Grant Deliverables and Reporting Requirements for UTC Grants

UTC Project Information	
Project Title	Impacts of Transit-Oriented Compact-Growth on Air Pollutant Concentrations and Exposures in the Tampa Region
University	University of South Florida
Principal Investigator	Amy Stuart Fred Mannering
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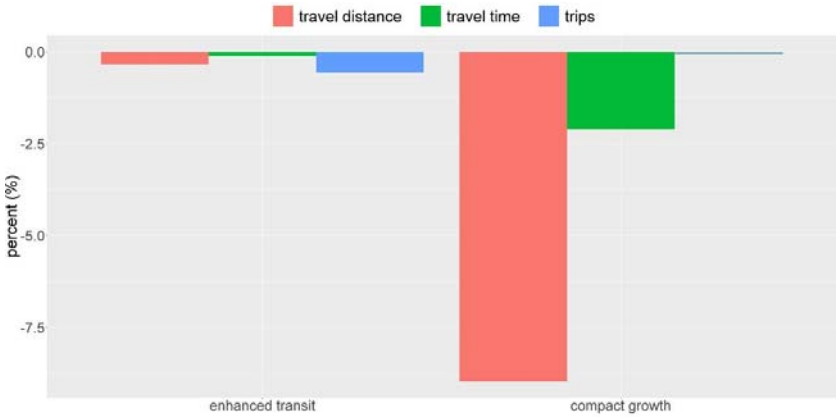
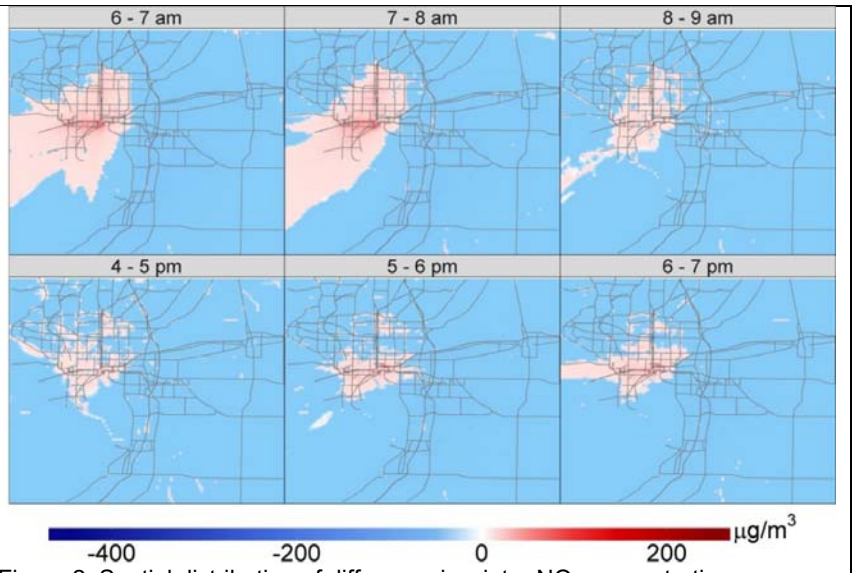
Funding Source(s) and Amounts Provided (by each agency or organization)	USDOT: $30,461 USF: $15,399
Total Project Cost	$45,860
Agency ID or Contract Number	Sponsor Source: Federal Government CFDA #: 20.701 Agreement ID: 69A3551747119
Start and End Dates	Start date: 11/30/2016 End date: 11/29/2017
Brief Description of Research Project	We performed a modeling study of the potential impacts of alternative transit-oriented urban design scenarios on community exposures to roadway air pollution. Specifically, we used a modeling framework developed previously for the study area that includes activity-based travel demand modeling (Tampa ABM), a dynamic traffic assignment model (MATSim), a mobile-source emissions model (MOVES), a line-source dispersion model (RLINE), and a population exposure model. Data from the 2040 transit plan envisioned by the Tampa Bay Area Regional Transportation Authority were added to the modeling system along with scenarios for reassignment of household residence locations to parcels near to both employment centers and transit stops. Results of modeling simulations on predicted daily activity-travel patterns, shifts in measures of travel, link-specific diurnally-varying roadway emissions, spatiotemporal distributions of concentrations, and population distributions of exposures to oxides of nitrogen were assessed to compare potential design and transport policy choices.

Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	This research was implemented as planned. Scenarios included a low-transit scenario (S1) that used the 2040 base residential distribution with 2010 bus services, an enhanced-transit scenario (S2) that applied the proposed 2040 bus services, and a compact-growth scenario (S3) that increased the residential density in S2 by redistributing 37% households to be near to jobs and bus stops. Buses were assumed to be diesel-powered in all scenarios. Results show slightly higher shares for active modes of travel for S2 and S3 compared to S1, with an increase of 7.1% for walking and 1.8% for transit under S3 specifically. Measures of travel (Figure 1) under S3, including daily total travel distance and travel time, decreased compared to S1 by 9% and 2.1%, respectively. Pollution results were more mixed. Daily total emissions of NO_x and its overall mean ambient concentration (Figure 2) were lower for S3 than S1 (by 11% and 9%, respectively), but mean population exposure was higher (by 29%), due to the collocation of people and pollution. Enhanced diesel bus services alone (S2) increased emissions, concentrations, and exposures to NO_x. This study suggests that a multi-faceted approach may be needed to ensure beneficial pollution outcomes of transportation and urban design interventions.  Figure 1: Percent change in daily-aggregate travel measures for the enhanced-transit (S2) and compact-growth (S3) scenarios compared to the low-transit scenario (S1).

	 Figure 2: Spatial distribution of difference in winter NO_x concentrations between compact-growth (S3) and low-transit (S1) scenarios for morning and evening peaks hours.
Impacts/Benefits of Implementation (actual, not anticipated)	<u>Outputs:</u> These include abstracts and presentations of the project work for 5 scholarly conferences, preparation of one journal article that is close to submission, completion of one doctoral dissertation containing work for this project, and one educational outreach activity in which results of the project work were presented as part of a guest lecture for an undergraduate class. These outputs are listed here: S Gurram, A Stuart, A Pinjari (2017). Impacts of Estimated Travel Activity on Air Pollutant Concentrations and Human Exposures in the Tampa Region. Abstract/Presentation. Active City Conference on Health, Wellness and Urban Design. Hosted by the American Institute of Architects and USF, Tampa, Florida, January. S Gurram and A Stuart (2017) Impacts of Transit-Oriented Compact-Growth on Air Pollutant Concentrations and Exposures in the Tampa Region. Abstract/Presentation. Air Quality Workshop 2017. University of Florida, Gainsville, FL. March. A Stuart. (2017). Air quality design for sustainable and healthy urban communities. Abstract/Presentation. AEESP Research and Education Conference, Ann Arbor, Michigan, June. https://www.AEESP2017.com A Stuart. (2017). Impacts of community design and commute behavior on exposures to traffic-related air pollution. Abstract/Presentation. International Society of Exposure Science Annual Meeting. Research Triangle Park, NC, October. https://intlexposurescience.org/ISES2017/ S Gurram, AL Stuart, and AR Pinjari. (2018). Impacts of Transit-Oriented Compact-Growth on Air Pollutant Concentrations and Exposures in the Tampa Region. Abstract (submitted). Transportation Research Board Innovations in Travel Modeling Conference. June. S Gurram (2017). Understanding the Linkages between Urban Transportation Design and Population Exposure to Traffic-Related Air Pollution: Application of an Integrated Transportation and Air Pollution Modeling Framework to Tampa, FL. PhD dissertation. University of South Florida. S Gurram, AL Stuart, and AR Pinjari. (2018). Agent-based modeling for estimating exposures to urban air pollution from transportation: exposure

	disparities and impacts of high-resolution data. Journal manuscript (in preparation). A Stuart (2018). Air pollution and its interactions with the environment, public health, and sustainability. Guest lecture for an undergraduate class in anthropology. January. Outcomes: These include increased understanding of the balance of effects that must be considered in planning sustainable transportation infrastructure that protects public health from exposures to air pollution. Additionally, the graduate student who worked on the grant gained improved knowledge and skills with the data and tools needed for transportation and air quality scenario modeling. Finally, the project provided helped to cement the collaboration between team members with expertise in transportation simulation and in air quality and exposure modeling. Impacts: There have not yet been any long-term impacts of the research.
Web Links • Reports • Project website	http://ctech.cee.cornell.edu/final-project-reports/