**Center for <u>T</u>eaching <u>O</u>ld <u>M</u>odels <u>N</u>ew <u>T</u>ricks (TOMNET)**

**A USDOT Tier 1 University Transportation Center**

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**PROJECT SCOPE 2020 - 2021**

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**Title:** Meeting everyday needs in a disaster scenario: the potential for resource sharing through local networks

**Principal Investigator:** Cynthia Chen, Professor, Department of Civil and Environmental Engineering, University of Washington, Seattle

**Co-Principal Investigator:** Daniel B. Abramson, Associate Professor, Department of Urban Design and Planning, University of Washington, Seattle

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# 1. Introduction/Problem Statement

This proposal describes the **fourth phase** of a multi-year project:

- 2017 – 2018: Literature review assessing the state of the field regarding incorporating attitudinal information into resilience survey methodologies, development of draft methodology
- 2018 – 2019: Field work to develop and test ideas in case study communities via a community self-assessment survey and community workshops
- 2019 – 2020: Complete field work and begin data analysis; report preliminary findings through conference presentations
- **2020 – 2021: Further information collection and analysis; communicate findings through presentations and publications**

*Background and context:* In a disaster response and recovery context, most of the current work on resource sharing assumes a top-down, centralized approach to resource allocation. Historically, disaster preparedness efforts have focused on hardening physical infrastructure and encouraging stockpiling of resources within individual households. More recently, community social infrastructure – shared spaces and local organizations that support community life – and strong social networks have been recognized for their importance in disaster preparedness, response, and recovery. However, despite this potential, community organizations and other forms of social infrastructure are not necessarily involved in disaster preparedness efforts, nor is the building of community social networks addressed in standard, top-down approaches to preparedness. Social capital, mobilized via social ties, and social infrastructure can serve as a kind of "backup" for physical infrastructure when it fails. As managers, shapers and regulators of public space, planners have an important role to play in strengthening the state of community social infrastructure.

This study is situated in a dialogue that draws from literature in three areas: 1) the role of social ties and social capital in disaster preparedness and response; 2) the potential role of social infrastructure in disaster scenarios; and 3) the integration of urban planning and hazard mitigation planning. The primary research question explores the potential for resource matching at the local level – how can social ties and social infrastructure help to meet community members' essential needs in a disaster scenario? To answer

this question, we investigate patterns related to resource needs and anticipated resource-seeking behavior across three communities.

Situated in Washington State, this study is focused on a potential earthquake scenario such as a magnitude 9.0 Cascadia Subduction Zone event, which would cause significant disruption to conventional modes of resource access and leave communities dependent upon local resources. We approach community disaster preparedness planning from a resource-matching perspective, by understanding what resources people might need and how they expect to access them in the case of a disaster. Using data gathered from a sample survey conducted in three Washington State communities, we explore respondents' expectations regarding where they might turn to meet essential needs in a disaster.

Disasters constitute sudden disruptions of collective social routines due to perceived threats, leading to the need for adaptation to cope with the crisis (Quarantelli 2000). Disasters are socially constructed, meaning that although external events may trigger disasters, their consequences are largely shaped by the social structure in which those they affect are embedded (Bankoff 2007; Tierney 2014). Disasters are becoming more common and pervasive, their effects felt across all sectors of society. In the United States, the number of climate- and weather-related disasters, and their associated costs, are rising due to a combination of increased exposure and vulnerability, as well as increased frequency of events due to climate change (Zagorsky 2017; Reidmiller et al. 2018). In 2020 alone, there were 22 billion-dollar weather and climate disasters in the U.S., costing the country $95 billion in damages (Smith 2021).

