Measuring the Effectiveness of TDM

This chapter describes the method for determining the efficacy of TDM measures, and how measures are operationalized for this program. It also describes alternative methods for compliance that are available for project proposers who wish to try measures that are not on the program menu.

Evaluations of existing programs and research provide a wealth of information by which to judge the effectiveness of various TDM measures. However, like most research findings related to transportation, these come from a variety of settings and are based on TDM measures that are operationalized in various ways, and they describe results in various ways—VMT reduction, mode shift, parking reduction, etc. This program uses the research in two ways: to determine the extent to which a measure has been studied and to gauge the relative strength of that measure.

The following table summarizes findings related to various categories of measures.

Bicycle infrastructure/ amenities improvements	• The California Air Pollution Control Officers Association (CAPCOA) estimates VMT reduction of between 3.0 and 21.3 percent based on the land use context and the assumption that measures are grouped together.[1] Bike-specific TDM strategies addressed as a "grouped" strategy. Individual measures (bike lanes, bike parking, showers, lockers) have minimal impact implemented alone. • A project in San Francisco that includes a more comprehensive set of facilities: bike parking, bike lanes and paths, and destination amenities such as showers, is anticipated to get between one- and four- percent reductions in VMT. Additionally estimates one-percent VMT reduction for each of these strategies—valet bike parking for events and bicycle fleet vehicles for businesses or neighborhoods.[2] • A King County, Wash., study finds good walking and bicycling infrastructure lowers VMT by 5 to 15 percent.[3] • A project in downtown Portland, Ore., with secure bike parking, showers, and changing rooms reduced VMT by 46,400 miles in one year.[4]

[1] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," August 2010, 182, 200, http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.

[2] "Transportation Demand Management; Technical Justification" (San Francisco, CA, June 2016), 24-26, http://default.sfplanning.org/plans-and-programs/emerging_issues/tsp/TDM_Technical_Justification.pdf.

[3] Oregon Department of Transportation, "Bicycle and Pedestrian Connectivity" (Oregon Department of Transportation), accessed March 14, 2017, 1-2, https://www.oregon.gov/ODOT/TD/TP/docs/Toolkit/Strategy%20Reports/SR15_BikePed%20Connectivity.pdf.

[4] Oregon Department of Transportation, "Bike Parking," 2, accessed February 27, 2017, http://www.oregonmosaic.org/files/33.pdf.

Bike parking	● CAPCOA estimates a 0.625 percent reduction in VMT if bike parking at non-residential destinations is provided as a standalone. However, bike parking should be paired with other bicycle infrastructure for the greatest impact.[5] ● Valet bike parking corrals at Portland businesses increased the "person capacity" of curb parking by as much as 1,200 percent.[6] ● San Francisco estimates up to 4 percent reduction in VMT, depending on surrounding land uses.[7,8] ● A study of bike-and-rides at nine Metra stations in Chicago found that improved bike parking accounted for an increase in bicycle use and an avoided 1,739 VMT per day.[9]
Bikeshare program	● CAPCOA notes this is a new program with limited studies documenting effects on VMT found. Observed use shows bike share programs have a positive impact on reducing VMT, especially when implemented as a grouped strategy. Complementary strategies include programs and policies to improve bike infrastructure.[10] ● Minneapolis bikeshare reported 23 percent of bikeshare trips would have been made by auto. Denver bikeshare reported 43 percent of trips would have been made by car.[11] ● Bikeshare memberships in San Francisco may result in a 2 percent reduction in VMT. Location of bikeshare station is critical; the maximum benefit is seen if a bikeshare station is within approximately 1,000 feet of a development project.[12] ● Georgetown Public Policy Review finds bikeshare systems may result in an annual reduction of up to 200 fewer miles driven per person.[13]
Carshare	● CAPCOA identifies a 0.4 to 0.7 percent reduction in VMT.[14]

[5] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 202.

[6] Oregon Department of Transportation, "Bike Parking," 3.

