TRANSIT RETURN ON INVESTMENT

Examining the Business Case for Transit in the Omaha Region

SPRING 2020

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PURPOSE:

Beginning in 2018, MAPA embarked on a Transit Return on Investment (ROI) Study to evaluate the "business case" for expanding regional transit in the region. The study builds on a foundation established by two prior studies: The Heartland 2050 Vision and the Close the Gap Analysis of Potential Transportation Corridors in the Omaha-Council Bluffs Metro Area. The study addresses the key question: *How can our decisions around transit and land use yield economic returns for the Greater Omaha economy?*

ANALYSIS OF ALTERNATIVE FUTURE SCENARIOS:

The study analyzed the transportation and economic implications of two alternative future transportation and development scenarios: a *business as usual* scenario that continues the current pattern of sprawling development with no further investment in transit and a *better transit smarter growth* scenario with high-quality BRT corridors would support denser patterns of development in transit-accessible locations along the Omaha/Bellevue North-South Spine (30th-24th-Fort Crook) as well as the 72nd and 84th Street Spine.

RESULTS:

If the Omaha region chooses to invest in an enhanced BRT network *and* succeeds in encouraging development along designated transit corridors, the regional economy can add as many as 8,000 jobs and see an economic impact of $1.8 billion in added annual business revenue by 2050, relative to a business-as-usual base case.

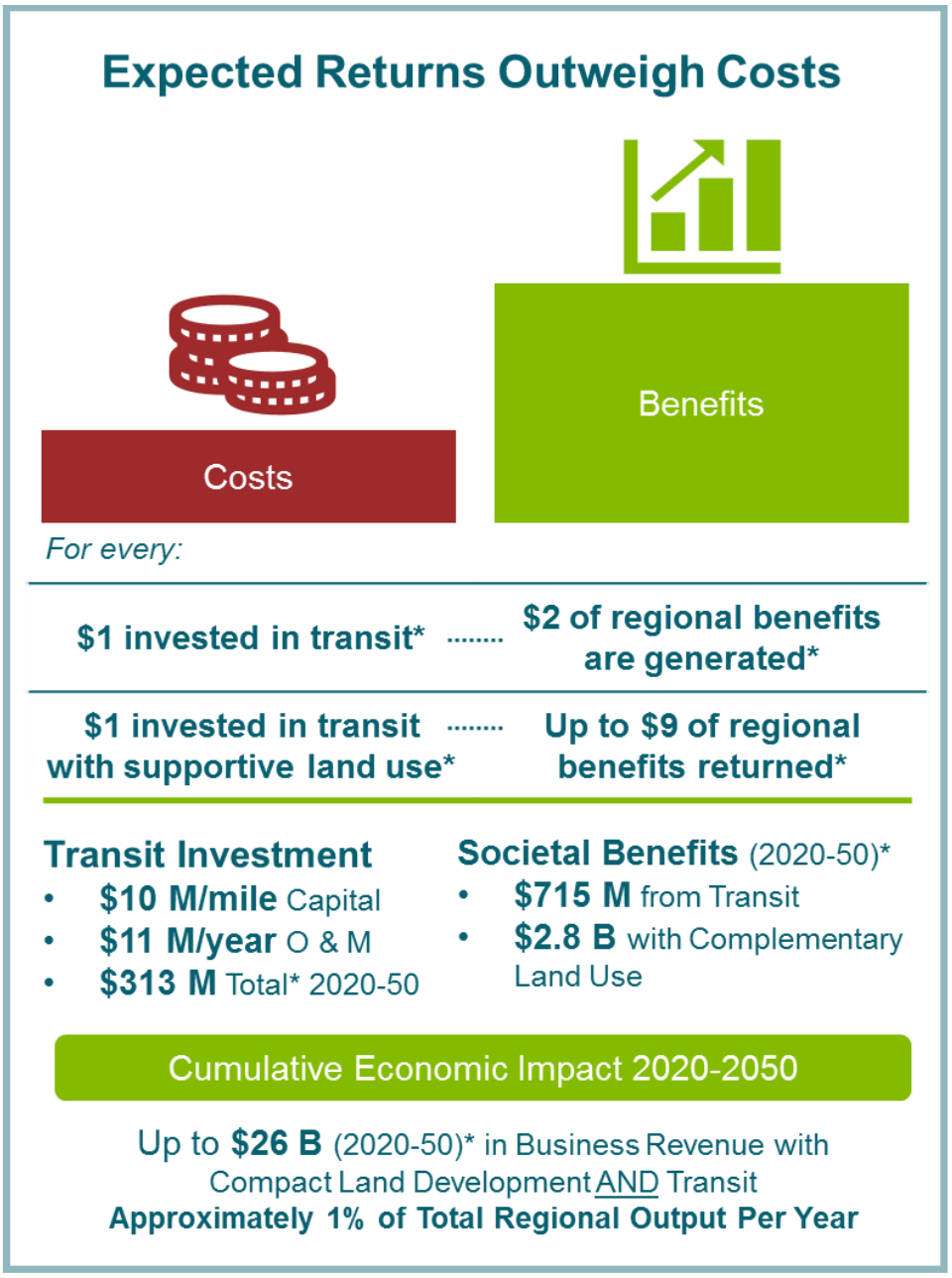
Economic Impact of Better Transit, Smarter Growth Scenario Compared to Business-As-Usual, in 2050

8,000
more jobs created

$750 million
in labor income earned in the region (annual)

$1.8 billion
in business revenue in the region (annual)

The figure below illustrates how BRT and complementary land use is expected to generate societal benefits and impacts on the economy, over time.



* Discounted at 7%. Results depend on public and private investment and timing as well as BRT configuration. Supportive land use requires private developer participation.

For illustrative purposes, the above figures assume the two BRT corridor projects are built in 10 years starting in 2020 and then accumulate benefits and associated impacts on the economy out to the year 2050. Construction costs are incurred in early years, while operations and maintenance costs occur over time. Benefits and economic impacts grow over time as a function of the region's population growth, the pace of transit-oriented land development, and the phasing of BRT construction. Even though costs and benefits may play out differently in the future from what is assumed here, there are likely to be significant benefits outweighing the costs of BRT.