The increasing reliance of cities and urban-rural regions on complex and interdependent infrastructures has heightened community vulnerability to all scales of natural and man-made threats. In both urban and rural areas, smart cities systems have contributed to increasing societal dependence on the brittle infrastructure of cell phones, cloud computing and GPS-reliant devices – technologies that are susceptible to system-wide failure (Townsend 2013). People exist deeply embedded in these socio-technical systems, dependent on such infrastructures for myriad everyday tasks and activities, not to mention critical services such as health care. Despite the risk and uncertainty associated with new technologies, people often trust them, even though they often fail (Li, Hess, and Valacich 2008; Townsend 2013). In addition, the disrepair of physical infrastructure systems is a problem in the U.S., with the nation's critical facilities and infrastructure receiving a grade of "D" in 2008 (Flynn and Burke 2011).

Disasters are inherently geographical, and affected communities often become reliant on local resources when municipalities and agencies become overwhelmed. Disruptions caused by natural and man-made hazards exacerbate the impacts of physical and technological infrastructure failure, which are felt most by societal groups dealing with pre-existing vulnerabilities and social inequalities (Klinenberg 2015; Elliott and Howell 2016). Meanwhile, standard approaches to resilience planning tend to shift the responsibility for "being resilient" from government onto individuals and communities, leaving the most vulnerable places even more exposed (Davoudi 2012).

In the U.S., as in many other places, disaster preparedness and response have historically been approached by employing top-down, one-size fits all strategies focused on individuals or households (Scolobig et al. 2015). But top-down approaches don't recognize the unique values and identities of communities, nor do they fully consider how community members could work together to support resilience. For example, while FEMA's National Household Survey does ask one question about whether participants have spoken with their neighbors about disaster preparedness and whether their disaster preparedness plan includes checking in on neighbors, it focuses almost exclusively on preparation in terms of individual- or household-level actions and does not address specific preparedness or mitigation actions that could be taken at the community scale or in cooperation with one's neighbors (Federal Emergency Management Agency 2017).

Top-down approaches end to focus on strengthening hard infrastructure, which has not been shown to be a successful long-term strategy (Aldrich and Meyer 2015; Imperiale and Vanclay 2020). On the other hand, we know that strengthening social infrastructure, or the places and systems that support social connectivity, can help to support longer-term flexibility and adaptation (Klinenberg 2015; 2018). Additionally, distinctive local characteristics contribute to community resilience and can help play a role

in developing place-based strategies for hazard mitigation, and local-level engagement can help to develop sustainable hazard mitigation strategies (Tierney 2014; Mileti 1999).

As place-based phenomena that affect, and are affected by, the ways in which people inhabit the built environment, disasters have become a topic of increasing interest and study in urban planning (Schwab 2010). However, we have limited resources with which to plan for the future, and the timing, location and magnitude of disasters are often somewhat uncertain, which makes them difficult to plan for. Disaster preparedness projects often have to compete for attention and funding with other kinds of urgent needs like infrastructure and social programs. The result is a kind of tension between what we might think of as "everyday" urban planning, which is typically focused on community development and improving quality of life, and hazards mitigation planning, which is typically focused on purpose-built structures that can be quite expensive.

This project addresses these challenges by focusing on the scale of the community to understand how local factors, including both physical and social attributes, can contribute to the adaptability of place-based communities in a disaster scenario. Although the dissertation primarily addresses a specific, and catastrophic, disaster scenario, the goal is to seek lessons that planners and communities can use to develop resiliency to acute hazards while improving everyday well-being and quality of life by leveraging place-based social connectivity and local resources.

## 2. Project Objectives

The overarching goal of the longer-term (four-phase) project is to understand, model and develop ways in which communities can leverage unique – and interconnected – physical and social resources of place to enhance their own adaptive capacity. This fourth phase will build upon our Phase III findings to analyze data gathered about issues of social trust, place attachment, and disaster preparedness and response as relevant to different modes of transportation and communication services. In this phase, we add qualitative data gathered through interviews and focus groups with stakeholders in our three partner communities to 1) aid in the interpretation of context-specific survey findings, 2) to contribute to a conceptual model about willingness to share essential resources in a disaster scenario, and 3) to identify gaps and opportunities to inform the development of place-based disaster preparedness strategies.