[7] City and County of San Francisco, "Standards for the Transportation Demand Management Program," August 2016, 12, http://default.sfplanning.org/plans-and-programs/emerging_issues/tsp/tdm_Program_Standards-011917.pdf.

[8] "Transportation Demand Management; Technical Justification" (San Francisco, CA, June 2016), 25–26, http://default.sfplanning.org/plans-and-programs/emerging_issues/tsp/TDM_Technical_Justification.pdf.

[9] Kuzmyak, Evans, and Pratt, "Traveler Response to Transportation System Changes Handbook, Third Edition: Chapter 16, Pedestrian and Bicycle Facilities," 16–388, accessed July 7, 2017, https://www.nap.edu/read/22791/chapter/5#388.

[10] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 256.

[11] Oregon Department of Transportation, "Bike Sharing," 2, accessed February 27, 2017, http://www.oregonmosaic.org/122/bicycle-and-pedestrian-programs.html.

[12] "Transportation Demand Management; Technical Justification" (San Francisco, CA, June 2016), 26, http://default.sfplanning.org/plans-and-programs/emerging_issues/tsp/TDM_Technical_Justification.pdf.

[13] "Beyond Urban Planning: The Economics of Capital Bikeshare," *Georgetown Public Policy Review*, April 7, 2014, http://gppreview.com/2014/04/07/beyond-urban-planning-the-economics-of-capital-bikeshare/.

[14] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 245.

program	● "City CarShare membership typically lowered daily travel by 7 vehicle miles. Residing in dense, transit-friendly San Francisco reduced the figure by another 3 vehicle miles."[15] ● Based on a 2007 study, Fehr and Peers identified a range of intermediate-term VMT reduction of 38 percent (two years) and a long-term (four years) VMT reduction of 67 percent based on a program that includes preferential carshare parking near the destination (usually a workplace) entrance.[16, 17] ● Oregon DOT report finds a 0.05 to 0.2 percent reduction in VMT for short term. Providing increased funding support for carshare may result in a 1.7 percent VMT reduction.[18]
Guaranteed ride home program	● CAPCOA found that as part of a robust Commute Trip Reduction TDM program GRH contributes to between a 4.2 to 21.0 percent reductions in commute VMT.[19] ● Examples of how Guaranteed Ride Home (GRH) benefits mode shift are cited in a 2007 FTA study, however no specific VMT reductions are given. The study notes that a 1999 survey of Tappan Zee Bridge express bus commuters found 16 percent said they would not use transit without the GRH program, and a 2003 study prepared for the Denver Regional Council of Governments that found a GRH program would increase the frequency of carpooling by 17 percent.[20] ● Alameda County Transportation Commission found that in 2014, the annual number of weekday vehicle miles avoided because of the GRH totaled 4,100,962.[21]
Parking management	● CAPCOA cites a 5 to 12.5 percent VMT reduction, depending on a limit of parking supply.[22] ● Cambridge, Mass., runs a highly effective TDM program through its

[15] Robert Cervero, Aaron Golub, and Brendan Nee, "San Francisco City CarShare: Longer-Term Travel-Demand and Car Ownership Impacts" (Institute of Urban and Regional Development, University of California at Berkeley, 2007), 38, http://iurd.berkeley.edu/wp/2006-07.pdf.

[16] Ibid., 25.

[17] Tien-Tien Chan, "TDM Framework for Growth. Summary Findings - Literature Review (Final)," March 30, 2015, 4, http://default.sfplanning.org/plans-and-programs/emerging_issues/tsp/tdm_Final_SF_TDM_Lit_Review_Letter_Summer2014.pdf.

[18] Oregon Department of Transportation, "Car Sharing," 3, accessed February 27, 2017, http://www.oregonmosaic.org/files/40.pdf.

[19] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 223.

[20] William B. Menczer, "Guaranteed Ride Home Programs: A Study of Program Characteristics, Utilization, and Cost," *Journal of Public Transportation* 10, no. 4 (2007): 143, https://nctr.usf.edu/jpt/pdf/JPT%2010-4%20Menczer.pdf.