Introduction

Study Purpose

Beginning in 2018, MAPA embarked on this Transit Return on Investment (ROI) Study to evaluate the "business case" for expanding regional transit in the region. The study builds on a foundation established by two prior studies: *The Heartland 2050 Vision* and the *Close the Gap Analysis of Potential Transportation Corridors in the Omaha-Council Bluffs Metro Area*. This study is also intended to support ongoing conversations happening within the region as part of the Greater Omaha Chamber's *ConnectGo* initiative. The study's goal is to provide a framework to support decision making about transit over time in the context of an evolving economy and land use. To achieve this, the study develops practical ways of defining and measuring ROI (return on investment) that are reflective of regional values and expectations. The end results, presented in this report, address the key question: ***How can our decisions around transit and land use yield economic returns for the greater Omaha economy?***

Approach

The study encompasses both qualitative and quantitative research and analysis. A key aspect of the study process is stakeholder engagement — talking with business leaders, community planners, transportation officials and public policy experts. The study was guided by 19-person stakeholder committee with representation from employers and institutions across the region. Interviews and focus groups with regional economic development leaders and employers provided additional insight into the current value of transit and its strategic role in the future of the Omaha region. Finally, specific transit and land use scenarios were analyzed using the MAPA travel demand model and the TREDIS® "Transportation Economic Development Impact System" to understand the long-term economic value of coordinated transit and land use strategies.

Figure 2: Study Approach

Figure 1: Study Goals

Practical ROI Definition & Calculation
What do we mean by "return" on investment?

Reflective of Regional Values & Expectations
Align with the region's vision of the future

Basis for the Future Decision-Making
When and how do we invest or develop policies to achieve the desired return?

Examine the Business Case for Transit
How can our decisions around transit and land use yield economic returns for the Greater Omaha economy?

Acknowledgements

Heartland 2050 (H2050) is MAPA's community-driven, big-picture vision for the Omaha-Council Bluffs metro area. As part of the H2050 initiative, a 28-member team representing business, government and philanthropy visited the Twin Cities of Minneapolis/St. Paul, Minnesota in October 2017. Presentations and tours highlighted the benefits of transit investments and best practices in private/public partnerships. The group was inspired by the Itasca Project, an employer-led civic alliance focused on building a thriving economy and expanding prosperity. In 2013 the Itasca Project released a Regional Transit System: Return on Investment Assessment, making a business case for transit investment. Looking to make a business case for transit investment in the Omaha-Council Bluffs metro area, *Heartland 2050* secured funding from the public and private sector to hire a consultant and conduct a Return on Transit Investment Analysis. The analysis that follows is a result of these efforts.

The analysis and content of this report were developed by EBP (formerly Economic Development Research Group), in association with JEO Consulting Group, Inc. and Metro Analytics. The Omaha-Council Bluffs Metropolitan Area Planning Agency (MAPA) oversaw the project and provided key staff support. The Greater Omaha Chamber also provided invaluable guidance to the study process.

Images Source: Heartland 2050.

Report Organization

This report is organized into four sections. The first describes the role of transit in connecting people to jobs and businesses to their workforce. The second lays out how future transit and future land development can both shape the future of the Omaha region as it manages significant anticipated growth. The third discusses how transit fits into an evolving mobility landscape of changing technologies. The final chapter presents results from an economic analysis of returns from strategic transit investments coupled with supportive land use.

Transit and the Omaha Region's Workforce

Transit Commuters and Regional Economy: Today

Transit already plays an important role in connecting Omaha regional residents to employers. An average of 2,624 workers in the Omaha-Council Bluffs Metro Area rely on the services of Metro Transit to get to work each day. These people earn $71.1 million in annual wages and support an average of $206.9 million in business sales and $117 million in regional value added. The role of transit in providing workforce access is currently most important in service sector industries such as hospitality, retail, education, and health, as shown in Table 1. However, other key sectors such as professional and business services and financial, insurance, and real estate also have employees that use the region's transit system to get to work.

Table 1: Industry Activity Supported by Transit Commuters in the Omaha Region

		Millions of dollars		
Industry	**Jobs**	**Labor Income**	**Value Added**	**Output**
Hospitality and Other Services	615	$8.4	$12.4	$21.1
Retail Trade	492	$10.7	$17.9	$28.6
Education & Health Services	417	$8.4	$9.6	$15.2
Construction	286	$11.6	$12.5	$25.3
Professional & Business Services	210	$4.9	$6.1	$9.7
Financial, Insurance, & Real Estate	134	$7.8	$32.1	$50.7
Manufacturing	115	$3.2	$4.5	$19.7
Transportation	113	$8.5	$11.0	$17.3
Wholesale Trade	109	$2.3	$3.8	$5.4
Other	133	$5.3	$7.2	$13.9
Total	***2,624***	***$71.1***	***$117.0***	***$206.9***

Source: EBP analysis using Metro Transit ridership data and the US Census American Community Survey

Equitable Access and Economic Participation

Transit in the Omaha region enables 689,000 trips per year by people who report that they would not otherwise be able to travel. Ninety-seven percent of those trips are made by people who did not have a car available for use.[1] This is indicative of the critical role played by transit in supporting equity of access and economic participation. Transit allows some households to avoid car ownership, which can come with significant fixed and operating costs. In 2019, AAA found that average annual car ownership costs could reach upwards of $9,000 per year.[2] By contrast, twelve monthly transit passes from Metro Transit cost $660.[3] Saving transportation costs is particularly important for low-income households, many of whom benefit from transit in the Omaha region. Thirty-four percent of transit riders in the Omaha region have household incomes less than $15,000 and an additional eighteen percent have household incomes between $15,000 and $25,000.[4]

21%

of transit commuters report they could not get to work without transit

Despite the critical access already provided by transit, the Omaha region faces remaining challenges in this area. Figure 3 shows the correspondence between transit service frequency and racially and ethnically concentrated areas of poverty in the region. Areas located north and south of downtown in particular have entrenched challenges and while there is transit service, there are limitations in its level of service. Figure 4 shows how