**Specific goals for the fourth phase of the project include the following:**

This phase of the project focuses on better understanding where people expect to turn to seek essential everyday resources in a disaster scenario. Specifically, we seek to understand what local resources respondents expect to be able to access following an earthquake. We also explore how those findings can help to shape local disaster preparedness actions. Specific goals are described below.

Our primary research question involves an exploration of the potential for resource matching at the local level in the event of an acute disaster – what is the potential of social ties and social infrastructure to meet community members' essential needs in a disaster scenario? To answer this question, we investigate patterns related to resource needs and anticipated resource-seeking behavior across three communities, asking the following sub-questions, paying particular attention to the role of local social networks and social infrastructure:

- With which essential resources are people most (and least) prepared?
- Where do people anticipate turning to obtain needed resources – those with which they are *not* prepared – in the event of a disaster?
- How can integrated community planning and hazard mitigation planning interventions address potential gaps and help to facilitate resource sharing at the local level?

# 3. Proposed Methodology and Data

***Data collection.*** Phase IV of the project involves continued analysis of the sample survey data as well as gathering qualitative data from project stakeholders and survey respondents in three study communities with varying degrees of urban-ness and socioeconomic status.

The proposed project seeks to understand the interactions between social trust, place attachment, and participation in collaborative transportation services to help leverage local social networks, match resources (vehicles) and needs (such as need to travel) within place-based communities. Three characteristically different types of communities in the state of Washington will be tested.

Within Seattle, we are working with the neighborhoods of Laurelhurst and South Park, and the third community is the town of Westport on the Pacific coast. These three communities comprise a range of median household income, density, and racial and ethnic composition. Laurelhurst is an affluent and mostly white Seattle neighborhood situated near the University of Washington and multiple world-class medical institutions. This neighborhood is primarily residential and occupies a peninsula on the shores of Lake Washington. South Park is an ethnically diverse and historically underserved community in south Seattle and comprises a mix of residential and industrial uses. This neighborhood faces public health challenges due to legacy of industrial pollution, and residents of this neighborhood have a life expectancy that is ten years less on average than those who live in Laurelhurst. Westport, located in primarily rural Grays Harbor County, has an economy that is supported largely by local natural resources and tourism. Westport is located on a low-lying peninsula that is particularly susceptible to tsunami hazards and is home to the first tsunami vertical evacuation center constructed in North America.

The research team will collect data from these two communities (via surveys, interviews, and focus groups), develop interventions, and conduct citizen science activities aimed at both engaging communities and generating potential solutions. The target population for this survey is adult neighborhood residents, that is, members of households that are likely to be involved in decisions about household disaster preparedness.

***Data analysis.*** The survey consists of four modules focused on 1) access to health care and wellness resources, 2) social trust and place attachment, 3) disaster preparedness and 4) demographic data. The objectives of the survey are to understand how different people in the community are connected to different resources, to understand community connection to place, to assess levels of trust associated with community networks and resources, and to gauge levels of household disaster preparedness.

For the questions that evaluated using Likert or other scales (e.g., willingness to share), we will sum the individual responses for each item to create a continuous scale variable. We will then evaluate the strength of association between the variables using Pearson's correlation coefficient/ We use the interpretation scale adopted by Dancey and Reidy[12] in which Pearson's $r$ indicates a weak association at 0.1-0.3, a moderate association at 0.4-0.6, a strong association at 0.7-0.9, and a perfect association at 1.0 (43).

To analyze the qualitative interview data, we will use an iterative coding approach to 1) identify text relevant to the research question; 2) identify repeating ideas within the relevant text; 3) group the repeating ideas into themes; and 4) develop a resultant narrative (Auerbach and Silverstein 2003). The interview protocol will serve to provide an initial structure to the data, including the identification of gaps between where people expect to seek resources according to the survey data and where they might actually be available; potential strategies for intervention to address those gaps; and disaster preparedness lessons learned through experiences with the COVID-19 pandemic. Once the interview data is gathered, we will develop a set of initial codes identifying repeating topics and ideas within the categories of "gaps" and "opportunities."

