CTPP Status Report

U.S. Department of Transportation
Federal Highway Administration
AASHTO Standing Committee on Planning

TRB Census Subcommittee
Bureau of Transportation Statistics
Federal Transit Administration

Census Transportation Planning Product (CTPP) Highlights

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Come to Kansas City, Missouri for the Applying Census Data for Transportation Conference November 14 – 16, 2017.

To prepare, the CTPP Oversight Board and Transportation Research Board Staff are identifying a conference task force, spreading the word, and encouraging papers and research. Watch for a call for papers in Spring 2017.

New Data: The 2012-2016 tabulation of Census transportation data is expected in early 2019.

Training: One-and-a-half day training sessions on the current dataset are slated for Missouri, Pennsylvania, Arkansas, Colorado, and D.C.;

there are more opportunities for training sessions as yet unscheduled. If you are interested in having CTPP training come to your state, please contact me. Opportunities for workshops, training, and advice are also available in 2017 at the following conferences:

- GIS-T Symposium Workshops in Phoenix, AZ on April 10-13, 2017.
- TRB Planning Applications Conference in Raleigh, NC on May 14-18, 2017.
- Census Data for Transportation Conference in Kansas City, MO on November 14-16, 2017.

Website Refresh: We would like to update our social media and web presence. If you are interested in giving feedback on the CTPP website to help make it more useful, navigable, and user-friendly, please email me at pweinberger@aashto.org.

Who's 60 years old?

On June 29, 1956, President Dwight Eisenhower signed into law the Federal-Aid Highway Act of 1956, opening the door to the world's largest federally funded road system.

Did you know that in 60 years the US has experienced…

- 20% increase in the interstate system?
- 3 times more drivers?
- 4 times more vehicle miles of travel?

More transportation fun facts available on the FHWA Facebook page.

Source: FHWA records, the Federal-Aid Road Act, Status of the Interstate Press Release, Interstate Quarterly Status Report 1976 and FHWA Highway Statistics Table VM-1, VM-202, and HM-220 for applicable years.
https://www.fhwa.dot.gov/policyinformation/statistics.cfm, https://www.fhwa.dot.gov/infrastructure/history.cfm.

Design Comparison of LODES and ACS Commuting Data Products

Excerpts selected by Jingjing Zang,
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The Longitudinal Employer-Household

Dynamics (LEHD) Origin – Destination

Employment Statistics (LODES) and the
American Community Survey (ACS) commuting
and workplace data - the data source for CTPP
data products - are two primary census data
resources for employment and commuting flow
data. This article includes excerpts from a
recent Census Bureau report comparing these
two data resources. To read the full report by
Mathew Graham, Mark Kutzbach, and Brian
McKenzie of the Census Bureau, visit:
https://ideas.repec.org/p/cen/wpaper/14-
38.html.

The Census Bureau produces two
complementary data products, the ACS
commuting and workplace data, and the LODES
data, which can be used to answer questions
about spatial, economic, and demographic
questions relating to workplaces and home-to-
work flows. The products are complementary in
the sense that they measure similar activities but
each has important unique characteristics that
provide information that the other measure
cannot. As a result of questions from data users,
the Census Bureau has created a report to
highlight the major design differences between
these two data products. This report guides users
on the relative advantages of each data product
for various analyses and helps explain
differences that may arise when using the
products.

As an overview, these two data products are
sourced from different inputs, cover different
populations and time periods, are subject to
different sets of edits and imputations, are
released under different confidentiality
protection mechanisms, and are tabulated at
different geographic and characteristic levels. As
a general rule, the two data products should not
be expected to match exactly for arbitrary
queries and may differ substantially for some
queries. Within this document, we compare the
two data products by the design elements that
were deemed most likely to contribute to
differences in tabulated data. These elements are
collection, coverage, geographic and
longitudinal scope, job definition and reference
period, job and worker characteristics, location
definitions (workplace and residence),
completeness of geographic information and
edits/imputations, geographic tabulation levels,
control totals, confidentiality protection and
suppression, and related public-use data
products. Table 1 provides a summary.

