

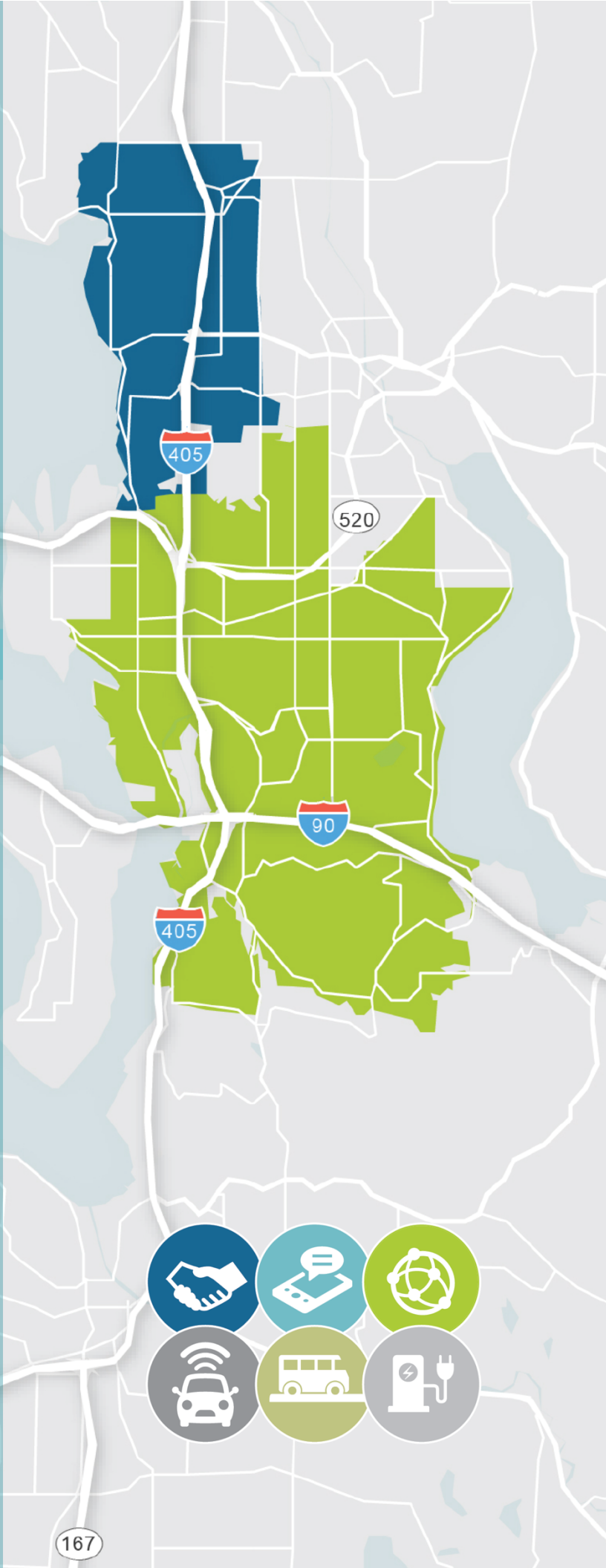
# A FLEXIBLE, ELECTRIC, AUTONOMOUS COMMUTEPOOL NETWORK

VOLUME 1 – TECHNICAL APPLICATION



Advanced Transportation  
and Congestion Management  
Technologies Deployment  
(ATCMTD) Initiative

Funding Opportunity Number 693JJ318NF0010



# U.S. Department of Transportation

Notice of Funding Opportunity Number 693JJ318NF0010

“Advanced Transportation and Congestion Management  
Technologies Deployment (ATCMTD) Initiative”

## Section I: Cover Page

Project Name	A Flexible, Electric, Autonomous “CommutePool” Network
Eligible Entity Applying to Receive Federal Funds	City of Bellevue, Washington
Total Project Cost	\$ 9,000,000
ATCMTD Request	\$ 3,000,000
Total Federal Funding (including ATCMTD)	\$ 3,000,000
Are matching funds restricted to a specific project component? If so, which one?	No
State(s) in which the project is located	Washington
Is the project currently programmed in the:  • Transportation Improvement Program (TIP)  • Statewide Transportation Improvement Program (STIP)  • MPO Long Range Transportation Plan  • State Long Range Transportation Plan	Yes  • Addressed in the Puget Sound Regional Council (local MPO) 2018 Regional Transportation plan incorporating advanced transportation technologies and mobility solutions.  • Addressed in Bellevue TIP through support of Smart Mobility Plan funded through Transportation Levy.  • Part of the 2018 Bellevue Smart Mobility Plan
Technologies Proposed to be Deployed (briefly list)	<ul style="list-style-type: none"><li>• Advanced traveler information app merging parking availability and shared mobility services</li><li>• Advanced public transportation systems – built on shared mobility and access to employment centers</li><li>• Autonomous vehicle technology</li><li>• Fast charging infrastructure for use with electric shared mobility services</li><li>• Parking and curbside monitoring equipment</li></ul>

**Submitted by:** The Cities of Bellevue and Kirkland, Washington

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# Section II: Project Narrative

## Executive Summary

The Bellevue/Kirkland Flexible, Electric, Autonomous, Shared Mobility Network (“CommutePool”) combines the latest in transportation technologies with an innovative private/public business model. While technology will play an important role in this, how we use it is more important. The CommutePool must:

- be flexible, with schedules and locations that meet individual needs of employees and businesses.
- serve low-density areas with limited access to traditional transit service, including families who have relocated to avoid high housing prices in central Puget Sound.
- have a unique smartphone app designed to make it easy to use this new shared mobility solution (to be built by Amazon Internet Business Solutions Group, and Luum – providers of commute solutions for employers – for this project).
- improve access to labor and individual access to jobs that will help support regional growth.
- focus on a single corridor rather than attempt to serve the entire region. This focus makes it more likely to create a tangible difference in congestion and community well-being.
- leverage existing public programs such as Washington State’s Commute Trip Reduction Act Program.

The CommutePool Network will use autonomous vehicles (with electric vans as a possible transition vehicle) to provide commuters along the I-405/SR 167 corridor with access from their homes and work. Indeed, the CommutePool program offers the first true integration of autonomous vehicles with a public-sector program. Unlike traditional vanpools, there will not be a fixed schedule nor pre-determined riders for each van. Riders will be able to reserve a space on a vehicle, and the vans will have flexible pick-up and drop-off locations.

Each CommutePool vehicle will make multiple trips during the commute period to support the range of work schedules, including different hours for office workers, manufacturing, retail, restaurants, plus any unplanned changes in work schedules. Once autonomous and all-electric goals are met, these vehicles will offer low-cost transportation and can serve off-peak travel during periods of limited traditional transit service.



## CURRENT BUSINESS PARTNERSHIPS

AAA  
ACES NW Network  
Association of Washington Business (AWB)  
Astronics Advanced Electronic Systems  
Auburn, City of  
Bellevue Chamber of Commerce  
Bellevue College  
Bellevue Downtown Association  
Bellevue School District  
East King County Chamber of Commerce Legislative Coalition  
Evergreen Hospital  
INRIX  
Kemper Development Company  
Kent, City of  
King County Metro  
Kirkland, City of  
Lake Washington Technical Institute  
LUUM  
Overlake Hospital  
Puget Sound Energy (PSE)  
Recreational Equipment Incorporated (REI)  
Renton, City of  
SeaTac, City of  
Talon Private Capital  
T-Mobile  
The Northwest Seaport Alliance  
TransDev  
Vulcan  
Washington State DOT



The focus is on a practical, business-oriented service. Bellevue and Kirkland have received an outpouring of support from the business community for this proposed mobility solution. Current partners are shown in the sidebar.

Public agency support has been received from the cities of Bellevue, Kirkland, SeaTac, Kent, Renton and Auburn; King County Metro (the local transit agency), the Northwest Seaport Alliance (the ports of Seattle and Tacoma) and the Washington State Department of Transportation (WSDOT).

CommutePool will leverage funds from employers under the Commute Trip Reduction Act framework (conservatively estimated by Luum at more than \$3 million per year). The plan will use software and a business process development provided in the form of in-kind services by Luum (a local technology firm that already helps employers match employees with shared mobility options) and Amazon. Amazon Internet Business Solutions Group has agreed to develop a smart phone app that meets the specific requirements of the CommutePool Network. Additional in-kind contributions will be provided by Puget Sound Energy in the form of advanced EV charging infrastructure. The City of Kirkland will provide matching funds along with the City of Bellevue.

This plan offers an ideal use case for the early phases, and careful deployment of autonomous vehicles and all-electric shared mobility vehicles.

## Introduction

Transportation is in the midst of a series of profound changes that will alter traditional ways people and goods move in urban areas<sup>1</sup>. The Flexible, Electric, Autonomous CommutePool Network seeks to take advantage of this new transport world to provide significant benefits to residents and businesses along the eastern half of the Puget Sound region. The project will generate a practical model that could be quickly and seamlessly adopted by regions across the country.

These mobility changes include some that are widely available today (traffic related smartphone apps); some that have been underway for just a few years (shared mobility – termed Transportation Network Companies (TNCs)); and some that are only just visible over the horizon (autonomous vehicles).

- **Smartphones** provide access to near real-time information regarding traffic, navigation, transit services, and access to TNCs;
- **Shared mobility** as provided by TNCs such as Uber, Lyft, Via, Chariot etc. These services often include more than one rider;
- **Autonomous vehicles** come in different types including self-driving vehicles that require an active driver and different types of driverless vehicles <sup>2</sup>.

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<sup>1</sup> For a summary see, “What’s New in Transportation,” Richard Mudge, (2016) prepared for Northern Virginia Transportation Authority.

<sup>2</sup>These include low-speed shuttles that operate in defined neighborhoods; vehicles that operate only in certain geographic locations and weather conditions; and vehicles that can operate on all roads at all times – still under development.

Along with these shifts in transportation modes come a series of shifts in public attitude, such as:

- a reduced focus on automobile ownership as the preferred means of transportation. One sign of this is a decline in the pace at which young people obtain drivers licenses. Automobile ownership is a significant cost to households faced with high housing costs;
- stronger concerns about environmental implications of gasoline-powered automobiles, partly motivated by concerns over greenhouse gas emissions;
- a rebirth in interest in central cities as a place to live and work. One unforeseen side effect of this change is the higher cost of housing in city centers. Clearly this has happened in the Seattle Metropolitan Area. People seeking affordable housing do so in less dense, suburban, and rural regions along the SR 167 corridor in suburban Puget Sound.

Figure 1 shows the important building blocks that create the foundation for the CommutePool Network.

Figure 1. Six Building Blocks for the CommutePool Network



### Key Characteristics

This proposal contains a series of new technologies and supporting actions. Our purpose, however, is not simply to do something new, but rather to make a *significant improvement* in traffic congestion, individual access to jobs, business access to labor, and the environment. In the process, we expect to develop and test a transportation technology deployment that will provide a model for other communities.

Bellevue and Kirkland have committed matching funds in addition to significant in-kind resources to not only develop the plan but also for work that will continue while we wait for FHWA to complete its review process.



The cities will:

- be in active conversation with suppliers of autonomous vehicles.
- continue recruiting partner employers (a major source of matching funds).
- work with Amazon Internet Business Solutions Group to develop a smartphone app designed for the specific requirements of this work.
- seek additional funding from local foundations

The CommutePool Network is focused on improving access to jobs for residents of low and middle-income areas, including low density and rural areas that have poor access to traditional transit. The direct link with major regional employers and thus will help improve employment prospects while also increasing business access to a larger labor pool.

The integration of autonomous vehicles into a flexible commuter system offers an ideal test case for autonomous vehicles, providing an opportunity to begin to overcome skepticism regarding the safety of autonomous vehicles. The CommutePool Network also provides a base of revenues during morning commute times – a quiet period for the shared ride business.

It makes good business sense to leverage non-federal funds. The CommutePool network does this in two ways: with matching funds from local public and private entities and through use of an existing state program that has not adjusted to technological change.

Private sector leadership is important since this shows the likely regional economic development and builds in a focus on efficient program management.