## 4. Work Plan (Project Tasks)

The 2020 – 2021 project is organized according to the following principal tasks and subtasks:

*Task 1: Data collection and analysis*
 1A. Make revisions based on pilot survey; prepare sampling frames and send out survey mailings in two waves (Sept. – Nov. and March – April)
 1B. Conduct survey respondent focus groups
 1C. Conduct stakeholder interviews
 1D. Qualitative analysis of interview and focus group data

*Task 2: Create outreach materials*
 2A. Prepare conference posters and/or presentations based on findings
 2B. Prepare journal publications to disseminate project findings

## 5. Project Schedule

| Tasks | June | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1 Data analysis** | | | | | | | | | | | | |
| 1A Survey analysis | | | | | | | | | | | | |
| 1B Interviews | | | | | | | | | | | | |
| 1C Focus groups | | | | | | | | | | | | |
| 1D Qual analysis | | | | | | | | | | | | |
| **2 Outreach** | | | | | | | | | | | | |
| 2A Conferences | | | | | | | | | | | | |
| 2B Publications | | | | | | | | | | | | |

## 6. Relevance to the Center Theme/Mission

***Understanding and predicting the behavioral impacts of changes in transportation patterns and technology.*** Developing a better understanding of attitudes and behavior patterns can help us to understand changes associated with new transportation technologies in the context of potential disasters or other long-term disruptions to social and physical infrastructures. This includes exploring how social (e.g., social networks) and physical (e.g., transportation/communication systems) infrastructures might interact with one another in times of stability as well as disruption.

***Integrating attitudinal variables into transportation modeling.*** Attitudes communicate personal and community values for the present and the future. Using an appreciative inquiry-based survey methodology that focuses on community strengths and values, we aim to better understand community attitudes about priorities and tradeoffs to enable bottom-up planning for the future (vs. traditional top-down, disaster-focused scenarios that tend to highlight vulnerabilities). This includes understanding the potential for sharing and reconfiguring community transportation resources. Additionally, current regional transportation modeling only examines normal day scenarios. This project will enable the connection to use of transportation modes under disastrous situations.

***Developing approaches for quantifying the effects of attitudinal variables on transportation choices and outcomes.*** The attitudinal variables collected through the sample survey will inform the development of a conceptual model describing factors that contribute to individuals' anticipated willingness to share resources in a disaster scenario. This information will be valuable in context of disaster preparedness planning but for anticipating innovative and practical approaches to uncertainty across multiple possible futures and addressing the long-term struggles of under-served and/or isolated communities.

# 7. Anticipated Outcomes and Deliverables

*Outcomes and benefits.* Our research will continue to develop and implement an innovative and scalable methodology that can be widely applied to communities across the U.S. Engaging regional and municipal partners in a workshop to discuss preliminary results and to consider the potential benefits of collaborative infrastructure will help us to shape future phases of the project. Sharing our research results will also contribute to city-wide initiatives to make Seattle and cities around the country more resilient. As a participant in the Rockefeller Foundation-supported 100 Resilient Cities initiative,[13] Seattle is expanding its inter-departmental coordination for emergency preparedness, recovery and mitigation as well as creative approaches to a wide range of chronic threats, from climate change to housing affordability. This project, in all of its phases, is tailored to inform these efforts.

*Anticipated products and deliverables.* Anticipated products and deliverables from this project include presentations at the Association of Collegiate Schools of Planning annual conference; the Natural Hazards Center annual workshop and researcher's meeting; and the Transportation Research Board Annual Meeting (poster) and the compilation of a survey data set from three communities.