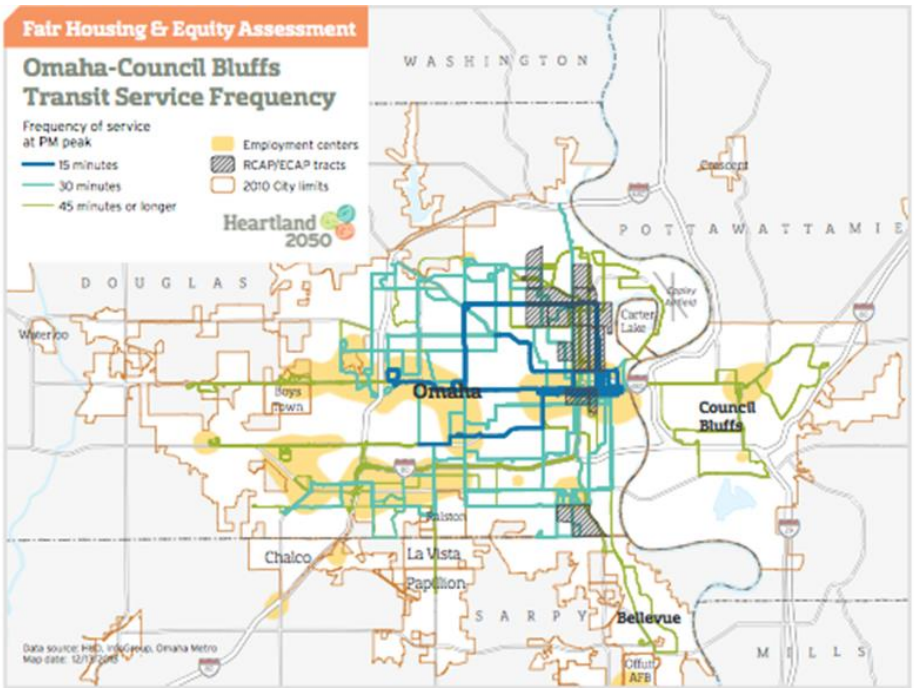


Figure 3: Transit Service and Racially and Ethnically Concentrated Areas of Poverty (RCAP/ECAP)

Source: MAPA

[1] Omaha Metro. Omaha Metro 2017 Data Collection – On-Board Survey and Boarding and Alighting Survey Results.
[2] AAA. Your Driving Costs: How Much Are You Really Paying to Drive? 2019. Weblink.
[3] Omaha Metro. Fares and Passes. Weblink.
[4] Omaha Metro. Omaha Metro 2017 Data Collection – On-Board Survey and Boarding and Alighting Survey Results.