## Geography

The cities of Bellevue and Kirkland are the major communities on the east side of Lake Washington, opposite the City of Seattle. I-405 is the primary north-south highway and parallels I-5 that runs through Seattle. The I-405 corridor, including its southern extension along SR 167, is one of the most congested routes in the state. This corridor also has less public transit service than the I-5 corridor. Figure 2 shows the corridor and the major communities to the South.

The communities along the southern end of SR 167 differ from the towns to the north in their mix of industry. Many of the regions warehouses are in the Renton-Kent-Auburn area. These locations provide good access to the Port of Tacoma and the Port of Seattle with major rail connections to both. Traffic congestion along the I-405 – SR 167 corridor adds significant logistics costs to the region's port-related industry. The Northwest Seaport Alliance has provided a letter of support for this proposal and offered to help identify parking locations for pick-up points along the I-405/SR 167 corridor.

Figure 2. Project Area and Partner Employer Locations

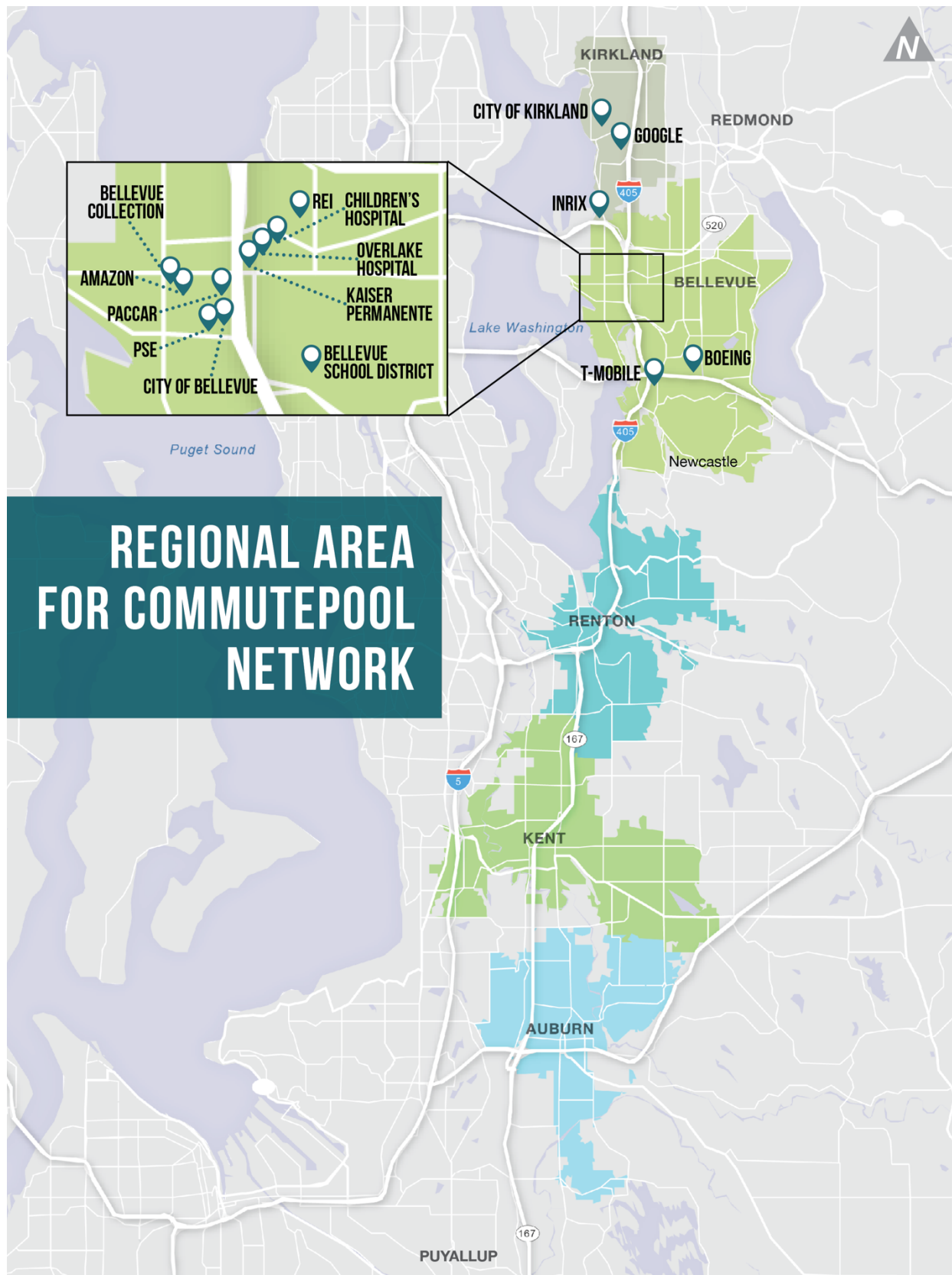
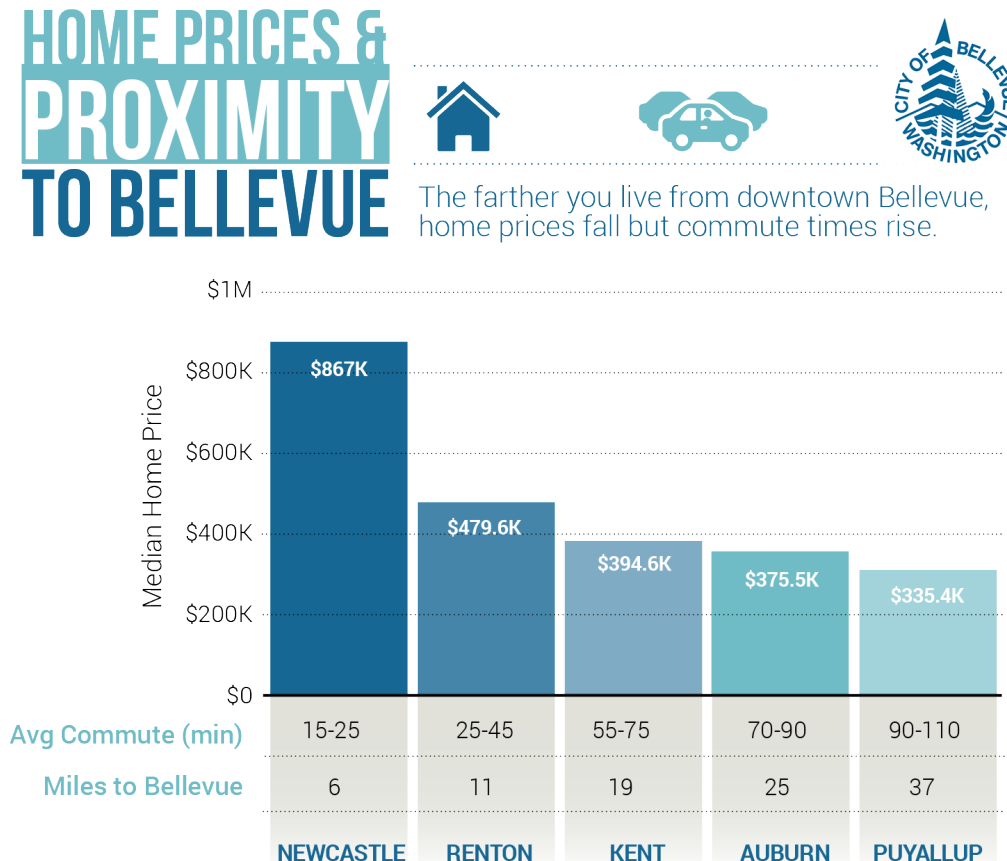




Figure 3. Home Prices and Travel Time to Bellevue Comparison



As shown in Figure 3, to find more reasonably priced homes, workers must move farther and farther away from major employment centers into lower density and rural areas. This, in turn, makes commute traffic on major corridors worse. For example, the Bellevue School District reports that 23 percent of new teachers leave the District after their first year, in large part because they can't afford to live in Bellevue and they cannot tolerate commute times from areas where housing is more reasonably priced. The most recent Puget Sound Regional Council survey found that the cost of living and affordable housing had outpaced traffic as the region's top concern.<sup>3</sup> A new draft state report notes:

Many people with low incomes are pushed from cities to suburbs to find affordable housing. Transit service is limited in most suburbs and, given lower densities, is more difficult and expensive to provide. This trend is amplified by increasing land values near high-frequency transit lines, which are growing faster than land values in other locations.<sup>4</sup>

<sup>3</sup> M. Rosenberg, *As home prices hit new highs, cost of living overtakes traffic as worst part of living in Seattle area* May 7, 2018 <https://www.seattletimes.com/business/real-estate/as-home-prices-hit-new-highs-cost-of-living-overtakes-traffic-as-worst-part-of-living-in-seattle-area/>

<sup>4</sup> "TDM Transition Plan (draft)." <https://ctrboard.ning.com/>

The Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD) grant would accelerate a new, integrated private/public approach to improve the flow of traffic, reduce emissions, enhance safety, and provide better access to jobs.

This proposal combines the latest transportation technologies with an innovative private/public business model that will help make transportation commutes to and from work safer, smarter, cleaner and more affordable, with less wasted time. In short, it will provide Bellevue/Kirkland workers commuting from low-density suburban and rural areas with better access to jobs. There will be an emphasis on social equity from the outset to ensure that workers displaced from central areas by high housing costs have reliable, lower-cost commute options to access their jobs.

## System Description

Bellevue and Kirkland are in King County, home of the largest public commuter vanpool program in the country (operated by King County Metro). Although highly successful, the current system, created in 1991 before the advent of advanced transportation technologies, is fixed and inflexible. Employees using the fixed vanpool system must leave at the same time to work with the same five or more passengers, usually to the same company, and must return at the same time. Much has changed since 1991. Employee work schedules are more flexible now – which significantly limits the ability of the current fixed vanpool system to attract more users. Technology has changed even more, making possible an entirely new approach to vanpools using advanced transportation technologies—automated, connected, electric and shared.

Our plan has **SEVEN** linked parts that will be developed in parallel. Work is already underway on several important steps (business partnerships, smartphone app, operating plans, and negotiations with autonomous vehicle firms). In sum, the Bellevue-Kirkland team is fully committed to implementing this transportation technology solution. The work already completed ensures a rapid start once the FHWA provides authorization to proceed with a grant award.

**FIRST**, we will partner with major private-sector and public-sector employers in the region to provide a base of employees with a common work location. These firms have a history of compensating and incentivizing their employees to switch from single occupancy vehicles and join carpools and vanpools. Their letters of commitment describe how they will support the CommutePool Network. These firms have committed to supporting this program through their contributions to the CTR program and in some cases, additional contributions.<sup>5</sup> The map in Figure 2 shows the location of some of these firms along the I-405/SR 167 corridor. These firms include:

- **Bellevue Collection**, 11,000 employees across all retail establishments, hotels, office tenants and restaurants located in downtown Bellevue.
- **T-Mobile**, 5,000 employees
- **Kaiser Permanente, Overlake and Children's Hospital**, 3,200 employees total in Bellevue

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<sup>5</sup> We expect that award of an ATCMTD grant will stimulate interest among other firms and public agencies.

- **Amazon**, 2,500 employees in Bellevue
- **Boeing**, 2,500 employees in Bellevue
- **Bellevue School District**, 2,500 employees
- **Google**, 1,700 employees in Kirkland
- **City of Bellevue**, 1,600 employees
- **Puget Sound Energy**, 1,200 employees
- **REI**, 1,200 employees
- **PACCAR**, 600 employees
- **INRIX**, 170 employees

The total list of employers that have already agreed to become active partners in CommutePool account for more than 30,000 employees in the Bellevue-Kirkland area.

**SECOND**, *develop an attractive, flexible and employee-focused commuting program* for each participating firm along the I-405 / SR 167 corridor. We will partner with Luum, a Seattle-based firm that specializes in organizing and then implementing van and other group travel for employees. Luum will work with partner employers to identify employees who live along the corridor and in reasonable proximity of each other. Luum will then help recruit these individuals to join the program. This will be an ongoing process as people become more familiar with the program and as employees join or depart the firms and build ridership. We will work with community organizations along the project corridor to make sure current and future residents are aware of this new, low-cost commute option. This outreach could help expand the labor pool for employer partners in the region, while also improving the number of potential jobs available to residents along the corridor.

