

# Nicholas Fournier, PhD

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## RESEARCH EXPERIENCE – SELECT PROJECTS

2020– **University of California Berkeley, Postdoctoral Scholar**

- **Exploring the operational and equity benefits of a pre-pay dynamic tolling system [lead researcher]:** R-based analytical simulation exploring optimal revenue and traffic flow in dynamic toll price “futures” market to enhance price-demand elasticity. Utilized Kernel Density Estimation to smooth traffic flow data for forecasting and pricing models. Funded by California State SB1.
- **Bicycle network connectivity evaluation methodology [lead researcher]:** Bicycle network connectivity performance measure using graph theory and user preference criteria (e.g., route choice models). Intended deployment as Python tool for GIS. Funded by Caltrans.
- **Erroneous High Occupancy Vehicle (HOV) Degradation:** Python program to detect operational but mislabeled traffic sensors using machine learning (e.g., k-Nearest Neighbor, Logistic Regression, Random Forest, Support Vector Machines, Local Outlier Factor, Isolation Forest, and Robust Covariance Anomaly Detection). Funded by Caltrans.
- **Bicycle level of service measures for the CA State Highway System:** UX research/human factors study to determine bicycle infrastructure preferences using virtual reality bicycle simulator. Estimated using a Latent Class Choice Model capable of accounting for user heterogeneity. Results to align with “Complete Cities” project. Funded by Caltrans.

2019–2020 **Monash University, Melbourne, Australia, Research Fellow**

- **Public Transport Research Group:** Advised team of 19 doctoral students conducting industry partnered research in public transportation engineering, planning, policy analysis, and economics.

2014–2018 **University of Massachusetts Amherst, Graduate Research Assistant**

- **Sustainable Travel Incentives with Prediction, Optimization and Personalization:** Data fusion population synthesizer using novel combinatorial optimization algorithm in R and C++ (demographics, OD-matrices, household/vehicle association, etc.). Mixed-methods include Bayesian Networks, Markov chain Monte Carlo simulation, iterative fitting (matrix raking), robust regression, LASSO/Ridge regularization, and gradient descent. Used as input in larger agent-based discrete choice and simulation to lower energy consumption with user incentives. Joint MIT project sponsored by ARPA-energy.

## ADDITIONAL WORK EXPERIENCE

2015–2017 **Volpe Transportation Center (U.S. DOT), Community Planner (Pathways Intern), Cambridge, MA**

2013–2014 **Sandis Civil Engineers, Planners, Surveyors, Design Engineer, Oakland, CA**

2011–2013 **Benjamini and Associates, Inc., Assistant Engineer, San Francisco, CA**

## EDUCATION

**University of Massachusetts, Amherst**

2019 PhD Civil Engineering – Transportation, GPA: 4.0

2018 MS Civil Engineering – Transportation

2017 Master of Regional Planning

2011 BS Civil & Environmental Engineering

*Dissertation: Equity and efficiency in multi-modal transportation systems*

## AWARDS

2018 Eno Fellow – Eno Future Leadership Conference

2015–2018 Dwight D. Eisenhower Transportation Fellowship

2016–2017 Outstanding Student of the Year

2015 Daniel B. Fambro Student Paper Award – ITE

## SELECT PUBLICATIONS

- 2021 [1] N. Fournier. Hybrid pedestrian and transit priority zoning policies in an urban street network: Evaluating network traffic flow impacts with analytical approximation. *Transportation Research Part A: Policy and Practice*, 152:254–274, 2021. ISSN 0965-8564. doi: <https://doi.org/10.1016/j.tra.2021.08.009>.
- [2] N. Fournier, E. Christofa, and E. J. Gonzales. A continuous model for coordinated pricing of mixed access modes to transit. *Transportation Research Part C: Emerging Technologies*, 128:103208, 2021. ISSN 0968-090X. doi: <https://doi.org/10.1016/j.trc.2021.103208>.
- 2020 [3] N. Fournier and E. Christofa. On the Impact of Income, Age, and Travel Distance on the Value of Time. *Transportation Research Record: Journal of the Transportation Research Board*, pages 1–14, November 2020. ISSN 0361-1981. doi: [10.1177/0361198120966603](https://doi.org/10.1177/0361198120966603)
- [4] N. Fournier, E. Christofa, A. P. Akkinipally, and C. L. Azevedo. Integrated population synthesis and workplace assignment using an efficient optimization-based person-household matching method. *Transportation*, February 2020. doi: [10.1007/s11116-020-10090-3](https://doi.org/10.1007/s11116-020-10090-3)
- [5] N. Fournier, S. Bakhtiari, K. D. Valluru, N. Campbell, E. Christofa, S. Roberts, and M. Knodler. Accounting for drivers' bicycling frequency and familiarity with bicycle infrastructure treatments when evaluating safety. *Accident Analysis & Prevention*, 137:105410, March 2020. doi: [10.1016/j.aap.2019.105410](https://doi.org/10.1016/j.aap.2019.105410)
- 2017 [6] N. Fournier, E. Christofa, and M. A. Knodler. A sinusoidal model for seasonal bicycle demand estimation. *Transportation Research Part D: Transport and Environment*, 50:154–169, January 2017. doi: [10.1016/j.trd.2016.10.021](https://doi.org/10.1016/j.trd.2016.10.021)