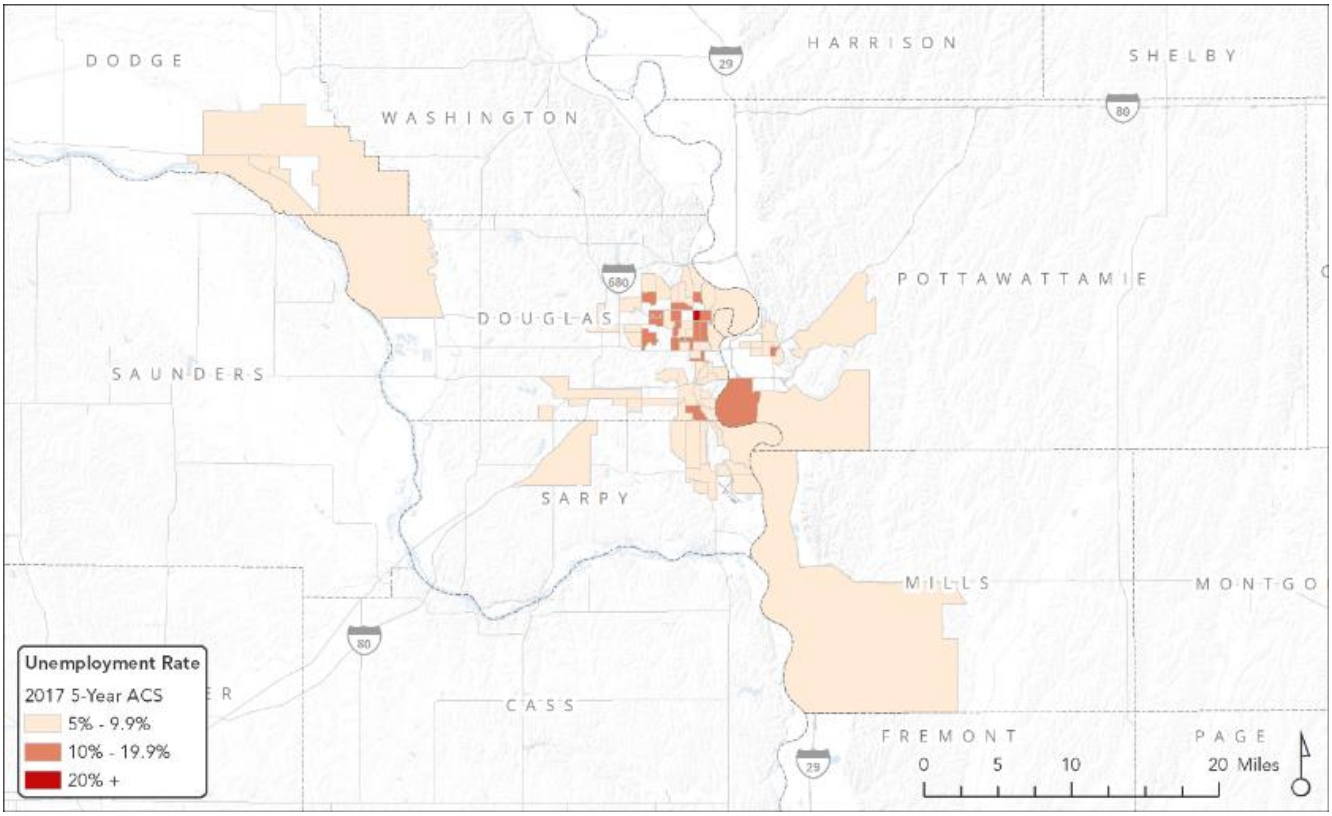


Figure 4: Unemployment in the Omaha Region

Source: MAPA

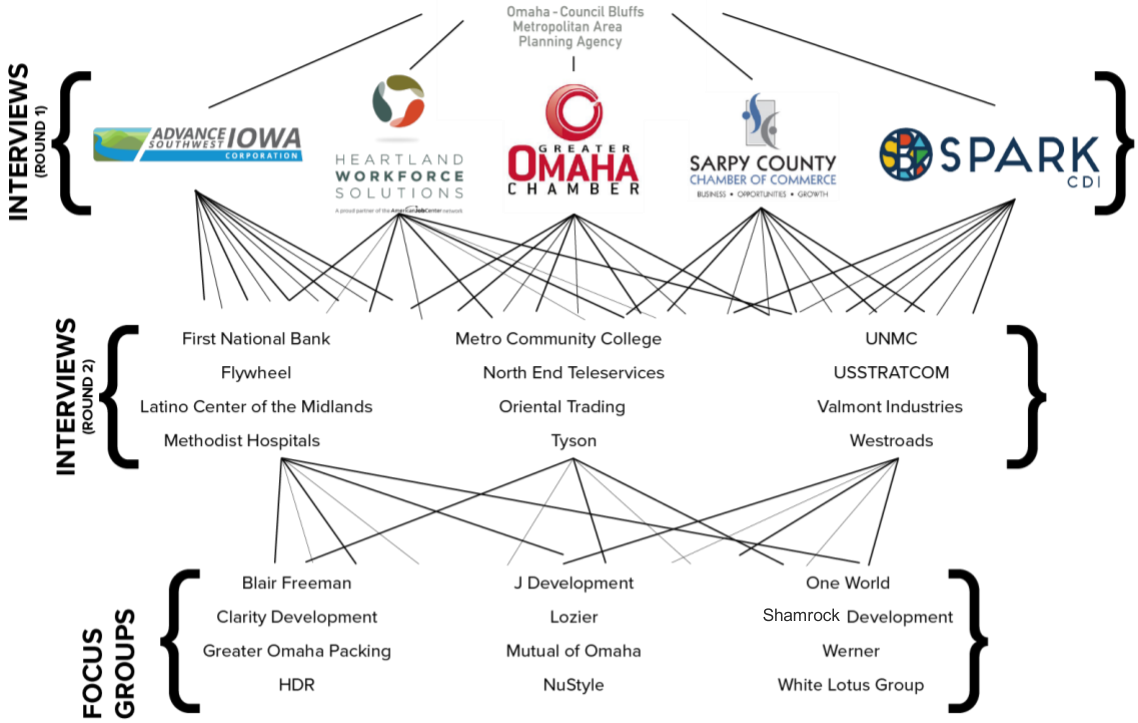
these same areas have high concentrations of unemployment, compared to an overall regional rate of under 3 percent.[5] Given regional struggles with talent shortages, connecting people to jobs is not just an equity imperative, but critical to continued regional economic development.

Meeting the Needs of Regional Employers

To further document the business case for transit in the Omaha region, the project team conducted a series of interviews and focus groups to incorporate the views of large and small employers across the region. The organizations that participated are shown in Figure 5.

[5] As of June 2018.

Figure 5: Interviews and Focus Groups



From these interviews and focus groups, a strong message was heard about three ways in which transit is important to area employers.

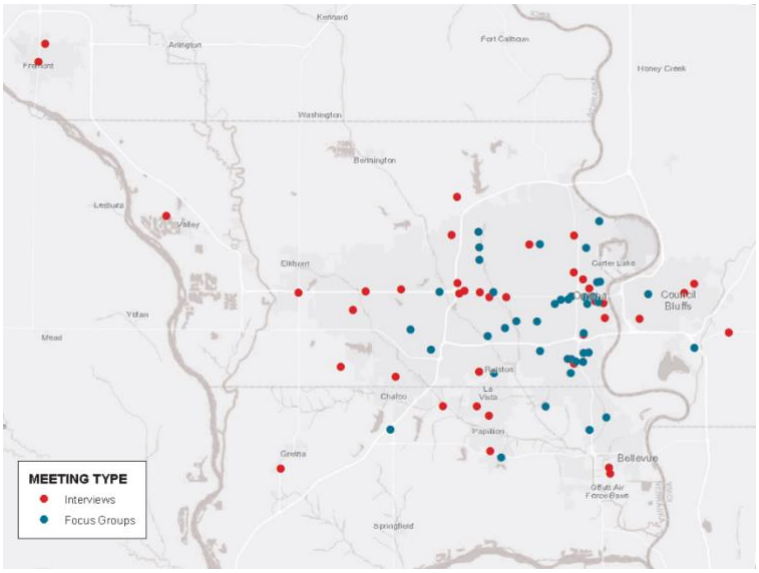


Figure 6: Location of Firms Participating in the Interviews and Focus Groups

Area employers rely on transit for access to their workforce and customers. For example:

- UNMC reports significant usage for their nearby transit system, indicating that 3,000 employees use it daily, and that they regularly hear about certain routes making their healthcare and education highly accessible.
- Companies, such as UNMC, North End Teleservices, and Tyson Foods have strategized their locations to be near transit, and as a result, have employees and customers that heavily rely on these modes of transportation.
- Tyson Foods goes further to indicate that their employees highly benefit from the transit's connectivity from north to south Omaha.

Area employers need transit for workforce recruitment and retention. Transit provides choices that are increasingly important to workers and employers. Not having those options can put their competitiveness at risk:

- UNMC, First National Bank, One World, Flywheel, and other companies have noticed lack of transit as a major factor in turnover.
- For Flywheel's employees, transit options are a quality of life amenity – part of what makes a community great and place where employees want to live. Flywheel competes for talent with cities offering quality transit, including Portland, OR and Austin, TX.