**THIRD**, *we will negotiate to obtain a fleet of electric autonomous vehicles*, including companies such as Waymo, General Motors' Cruise and Nissan. Waymo expects to have up to 82,000 autonomous vehicles<sup>6</sup> available for shared ride service as early as 2019 in multiple cities across the U.S.



Luum is a Seattle-based transportation technology company that has been helping employers improve commute trips for their employees since 2012. Much of their business in the Puget Sound region helps organizations to implement comprehensive employee commute benefit programs that enable them to achieve and exceed the drive alone rate reduction targets set by the Washington State Commute Trip Reduction Act. Luum helps their clients to deliver a personalized commute benefit for their employees, increase options, and incentivize behavior change. This effort involves encouraging employees to use car pools, vanpools, transit (and other non-single occupancy modes). The Luum system provides employers with management summaries and the data needed to apply for the Washington state tax credit. Employees receive options that match individual preferences and incentives for their new commute mode. Luum is currently working with more than 12 major employers in the Puget Sound Region.

<sup>6</sup> Waymo recently announced plans to purchase up to 62,000 Chrysler Pacifica vans and up to 20,000 Jaguar electric SUVs. Waymo already has 600 Chrysler Pacifica autonomous hybrid-electric vans in operation in Phoenix.

Autonomous vehicles are attractive for this service due to:

- low cost per passenger mile.
- the ability to support multiple trips during peak-hour commute period.
- availability for unplanned late evening trips.
- an alternative transportation service during the day.

One of our first actions upon receipt of authorization to proceed will be to issue an RFP for a vehicle service provider. Our partner employers will compensate employees for use of these vehicles – as they have been doing over the past few decades – for fixed route vans through Washington Commute Trip Reduction Act framework. If fully automated vehicles are not available by the spring or summer of 2019, we will lease electric vans to provide the flexible, electric CommutePool service as soon as possible.

**FOURTH**, *we will prepare a smartphone app designed for this project.* Personal communication is important to make sure that commuters know when and where to find their ride. Amazon’s Internet Business Solutions Group has agreed to develop a smartphone app to meet the specific demands of this program. This app will allow commuters to find available parking at a leased parking facility or park-and-ride; reserve a seat at a specific time; and select a drop-off/pick-up location. The app will help travelers locate their van and communicate with other riders as needed. They can also use this to track program use, including rewards for frequent use.

**FIFTH**, *we will conduct market research.* Regular communication with riders and with private and public partners is important. The Flexible, Electric, Autonomous, CommutePool Network is a new approach to urban mobility. Market research will be a routine activity and results will be integrated with operations to improve service and increase market penetration. This is not a traditional service, so standard market research techniques may not be appropriate. Our partner in this will be Dr. Susan Shaheen, a nationally-recognized expert in the shared mobility field, along with her team from the University of California at Berkeley. This group has hands-on experience with shared mobility deployments and will provide practical insights based on their past experience, as well as lessons learned during this deployment. The information that they collect will support the performance and evaluation efforts.



The Transportation Sustainability Research Center (TSRC) at the University of California – Berkeley was founded in 2006, it has become a global leader in bike sharing, car sharing, ride sharing, and transportation network company (or on-demand ride services) research and analysis and plays a pivotal research role in the field of shared-use mobility. In addition to performing research informed by a diverse array of perspectives, TSRC also engages in education and outreach to promote its core values of sustainability and equity, to ensure the industry meets the transportation needs of the present without compromising the needs of future generations.

Dr. Susan Shaheen is the co-director of the Institute.



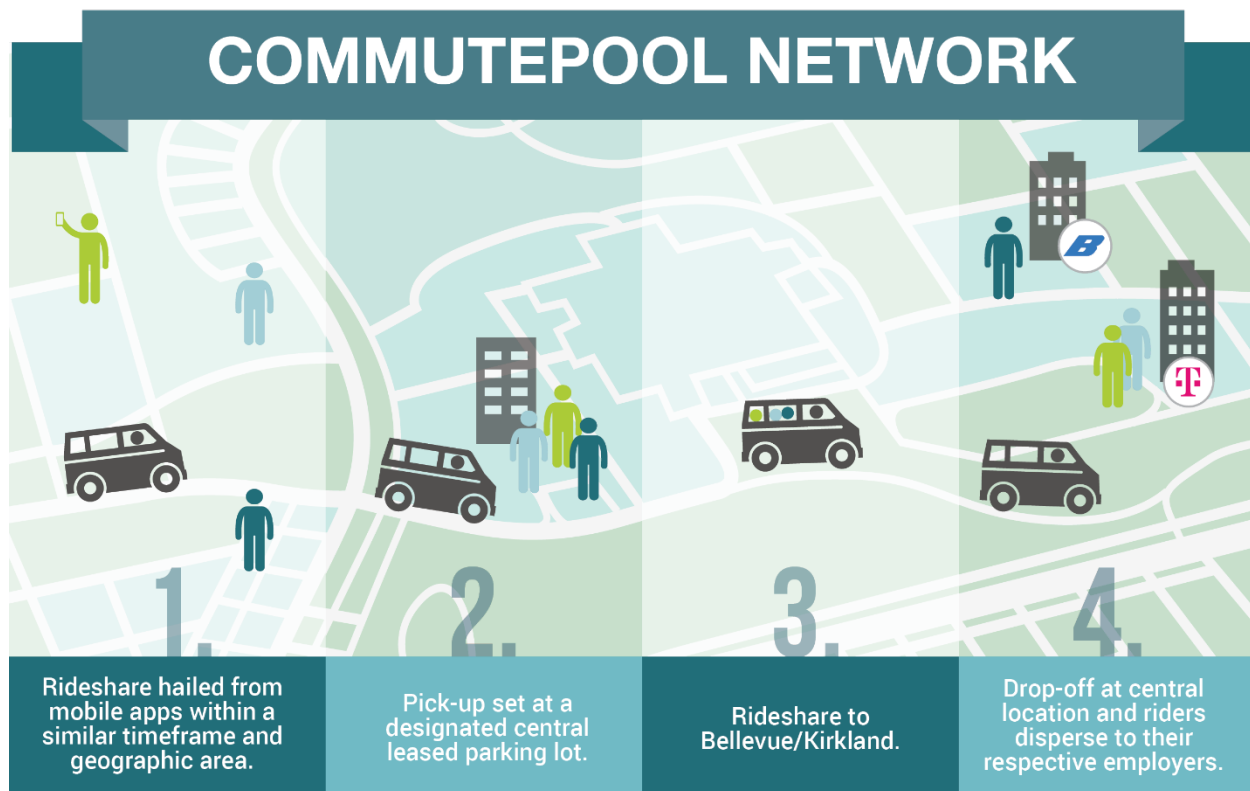
**SIXTH, we will use performance measures.** Evaluation is a vital activity, as part of ongoing management reviews and as part of reports for US DOT. An early task will be to prepare a menu of performance measures. These performance measures will cover operations issues (for example, on-time pickup and drop-offs, scheduled trips, number of riders, costs of operation) and general satisfaction with CommutePool. We will also develop measures that highlight system performance, including impacts on corridor congestion and on the environment.

**SEVENTH, we will have an active outreach program.** Outreach is important, not only to stimulate growth in the CommutePool program, but also in communication with communities around the country that have an interest in new ways to use technology to improve transportation effectiveness and to support economic growth. An ongoing effort will prepare summary material regarding operations and performance. Bellevue and Kirkland will sponsor workshops to make it possible for visitors to see operations first hand and to meet with our partners. Public officials, transportation experts, and private partners from the Bellevue-Kirkland area will be available to speak at local open houses and at relevant conferences and events in other parts of the country.

Figure 4 provides a graphical representation of how the CommutePool system will work. Riders from multiple employers will log into the Amazon app to request a CommutePool trip from their general location to the business center associated with their employer. The app will recommend an upcoming trip and will suggest a nearby parking facility to drive to for pooling with other neighbors heading to the same business center. Available parking will be identified and possibly reservable in the future.

The CommutePool van will drive the employees to the business center and either drop them at their respective building/ business park or will drop them at a central location that is an easy walk to their place of employment. For example, in downtown Bellevue where curb access to each building is not always available, designated pick-up and drop-off locations will be provided. Curbside monitoring equipment will be deployed to help enforcement staff monitor the turnover of these locations, and for planners to gather data to determine if more or less pick-up and drop-off space is needed.

Figure 4: CommutePool Graphical Representation



## Deployment Plan

Because of our planned and current work on CommutePool, deployment will begin quickly. Bellevue, Kirkland, and our partners are committed to a speedy and successful deployment. Work that we expect to complete using our own resources prior to authorization to proceed include the following:

- We will prepare a detailed workplan prior to authorization to proceed. This means the first task will be for US DOT to review this plan.
- We plan to complete a draft of an RFP for autonomous vehicles – but will not issue this until receiving an authorization to proceed.
- An operating version of the smartphone app will be completed prior to authorization to proceed, with consumer tests planned for early 2019.
- We will continue to be work with the partner employers to build interest in this program and will look to find additional employers to join.

Any forecast about the expected demand for a Flexible, Electric, Autonomous, Shared Mobility Network by definition will be uncertain. No similar system exists today so there is no other deployment to use as a model – indeed, this is a major rationale for implementing the CommutePool Network now.

This system does have positive features: a congested corridor, strong support from employers in the corridor, an existing process to recruit employees to travel options other than single-occupancy vehicles, a strong technical team that includes experience working with employers



on new transport options (Luum) and nationally recognized experts (Dr. Susan Shaheen from Berkeley, Timothy Papandreu (former Waymo executive), and Dr. Richard Mudge), and enthusiastic local sponsors (the cities of Bellevue and Kirkland). The CommutePool Network will be built around autonomous vehicles. There are optimistic forecasts about the per passenger costs for these vehicles relative to taxis and existing shared vehicles services (Uber, Lyft, etc.). Estimates of 25 to 50 cents a mile are common. This is another reason to be encouraged regarding the potential market for CommutePool.

Our implementation plan calls for a walk before you run strategy. Thus, we plan to focus on early success and use this to generate new riders over time, including possible new corridors. Our current goals call for reaching 1,000 daily riders by the end of the first year (after six months of operation); 2,000 by the end of year two; and 3,000 by the end of year three. The last year of this forecast will require additional matching funds, but our current match proposal only draws on thirty percent of our best guess regarding likely resources through the Commute Trip Reduction program. Based on these numbers, by year two we expect general commuters to see a noticeable improvement in peak-hour congestion along the corridor.

Further detail regarding the steps that will be taken to deploy this project can be found in the “Schedule” section.

## Challenges

The deployment of any new technology generates potential risks. This is particularly true for an effort that involves multiple innovations, such as those proposed here. Possible challenges include:

- *Will an adequate number of autonomous vehicles be available in the region?* This appears to be a manageable risk given the recent plan by Waymo to purchase 82,000 vehicles to deploy starting next year, and the recent multi-billion-dollar investment by SoftBank in General Motor’s Cruise subsidiary. General Motors has announced that they will deploy autonomous shared vehicles in commercial, shared operations starting in 2019. There is a risk, of course, that deployment will be delayed or that these firms will decide to deploy their vehicles in other metropolitan areas. This could delay deployment or mean that we will rely initially on electric vans.
- *What if autonomous vehicles do not perform well?* Safety is our number one concern. There should be higher expectations for autonomous vehicles than for current cars. Any actual or perceived safety concerns will create problems well beyond the Bellevue-Kirkland area. We expect to use safety drivers in the beginning, until the vehicles handle expected and unexpected events.
- *Cybersecurity is another risk, although also one that has implications beyond the Bellevue-Kirkland area.* We will track events around the world and work with the provider of autonomous vehicles to ensure we have state-of-the-art technology in place.
- *What if we have difficulty in finding convenient pick-up and drop-off locations in southeast King County?* This part of the planning effort will take time. We will work with REI (who is relocating their entire workforce from this region to Bellevue), the Northwest Seaport Alliance and King County Metro to find parking facilities with capacity.