Table 1. ACS and LODES Design Difference Summary Table

Element	ACS	LODES
Collection	Survey of 3.5 million addresses in the United States and Puerto Rico per year collected continuously in monthly samples.	Administrative records from the unemployment insurance reporting systems of 50 states and the District of Columbia, and from the Office of Personnel Management.
Coverage	The universe of workers is limited to those 16 years and over who worked during the ACS reference week, in reference to when the respondent completes the questionnaire. Respondent may only report one job. For ACS respondents who report working from home, the home is their primary workplace location, which differentiates them from workers who occasionally work from home or telework.	All jobs covered under state unemployment insurance law (95 percent of private sector wage and salary employment) plus most civilian federal employment. Does not cover the following groups: self-employment, military employment, the U.S. Postal Service, and informal employment. Jobholders may be of any age.
Geographic and Longitudinal Scope	Decennial censuses 1960 through 2000. ACS tabulations with national coverage beginning with the 2000 ACS and full implementation starting with the 2005 ACS. Since the 2006 ACS, data for people in group quarters (e.g., college dormitories, military	The workplace domain includes states with available earnings data from 2002 onwards. The residence domain includes all states from 2002 onwards. From 2002–2008, job characteristics included ownership, industry, age, and earnings.

Element	ACS	LODES
	barracks) have been collected. Workers living in institutionalized group quarters are not included in the universe for commuting estimates.	From 2009 on, sex, race, ethnicity, and educational attainment are also available. Tabulations from 2010 on include federal workers. From 2011 on, firm age and firm size are also available. Changes in processing methodology and updates to data and imputations lead to some longitudinal inconsistencies.
Job Definition and Reference Period	Tabulations include those aged 16 and older who worked in the reference week, or the calendar week the questionnaire was completed, and who provided a discernable workplace location. Workers who were on vacation or sick leave the entire reference week are not included. Workers living in noninstitutional group quarters are included. Those living in institutional group quarters (e.g., prisons, nursing homes) are not included. ACS 1-, 3-, and 5-year estimates are period estimates, which mean they represent the characteristics of the population and housing over a specific data collection period. Data are combined to produce 12 months, 36 months, or 60 months of data.	For a job, or an earnings history of a worker at an employer, to be included in a year of LODES, there must be earnings in both the first and second quarter. Workers with earnings from an employer in both quarters are assumed to be employed at the seam of those quarters, or April 1, the first day of the second quarter. Thus, LODES constitutes a cross-section or snapshot of all jobs held at that reference date. This definition omits some very short duration jobs. Earnings categories and job dominance are based on second quarter earnings. The source residence information could refer to any point in the year.
Job and Worker Characteristics	Worker characteristics depend on tabulation. The standard tables include workplace location, commute mode, departure time from home, arrival time to work, travel time (minutes), sex, age, race, ethnicity, citizenship status, language spoken, earnings, poverty status, occupation, industry, class of worker, hours worked each week, weeks worked in the past 12 months, earnings, number of vehicles available, household size, number of workers in household. Tables can be rendered for both current residence and workplace locations.	Job characteristics include dominance (primary or secondary job), ownership type (private, all), NAICS industry sector, firm age and firm size, earnings, age, sex, race, ethnicity, and educational attainment. These characteristics are constructed from both the unemployment insurance wage records as well as linked administrative and survey records, and when missing, they are completed with imputation models.
Location Definitions (Workplace and Residence)	The ACS questionnaire specifically asks for a work location of the respondent (employee) "last week," which may include a location associated with work-related travel that is not the respondent's typical work location if it occurred in the last week. The current place of residence is the housing unit or group quarter address being sampled. People at the address are included in the survey if they are living or staying at the location for more than 2 months or do not have another place to stay.	The employment location is reported by employers. In some cases, this may not be the location at which an employee performs his/her work duties. Residence location is derived from annual federal administrative data. LODES includes no information on commute mode, or whether the origin-destination flow constitutes an actual trip.
Completeness of Geographic Information and Edits/Imputations	Among workers in the ACS sample, the workplace locations of about 92 percent of worker records are successfully coded to the place level, and the remaining cases are allocated a workplace location down to the place level.	For multiestablishment employers, establishments are not assigned to jobs in the source data, except for Minnesota. Candidate establishments allocated to jobs using multiple imputation based on establishment size and proximity to residence. LODES completes workplace geography by drawing from the distribution of workplaces of residential neighbors.
Geographic Tabulation Levels	Varies by release. ACS data are released as single-year data or multiyear pooled samples of 3 and 5 years. Across release types, ACS tables are restricted according to summary levels and population thresholds.	LODES job counts are released at the census block level. All higher-level aggregations produced by the OnTheMap application are sums of whole census blocks.
Control Totals	The ACS uses independently derived annual population estimates as population controls in its weighting methodology. The 2010 ACS estimates and later years use population estimates that reflect the results of the 2010 Census. Population controls	At the state level, the source data for LODES are reweighted to state totals from the Bureau of Labor Statistics (BLS) release of Quarterly Census of Employment and Wages (QCEW). Because of the small-cell imputation, noise infusion, some small-