# 8. Research Team and Management Plan

*Research team and qualifications.*
- Prof. Cynthia Chen, Civil & Environmental Engineering, Principal investigator. Prof. Chen's interdisciplinary research focuses on the sustainability and resilience of a city through the lens of human beings interacting with the physical environment. Her research results facilitate real-time disaster response and recovery efforts and explore three inter-connected themes: travel behavior (human mobility) analysis, resilient infrastructures, and their intersections.
- Associate Prof. Daniel Abramson, Urban Design & Planning, Co-PI. Prof. Abramson's research in urban planning includes a focus on methods of socio-spatial analysis and public participation, including community resilience and adaptive planning in disaster recovery and hazard mitigation. Recent projects include FEMA- and NSF-funded research on new protocols for state agencies and communities to envision earthquake- and tsunami-resilient development.
- PhD student Katherine Idziorek, Urban Design & Planning, research assistant. Katherine's research interests include community resilience and connections between physical and social infrastructures with a specific focus on transportation systems.
- PhD student XIangyang Guan, Civil & Environmental Engineering, research assistant. Xiangyang's research interests involve resilience of infrastructure systems, social media data mining for civil engineering, and modeling the complex dynamics in interdependent infrastructure networks.

*Team management and communications plan.* Profs. Chen and Abramson will supervise the research work, which will primarily be carried out by Katherine and Xiangyang. This UW internal team will meet every other week to review progress and work completed. The UW team will provide the TOMNET team with quarterly project updates and will seek advising and feedback from the team as needed.

# 9. Technology Transfer Plan

*Publications and presentations.* In this fourth-year phase of the project, we will present findings at conferences in the areas of urban planning; disaster mitigation and preparedness; and transportation planning, and we will prepare manuscripts for journal publication.

*Stakeholder interviews and focus groups.* We propose to interview 10-12 stakeholders from across the three study communities, including City staff, emergency managers, business owners, and disaster

preparedness volunteers to share the survey results and to understand the potential for addressing perceived gaps in place-based disaster preparedness. We also propose to hold at least one focus group in each of the study communities to collect qualitative data on willingness to share resources.

***Technical assistance.*** This project is designed to support the City of Seattle's participation in the 100 Resilient Cities Initiative. The project team will continue to meet with staff from the Office of Emergency Management to plan how the project findings can be used to contribute to their goals.

## 10. Workforce Development and Outreach Plan

***Outreach to communities.*** We will share collected survey data (in aggregate form) with our community partners to inform a dialogue about potential context-specific interventions for enhancing community adaptive capacity by leveraging collaborative infrastructure.

***Graduate student involvement.*** This project will support one PhD student as a Graduate Research Assistant for one year.

***K-12 and teacher involvement.*** No K-12 activities are planned for this phase of the project.

***Enhancement of diversity.*** The project's values- and asset-based protocol and its focus on understanding diverse social networks can reveal unexpected and often under-appreciated community resources, including multilingualism and other aspects of socio-cultural identity, that support resilience.

# 11. References

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## 12. Qualifications of Investigators

**CYNTHIA CHEN**
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University of Washington (UW), Seattle, WA 98195-5740 Email: qzchen@uw.edu
THINK lab: https://sites.uw.edu/thinklab

## Education
Ph.D., Civil and Environmental Engineering, University of California, Davis, 2001.
M.S., Transportation, New Jersey Institute of Technology, 1995.
B.A., Nan Kai University, Tianjin, China, 1992.

## Selected Employment History
Professor, Department of Civil and Environmental Engineering, University of Washington, Seattle, 2016-present
Program director, Civil Infrastructure Systems (CIS) program, CMMI division, NSF, 2017-2019
Associate Professor, Department of Civil and Environmental Engineering, University of Washington, Seattle, 2009-2016
Assistant Professor, Department of Civil Engineering, City College of New York, 2003-2009
Postdoctoral Research Fellow, Department of Civil and Environmental Engineering, University of California, Davis, 2002-2003.