- *Will there be adequate curb space during the rush hour?* Most of the employers outside of downtown Bellevue have private parking areas or roads that can provide adequate pick-up and drop-off space. In downtown Bellevue, curbside monitoring will be essential to the enforcement of turnover and the planning for the need of additional space.
- *What if there are not enough users to match the capacity of the vehicles?* This will require a rethinking of incentives and how best to serve the market. Luum has built their business on attracting SOV drivers to transit, biking, walking and shared mobility trips. Luum will work with employers to find the right combination of incentives to improve use of the system.
- *What if demand exceeds the capacity of our system?* This is a good problem to have. One option would be to expand the fleet of available autonomous vehicles. Since this would increase revenues, a supportive response is likely.
- *Will weather be a problem?* Some autonomous vehicles have had problems with bad weather – snow and heavy rain in particular. This is where the use of a safety driver will be critical until the transportation service provider and the program partners believe weather issues have been addressed.
- *CommutePool riders will include employees of more than one company.* This requires a more complex flexible on-demand system coordinated in large part with an app that will be developed and tested on this project. In addition, Washington State has a law that may be interpreted to prohibit employers from providing a shared employer service and allowing pooling of employees working for different companies. However, King County Metro has a program that can authorize this type of operation after a review of the proposed service against their existing transit service in the area. King County Metro has committed to work with Bellevue and Kirkland to develop the service envisioned in this grant application. In addition, Bellevue and a consortium of other cities and chambers of commerce will work with state legislators to modify this law to allow more flexibility for shared employer shuttles statewide.

## System Performance Improvements and Benefits

The performance measures will cover project outcomes as well as operational measures. Congestion and related environmental impacts are a major motivation behind this project, so they will also be a focus of the performance measures. I-405/SR 167 are recognized traffic congestion problems. At the north end of Renton, approaching the I-90 interchange, I-405 carries almost 120,000 vehicles per day in its general-purpose lanes and 40,000 vehicles in its HOV lanes. Morning peak hour volumes entering Bellevue from Renton, and communities to the south, are 3,700 general purpose vehicles and 1,500 HOVs. The afternoon peak departing Bellevue and entering Renton is 3,300 general purpose vehicles and 1,600 HOVs.

**Congestion Impacts.** We will use INRIX data to measure congestion along the I-405 / SR 167 corridor before the project starts and during the project. Standard measures include the travel time index and the buffer zone index. These will vary by time of day (morning peak, evening peak, mid-day and evening) and day of week. These will be compared by season as well. We will also use WSDOT data to measure the average speed along the corridor and estimates of the volume of traffic.

**Environmental Impacts.** Pollution measures will be estimated for SOV vehicles used prior to the project versus the electric autonomous vehicles once the project begins.

**Mode Shifts.** Single occupancy vehicles (SOVs) are significant contributors to traffic congestion. The percentage of transit work trips originating from communities along the I-405/SR 167 corridor is quite low at approximately 20 percent, whereas Seattle sees almost 50 percent of all work trips coming from transit. This mode split will be tracked during the project. One goal is to reduce the percentage of SOVs.

**Operations.** How well is the service performing? These measures will include quantitative metrics such as pickups made on time (or within five and ten minutes of promised times) and drops offs made on time (adjusted for unusual traffic delays). Perceptions are important as well, and the market research task will identify the traveler's perception regarding the quality of the service.

**Socio economic impacts.** We will collect data on the socio-economic characteristics of those who use the service relative to the overall population. This will cover incomes, type of job, number of cars owned etc. We will also track any changes in employment – new jobs or shifts to new positions or new firms. One goal for this project is to improve transportation access for groups with limited transportation service.

## Vision, Goals and Objectives

The vision behind this proposal is to provide the region with a sustainable, practical and forward-looking mobility option.

**A SUSTAINABLE REGION** - This has two dimensions:

- reduced impacts on the environment, through use of electric vehicles and fewer single-occupancy vehicle trips.
- improved economy through better individual access to jobs and business access to labor. There are positive synergies between efforts to reduce traffic congestion and environmental benefits.

**A PRACTICAL SOLUTION** – focus on what works and what can potentially be a model for expansion elsewhere in the Puget Sound area and across the nation.

- *Focus on a specific corridor* - Rather than try to solve problems for the entire region, the CommutePool network will initially focus available resources on the I-405 – SR 167 corridor. This heavily-congested corridor connects with communities that have limited frequent transit service beyond the freeway corridor.
- *Partner with private/public firms* - The employer partners for this proposal have a total of more than 30,000 jobs in Bellevue and Kirkland. A complete list of employers currently committed to this project is listed in the “Executive Summary” section of this proposal.
- *Market driven* – Recognizing the need for transportation that is flexible in time and location. This differs from the traditional vanpool that has a fixed group of riders, leaving at the same set time and traveling to and from fixed locations. Travelers in

shared vehicles need to have the flexibility to change the time of day they travel and even to change pick-up and drop-off locations.

- *Build on past experience:*
  - Since 1991, WSDOT has had a Commute Trip Reduction (CTR) Act to reduce peak congestion that requires and incentivizes employers with over 100 employees to provide alternatives to single-occupancy vehicle trips, including, for example, providing transit passes and paying for employee use of vanpools. The employer payment for employee use of vans will be a significant source of matching funds to enable the CommutePool system to pay the vehicle providers for the flexible, electric and autonomous service.
  - Luum is a private firm that has worked with the business community in Puget Sound since 2012 to organize, recruit and incentivize employees for these Commute Trip Reduction Act programs. Luum's success with private firms and employees in implementing these programs is invaluable. Based on their experience in the region and the commitment from employers in Bellevue and Kirkland, Luum estimates that up to \$6 million a year in employer-based funding could be available for this project.

## WASHINGTON STATE COMMUTE TRIP REDUCTION PROGRAM

The Washington State Legislature passed the Commute Trip Reduction (CTR) Act in 1991 to help reduce traffic congestion, air pollution, and use of petroleum. This was amended in 2006. CTR requires workplaces with more than 100 full-time employees to implement programs that reduce commuting by single-occupant vehicles. Employers develop and manage their own programs. Firms receive a tax credit equal to half their expenditures with a cap on spending per employee. Today, more than 1,050 worksites statewide and 530,000 commuters participate in this program.

**FORWARD LOOKING** – building the system around a future with autonomous, electric vehicle technology. Autonomous vehicles offer flexible schedules during peak commute times and provide service during times with limited traditional transit service. A smartphone application designed to meet the specific needs of this Advanced Commuter Network. Amazon Internet Business Solutions Group will prepare this smartphone app with the assistance of Luum.

## Leverage Existing Programs and Investments

This proposal will leverage Washington State's existing Commute Trip Reduction program to help offset the operating cost of the system. As with this proposal, WSDOT's program is built around encouraging commuters to switch from single-occupancy vehicles. The current WSDOT program was established in 1991 but has not adjusted to changes in technology, institutions (such as TNCs), or public attitudes. Fixed vanpools do not support more flexible work schedules common with many businesses today. The CommutePool network will have the opportunity to use these funds to pilot a new, more flexible mobility solution.



The CommutePool Network has attracted private sector investment as well. These investments combine hard dollars with active support for the program in terms of encouraging employees to sign up, and in terms of providing financial help. Private sector involvement shows both the seriousness of the traffic problems faced by their employees and the belief that this program provides a significant opportunity to reduce traffic congestion.

## Schedule

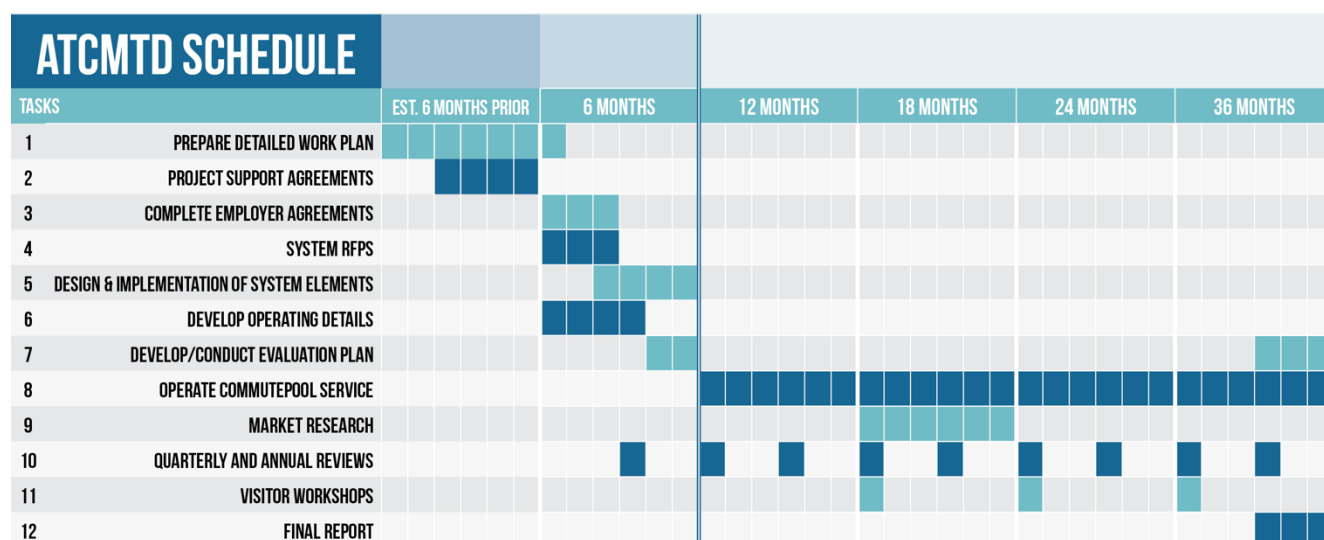
Deployment of the CommutePool network includes twelve tasks, which are described below. Given the importance of this project for transportation access and the region's general economic health, we plan to begin preliminary work prior to receiving authorization to proceed. This work would not be eligible for payment by federal funds. These efforts include parts of Task 1 and Task 2. For Task 1, a draft work plan will be prepared prior to authorization to proceed, so the first FHWA effort will be to review and comment on the work plan.

Task 2 calls for completing agreements with our private partners – Luum, UC Berkeley, Amazon Internet Business Solutions Group, and the advisory team. To help speed implementation once we receive approval, draft agreements will be prepared (but not signed) prior to authorization to proceed.

During the first six months we will complete the first seven tasks – which is all the work needed to begin operation. These include agreements with the employer partners, RFPs for vehicles and infrastructure support, design and implementation plans, and an evaluation plan. The CommutePool Network will begin operation no later than month 7 and continue through month 36. One goal is to develop a business plan that will ensure a self-sustaining program. We expect the service to continue after federal funds are no longer available.

Market research is shown for months 13-18, which is subject to change. Regular quarterly and annual reports will be provided, as called for in the RFP. After 12 months we will begin to host visitor workshops, at least one every six-month period. The final report, with time for review by FHWA, occurs at the end of the project.

Figure 5. Project Schedule



Within one month of authorization to proceed, we will organize a meeting with US DOT staff to review our plans and receive comments and suggestions for improvement from US DOT. These comments and discussions will be incorporated into the draft work plan.

#### **TASK 1: PREPARE DETAILED WORK PLANS** (Bellevue lead)

A detailed work plan will describe specific actions, including organizations and individuals responsible for each task. This work plan will be completed prior to authorization to proceed and provided to FHWA for their review once the contract begins. Each task in the plan will:

- include a time table;
- describe individuals responsible for each task;
- identify interactions with other Tasks; and
- describe specific results that will be expected – deliverables and products.

The work plan will also describe ongoing communication with US DOT – and with local public and private organizations. We expect that this plan will call for monthly telephone calls (perhaps more frequent during the first few months) and written monthly reports.