Element	ACS	LODES
	are applied down to the county level for basic demographic characteristics: age, sex, race, and Hispanic origin. Population controls are applied down to the place and minor civil division level for basic population totals.	cell rounding effects, and input-data vintaging differences for the released LODES statistics, state totals may deviate slightly from QCEW totals, as well as from QWI.
Confidentiality Protection and Suppression	Some ACS data are suppressed in order to limit the disclosure of information about individuals or reduce the number of estimates with unacceptable levels of statistical reliability. Geographic areas or groups of 65,000 population or more are eligible for 1-, 3-, and 5-year estimates. Areas or groups of 20,000 or more are eligible for 3- and 5-year estimates. Areas or groups of 20,000 or fewer are eligible for 5-year estimates only.	Employment totals are protected by noise infusion and small cell imputation. Residential location is protected by synthetic data methods with probabilistic differential privacy. LODES releases protected job counts in all cells at all levels of aggregation, with no suppression.
Related Public-Use Data Products	American Community Survey (ACS) commuting data are distributed through the American FactFinder (AFF) web site, with earlier years also available on the Census Bureau's FTP site. The Census Bureau produces county-to-county commuting flows as part of the routine update of metropolitan and micropolitan statistical area boundaries. The Census Bureau also provides Public Use Microdata Sample (PUMS) data from the ACS, and releases ACS-based reports on various commuting topics.	The LEHD Origin-Destination Employment Statistics (LODES) are distributed through the Web tool OnTheMap. The Longitudinal Employer-Household Dynamics (LEHD) program also releases the Quarterly Workforce Indicators (QWI), which provide more job measures, greater industry detail, and more longitudinal consistency, but less geographic detail.

An in-depth data analysis—in aggregate or with the microdata—between the two data products will be the subject of a future technical report. The Census Bureau has begun a pilot project to integrate ACS microdata with LEHD administrative data to develop an enhanced frame of employment status, place of work, and commuting. The Census Bureau will publish quality metrics for person match rates, residence and workplace match rates, and commute distance comparisons.

Using CTPP Data to Segment Households and Employment

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Background and Objective

Using National Household Travel Survey (NHTS) 2009, North Central Texas Council of Governments (NCTCOG) modelers found that the best market segmentation for home-based work (HBW) trips is breaking down the households by number of workers by number of vehicles in small geographies. For the purpose of trip distribution, mode choice, and traffic assignment, the HBW market segmentation needs to have a breakdown of households by income also. To implement this, NCTCOG modelers used a combination of CTPP and ACS data. A similar process is used to break down employment into desired segments.

Methodology and Results

In the NCTCOG region, there are 243 Traffic Analysis Districts (TADs), 1,333 census tracts, and 4,182 block groups. An iterative proportional fitting process (IPF) was used to connect the sources of the data into a desirable breakdown of the households by number of workers, by number of vehicles, and by income at the block group level.

The ACS data provided the distribution of households by number of workers by number of vehicles at the census tract level. Each block group inherited this distribution from the census tract. The ACS data also provided the distribution of households by income groups at the block group level. CTPP provides a

3-dimensional breakdown of households by number of workers by number of vehicles by income at both the TAZ and TAD level. For purposes of stability and the reduction of sampling error, NCTCOG used the TAD level. NCTCOG used the seed from CTPP at the TAD level for each block group within each TAD.

The IPF process started from the seed in each block group and distributed the households to match the control totals in each of the block groups. Figure 1 and Figure 2 show the results of the household segmentation. The green dots show the location of all households in the region, regardless of household income. The black dots indicate the location of a specific income group on each map. Each green/black dot represents 500 households. Figure 1 shows low-income households (<$35,000) versus all households, and Figure 2 shows high-income households (>=$75,000) versus all households.

