10,000
License speed data (MD)	Licensed from commercial vendor	\$ 10,000
License speed data (WA)	Licensed from commercial vendor	\$ 12,000
Presentation materials		\$ 349
Travel (mileage & hotel)		
~4 trips (airfare/hotel)	Meet with project partners, develop new partnews, present project progress and results	\$ 5,000
~1 trip/year (airfare/hotel)	CTS staff travel to annual TAP meetings	\$ 1,700
Other		
Services		\$ 500
Telecommunications		\$ 300
Room rentals/leases		\$ 1,500
<b>Total Direct Costs</b>		\$ 377,500
<b>Indirect Costs</b>	Indirect Cost Rate: 0%	\$ -
	<b>TOTAL</b>	<b>\$ 377,500</b>