- Kickoff meeting, within two weeks of authorization to proceed
- Provide Draft Work Plan (to be updated annually). This will include:
  - Communication plans
    - Internal among team members
    - With local community / agencies
    - With US DOT
  - Performance measures
  - Evaluation parameters
  - Detailed schedule

*Deliverable: Draft work plan and final work plan.*

#### **TASK 2: INITIATE AGREEMENTS FOR PROJECT SUPPORT** (Bellevue lead)

A formal agreement will be required for each member of the support team. To help speed deployment, Bellevue and Kirkland will prepare draft scopes of work for each activity prior to formal authorization to proceed. Task 2 will then complete negotiations with each entity. We believe this process will be relatively straightforward, permitting an early start to technical work. These agreements include:

- agreement with Luum to manage operations. This will call for the use of Luum’s existing software to manage employee-employer links with different modes and will include advice regarding agreements with employers;
- agreement with University of California at Berkeley for market research and general advice;
- agreement with University of Washington for evaluation and performance monitoring of the project;



- agreement with Amazon Internet Business Solutions Group regarding use of a smartphone-based app to support use of the system by employees and program managers; and
- service agreements with Advisory Team members;
- agreement/MOU with Puget Sound Energy on increasing EV Charging capabilities.

*Deliverable: Technical memo that describes the agreements.*

### **TASK 3: COMPLETE EMPLOYER AGREEMENTS** (Bellevue and Luum Lead)

A formal agreement is needed with each employer that plans to promote the service with their employees. These agreements will build on existing experience of Luum with the implementation and funding of similar employer-employee mobility options. While the basic agreement language should be similar, each employer will have its own agreement. Bellevue, with advice from Luum, will finalize agreements with employers that will be part of the deployment.

*Deliverable: Technical memo that describes the agreements.*

### **TASK 4: SYSTEM RFPS**

RFPs are needed to select a vehicle service provider and to select an infrastructure consultant to help design and manage curb space and parking locations. These RFPs are time critical and will be issued as soon as practical after authorization to proceed. A formal review process will be carried out for each RFP. In addition to published notification, potential bidders will be notified in advance. Bellevue and Kirkland reserve the right to hire a consultant (via competitive process) to support program management.

Based on the results of the procurement, Bellevue will complete contracts with:

- **A vehicle service provider.** This agreement will include performance measures. Bellevue and Kirkland will retain the right to issue another RFP if there is a significant increase in the number of required vehicles later in the project.
- **An infrastructure consultant** who will perform roadside equipment design and integration and help select parking and curb space monitoring technology.

*Deliverable: Technical memo that describes the results of the RFP process and resulting contracts.*

### **TASK 5: DESIGN AND IMPLEMENTATION OF SYSTEM ELEMENTS** (Bellevue)

Key system elements include the ability to monitor parking (to ensure space is available as reserved); monitor use of curb space (a limited resource) and ensure use of the smartphone mobility app. This last effort will include field tests and training. This task will be coordinated with Task 6 regarding operating details.

*Deliverable: Technical memo.*

#### **TASK 6: DEVELOP OPERATING DETAILS** (Luum and Bellevue and private employer firms)

This effort will build on lessons learned from work by Luum since 2012. It will take advantage of Luum’s existing management software and tools to track operations and expenditures. A process will be defined that will:

- Identify potential employees who could use the system and who live along the corridor
- Recruit them to join the program
- Identify pick-up and drop-off locations along I-405/SR 167 corridor.
  - For business locations, these will include curbside or parking garages.
  - For employees, these may include church parking lots, underutilized warehouse or similar parking places near residential areas.

*Deliverable: Technical memo.*

#### **TASK 7: DEVELOP AND CONDUCT EVALUATION PLAN** (University of Washington)

Evaluation is important for all new programs – and mandated to ensure effective use of federal funds. The evaluation plan will identify specific performance measures for the project. These will include:

- Congestion impacts
- Environmental impacts
- Mode shifts
- Operations and
- Socio economic impacts

The evaluation plan will use the results of market research and collect its own data.

*Deliverable: Technical memo on evaluation plan and performance measures.*

#### **TASK 8: OPERATE COMMUTEPOOL SERVICE** (Luum and vehicle provider)

Based on the planning work completed in Tasks 5 and 6, legal agreements with employers from Task 3, and selection of the vehicle service provider in Task 4, operations will begin. This will be the largest single task and the one with the greatest visibility for the traveling public and for the communities along the I-405/SR 167 corridor.

In addition to the collection of performance measures starting from Day One, we will be sensitive to qualitative responses. CommutePool will have its own web site, providing an opportunity to receive e-mails and text messages from commuters and from the general public. CommutePool will also have an “800 number” for voice messages. These quantitative and qualitative response will provide valuable guidance, particularly during the early days. Luum is a likely source for these early comments given the firm’s direct involvement both with employers and employees. Timely response to concerns and questions will be an important tool to ensure a successful service.

Performance measures defined in Task 7 will be collected on an ongoing basis during CommutePool. Formal market research efforts (Task 9) will be an important way to quantify public perception regarding the effectiveness of CommutePool.

We expect the size of the CommutePool operations to grow over time with additional vehicles and additional employees and employers. One option would be to extend service along I-405 to the north.

*Deliverables: Quarterly reports on operation, including performance measures and any problems encountered and proposed solutions.*

#### **TASK 9: MARKET RESEARCH** with feedback for operations (UC Berkeley)

A draft market research plan will be prepared and reviewed by the management team and the advisory team. The market research will be carried out six months after operation begins (timing subject to change). Additional market studies would help, and we may propose to expand the number and extent of these efforts. We expect the market research will provide insights regarding how to improve operations and extent market coverage. In addition to a formal report on market research findings, UC Berkeley will provide suggestions for improvement to the operating team (Task 8).

*Deliverables: Progress reports on market research and final report on findings and implications for operations.*

#### **TASK 10: QUARTERLY AND ANNUAL REVIEW** (Bellevue and team)

These reports will summarize actions to date, lessons learned, identify any problems encountered and proposed solutions, summarize expenditures to date, and describe plans for the next reporting periods. The annual reports will be in a format and style that assumes they will become a public document.

*Deliverables: Quarterly and annual reports for review by FHWA.*

#### **TASK 11: ORGANIZE WORKSHOPS** (Bellevue and team)

Outreach is an important part of all ATCMTD programs. The purpose is not just to improve transportation services along the I 405 / SR 167 corridor, but to develop a model that could be adopted by other communities. On-site visits can be the best way to understand the nature of the project including its advantages and disadvantages. We will organize a series of in-person workshops and site visits once every six months after operations have begun. These will be open to communities from around the country. Bellevue and Kirkland will prepare materials and host these workshops. To cover the full range of the project, the workshops will be two days. The Bellevue team will provide descriptive material and lecturers. We will not be able to provide for travel and per diem costs.

In addition to workshops from other parts of the country, we will organize less formal meetings with groups from the Puget Sound Region and elsewhere in the Northwest. Members of the Bellevue team will participate in relevant national conferences from time to time.

*Deliverables: Summary report on results of each workshop including contact information for each attendee and proposed follow-ups with each organization.*

#### **TASK 12: PREPARE FINAL REPORT** (Bellevue and team)

The final report will summarize the full project, covering lessons learned, evaluation (including performance measures), and suggestions for next steps, which would include a guide for implementation of similar programs in other communities. This guide will identify possible legal or administrative changes that would ease implementation, including copies of contracts the Bellevue and Kirkland used with key supporting organizations. The guide will suggest possible adjustments that communities might consider based on changes in technology since the project began. It will also include a business case for future operation of the CommutePool Network along the I-405/SR 167 corridor and elsewhere in the Puget Sound Region, and financial suggestions for other communities.

*Deliverables: Draft report and final report based on comments from FHWA.*

#### **Link to US DOT Criteria**

The RFP asks to identify how this proposal relates to the US DOT's eleven goals, 7 focus areas, 9 technologies and 4 objectives. The following tables and narrative address each of the applicable elements.

#### **US DOT Goals**

Reduced costs and improved return on investment	By pooling riders, this project will reduce vehicle trips into Bellevue and Kirkland, thus making better use of existing roadway capacity.
Delivery of environmental benefits that alleviate congestion and streamline traffic flow	This project will reduce vehicle emissions through the use of an all-electric or hybrid-electric vehicle fleet and through the reduction of single occupancy vehicle (SOV) trips.
Measurement and improvement of the operational performance of the transportation network	A reduction in peak-hour SOV trips will improve of the operational performance of the transportation network.
Reduction in crashes and increase in safety	An increase in safety and reduction in crashes are anticipated based on the use of autonomous vehicle technology.
Use of real-time transportation related information	The new traveler information app to be developed by Amazon will provide a more integrated traveler app, providing real-time information about parking availability, flexible CommutePool trips and eventually other shared-mobility and transit services.
Monitoring assets to improve infrastructure management	Not applicable

Delivery of economic benefits by reducing delays and improving system performance	This project should improve access to jobs for residents in southeast King County and access to potential employees for businesses in Bellevue and Kirkland. The combination will provide tangible economic benefits.
Accelerate deployment of V2V, V2I and autonomous vehicle technologies	This project will bring more autonomous vehicle technology to the region to make this a more economically viable, flexible, and safer commute option.
Integration of advanced technologies in transportation system management	This project will bring parking and curbside monitoring into management of the transportation system. These elements should improve commute choices and reduce parking related delays in the downtown area.
Demonstration, quantification and evaluation of the impact of advanced technologies	The project will employ the expertise of Dr. Susan Shaheen and Dr. Yinhai Wang and their respective research institutions to document the impact of the CommutePool network.
Reproducibility of successful system	The schedule includes a series of workshops where agencies outside the region will be invited to experience the system and provide input on the reproducibility in other jurisdictions or regions.

### US DOT Focus Areas

Of the seven focus areas, this proposal is most relevant for support for connected communities. We will use the CommutePool network to reach communities along the I-405/SR 167 corridor that are underserved by regional and local transit. This technology is linked directly to providing access to economic and social activity centers in Bellevue and Kirkland but could be expanded in the future.

By adding a shared vehicle network to an existing corridor, this proposal also supports the multi-modal integrated corridor management focus area.

Advanced traveler information system	This project will develop and implement a smartphone app designed specifically to support flexible commuter options. The app will also inform drivers of available commute parking in the southeast King County area leased parking facilities. This app will have value for communities beyond the I-405/SR 167 corridor.
Advanced public transportation systems	This effort is built around advanced shared mobility techniques. The vehicle service provider could also address first mile/last mile needs when not in demand for longer regional trips.

Transportation system performance data collection, analysis, and dissemination systems	Performance measures are at the heart of this effort. Our focus on a single corridor increases the likelihood that these measures will generate significant impacts. Performance measures will provide guidance to other groups that wish to adapt this plan to their community.
Advanced safety systems	This system is built around autonomous vehicles, including their ability to track movement of other vehicles (V2V) and take advantage of current infrastructure condition (V2I).
Integration of ITS with the Smart Grid	Bellevue will work with Puget Sound Energy to coordinate deployment of fast charging stations that can support electric/autonomous shared mobility vehicles.
Electronic pricing and payment systems	Not applicable
Advanced mobility and access technologies, such as dynamic ridesharing	While our focus is not on elderly and disabled individuals per se, the heart of our system is a dynamic ridesharing and information system. This will benefit all travelers including elderly and disabled individuals.

## US DOT Objectives

Support economic vitality	Improving regional access to jobs and access to labor is at the heart of this proposal. Indeed, this is one reason we have been able to generate tangible support from the region's major corporations.
Leveraging Federal funding to attract other, non-Federal sources of infrastructure investment	This project achieves this goal in two ways 1) Matching and in-kind contributions from private corporations and the cities of Bellevue and Kirkland; and 2) leveraging Commute Trip Reduction Act resources.
Use innovative approaches to improve safety and expedite project delivery	This project will focus deployment of autonomous vehicles on a single major corridor. By diverting significant numbers of commuters away from traditional single occupancy vehicles to vehicles that are both shared and have modern autonomous vehicle safety features.
Achieve specific measurable outcomes	Our evaluation plan will build on specific performance measures regarding traffic congestion, reduced emission, safety, and the mode shifts from single occupancy vehicles to shared vehicles. These performance measures will be tracked and reported in each quarterly report to FHWA.



# Section III: Management Structure

## Project Management Organization

The city of Bellevue will serve as the manager and architect of the overall system and will ensure that the various partnerships work together in an integrated and seamless way. To help with this function, the city will create an advisory group of experts including Dr. Susan Shaheen of the University of California at Berkeley, Richard Mudge from Compass Transportation and Technology, Charles Collins, former head of King County Metro transit, and Timothy Papandreou, formerly of Waymo and the former Chief Technology Officer for the San Francisco Municipal Transportation Agency. This advisory group will be assisted by an executive from the City of Kirkland.