NCTCOG used a similar two-dimensional IPF process to break employment into 12 segments (income by industry) at the traffic analysis zone level. The row targets are employment by industry (basic, retail and service) estimated from 2010 Census, 2013 Bureau of Economic Analysis county level estimates, and modified 2010 Longitudinal Employer-Household Dynamics (LEHD) data for each traffic analysis zone. The column targets are employment by household income from CTPP at the TAD level. Each traffic analysis zone inherited this distribution from the TAD.

The initial seed (income by industry) came from two TAD-level employment tables provided by CTPP: Income by Earnings and Earnings by Industry. Each earning group in the former table was first further broken into three industries (basic, retail and service) based on the distribution in the latter one. Then, the resulting table was consolidated by income and industry. Each traffic analysis zone inherited the same distribution from the TAD.

The IPF process started from the seed in each traffic analysis zone and distributed the employment to match the control totals in each of the traffic analysis zones.
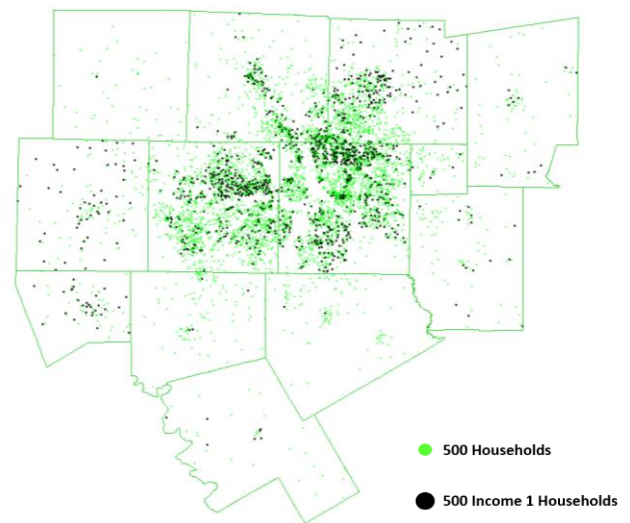

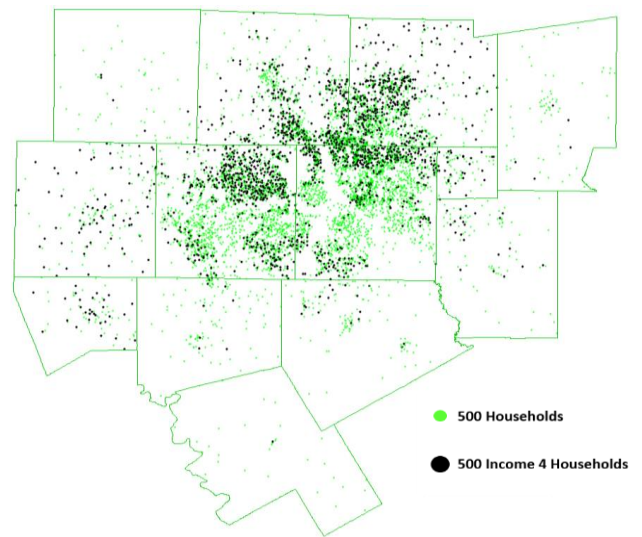**Figure 1. Low-Income Households versus All Households**