[21] Alameda County Transportation Commission, "Guaranteed Ride Home Program Evaluation," Final Report (Alameda County, CA, 2014), 5–1, http://grh.alamedactc.org/wp-content/uploads/2015/08/Eval_FINAL_web.pdf.

[22] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 207.

	Parking Transportation Demand Management ordinance (PTDM).[23] The PTDM ordinance is credited with a 5 percent drop in drive-alone trips to work, a 4 percent increase in transit trips, and a doubling of bicycle trips to work. This program is also credited with reduced parking supply, improved air quality, and increased bike, walk, and transit use.[24] ● Oregon DOT's Mosaic tool shows 0.80 to 1.80 percent VMT reduction.[25] ● Oregon Greenhouse Gas Reduction Toolkit estimates 5 to 12 percent reduction in VMT with effectiveness increasing over time.[26] ● San Francisco estimates 1 to 11 percent reduction in VMT, depending on land use.[27]
Marketing, education, outreach	● CAPCOA estimates 0.8 to 4.0 percent reduction in VMT.[28] ● Alta Planning and Design's outreach programs resulted in measureable TDM benefits. For example, the community of Juanita in King County, Washington participated in a 16-week program to reduce auto dependence, reducing drive-alone trips in the community by almost 145,000 miles.[29] ● Arlington County, Vir., Commuter Services provides information and services to increase the use of alternative transportation. Between 2008 and 2014, Arlington documented an average weekday reduction in SOV trips of 8 percent with a resulting reduction in VMT of 39 percent.[30] ● In 2007, the Portland SmartTrips and TravelSmart projects documented a reduction of 9 to 13 percent in drive-alone car trips by area residents with a corresponding increase in walking, bicycling, and transit mode shares in the SmartTrips areas.[31] The SmartTrips

[23] City of Cambridge, "Chapter 10.18 - Parking and Transportation Demand Management Planning; Parking Space Registration | Code of Ordinances | Cambridge, MA | Municode Library," 10.18 Parking and Transportation Demand Management Planning; Parking Space Registration § (1998), https://www.municode.com/library/ma/cambridge/codes/code_of_ordinances?nodeId=TIT10VETR_CH10.18PATRDEMAPLPASPRE&searchText=.

[24] "2006 - 2010 Cambridge Journey to Work - CDD - City of Cambridge, Massachusetts," accessed January 5, 2017, http://www.cambridgema.gov/CDD/factsandmaps/transportationdata/200610jtwtable.

[25] "Parking Demand Management and Pricing" (Oregon Department of Transportation, n.d.), 3, http://www.oregonmosaic.org/files/39.pdf.

[26] Oregon Department of Transportation, "Parking Management," 1, accessed March 15, 2017, https://www.oregon.gov/ODOT/TD/TP/docs/Toolkit/Strategy%20Reports/SR3_ParkingManagement.pdf.

[27] "Transportation Demand Management Measures," 75, accessed February 13, 2017, http://default.sfplanning.org/plans-and-programs/emerging_issues/tsp/tdm_Measures-011917.pdf.

[28] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 240.

[29] Jessica Roberts, "King County Metro In Motion TDM," *Alta Planning + Design*, August 19, 2015, http://altaplanning.com/projects/king-county-tdm/.

[30] "Reduction in SOV Trips," *Transportation*, accessed January 5, 2017, https://transportation.arlingtonva.us/key-performance-measures/mobility/reduction/.

[31] Pedestrians and Bicycle Information Center, "PBIC Case Study: Portland Smart Trips," October 27, 2007,

