Promoting Active Transportation: A TransCAD-based Approach

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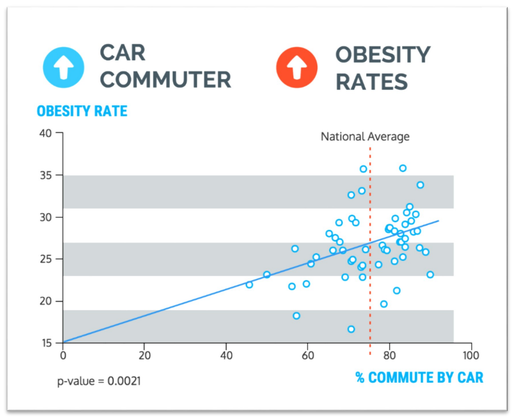
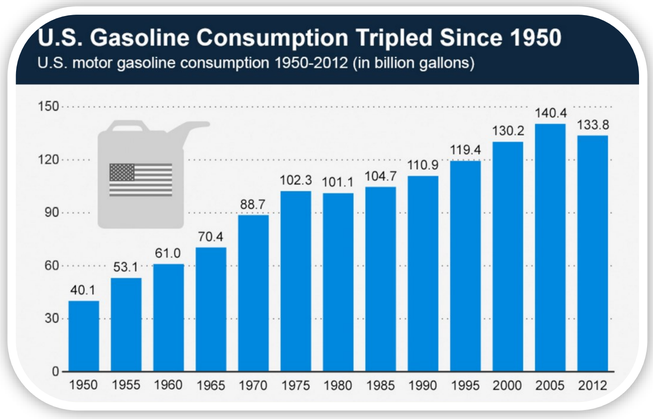
Introduction

The United States is unique in the degree to which its populace relies on personal automobile for the vast majority of daily travel. The proliferation of single-occupant commuting has resulted in numerous problems over the past few decades. Commuters generally prefer automobiles over walking or biking even for short distance trips. These preferences have exacerbated public health and quality of life issues such as obesity, traffic congestion, fuel demand, air quality, and others. Consequently, efforts are warranted toward promoting walking and biking as a preferred mode choice for short distance trips to alleviate such problems.

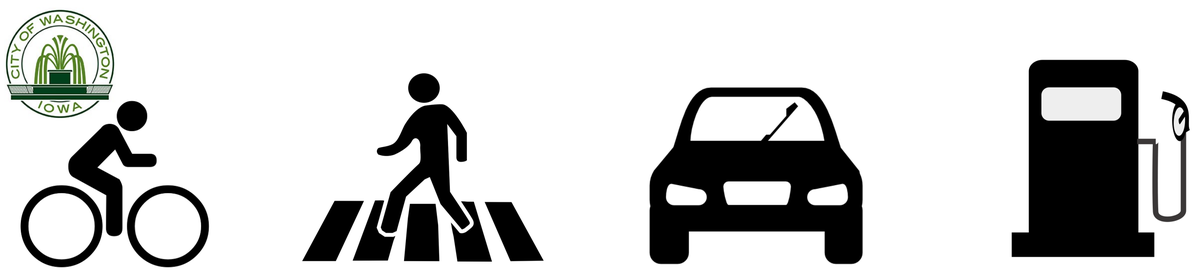




Transportation sector contributed 1786.2 Million Metric Tons of CO_2 equivalent, (2014)

Objectives

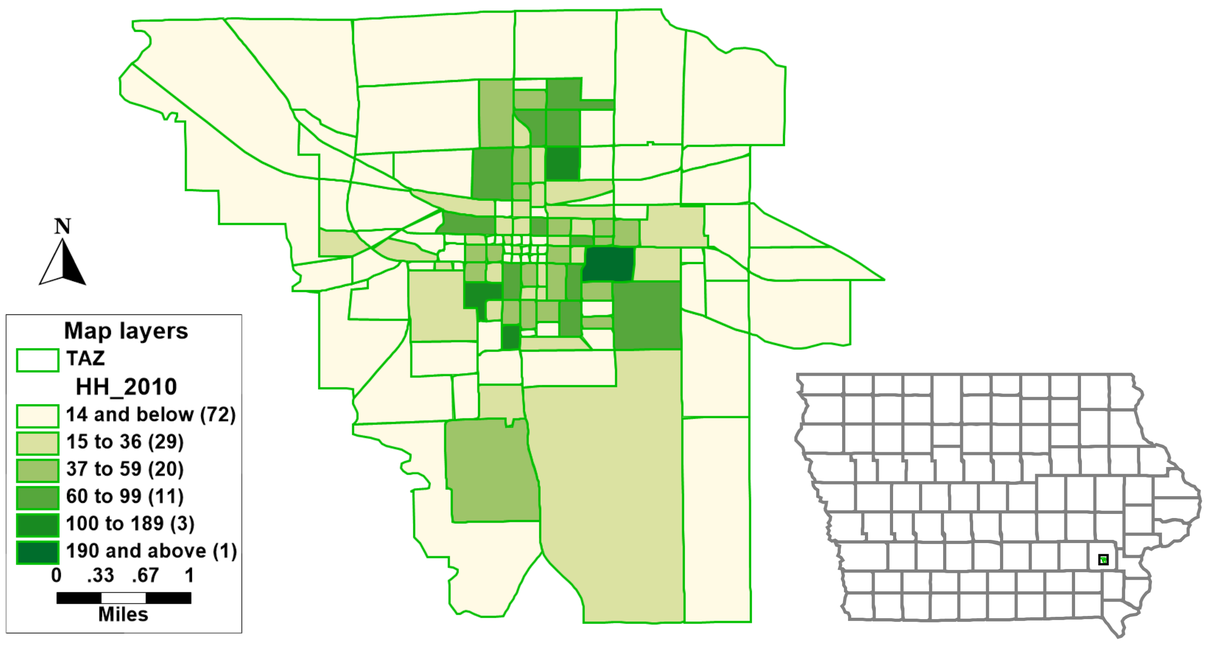
This study involved the development and application of a methodology to identify road segments that are good candidates for the provision or upgrading of bicycle and pedestrian infrastructure. Assuming such improvements are implemented, the reduction in total vehicle miles traveled (VMT) and gasoline consumption is estimated considering the change in commuter mode choice behavior.