All the grant and match funds will flow through Bellevue, with subcontracts for specific work by Luum, the infrastructure and support consultants, and the supporting universities. It is anticipated that Luum will manage the coordination of resources generated through the State's Commute Trip Reduction Program and through additional trip subsidizing by partner employers. Luum will work with the vehicle provider to ensure payment for travel on the network.

The City of Bellevue will take the lead in building support to remove unnecessary or restrictive regulations. Legislation will be proposed to create additional incentives for the CommutePool Network and associated infrastructure. Bellevue will also be responsible for reporting to US DOT on progress, possible problems, and metrics of success of the grant program. Bellevue will provide information regarding the CommutePool Network to other communities with an interest in this solution to urban traffic congestion.

Several tasks will be carried out in parallel. Our plan calls for ongoing surveys and data collection. We will use this data to improve operations as soon as possible, rather than waiting for a nicely bound final report. In sum, we will maximize the time during the next three years that the public and the community in general will be able to make use of the system that we deploy. The work plan prepared in Task One will expand upon the tasks listed in this proposal, provide a more detailed schedule, and define performance goals for each task.

## Partnering Plan

The Cities of Bellevue and Kirkland have already done extensive work to develop formal partnerships to support this project. Partners are from both the public and private sector, as well as academic institutions. These partnerships include:

- **Public Sector**
  - The City of Bellevue will provide \$700,000 in direct and indirect financial support for this project.
  - The City of Kirkland has provided unanimous support from their Council for this project. They have provided a letter of support which includes a statement regarding their financial contribution.
  - King County Metro will support the planning of the CommutePool network. They will ensure these services mesh well with current regional transit offerings.



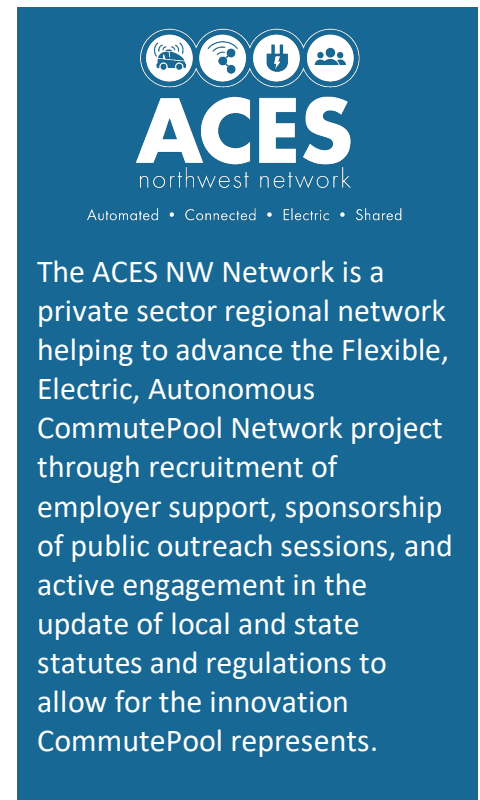
- The Northwest Seaport Alliance will help locate leased parking on underutilized warehouse space in southeast King County.

- **Private Sector**

- Luum has provided a letter of support that defines their contribution regarding work with the employer partners.
- Amazon Internet Business Solutions Group will prepare the CommutePool smartphone app. This will be leased or provided at no cost to this program.
- Puget Sound Energy (PSE) plans to provide new fast-charging and EV infrastructure in Bellevue to support the use of electric vehicles for this system.
- In its support letter, ACES NW Network has stated they will provide key connections to private sector is providing in kind services to help facilitate the grant project.
- Letters of support have been received from many of the employers that will partner with us for the initial deployment of this system. The employers will work with Luum to encourage and provide subsidies for their employees to use this service in the initial service area. The employers will also provide system evaluations, administrative support, and other direct and indirect financial contributions, many of which are outlined in the attached letters of support.
- An RFP will be used to select a consultant to manage deployment of the monitoring technology used in the parking facilities in South King County, and for the curbside pick-up and drop-off sites in downtown Bellevue.
- An RFP will be used to select the electric, autonomous vehicle service provider, using the share mobility model that the current autonomous vehicle makers such as Waymo and General Motor's Cruise subsidiary intend to use.

- **Academic Institutions**

- UC Berkeley's Transportation Sustainability Research Center director Dr. Susan Shaheen has committed the Center's support for market research and her participation on the advisory team.
- Dr. Yin Hai Wang of the University of Washington has committed the Pacific Northwest Transportation Consortium to support the performance evaluation of this program.



## Organization Structure

Figure 6. CommutePool Network Team Management Structure

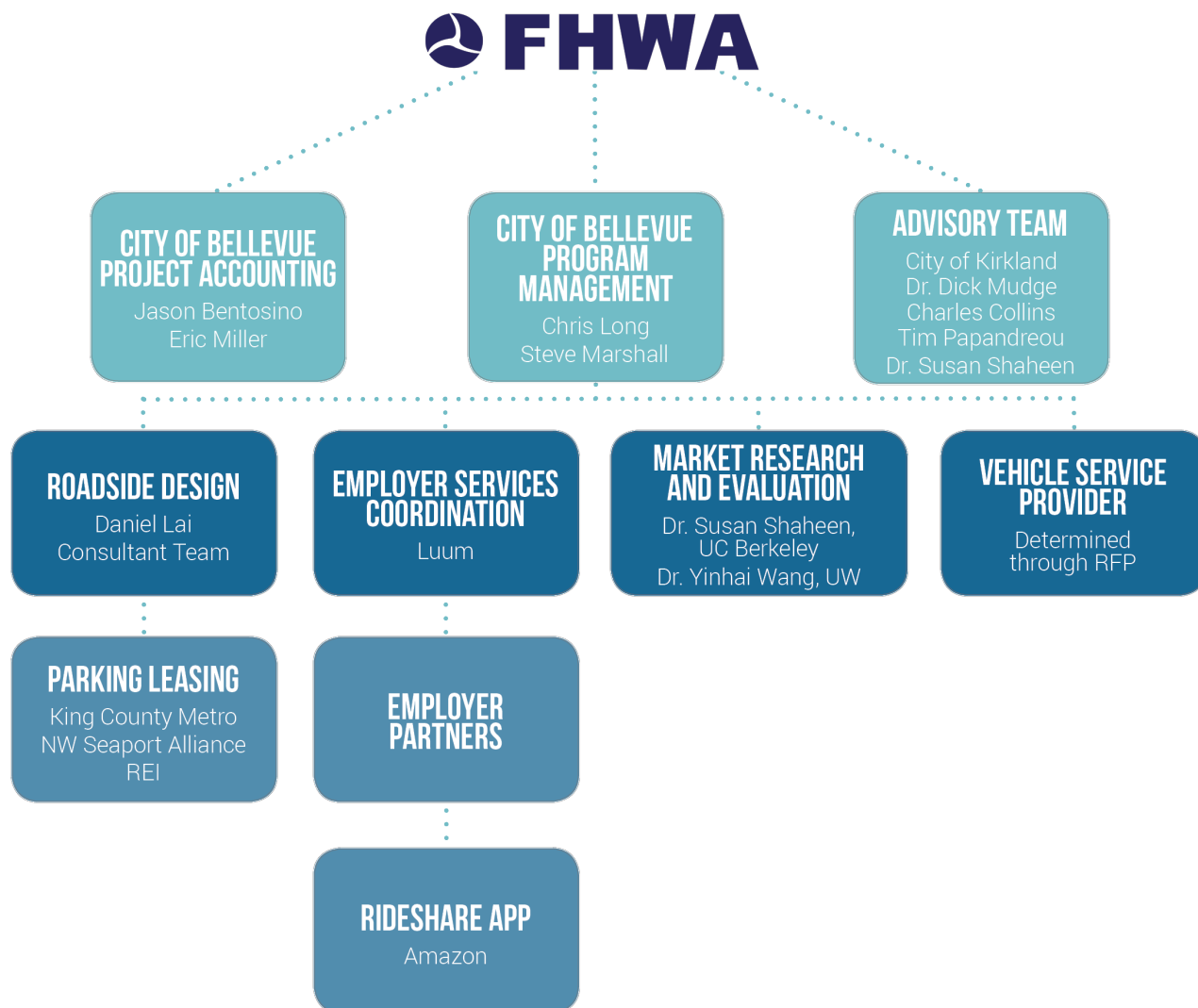


Figure 6 shows the management structure for the City of Bellevue team. The City of Bellevue will handle the management and financial aspects of the project along with the design and implementation of the parking and curb monitoring equipment. Chris Long and Steve Marshall will provide management direction. Chris will oversee the technical operations of the program and Steve will manage the partnerships. Chris and Steve will be the primary points of contact for FHWA and will be responsible for providing quarterly and annual reports to FHWA.

The org chart reflects four activities, each with its own column. The first activity focuses on infrastructure requirements. Roadside design, led by Daniel Lai from the City of Bellevue, will include managing a consultant team to design and implement the parking and curb space monitoring equipment that will be deployed at pick-up and drop-off locations. Daniel will also manage efforts to identify parking locations along the SR 167 corridor in coordination with King County Metro, REI, and the Northwest Seaport Alliance. The Northwest Seaport Alliance has committed to working with owners/operators of the warehouse space in south King County to identify facilities that may have excess parking space.

The second activity handles operations. Luum, led by its President, Sohier Hall, will coordinate this effort with the major employer partners. This builds on the experience and supporting software that Luum has developed over the past six years in providing similar service for Puget Sound area businesses. This effort will recruit employees to join the program, ensure that they are linked with the appropriate vehicles for each trip, and handle the transfer of funds from each employer. The app developed by Amazon Internet Business Solutions Group will be a key tool in linking workers with the appropriate group vehicle and the correct pick-up and drop-off locations.

The third activity covers market research and program evaluation. UC Berkeley's Transportation Sustainability Research Center, under the direction of Dr. Susan Shaheen, will organize and conduct the market research. Based on these results, and on the group's experience, they will provide advice regarding opportunities to improve the effectiveness of the shared mobility system and ways to expand its reach in the community. The market research results will help support the performance evaluation that will be prepared by Dr. Yinhai Wang of the University of Washington and the PacTrans research center.

The fourth activity involves working with the transportation service provider. This provider will be determined via an RFP. The evaluation of potential service providers will include looking at the ability for their company to provide a fleet of electric and eventually autonomous vehicles.

Team communication is important, particularly during the early parts of the project. We plan to have weekly team calls including senior members of each activity. FHWA is welcome to listen in on these calls. There will be formal monthly (or weekly) calls with FHWA during the early stages of the project.

## Section IV: Staffing Description

This section describes the background and experience for each of the individuals mentioned in the org chart. Full resumes are provided in the Appendix for five key staff. These are:

- Steven Marshall from the City of Bellevue
- Chris Long from the City of Bellevue
- Dr. Richard Mudge from Compass Transportation and Technology
- Sohier Hall from Luum
- Dr. Susan Shaheen from the University of California at Berkeley

Chris Long and Steve Marshall will manage the overall project. Chris will oversee the technical aspects of the project, including infrastructure design, parking leasing, development of RFPs for services and contracting. Steve will manage all the partnerships, including coordination with Luum and Amazon Internet Business Solutions Group, and finalizing support from all partner agencies.

Chris Long, PE, PTOE is the Traffic Engineering Manager for the City of Bellevue. Chris manages operations of ITS, traffic signals and street lighting, oversees arterial operations, coordinates traffic data and performance data collection, supervises response to all traffic safety and operational concerns submitted to the City, and manages parking enforcement for downtown on-street parking. Chris recently completed leading the development of an update to the City's 2004 ITS Master Plan, now called the Bellevue Smart Mobility Plan, and serves on the City's SmartCity Core Team. Prior to working for Bellevue, Chris was a consultant working in the ITS industry for almost 20 years. He has managed many major federally-funded ITS and transit projects in the region.