Figure 2. High-Income Households versus All Households

Figure 3 and Figure 4 show the results of the employment segmentation. The green dots show the location of all employment in the region, regardless of household income. The black dots indicate the location of a specific income group on each map. Each green/black dot represents 500 employment. Figure 3 shows low-income employment versus all employment, and Figure 4 shows high-income employment versus all employment.
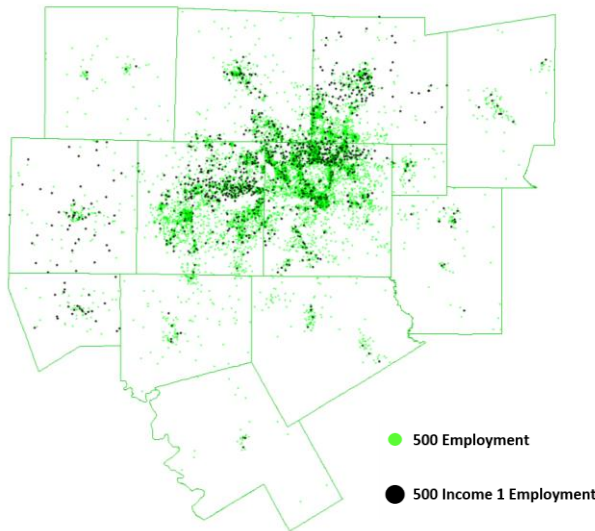
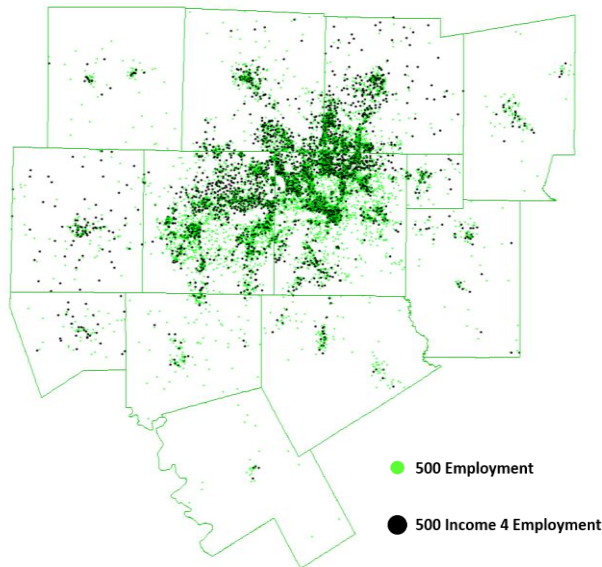**Figure 3. Low-Income Employment versus All Employment**

Figure 4. High-Income Employment versus All Employment

Conclusion

CTPP provided crucial data to break households and employment into desired segments. From the household and employment results, we reached the following preliminary conclusions:

- Low-income households and high-income households overlap a lot throughout the Dallas Fort Worth

(DFW) Area. This is also true for low-income/high-income employment.

- The majority of low-/high-income households have access to low-/high-income employment nearby.

- It helps confirm that household income is a not significant factor in trip generation and trip distribution for HBW trips in DFW.

Using CTPP and ACS Data in a Commuter Service Expansion Feasibility Study
Tom Faella, La Crosse Area Planning Committee, TFaella@LaCrosseCounty.org

Background

In 2016 the La Crosse Area Planning Committee, Mississippi River Regional Planning Committee and La Crosse County, Wisconsin conducted a feasibility study to add additional regional commuter transit service in the adjoining counties of Trempealeau and Monroe. The proposal would add service to the Scenic Mississippi Regional Transit (SMRT Bus) which currently serves La Crosse, Vernon and La Crosse Counties with about 16,500 rides annually.

To evaluate the feasibility of additional service these agencies surveyed major employers and their employees, held open house meetings, determined conceptual bus routes and stops, calculated and analyzed capital and operational costs, and developed implementation steps. In addition, they analyzed demographic data and projected ridership, using information from the CTPP and ACS. This map shows the routes considered for expanded service between Arcadia, Tomah and La Crosse, Wisconsin.