Area employers see transit as a way to reduce costs and make them more competitive. There are hidden business costs for companies operating in environments with insufficient transit:

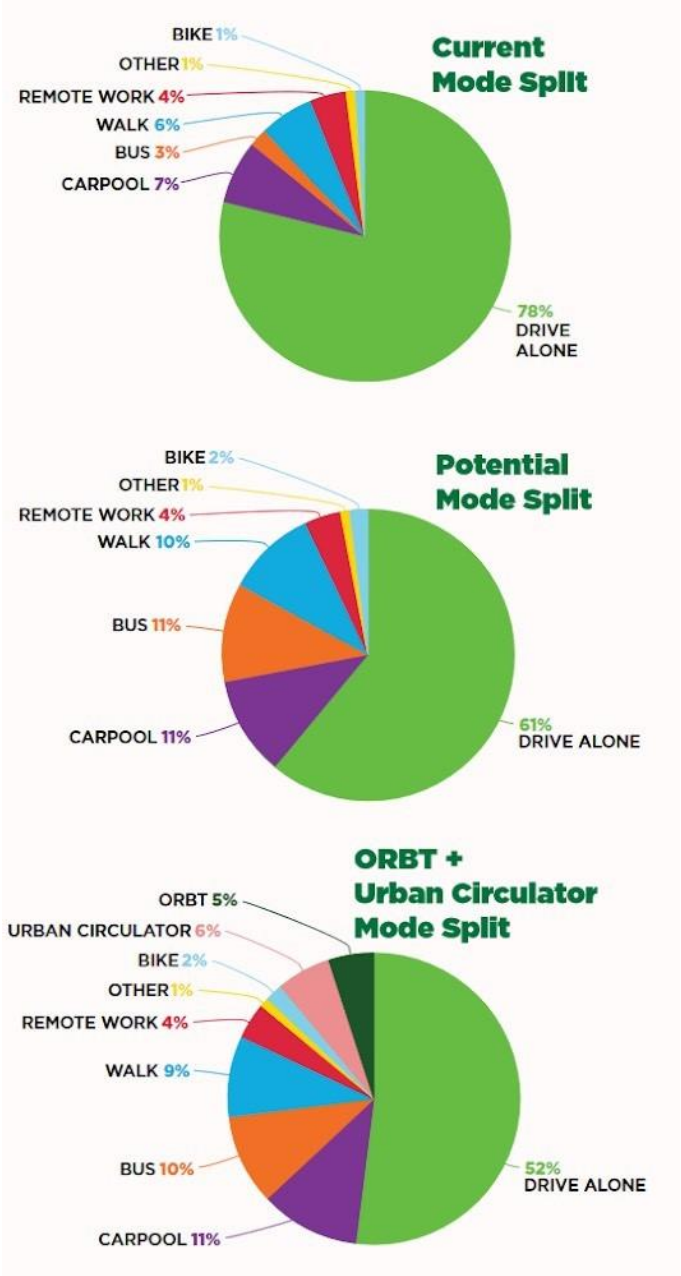
- Faced with employee parking issues for 20 years, First National Bank began organizing a bus shuttle with parking lots along the Dodge corridor. Despite its success, high cost and forgone opportunity have made parking an inefficient use of this downtown space.
- Metropolitan Community College (MCC) describes access as a key issue. They have been duplicating classes at more than one campus so that students are able to access class. With enhanced transit connecting wider areas of the region, MCC believes staff, space, and equipment expenses could be saved while their vision of full accessibility is kept.

Emerging Preferences of Omaha's Regional Workforce

Omaha's regional workforce wants more mobility options. The Greater Omaha Chamber's 2017 Diversity and Talent Inclusion Study found that only 17.6% of surveyed young professionals were satisfied with the availability of public transit in greater Omaha. With the right support, many residents, particularly those who live, work, and play in Downtown and Midtown, would shift away from driving alone to ride the bus, walk, bike, or carpool.

The Downtown & Midtown Mobility Survey was conducted in 2019 to understand the current pattern of transportation usage in these areas and the gap between today's situation and what people want.[6] According to the 8,500 survey respondents, the current active commuting modes split for these key areas is 22%, including 7% carpooling, 3% bus, and 6% walking, as shown in Figure 7. With support from employers such as bus passes or better bike facilities, this could rise to 39%, including 11% by bus (see the middle chart of Figure 7). The addition of high-performance transit such as Bus Rapid Transit (BRT) or streetcar could push that mode shift even higher, as shown in the last chart of Figure 7.

Figure 7: Downtown & Midtown Mobility Survey Results



Source: Verdis Group. Downtown & Midtown Mobility Survey.

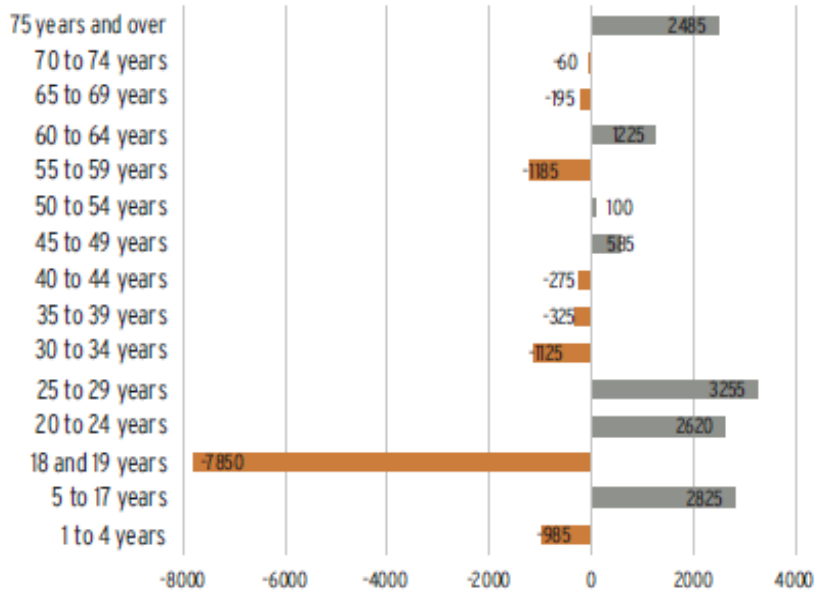
[6] Verdis Group. Downtown & Midtown Mobility Survey. Executive Summary. May 2019.

Adding high-capacity transit options, including BRT or streetcar, could increase usage of active commuting modes. Image Source: Metro Transit. ORBT.

Continued growth in the Omaha region requires that it attract and retain talent and employers seeking that talent. To date, Omaha has struggled in particular with the national competition to attract young people, as shown in Figure 8.

Transit provides choices and supports urban living in a way that is increasingly important to workers and employers, both in the Omaha region and nationally.