## Fields of Interest and Expertise
(1) Travel behavior/human mobility analysis; (2) Resiliency of infrastructure networks and community resilience; (3) Modeling of socio-physical systems for resiliency and sustainability

## 5 Recent Relevant Publications
1. Guan, X and Chen, C. (2018). General methodology for inferring failure-spreading dynamics in networks. Proceedings of the National Academy of Sciences.
   DOI: https://doi.org/10.1073/pnas.1722313115
2. Guan, X., Chen, C., and Work, D. (2016) Tracking the Evolution of Infrastructure Systems and Mass Responses Using Publically Available Data. *PLOS ONE*, 11(12), e0167267. DOI: 10.1371/journal.pone.0167267.
3. Guan, X. and Chen, C. (2014) Using social media data to understand and assess disasters. *Natural Hazards*, 74(2), 837-850.
4. Wang, F., Wang, J., Cao, J., Chen, C., Ban, X. (Jeff), 2019. Extracting trips from multi-sourced data for mobility pattern analysis: An app-based data example. Transp. Res. Part C Emerg. Technol. 105, 183–202. https://doi.org/10.1016/j.trc.2019.05.028
5. Wang, F. and Chen, C. (2018). On data processing required to derive mobility patterns from passively-generated mobile phone data. *Transportation Research Part C*, 87, 58-74. DOI: 10.1016/j.trc.2017.12.003.

## Recent Honors, Grants, and Awards
NSF, SCC-PG: Building capacity for data-driven physical activity interventions in communities with depression and obesity hotspots, $150k, co-PI, 2020-2021.
NSF, JST: SCC-PG: Socially-integrated Technological Solutions for Real-time Response and Neighborhood Survival After Extreme Events, $95k, PI, 2020-2022
NSF, RAPID: Collaborative Research: Modeling and Learning-based Design of Social Distancing Policies for COVID-19, $200k (PI), 2020-2022.
NIH, "3-population 3-scale social network model to assess disease transmission, $1,106k, MPI, 2015-2022.
FHWA, Promises of data from emerging technologies for transportation applications. Phase III, co-PI, $200k, 2020-2022.

**DANIEL BENJAMIN ABRAMSON**
**Associate Professor**, Department of Urban Design and Planning
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## Education
Ph.D., Urban Planning, Tsinghua University, April 1998.
M.C.P., Urban Studies and Planning, Massachusetts Institute of Technology, June 1992.
M.Arch., Architecture, Massachusetts Institute of Technology, June 1992.
B.A., European History, Harvard University, Magna Cum Laude, June 1985.

## Selected Employment History
Asst./Assoc. Professor, Department of Urban Design and Planning, UW, 2001-present.
Postdoctoral Research Fellow and Lecturer, School of Community and Regional Planning Centre for Human Settlements, University of British Columbia, 1998-2001.

## Selected Fields of Interest and Expertise
(1) Community resilience and adaptive planning in disaster recovery and hazard mitigation; (2) Periurban and rural responses to rapid urbanization

## 5 Recent Relevant Publications
Abramson, D. (2017) "The Uses of Planning History in China," in *The Routledge Handbook of Planning History*, edited by Carola Hein (Routledge): 260-272.
Abramson, D. (2016) "Periurbanization and the Politics of Development-as-City-Building in China: a Case for a Social-Ecological Perspective," *Cities.* In press, corrected proof, available online 5 January 2016.
Hu, J. and D. Abramson (2015). "Visions of New Urban-Rural Relations and Alternative Definitions of Well-being in Rapidly Urbanizing China: the Case of Chengdu, Sichuan," in *Transforming Distressed Global Communities: Making Inclusive, Safe, Resilient, and Sustainable Cities*, edited by Fritz Wagner (Ashgate): 317-337.
Freitag, R., D. Abramson, M. Chalana, and M. Dixon (2014). "Whole Community Resilience: An Asset-Based Approach to Enhancing Adaptive Capacity before a Disruption." *Journal of the American Planning Association* 80/ 4: 324-35.
Abramson, D. & Y. Qi (2011). "'Urban-rural Integration' in the Earthquake Zone: Sichuan's Post-Disaster Reconstruction and the Expansion of the Chengdu Metropole," *Pacific Affairs 84*(3), 495-523.