	Welcome program, targeting new residents in a neighborhood, resulted in a 10.4 percent reduction in drive alone trips for all new residents, not just those that participated in the program.[32] ● San Francisco estimates up to 4 percent reduction in VMT.[33] ● Seattle Best Practices estimates up to 21 percent transit ridership increase.[34]
Multimodal wayfinding	● Oregon DOT reports quality multi-modal wayfinding offered to employees resulted in a 17 percent mode shift from driving to active transportation and transit.[35] ● San Francisco's TDM documentation notes the dearth of literature on the topic, but acknowledges its potential relevance, estimating a potential 1 percent VMT reduction.[36]
Parking cash-out program	● CAPCOA estimates between 0.6 and 7.7 percent reduction in commute VMT, depending on land uses.[37] ● San Francisco estimates program may result in a 2 percent reduction in VMT for non-residential tenants.[38] ● TCRP Report 95 estimates may create a 12 percent reduction in commute VMT.[39]
On-street and public parking	● CAPCOA estimates 2.8 to 5.5 percent reduction in VMT.[40] ● For non-residential properties, parking passes sold on a daily or hourly basis should produce a 2 percent reduction in VMT in San Francisco.[41] ● Washington State DOT reports "When parking charges are increased from approximately $0.28 per hour to $1.19 per hour… [The result is] an 11.52 percent decrease in VMT and a 9.92 percent decrease in CO2. This suggests that parking charge rates generate a substantial

http://www.pedbikeinfo.org/data/library/details.cfm?id=3961.

[32] Cullbridge Marketing and Communications, "Tools of Change: Portland's Smart Trips Welcome Program," *Tools of Change*, accessed January 18, 2017, http://www.toolsofchange.com/en/case-studies/detail/658.

[33] "Transportation Demand Management; Technical Justification," 30.

[34] Seattle Department of Transportation, "Best Practices in Transportation Demand Management" (Seattle, WA, January 2008), 7C–2-3, http://www.seattle.gov/transportation/docs/ump/07%20SEATTLE%20Best%20Practices%20in%20Transportation%20Demand%20Management.pdf.

[35] Oregon Department of Transportation, "Wayfinding and Signage," 2, accessed February 27, 2017, http://www.oregonmosaic.org/files/46.pdf.

[36] "Transportation Demand Management; Technical Justification," 29.

[37] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," August 2010, 266, http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.

[38] "Transportation Demand Management; Technical Justification," 31.

[39] Erin Vaca and Richard Kuzmyak, *Traveler Response to Transportation System Changes: Parking Pricing and Fees. Third Edition; Chapter 13* (Washington, D.C.: Transportation Research Board: Transit Cooperative Research Program, 2003), http://www.tcrponline.org/PDFDocuments/TCRP_RPT_95c13.pdf.

[40] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 213.

[41] "Transportation Demand Management; Technical Justification," 31.

	influence on VMT and CO2 only when they reach higher-end rates."[42]
Affordable housing	• CAPCOA estimates 0.04 to 1.20 percent reduction in VMT for incorporation of 30 percent below-market housing adjacent to transit. The range of VMT reduction represents the percent below market rate housing included in a development.[43] • In Metro Regions, home to two-thirds of California's population, identically-composed and located Low Income households are predicted to drive 10% less than the median, Very Low Income households 25% less, and Extremely Low Income households 33% less. By contrast, Middle Income households are predicted to drive 5% more and High Income households 14% more. Extremely Low Income Family in a transit-rich area demands 55% less parking than the median while the average Middle Income Family in those same transit-rich areas demands 5% more parking.[44] • San Francisco excludes affordable housing projects from TDM requirements. City data show these types of projects typically include very limited accessory parking.[45]
Provide fully or partially subsidized transit fares	• CAPCOA estimates 0.3 to 20 percent reduction in commute trip VMT. The variations stem from the number of eligible employees and worksite land use settings (low-density suburb; suburban center; and urban location).[46] • Eliminating fares in Corvallis, Oregon resulted in a 38 percent bump in ridership. Each 1 percent change in bus fares produces a 0.4 percent change in ridership in the short term. A corresponding increase or decrease in rail fare results in a 0.2 percent change in ridership.[47] • Lowering transit fares in the Puget Sound region resulted in a decrease in VMT from 1.34 to 2.23 percent, depending on land use and intersection densities.[48]

[42] Lawrence D. Frank et al., "An Assessment of Urban Form and Pedestrian and Transit Improvements as an Integrated GHG Reduction Strategy" (Washington State: Department of Transportation, April 1, 2011), 34, http://www.wsdot.wa.gov/research/reports/fullreports/765.1.pdf.