Figure 8: Domestic Net Migration (2010-2015)



Source: Nebraska State Data Center. As presented in: MAPA. Close the Gap: Analysis of Potential Transportation Corridors in the Omaha-Council Bluffs Metro Area

The Transit-Land Use Nexus: Planning for Omaha's Regional Growth

Heartland 2050 identified greater Omaha's central challenge as accommodating growth in a manner that is sustainable and continues to deliver economic prosperity and improve quality of life. This vision aligns with other key planning efforts, including Greater Omaha 2040 (Greater Omaha Chamber) and Blueprint Nebraska. All of these efforts call for enhanced transportation options to create a more vibrant and connected landscape. The Omaha region is posed to add nearly 400,000 people between 2010 and 2050.[7] This growth can either be accommodated according to current trends of sprawling land use and auto-dominated development, or it can be supported by better transit and smarter growth.

ANTICIPATED GROWTH IN THE OMAHA-COUNCIL BLUFFS METRO AREA BETWEEN 2010-2050:

42% population growth

40% employment growth

The following sections describe the transportation implications of two alternative future transportation and development scenarios. The findings were derived from regional population and employment forecasts and analysis using MAPA's Regional Travel Demand Model.

Business as Usual: Facing a Congested Future with Fewer Opportunities

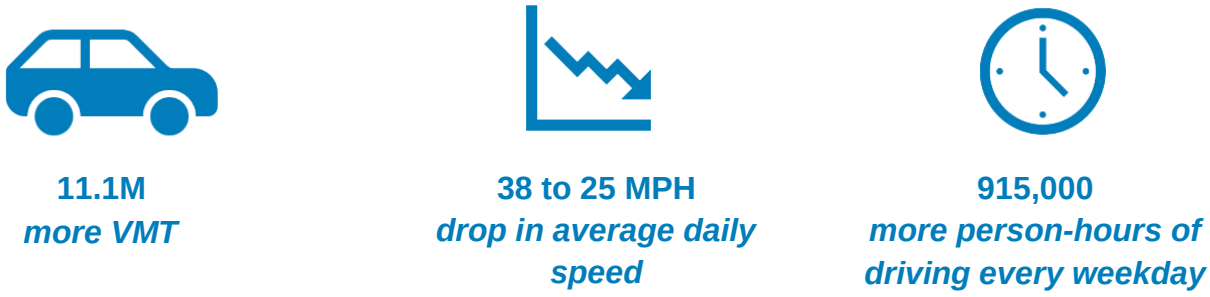
Under a "business-as-usual" scenario, development in the Omaha region will continue to follow a pattern of outward low-density growth. Sprawling growth together with no additional investments in transit beyond what is already present or committed to in the region will erode the performance of the transportation system for all users. Analysis conducted with the MAPA regional travel demand model forecasts 11.1 million more vehicle-miles of car travel by 2050 under this scenario, compared to 2015.

This increase in traffic is projected to further degrade existing bottlenecks causing average daily traffic speeds to drop from 38 to 25 miles per hour. As a result, people in the region will experience 915,000 more person-hours of driving every weekday. Moreover, backups caused by collisions today will become disruptively common as

[7] *Heartland 2050*. Vision. Weblink.

population growth and sprawl both add traffic and make the network more vulnerable to incident related congestion.

Figure 9: Change in Transportation Performance Under Business-as-Usual Scenario: 2015-2050



Source: Analysis Using MAPA's Regional Travel Demand Model.

Better Transit, Smarter Growth

However, there is an alternative path of growth open to the region – one characterized by better more comprehensive transit services and smarter growth oriented around key transit corridors, building on the goals established by *Heartland 2050* and other strategic initiatives in the region. Under this vision, developed by MAPA as part of the *Close the Gap* study[8] and in alignment with Metro's Transit Development Plan, the region would invest in BRT (bus rapid transit) along two additional corridors beyond the Omaha Rapid Bus Transit (ORBT) already under development:

- Omaha/Bellevue North-South Spine: 30th-24th-Fort Crook
- 72nd & 84th Street Spine

"Bus Rapid Transit" is a relatively new form of bus-based transit that delivers more comfortable, reliable, convenient and faster service than regular bus service, achieved through features such as separate dedicated lanes and signal priority, along with attractive stations with premium comfort and features such as arrival information along major commercial corridors.

Figure 10 shows the existing and committed transit network considered in the business-as-usual scenario, while Figure 11 illustrates the vision for enhanced bus rapid transit. Under this scenario, the high-quality BRT corridors would support denser patterns of development in transit-accessible locations along the Omaha/Bellevue North-South Spine (30th-24th-Fort Crook) as well as the 72nd and 84th Street Spine.

[8] MAPA. Close the Gap: Analysis of Potential Transportation Corridors in the Omaha-Council Bluffs Metro Area. July 2018.

Please note that while there are other potential transit projects and corridors that have been or are under discussion in the region, this network represents likely candidate projects for purposes of evaluating economic impact since they connect some of the region's highest employment and residential concentrations.