Methodology and Results

In order to estimate potential (worker) ridership, the agencies obtained existing commuter flows between the communities in the "transit shed" from the CTPP. Table 2 shows the Tomah to La Crosse Route commuter flow data.
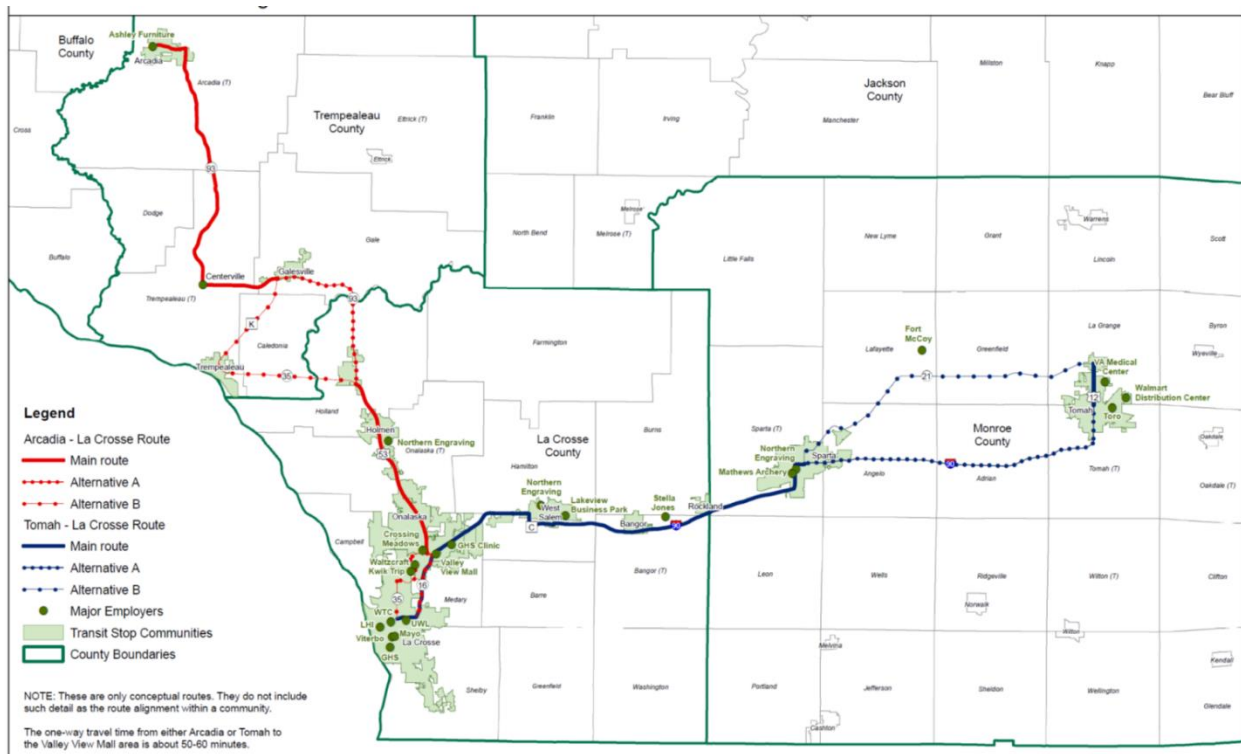
Figure 5. Transit Routes Considered: Arcadia—La Crosse and Tomah—La Crosse

Table 2. Tomah to La Crosse Route Commuter Work Flows, 2006-2010

	Workplace							
Residence	**Tomah**	**Lafayette**	**Sparta**	**Rockland**	**Bangor**	**West Salem**	**Onalaska**	**La Crosse**
Wyeville (V)	25	4	10	0	0	4	0	4
Tomah (T)	340	10	40	0	0	0	0	15
Tomah (C)	2,430	70	175	0	0	30	15	155
Sparta (T)	115	0	600	4	20	45	60	175
Sparta (C)	335	45	2,320	10	15	100	105	370
Oakdale (T)	190	0	10	0	0	0	0	4
Oakdale (V)	60	0	0	0	0	0	0	0
La Grange (T)	500	10	35	0	0	4	15	15
Lafayette (T)	20	30	45	4	4	4	0	10
Greenfield (T)	185	10	25	0	0	0	0	4
Byron (T)	305	0	25	0	0	0	0	4
Angelo (T)	75	4	200	0	4	20	10	80
Adrian (T)	120	4	60	10	0	0	10	4
Leon (T)	20	0	155	4	10	10	35	80
Rockland (V)	20	0	50	30	15	20	40	55
Bangor (V)	15	4	30	0	135	65	70	150
Bangor (T)	15	0	40	0	20	35	35	115
Burns (T)	20	0	35	0	15	35	75	145
West Salem (V)	25	0	170	0	4	525	355	745
Hamilton (T)	20	0	65	4	4	215	220	465
Barre (T)	0	0	10	0	10	60	50	370
Onalaska (T)	0	0	10	0	15	60	530	1,670
Onalaska (C)	85	0	150	0	0	100	2,625	4,290
Medary (T)	0	0	25	0	0	20	170	470
La Crosse (C)	165	15	160	0	0	435	3,480	18,985

Source: Census Transportation Planning Package, Part 3: Flows: Workers 16 Years and Older. (*Note: V = Village, T = Town, C = City.*)

A "transit factor" was then applied to the worker flows from each resident community to each workplace community. Communities defined by the U.S. Census as urban areas were assigned a transit factor of 0.009 while rural communities were assigned a transit factor of 0.001. The transit factors were developed from existing urban and rural transit ridership in La Crosse County. The results for the Tomah to La Crosse Route, for flows with anticipated riders, are illustrated in Table 3 (numbers are rounded down to the nearest whole number). Red denotes a high likelihood of transit use; Green denotes internal trips, which are not included in the final calculation; and Blue denotes possible commuters, but they occur between communities with existing transit service.