Biking & Pedestrian Infrastructure | **VMT Reduction** | **Energy Savings**

Methodology & Results

2010 census data for the study area of Washington, Iowa was downloaded from the U.S. Census Bureau and divided into 136 traffic analysis zones (TAZs). The Quick Response Method (QRS) and Gravity Model were then used to forecast trip generation and distribution.



Trip Generation (Quick Response Method)

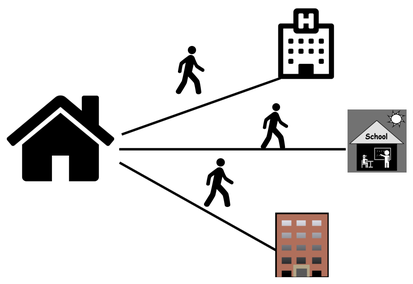
Trip Production
- Total Households
- Avg. Daily Person Trips per Household (NCHRP 187)

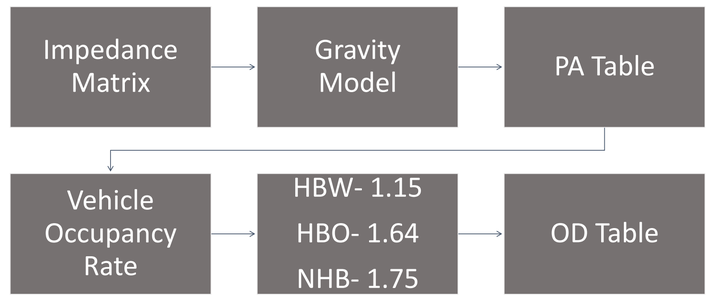
Trip Attraction
- Retail Employment
- Non-retail Employment
- Total Dwelling Units
- Regression Model (NCHRP 187)

HBW_P	HBO_P	NHB_P
8827	33010	13490

Balanced Production and Attraction by Trip Purpose

Trip Distribution





	PA Trips (μ, σ)	OD Trips (μ, σ)
HBW	0.36, 1.25	0.32, 0.81
HBO	1.36, 6.94	0.83, 3.33
NHB	0.55, 1.76	0.32, 0.77

PA Trip and OD Trip Distribution

Trip Purpose	Mean (μ)	Std. Dev (σ)
HBW	3.94	2.15
HBO	4.89	2.24
NHB	3.89	2.15

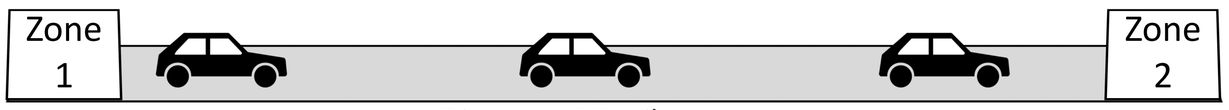
Trip Length Distribution

Trip Assignment

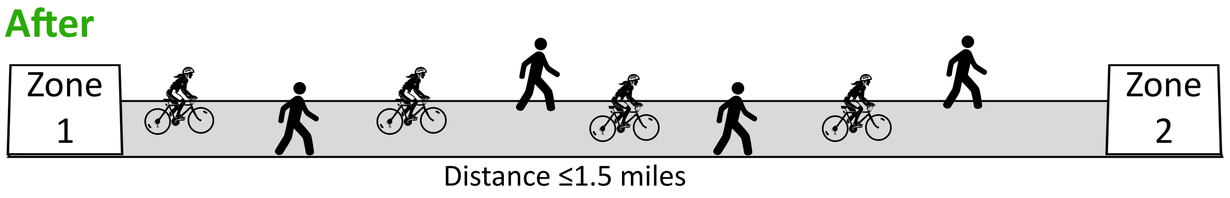
Traffic assignment was performed with the OD matrix generated from the trip distribution step. It is assumed that all personal motor vehicle trips between zonal pairs within 1.5 miles of each other will be converted to biking or walking trips. Consequently, the OD matrix was modified and traffic assignment step was rerun to estimate the reduction in VMT.

	Existing	After Ped/Bike Infrastructure
Input	OD Matrix	Modified OD Matrix
Output (VMT)	98581.4	87762.37

Existing



After



Conclusions

The study results indicate that adding bike lanes and side-walks along road links that are a part of the shortest path between zonal pairs results in approximately an 11-percent reduction in VMT. Moreover, assuming a fuel efficiency of 23.6 miles per gallon, a total of 458.5 gallons would be saved per day.

These results highlight the best-case scenario that would result from a paradigm shift in road user mode choice behavior. The results are based on the default set of parameters available in TransCAD and, as such, may not reflect the actual travel behavior within the study area. Nonetheless, such analyses provide a compelling argument in support of initiatives that are pedestrian– and bicycle-friendly such as Complete Streets and Safe Routes to School.