Steve Marshall is the Transportation Technology Partnership Manager for the City of Bellevue, a new position created by the Bellevue City Council. Before coming to Bellevue, he was executive director of the Center for Advanced Transportation and Energy Solutions. He has more than 30 years of experience working on energy and transportation issues, including serving as chief outside legal counsel to Puget Sound Power & Light as a partner at the law firm of Perkins Coie. At Perkins Coie, his first work was defending Boeing in aircraft crash cases. Steve has served on the boards of numerous civic groups including the Municipal League of King County where he is a past chairman and a current member of the foundation board. He has served as an advisor to the Washington State Economic Development Commission and was on the Regional Transit Task Force advising King County Metro.

Sohier Hall, President and CEO of Luum, will lead the Luum team in developing the CTR integration with all the partner employers and the transportation service provider. Sohier co-founded Luum in 2012 and serves as the Company's President & CEO. He leads Luum in its mission to provide the most comprehensive and effective commute business solution for

### PRIMARY CONTACT

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425-452-4221



employers. Sohier's expertise is in digital business and product strategy, global strategic partnerships, complex systems thinking, corporate performance management, and putting disruptive business models into practice. In its short history, Luum is already widely cited as a case study for changing employee's behavior towards sustainable commute, reducing millions of pounds of carbon emissions, and improving the bottom line.

Program evaluation will be led by Dr. Susan Shaheen of the University of California at Berkeley, and Dr. Yinhai Wang from the University of Washington. Dr. Shaheen is a pioneer and thought leader in future mobility strategies. She was among the first to observe, research, and write about changing dynamics in shared mobility and the likely scenarios through which automated vehicles will gain prominence. She is an internationally recognized expert in mobility and the sharing economy and co-directs the Transportation Sustainability Research Center (TSRC) of the Institute of Transportation Studies at the University of California (UC), Berkeley. She is also an adjunct professor in Civil and Environmental Engineering at UC Berkeley.

Dr. Wang is a professor in both Civil and Environmental Engineering and Electrical Engineering at the University of Washington (UW). He serves as director for the Pacific Northwest Transportation Consortium (PacTrans), US DOT University Transportation Center for Federal Region 10. He is currently a member of the steering committee for the IEEE Smart Cities and president for the American Society of Civil Engineers (ASCE) Transportation and Development Institute (T&DI). Dr. Wang also serves as members of the Artificial Intelligence and Advanced Computing Applications Committee, Transportation Information Systems and Technology Committee, and Highway Capacity and Quality of Services Committee of the Transportation Research Board (TRB).

The advisory team will be led by the City of Kirkland, which includes the following members:

- **Dr. Richard Mudge**, President and founder of Compass Transportation and Technology Inc. Dr. Mudge is a nationally recognized expert in the economics and finance of all modes of transportation. He has held a series of management positions as a transportation consultant. These include co-founder and Chairman of the Board for Apogee Research. He also directed the transportation policy group for the Congressional Budget Office and worked in applied research at the RAND Corporation. Dr. Mudge is currently assisting Greenville South Carolina in the deployment of low-speed automated shuttles (with support from a \$4 million grant from US DOT). For Greenville he will prepare business models for each of three planned deployments.
- **Charles Collins** is a former Director of King County Metro Transit and King County Chief Administrator. Among his accomplishments, he helped to initiate a vanpool program for King County Metro, which is now the largest vanpool program in the United States. He is a current member of the Seattle Times Traffic Lab and is a speaker at conferences and an author of transportation and energy articles. Collins has also served as Chair of the Northwest Power Council, and the State Higher Education Coordinating Board. He is the retired President/CEO of Colspur Corporation and Mohave Disposal, Inc. Prior to that he was the Vice Pres./General Manager of Polyform US Ltd.



- **Dr. Susan Shaheen**, an internationally known expert in shared mobility, as described above.
- **Timothy Papandreou** is the former chief technology officer for the City of San Francisco and was recently a senior manager for Waymo. Tim helped develop San Francisco's winning ATCMTD grant proposal for a new mobility solution and has worked with Waymo to promote the deployment of their autonomous vehicle service network.
- **The City of Kirkland** will provide an executive with background in local transportation and business issues

Jason Bentosino and Eric Miller will provide project accounting services and financial oversight for the project. Eric has been with the Bellevue Transportation Department for more than 20 years with a focus on capital program management, administration and implementation. Eric and his team are responsible for grant-seeking, administration, and reporting on all Washington State and Federal Highway Administration transportation grants awarded to the City of Bellevue. Jason Bentosino has been with the department for six years, and for an additional 10 years with the city's central Finance Department. Mr. Bentosino and his team are responsible for grant budgeting, reimbursement billing and reporting. Over the past 10 years the two have worked together to apply for, administer and report on at least 16 state and 20 federal grant awards totaling more than \$58 million. They are also currently managing the administration and reporting for a \$99.6 million federal Transportation Infrastructure Finance and Innovation Act (TIFIA) loan with the US Department of Transportation (US DOT). This loan is partially funding the design and implementation of multiple arterial corridor improvement projects in a rapidly re-developing area of Bellevue, the Bel-Red neighborhood.

Daniel Lai will manage the consultant team that will be deploying all parking and curbside monitoring equipment. He will also oversee the leasing of parking in coordination with our partners. Daniel is a Senior ITS engineer with the City of Bellevue. He served as the primary author for Bellevue's Smart Mobility Plan. Daniel worked as an ITS consultant in the region for 10 years prior to joining the City.

## APPENDIX A – TEAM RESUMES

# STEVEN C. MARSHALL

## PROFESSIONAL EXPERIENCE

**2017-Present** *Transportation Technology Partnership Manager for the City of Bellevue*. Responsible for developing and managing public-private partnerships to support advanced transportation technology initiatives, including autonomous, connected, electric and shared mobility options.

**2006-2017** Consultant on Electric Transportation and Energy projects, including:

- *Executive Director*, Center for Advanced Transportation and Energy Solutions
- *Senior Fellow and coordinator* of the Cascadia Project's on transportation and energy programs; chair organizer and moderator of the series of conferences on advancing electric vehicles known as the "Beyond Oil" conferences.
- *Advisor and consultant* to the Washington State Economic Development Commission on energy and transportation issues.
- *Consultant* to Energy Northwest on electrification of transportation and related nuclear energy issues.
- *Advisor* to the Puget Sound New Energy Solutions task force.
- *Consultant* and advisor to the West Coast Corridor Coalition
- *Advisor* to and author with David Sandalow of the Brookings Institution of the chapter on energy issues in the book *Plug-in Electric Vehicles: What Role for Washington?* Co-author of the 2016 book *Road Vehicle Automation*.

**2003-2006** Assistant General Manager, Power and Transmission Services, Snohomish County Public Utility District No. 1

Responsible for all power, conservation and transmission issues; including coordination with Energy Northwest and BPA.

**1973-2003** Lawyer and Partner at Perkins Coie Law firm

Served as chief counsel to Puget Sound Power and Light prior to the merger with Washington Natural Gas and was responsible for all corporate governance, regulatory, contract and litigation matters, including BPA power and transmission rate cases. Served as member and vice chair of the Edison Electric Legal Committee. Took a public service leave in 2003 to assist Snohomish County PUD No. 1 directing power, conservation and transmission services, including Enron and BPA matters.

[smarshall@bellevuewa.gov](mailto:smarshall@bellevuewa.gov)

206-909-2019

## EDUCATION

University of Washington  
BA, 1970 (Magna cum  
Laude; Phi Beta Kappa)

Harvard Law School, JD,  
1973 (Cum Laude)

*Steve Marshall continued*

**ACTIVITIES/AWARDS**

Member King County Regional Transportation Task Force (2009-2012); Commissioner of the Mercer Island Planning Commission (2007-20016); Past Chair and Trustee of the Washington State Bar Association's Administrative Law Section. (Chair, 2003-2004; trustee 1997-2004) Initiated and contributed to the "Public Records Act Deskbook: Washington Public Disclosure and Open Public Meetings Law.

Past or current member of boards of numerous civic organizations including the Municipal League of King County; the Bellevue Chamber of Commerce Board; King County Charter Review Commission; Eastside Business Alliance; the Municipal League Foundation and Friends of Youth. Senior fellow at the Cascadia Center for Regional Development. Named in "Best Lawyers in America."

# CHRIS LONG, PE, PTOE

## PROFESSIONAL EXPERIENCE

**January 2016 – Present**, City of Bellevue, Traffic Engineering Manager, Bellevue, WA

Manages operations of traffic signals and street lighting; oversees arterial operations; coordinates traffic data and performance data collection; supervises response to all traffic safety and operational concerns submitted to the City; and manages parking enforcement for downtown on-street parking. Currently developing an update to the City's 2004 ITS Master Plan. This effort is being coordinated with Smart Cities planning through Mr. Long's role on the Smart City Core Team. Also coordinating with technology proposed for pedestrian and bicycle mobility, transit operations and freeway operations.

**1997 – 2015**, DKS Associates, Seattle, WA

Office Manager and Senior ITS Project Manager for transportation consulting firm, providing consulting services throughout the Puget Sound Area and along the west coast. Managed a group of 16 traffic engineers and planners located in Seattle. Through work as a consultant, provided ITS and transit operational services to Bellevue on numerous projects, including:

- Prepared Bellevue's first ITS Master Plan in 2004
- Developed GIS Database for all fiber optics in Bellevue
- Support systems engineering for selection of Bellevue's Adaptive Traffic Signal System
- Performed corridor analysis, preliminary and final design services for King County Metro B-Line RapidRide

## SIGNIFICANT PROJECTS OUTSIDE OF BELLEVUE

- Design manager for all traffic related improvements for the first at-grade light rail system in Seattle; preparing timings that allowed the train to travel station-to-station without stopping through 28 traffic signals in the Rainier Valley.
- Project Manager for the ITS and traffic engineering related design for all six RapidRide BRT corridors in King County.
- Design Manager for first Active Traffic Management freeway system on the west coast on I-5, I-90 and SR 520. The variable speed limits and lane control provided significant safety benefits to the region when managing traffic around incidents and congestion.
- Project Manager for System Engineering process to select adaptive signal systems for the Cities of Renton, Puyallup and Lynnwood in Washington. Projects followed the FHWA developed systems engineering process for evaluating requirements for an adaptive signal system. All three systems have been installed and are fully operational.
- Project Manager for the design of the upgrade to LED of over 3000 street lights for Seattle City Light.

[clong@bellevuewa.gov](mailto:clong@bellevuewa.gov)

**206-850-6133**

## EDUCATION

B.S., Civil Engineering,  
University of Washington,  
1995

# RICHARD MUDGE, Ph.D.

## PROFESSIONAL ACTIVITIES

Invited member of Transportation Research Board Committee on Congestion Pricing. He is a past member of the ITS Committee and the Committees on Finance and Economics.

Member of organizing panel for the 2017 ITS World Congress in Montreal

Founding Chair of the International Benefits, Evaluation and Costs Working Group (IBEC)

Dr. Mudge has numerous publications and speaking experiences before local, state, national, and international organizations including AASHTO (national and regional), IBTTA, ITS America, ITS World Congress, and Transportation Research Board.

He has also served as an expert witness before committees of the US Congress and in several state and federal court cases.

## QUALIFICATIONS

Dr. Mudge is President and founder of Compass Transportation and Technology Inc. This firm specializes in the economics, finance, and policy of transportation, with an emphasis on new technology, new transport institutions and the implications for planning and implementation at state and local governments.

Dr. Mudge is a nationally recognized expert in the economics and finance of all modes of transportation. He has held a series of management positions as a transportation consultant. These include co-founder, President, and Chairman of the Board for Apogee Research. He also directed the transportation policy group for the Congressional Budget Office and worked in applied research at the RAND Corporation. He also served as Vice President of Delcan Corporation and led the firm's management consulting group with a focus on transportation policy, economics, finance, and technology.

Dr. Mudge's consulting clients are usually decision makers, whether from public agencies or private firms. Dr. Mudge's work usually involves the changing market place for transportation, including forecasts for future markets. Many of these efforts incorporate the effects of new technology including autonomous vehicles and shared mobility. When prepared for public-sector clients, they usually assess economic and social impacts. When performed for the private sector, they incorporate forecasts of profits and return on investment as well as competitive market assessments.