The results in Tables 2 and 3 were then used to produce "Best Case" and "Likely Case" scenarios with consideration for the availability of park-and-ride lots and a comparison of auto to bus travel times. These daily worker ridership estimates are in Table 4.

Additional analysis considered "transit propensity" variables for each of the potential transit stop communities from the 2010-2014 ACS 5-year estimates. These variables included workers with 0 vehicle available, low-income and disabled populations and college-aged and elderly populations. Table 5 shows the concentration or "percent of universe" of people for each of these propensity variables. The universes for the variables are Workers 16 and older in households for "0 Vehicles"; Total population for "College Age," "Elderly," and "Disabled"; and Population for which poverty status has been determined for "Low Income."

Conclusion

Based on the estimated number of work riders, location of destinations such as regional hospitals, employment opportunities, and universities, and the community transit propensities, plans are underway to implement the additional service.

Table 3. Preliminary Transit Commuter Flow Estimates, Tomah-La Crosse

Residence	Transit Factor	Workplace							
		Tomah	Lafayette	Sparta	Rockland	Bangor	W Salem	Onalaska	La Crosse
Tomah (C)	0.009	21	0	1	0	0	0	0	1
Sparta (C)	0.009	3	0	20	0	0	0	0	3
West Salem (V)	0.009	0	0	1	0	0	4	3	6
Onalaska (T)	0.001	0	0	0	0	0	0	0	1
Onalaska (C)	0.009	0	0	1	0	0	0	23	38
La Crosse (C)	0.009	1	0	1	0	0	3	31	170

Source: Means of Transportation to Work, 2006-2010 CTPP; and list of 2010 Census Urban Areas, U.S. Census Bureau.

Table 4. Daily Worker Ridership Estimates

Scenario	Tomah-La Crosse Route		Arcadia-La Crosse Route	
	Westbound to La Crosse	Eastbound to Tomah	Southbound to La Crosse	Northbound to Arcadia
Best Case				
# Commuters	12	10	16	2
# Trips	24	20	32	4
Total Trips per Day	*44*		*36*	
Likely Case				
# Commuters	5	9	8	2
# Trips	10	18	16	4
Total Trips per Day	*28*		*20*	

Table 5. Concentration of Workers and Population Groups in Transit Stop Communities

Propensity Variable	Percent of Universe[1]			
	<10%	10% – <20%	20% – <30%	30% – <40%
0 Vehicles	Bangor, Holmen, La Crosse, Onalaska, Rockland, West Salem, Lafayette, Sparta, Tomah, Arcadia, Galesville, Trempealeau	None	None	None
College Age (18-24)	Bangor, Holmen, Onalaska, West Salem, Sparta, Tomah, Arcadia, Galesville, Trempealeau	Rockland, Lafayette	La Crosse	None
Elderly (65 and older)	Rockland	Bangor, Holmen, La Crosse, Onalaska, West Salem, Lafayette, Sparta, Tomah, Arcadia, Galesville, Trempealeau	None	None
Low-Income (150% of the poverty line)	Rockland, Lafayette	Bangor, Holmen, Onalaska, West Salem, Trempealeau	Galesville	La Crosse, Sparta, Tomah, Arcadia
Disabled	Onalaska, Lafayette, Trempealeau	Bangor, Holmen, La Crosse, Rockland, West Salem, Sparta, Tomah, Arcadia, Galesville	None	None

Sources: B08141 Means of Transportation to Work by Vehicles Available for workers 16 years and over in households, S0101 Age and Sex, S1701 Poverty Status in the past 12 Months, and S1810 Disability Characteristics from the U.S. Census Bureau, 2010-2014 ACS 5-year estimates.

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CTPP website: http://www.fhwa.dot.gov/planning/census_issues/ctpp/
FHWA website for Census issues: http://www.fhwa.dot.gov/planning/census_issues
AASHTO website for CTPP: http://ctpp.transportation.org
1990 and 2000 CTPP data downloadable via Transtats: http://transtats.bts.gov/
TRB Subcommittee on census data: http://www.trbcensus.com

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CTPP Listserv

The CTPP Listserv serves as a web-forum for posting questions, and sharing information on Census and ACS. Currently, more than 700 users are subscribed to the listserv. To subscribe, please register by completing a form posted at: http://www.chrispy.net/mailman/listinfo/ctpp-news.

On the form, you can indicate if you want emails to be batched in a daily digest. The website also includes an archive of past emails posted to the listserv.