Figure 10: The Existing and Committed Transit Network

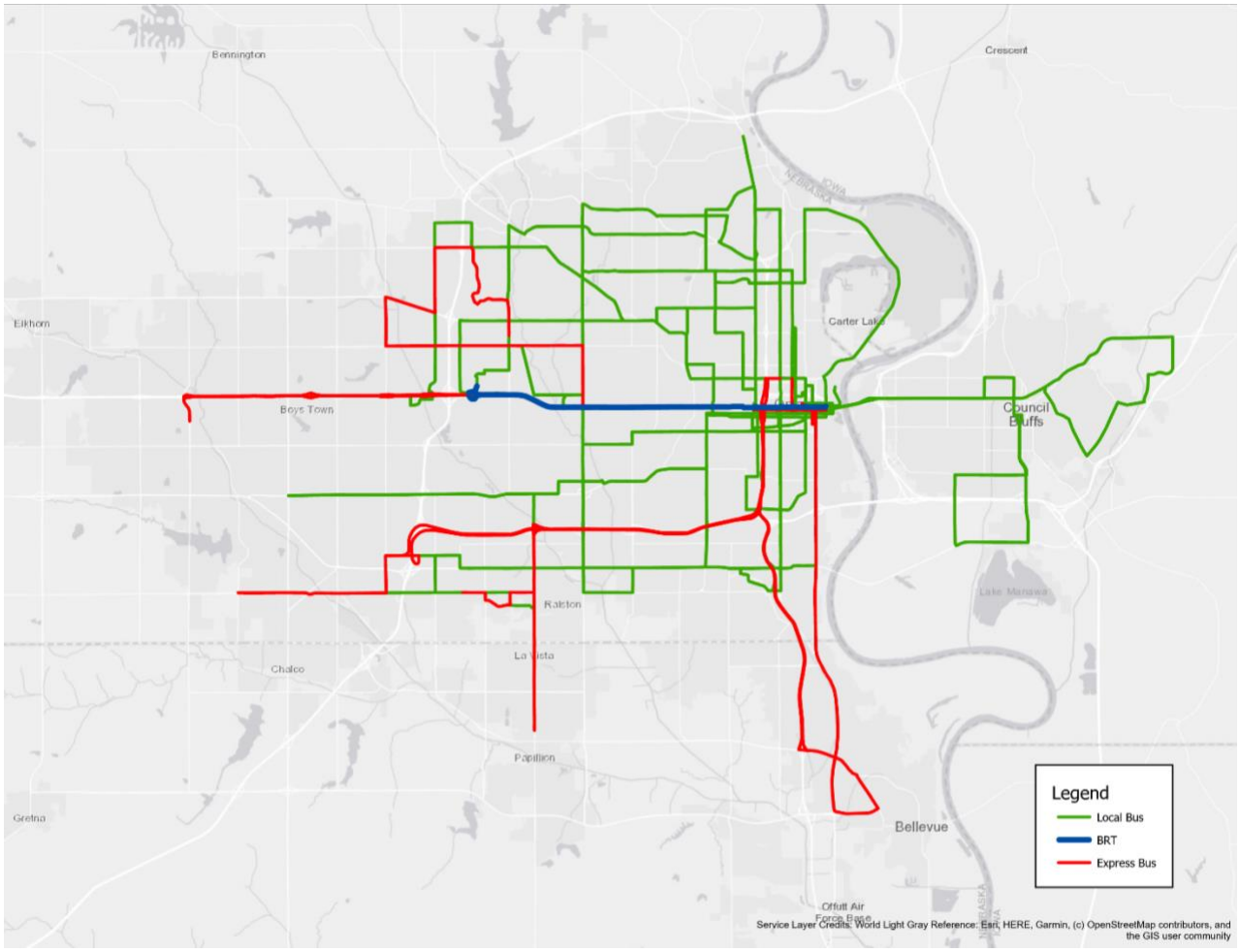
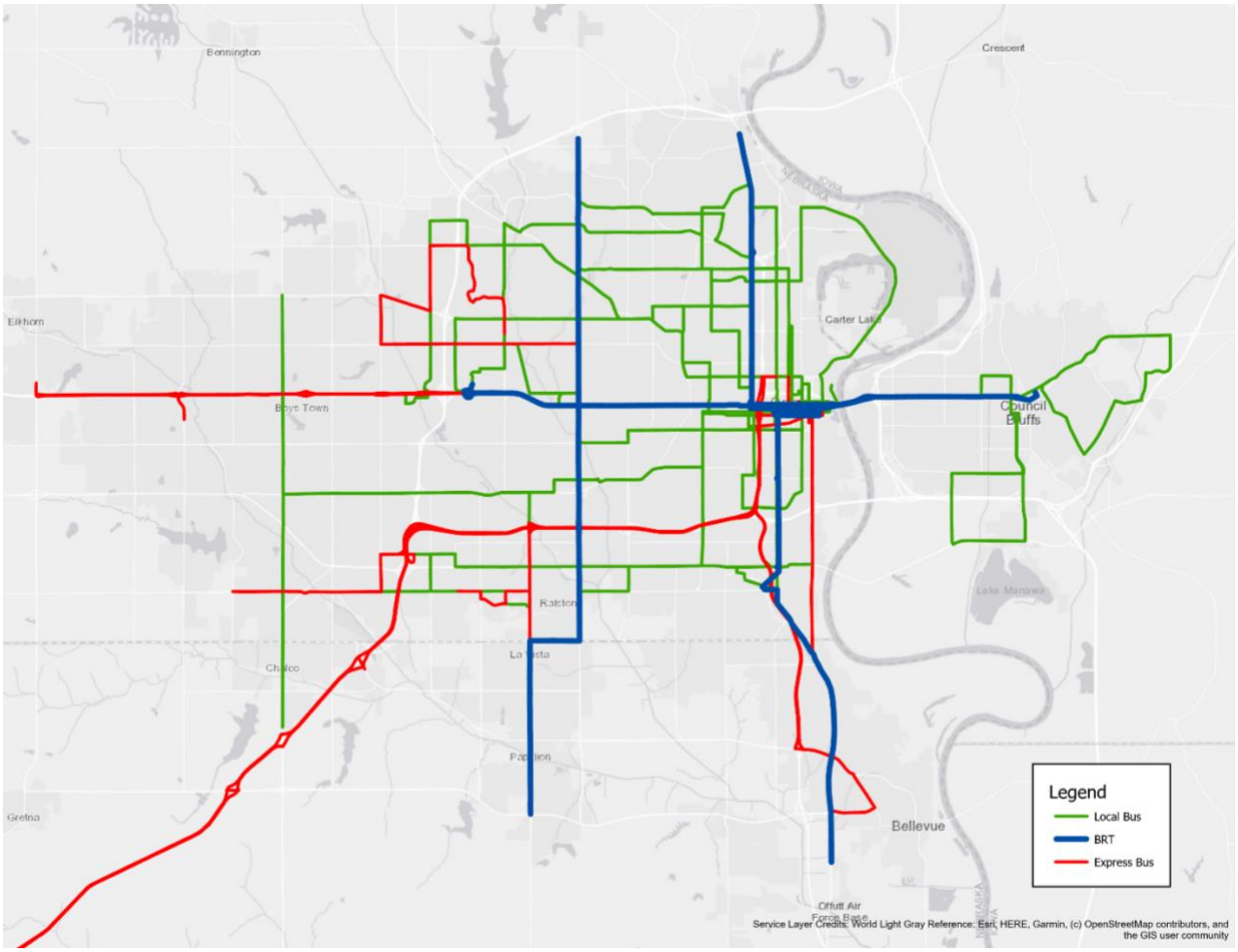


Figure 11: A Vision for Enhanced Bus Rapid Transit



Two Visions of the Future: Risks and Opportunities

Enhanced BRT service as envisioned above would significantly increase the coverage and quality of regional transit service. Under a scenario that pairs this service improvement with more compact land use patterns along the BRT corridors, the Omaha region could achieve an increase in 20,000 trips made regionally each day by BRT, relative to the business-as-usual scenario. That mode shift would in turn leave 350,000 fewer person-hours and 57,000 fewer vehicle miles spent on the road network as a result of the joint effects of transit and land use on road network volumes and speeds.