[43] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 176.

[44] Gregory L. Newmark and Peter M. Haas, "Income, Location Efficiency, and VMT: Affordable Housing as a Climate Strategy," Working Paper (Chicago, IL: Center for Neighborhood Technology, December 16, 2015), 15, http://www.cnt.org/sites/default/files/publications/CNT%20Working%20Paper%20revised%202015-12-18.pdf.

[45] "Transportation Demand Management; Technical Justification," 11.

[46] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 230.

[47] Oregon Department of Transportation, "Decrease or Eliminate Transit Fares," 1-2, accessed February 27, 2017, http://www.oregonmosaic.org/files/31.pdf.

[48] Lawrence D. Frank et al., "An Assessment of Urban Form and Pedestrian and Transit Improvements as an Integrated GHG Reduction Strategy," 34.

Provide preferential parking for rideshare	● CAPCOA reports between a 1 and 15 percent commute trip VMT reduction depending on surrounding land use.[49] ● San Francisco bundles this measure under High Occupancy Vehicles; estimating a maximum reduction in VMT of 14 percent, depending on surrounding land use and transportation options.[50]
Provide residential area parking permits	● CAPCOA reports no effect if used alone. Should be grouped with other trip reduction and parking strategies and subsidized neighborhood transit passes. Surrounding land uses—high, medium, or low density and quality of transit service—will affect the amount of VMT reduced[51] ● San Francisco does not assign a specific reduction in VMT for residential parking permits. Notes provision of unregulated off-street parking as inducing demand for driving of both residents and employees in an area.[52]
Real-time trip options data	● Oregon DOT reports real time arrival information impacts perceived and actual wait time. o A Seattle study found a 13 percent reduction in perceived wait time and a two-minute reduction in actual wait times. Accurate arrival information also impacts ridership. o A Chicago study recorded a 2 percent bump in ridership a year after the real time system was implemented.[53] ● San Francisco assigns a 1 percent reduction in VMT.[54]
Connectivity, accessibility, walkability, mixed uses	● CAPCOA reports improving the pedestrian network may increase the walk mode share 2 percent.[55] ● Oregon Sustainable Transportation Initiative reports neighborhoods with pedestrian networks reduce VMT by a minimum of 2 percent.[56] ● Improving the streetscape to encourage walking may increase walking 1 percent in San Francisco.[57] ● TCRP 95 finds the rates of utilitarian walking increases with the

[49] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 227.

[50] "Transportation Demand Management Measures," accessed February 13, 2017, http://default.sfplanning.org/plans-and-programs/emerging_issues/tsp/tdm_Measures-011917.pdf, 12.

[51] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 244.

[52] "Transportation Demand Management; Technical Justification," 31.

[53] Oregon Department of Transportation, "Real Time Transit Information," 2, accessed February 27, 2017, http://www.oregonmosaic.org/files/28.pdf.

[54] "Transportation Demand Management; Technical Justification," 29.

[55] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 186.

[56] Oregon Department of Transportation, "Strategy Report: Pedestrian Environment" (Oregon Department of Transportation, 2010), 1, http://www.oregon.gov/ODOT/Planning/Documents/Pedestrian-Environment-SR.pdf.

[57] "Transportation Demand Management; Technical Justification," 25.