## Selected Recent Honors, Grants, and Awards
Bullitt Foundation, Thought Leadership and Innovation in Applied Urban Sustainability Research, Scholarship and Action grant for "Building Community Adaptive Capacity." PI with Cynthia Chen and John Scott, Co-PIs. $97,896. Funding approved, April 2018.
UW Jackson School of International Studies Area and International Studies grant for "New Urban-Rural Relations in Asia: Trans-Pacific Perspectives on Resilient City-Regions." PI. $55,000, 2015-2016.
NSF Hazards SEES Award#1331412, "Magnitude 9 Earthquake Scenarios – Probabilistic Modeling, Warnings, Response and Resilience in the Pacific Northwest." Co-PI with John Vidale (PI), Jeff Berman, Ann Bostrom, and Alison Duvall. $2,937,478. 2013-2017, no-cost extension to August 2019.
UW College of Built Environments interdepartmental research cluster seed fund for Resilience in the Built Environment. Convener and Co-PI. $35,000. 2013-2016.

# 13. Budget Including Non-Federal Matching Funds

**Institution: University of Washington Seattle**
**Project Title:** Meeting everyday needs in a disaster scenario: the potential for resource sharing through local networks
**Principal Investigator: Cynthia Chen**
**Budget Period: 8/1/2020 - 07/31/2021**

| CATEGORY | Budgeted Amount from Federal Share | Budgeted Amount from Matching Funds | Explanatory Notes; Identify Source of Matching Funds |
|---|---|---|---|
| Faculty Salaries | | | |
|    Cynthia Chen | 15,521 | 42,657 | 2.0 summer month support. 2.75 academic months applied to cost share. |
|    Shuai Huang | 7080 | | 1.0 summer month support. |
|    Daniel Abramson | 2630 | | 0.5 summer month support. |
| Other Staff Salaries | | | |
| Student Salaries | 59,604 | | Two 12-month students at 50% FTE |
| Fringe Benefits | 18,666 | 10,195 | 24.0% for faculty; 22.4% for student |
| **Total Salaries & Benefits** | 103,501 | 52,852 | |
| Student Tuition Remission | 42,556 | 27,816 | 4 academic quarters of support for the graduate student on the project. 3 academic quarters of non-resident tuition waiver applied to cost share. |
| Operating Services and Supplies | | | |
| Domestic Travel | 5,611 | | Attend workshops organized by the center and conferences |
| Permanent Equipment (specify) | | | |
| Other Direct Costs (specify) | 5,000 | | Publication costs, dataset purchases and computational costs |
| **Total Direct Costs** | 156,668 | 80,667 | |
| F&A (Indirect) Costs | 63,332 | 29,333 | MTDC: 55.5% |
| **TOTAL COSTS** | 220,000 | 110,000 | |

**14. Grant Deliverables and Reporting Requirements for UTC Grants (November 2016)**

**Exhibit F**

| UTC Project Information | |
|---|---|
| Project Title | Attitudes and trust in promoting use of collaborative transportation services for community adaptive capacity |
| University | University of Washington, Seattle |
| Principal Investigator | Cynthia Chen |
| PI Contact Information | qzchen@uw.edu; 206-543-8974 (office) |
| Funding Source(s) and Amounts Provided (by each agency or organization) | USDOT (RITA) and UW for matching fund |
| Total Project Cost | $330,000 (including matching funds) |
| Agency ID or Contract Number | |
| Start and End Dates | 8/1/2020 - 07/31/2021 |
| Brief Description of Research Project | The overarching goal of the longer-term (four-phase) project is to understand and model ways in which we can leverage unique – and interconnected – physical and social characteristics of place to enhance community adaptive capacity in response to disruptions. This second phase (one-year) is focused on finalizing and implementing the survey instrument developed in the previous year, which assesses community adaptive capacity in terms of social trust, use of transportation networks, and disaster preparedness. Between the pilot data collection and the full survey launch, the team will hold 1-2 stakeholder review workshops to review the initial data and to engage local, municipal and regional stakeholders in a dialogue about the potential benefits of collaborative infrastructure to help connect our work to ongoing regional transportation and resilience planning initiatives. |
| Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here | |
| Impacts/Benefits of Implementation (actual, not anticipated) | |
| Web Links <ul><li>Reports</li><li>Project Website</li></ul> | |