He holds a Ph.D. in Regional Economics from the University of Pennsylvania and an under graduate degree from Columbia College



*Dr. Mudge continued*

## **PAST RELEVANT PROJECTS**

### **Deployment of Automated Shuttles.**

Dr. Mudge is currently assisting two communities in the deployment of automated shuttles – one a medium sized city and the other a campus with links to major business centers. For Greenville South Carolina he identified a technology provider and helped draft a winning proposal for US DOT funds (the first federal grant for autonomous vehicles). The Greenville plan is ambitious, covering three neighborhoods: a new residential development, an industrial park, and a low-income neighborhood. Dr. Mudge will prepare the business case for the three deployments and the evaluation plan.

### **Implications of autonomous vehicles for the insurance industry.**

Dr. Mudge leads a team that is preparing a framework regarding key forces that are shaping the deployment of autonomous vehicles. This work will include trigger points to help the Society of Actuaries to identify trends and changes.

### **Autonomous Vehicles, Shared Mobility and Regional Plans**

As part of a transportation plan for Northern Virginia, Dr. Mudge prepared a memo on “What’s New in Transportation.” This memo helped prepare scenarios, adjust assumptions for forecasting models, and identify and assess revised investment packages. The scenarios make it possible to estimate the impacts of alternative combinations of deployment of autonomous vehicles and shared mobility. These scenarios show reduced traffic congestion even with no increase in current funding.

### **Scenarios to Help DOTs and MPOs Develop Plans for Autonomous Vehicles**

Dr. Mudge is part of a team working for FHWA to develop seven alternative scenarios designed to help state and local planners assess the potential impacts for the deployment of autonomous vehicles and shared mobility. Dr. Mudge helped lead workshops on these draft scenarios for state and local planners. He also prepared an assessment of relative costs and benefits for each scenario.

### **Economic and Financial Implications for Connected Vehicles and Autonomous Vehicles**

Dr. Mudge has prepared a series of studies of the costs and benefits of these new technologies. This work draws parallels between past network-scale investments in transportation and technology – the Interstate Highway System and the internet provide examples. Examples include:

- *The Economic and Social Value of Autonomous Vehicles: Implications from Past Network-Scale Investments*, prepared for a Washington DC Think Tank. The focus here is on the non-linear impacts generated by “network-scale” investments. These benefits usually out shine direct losses.
- *40 Proposed Transportation and Water Infrastructure Projects of National Economic Significance*, United States Treasury, (December 2016). This report estimated that the net economic impact of autonomous vehicles would be 7-8 times larger than that for 40 large traditional infrastructure projects.

*Dr. Mudge continued*

- “A Network Perspective” chapter in *Evaluation of Intelligent Road Transport Systems: Methods and Results*, published by the Institution of Engineering and Technology, (2016).
- “Technology Options and Planning” presentation at the Aalto University Summer School, Helsinki, Finland, August 2015.
- Presentations at TRB’s Automated Vehicle Symposium (2014-2016); TRB’s 2018 Annual Meeting and regional meetings in Ohio and Maryland.

**AV and Transport Models.** Dr. Mudge is a member of panel for NCHRP 20-102 (9) Providing Support to the Introduction of CV/AV Impacts into Regional Transportation Planning and Modeling Tools.

# E. SOHIER HALL

## PROFESSIONAL EXPERIENCE

**2012-Present** Fort Effect Corp., dba Luum, *Co-founder, President and CEO; Board,*

- Established the Company in 2012, headquartered in Seattle, WA.
- Responsible for all funding, governance, investment decisions; attracting and retaining talent including establishing and elevating customer-centric team culture
- Responsible for business-oriented activity tied to Luum: establishing city & regional stakeholder networks; customer and business development; business model innovation; strategy
- Frequent speaker at Industry conferences, summits (World Mobility Leadership Forum; ACT Conference; Transportation Authority of Marin (TAM) Moving Marin Forward 2018 Conference
- Luum Customers have been recognized with multiple regional and national Employer Transportation Awards
- Luum was awarded the Puget Sound Business Journal 2018 Innovation Award in Transportation

**2001 - 2012** Microsoft Corporation (Redmond, WA), *Global head of MSN Product Management, Product Planning, Business Operations*

Executive responsibilities included Sr. Director, General Manager roles all within Microsoft's Online Services Division (Bing search engine, MSN, Advertising platform)

**2000 - 2001** Arthur Andersen, LLC (Seattle, WA) *Senior Manager – Financial & Analytical Consulting business unit*

**1995 - 2000** Fidelity Investments (Boston, MA), *Investment Analyst*

## ACTIVITIES

Past or current member of boards of multiple organizations – public and private.

Positions have included:

**Open Effect (Openeffect.ca)** – co-founder and Board Member. Open Effect is a Canada NGO affiliated with the University of Toronto Munk School Citizens Lab. Open Effect conducts research and advocacy focused on ensuring people's personal data is treated securely and accountably

[sohier@luum.com](mailto:sohier@luum.com)

**206-596-6938**

## EDUCATION

Dartmouth College, BA,  
1992; Boston College  
Masters of Science in  
Finance MSF

*Sohier Hall continued*

**Cody App** – past Board Member

**Sammamish Rowing Association (SRA)** – community-based rowing club for all ages – past Board Member

**United States Rowing Association (US Rowing)** – past Board Member

**Competitive Master's rower** – continues to be part of the daily routine, including Master's national-level competition.

# SUSAN SHAHEEN, Ph.D.

Susan Shaheen is an adjunct professor in the Civil and Environmental Engineering (CEE) Department at the University of California (UC), Berkeley and is a full research engineer with the Institute of Transportation Studies-Berkeley. She teaches a graduate-level course in CEE on Transportation Sustainability. In October 2007, Susan became a Research Director of the Transportation Sustainability Research Center (TSRC) and was later named TSRC Co-Director in Fall 2008. She served as the Policy & Behavioral Research Program Leader at California Partners for Advanced Transit and Highways from 2003 to 2007, and as a special assistant to the Director's Office of the California Department of Transportation from 2001 to 2004. She was honored as the first Honda Distinguished Scholar in Transportation at the Institute of Transportation Studies at UC Davis in 2000 and served as the endowed chair until 2012. She has a Ph.D. in ecology, focusing on technology management and the environmental aspects of transportation, from the University of California, Davis (1999) and a MS in public policy analysis from the University of Rochester (1990). She completed her post-doctoral studies on advanced public transportation systems at UC Berkeley in July 2001.

She has served as the Principal Investigator on approximately 60 projects at UC Berkeley on travel behavior, shared mobility, ITS, and alternative fuels. She has earned a variety of honors, including two national research awards for her contributions to a carsharing pilot program (2001) and a smart parking field test (2005). In May 2016, she was named one of the top 10 academic thought leaders in transportation by the Eno Foundation. She has co-edited two books and authored 60 journal articles, over 120 reports and proceedings articles, and 10 book chapters. In 2017, she received the Roy W. Crum award from the Transportation Research Board for her distinguished achievements in transportation research.

She is a desk editor of Transport Policy. She has also served as guest editor for Transport Policy, Energies, and the International Journal of Sustainable Transportation (IJST). She served on the ITS World Congress program committee from 2002 to 2014 and was the chair of the Emerging and Innovative Public Transport and Technologies Committee of the Transportation Research Board (TRB) from 2004 to 2011. She is on the editorial board of IJST (2011 to present) and the International Journal of Transportation Science and Technology (2015 to present), was a member of the National Academies' Transit Research Analysis Committee (2011 to 2013) and was named to the ITS Program Advisory Committee of U.S. DOT advising the Secretary of Transportation (2014 to Present).

## EDUCATION

Ph.D., Ecology,  
University of California,  
Davis

MS, Public Policy,  
University of Rochester

BA, Political Science and  
English, Nazareth  
College of Rochester

*Dr. Shaheen continued*

## **PROFESSIONAL EXPERIENCE**

### **Adjunct Professor, Civil and Environmental Engineering**

Teaches graduate class on Transportation Sustainability (CEE 256), primarily among engineering students.

**2001-Present** Research Engineer and Co-Director, TSRC, University of California, Berkeley (starting 2007) and Program Leader, California PATH (2001-2007)

**2000-2001** Postdoctoral Scholar, College of Engineering –California Partners for Advanced Transit and Highways (PATH), University of California, Berkeley

Performed research tasks as directed focused on advanced public transportation; assisted with preparing project reports and research proposals; disseminated research results through publications and presentations.

**1991-1993** Research Associate, Energy and Environmental Consulting, Energetics

**1990-1991** Research Associate, Environmental Consulting, ICF, Washington, DC

## **SELECTED PEER-REVIEWED PUBLICATIONS**

Shaheen, Susan, Nelson Chan, and Helen Micheaux (2015). "One-Way Carsharing's Evolution and Operator Perspectives from the Americas," *Transportation* 42: 519-536. DOI: 10.1007/s11116-015-9607-0

Shaheen, Susan, Elliot Martin, and Adam Cohen (2013). "Public Bikesharing and Modal Shift Behavior: A Comparative Study of Early Bikesharing Systems in North America," *International Journal of Transportation*. Vol. 1, No. 1, pp. 35-53. <http://dx.doi.org/10.14257/ijt.2013,1,1,03>.

Shaheen, Susan and Adam Cohen (2013). "Carsharing and Personal Vehicle Services: Worldwide Market Developments and Emerging Trends." *International Journal of Sustainable Transportation*, 7:1, 5-34.

Shaheen, Susan, Mark Mallery, and Karla Kingsley (2012). "Personal Vehicle Sharing Services in North America." *Research in Transportation Business & Management*, DOI: 10.1016/j.rtbm.2012.04.005.

Chan, Nelson D. and Susan A. Shaheen (2012). "Ridesharing in North America: Past, Present, and Future." *Transport Reviews*, 32(1), pp. 93-112.

Shaheen, Susan, Hua Zhang, Elliot Martin, and Stacey Guzman (2011). "Hangzhou Public Bicycle: Understanding Early Adoption and Behavioral Response to Bikesharing in Hangzhou, China," 2011 *Transportation Research Record*, No. 2247, pp. 34-41.

Martin, Elliot and Susan Shaheen (2011). "Greenhouse Gas Emission Impacts of Carsharing in North America." *IEEE Transactions on Intelligent Transportation Systems*, Volume 12, Issue 4: 1074-1086.



*Dr. Shaheen continued*

Martin, Elliot and Susan Shaheen (2011). "The Impact of Carsharing on Public Transit and Non-Motorized Travel: An Exploration of North American Carsharing Survey Data," *Energies* 2011, 4, 2094-2114; doi:10.3390/en4112094.

Shaheen, Susan, Stacey Guzman, and Angela Zhang (2010). "Bikesharing in Europe, The Americas, and Asia: Past, Present, and Future," *2010 Transportation Research Record*, No. 2143, pp. 159-167.

Martin, Elliot, Susan Shaheen, and Jeffrey Lidicker (2010). "Impact of Carsharing on Household Vehicle Holdings: Results from North American Shared-Use Vehicle Survey," *2010 Transportation Research Record*, No. 2143, pp. 150-158.

Shaheen, Susan, Denise Allen, and Judy Liu (2010). "Public Transit Training: A Mechanism to Increase Ridership Among Older Adults," *Journal of the Transportation Research Forum*, Volume 49, Number 2, pp. 7-28

Dorinson, Diana, Deanna Gay, Paul Minett, and Susan Shaheen (2009). *Flexible Carpooling: Exploratory Study*. UCD-ITS-RR-09-37. Davis, CA. September, pages 83.

Shaheen, Susan, Adam Cohen, and Melissa Chung (2009). "North American Carsharing: A Ten-Year Retrospective," *Transportation Research Record*, No. 2110, pp. 35-44.

#### **SELECTED SYNERGISTIC ACTIVITIES**

Member and Subcommittee Chair, Emerging and Innovative Public Transport Systems and Technologies (AP020), Transportation Research Board, 2013 to Present

Panel Member, TCRP Project J-7, Synthesis Topic SB-19, Ridesharing as a Complement to Public Transit, 2010 to 2011