	presence and completeness of a city's sidewalk network.[58] ● Forthcoming research for the Virginia Department of Transportation shows that household auto mode share drops by 40 percent between neighborhoods with poor walking accessibility to non-work destinations and those with the best walking accessibility to non-work destinations. Similarly, household VMT drops by about 60 percent.[59] ● Mixed-use developments generate significantly less travel demand than separated uses, due to internal capture of trips.[60, 61]
Neighborhood-supportive services such as grocery stores, delivery services, or non-site childcare	● San Francisco's TDM documentation estimates VMT reduction as follows:[62] o Delivery and neighborhood-supportive amenities and services – Potential VMT reduction of 1 percent. Delivery "by bicycle, on foot, or in a delivery vehicle that makes multiple stops." No literature was found to document the effectiveness of this strategy but expert opinion is in favor of the utility of this strategy. o On-site childcare is estimated to result in a 2 percent reduction in VMT due to removing the need to drive a child to daycare at a separate location.
Telework, compressed and alternative work schedules	● Mobility Lab reports the strategy does not guarantee a reduction in VMT, as the teleworker or employee on an alternative schedule may run home-based errands in their car during the day. Many employers and employees are aware of teleworking options, so TDM agencies and employers are better served focusing on other TDM options.[63] ● San Francisco assigns no point values to these options due to the difficulty in monitoring and implementing these programs.[64]
Transportation network company	● A study in New York found that the presence of TNCs actually increased VMT and congestion.[65] ● A study in the Denver area reached similar conclusions.[66]

[58] Kuzmyak, Evans, and Pratt, "Traveler Response to Transportation System Changes Handbook, Third Edition: Chapter 16, Employer and Institutional TDM Strategies," 16-20.

[59] SSTI/VDOT forthcoming

[60] OA US EPA, "Mixed-Use Trip Generation Model," Data and Tools, *US EPA*, (April 28, 2013), https://www.epa.gov/smartgrowth/mixed-use-trip-generation-model.

[61] Brian S. Bochner et al., *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments* (Washington, D.C.: National Academies Press, 2011), doi:10.17226/14489., https://static.tti.tamu.edu/tti.tamu.edu/documents/5-9032-01-1.pdf

[62] "Transportation Demand Management; Technical Justification," 28.

[63] "Transportation Agencies: Focus Less on Telework," *Mobility Lab*, November 24, 2014, https://mobilitylab.org/2014/11/24/transportation-agencies-focus-less-on-telework/.

[64] "Transportation Demand Management; Technical Justification," 23.

[65] Bruce Schaller, "Unsustainable? The Growth of App-Based Ride Services and Traffic, Travel, and the Future of New York City" (Brooklyn, New York: Schaller Consulting, February 27, 2017), http://www.schallerconsult.com/rideservices/unsustainable.pdf.

[66] Alejandro Henao, "Impacts of Ridesourcing - Lyft and Uber - on Transportation Including VMT, Mode Replacement, Parking, and Travel Behavior." (PowerPoint, Doctoral Dissertation Defense, Denver, CO, January 19, 2017), https://media.wix.com/ugd/c7a0b1_68028ed55eff47a1bb18d41b5fba5af4.pdf.

access	
Unbundle parking costs from property costs	• CAPCOA estimates 2.6 to 13 percent commute VMT reduction.[67] The range of effectiveness is related directly to the land use and range of available transportation alternatives. • 1.0 to 5.0 percent VMT reduction reported in San Francisco, depending on land use type.[68] • TCRP Report 95: 10 percent VMT reduction in areas with poor transit. 36 percent where transit is high quality.[69]
Carpool, vanpool and shuttle bus	• CAPCOA estimates between 1 and 15 percent reduction in VMT depending on density and land use.[70] • Portland Metro's carpool matching program achieved approximately 0.07 to 0.1 percent reduction in regional VMT.[71] • Between a 7 and 14 percent reduction in VMT for carpools and vanpools, depending on land use and program details estimates in San Franciasco. Shuttle buses, with longer operating hours, may result in additional VMT reductions.[72]

[67] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 210.

[68] "Transportation Demand Management Measures," PKG-1.

[69] Erin Vaca and Richard Kuzmyak, *Traveler Response to Transportation System Changes: Parking Pricing and Fees. Third Edition; Chapter 13*, chap. 13," 13–16.

[70] California Air Pollution Control Officers Association et al., "Quantifying Greenhouse Gas Mitigation Measures," 227.

[71] Oregon Department of Transportation, "Ridesharing," 2, accessed February 27, 2017, http://www.oregonmosaic.org/files/30.pdf.

[72] "Transportation Demand Management; Technical Justification," 29.