Figure 12: Better Transit, Smarter Growth Scenario Compared to Business-As-Usual in 2050

20,000
new BRT trips

350,000
fewer person-hours of driving every weekday

57,000
fewer vehicle miles of driving every weekday

Source: Analysis Using MAPA's Regional Travel Demand Model.

A growing number of communities are already recognizing the need for plans and policies to support transit corridors. For example:

- Sarpy County, Papillion, and Ralston have all developed policies and updated their land use plans to create a critical mass along proposed transit corridors, by encouraging private development at a higher density there.
- The City of Omaha recently amended its master plan to encourage transit-oriented development along the Dodge Street ORBT line and is presently working to amend its zoning code to support more transit-friendly projects.

Intentionally pursuing more compact growth and enhanced BRT service, in the Omaha region can mitigate the burden of future growth, as shown in Table 2. While the *Heartland 2050* vision of more compact growth supported by enhanced BRT would still yield a more congested regional network over time, this scenario constrains the region's future mobility significantly less than in the business-as-usual scenario.

Table 2: Network Performance Changes Between 2015 and Two Alternative Visions of the Future

Scenario	Average Daily Speed (mph)	Weekday Person Hours of Driving*
2015	38	632,000
Alternative Future Scenarios:		
2050 Business-as-Usual	25	1,548,000
Heartland 2050 and Enhanced BRT	33	1,196,000

Source: Analysis Using MAPA's Regional Travel Demand Model.
**Rounded to the thousands.*

BRT supports development of activity centers, providing targeted congestion management on the most challenging corridors.

Figure 13: A Vision for Transit Oriented Corridors

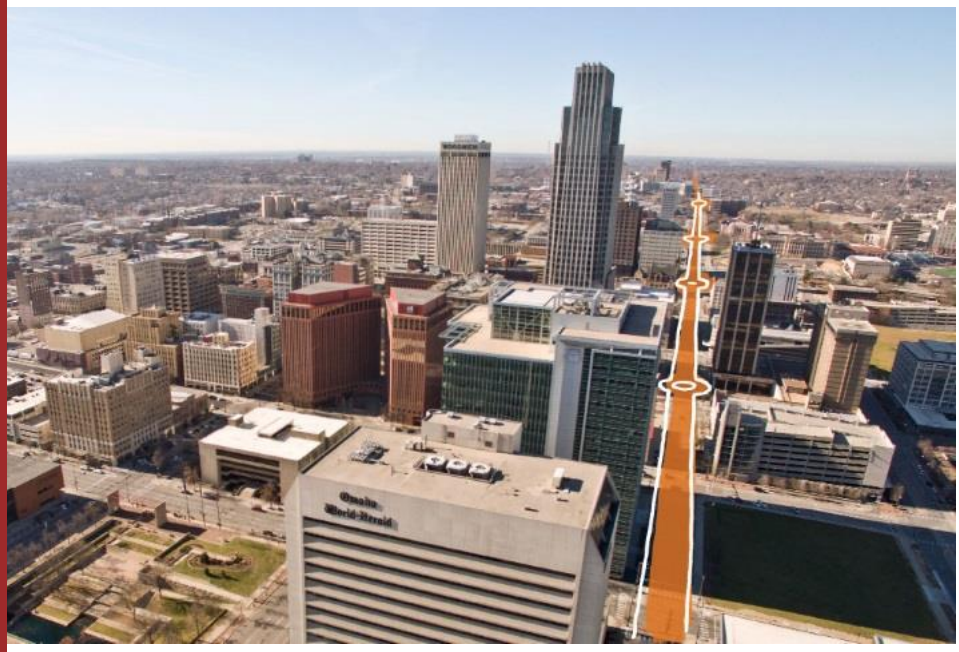


Image Source: Metro Transit. ORBT.

Transit in An Evolving Mobility Future

The Changing Mobility Landscape

Today, new technologies are changing the mobility landscape. Various ride-hailing, ridesharing, car-sharing, bike-sharing, and scooter-sharing companies have expanded mobility options beyond just bus transit services. Naturally, every new form of transportation attracts some users from other existing options, leading to press discussion about how it will all eventually "shake out" with winners and losers among competing service providers. The future can become even more complicated as autonomous vehicles become available to support even more variants of transit and ride sharing services, including "micro transit."

Figure 14: The Changing Mobility Landscape – Transit Supported by First and Last Mile Mobility

Source: EBP. Select Images from Omaha Metro Transit.

There is a strong consensus that America is moving in the direction of more seamlessly integrated transit and mobility services that will optimize people's ability to move without needing to drive their own car. The optimization from both cost and service viewpoints is clearly to have high performance, high frequency transit serving major travel corridors, while other mobility services provide feeder service as well as more dispersed rides for lower volume areas and times. With seamlessly integrated scheduling and payments coordinated via phone app, people in the future can expect more flexible, multi-faceted transit options. There is a wide body of evidence supporting this consensus view in which transit plays a key mobility role.

- **Complementarity.** Surveys of ride-hailing companies Uber and Lyft (are often referred to as TNCs or "transportation network companies") have shown that a significant share of their use is to get to/from bus and rail services.[9] This represents a growing solution to the "last mile access" problem for transit services.

- **Partnerships.** Recognizing this relationship, more and more transit operators are setting up formal partnerships with TNCs to enable integration of their services through use of phone apps. Multiple web sites are documenting these cases.[10] As these partnerships grow, they will support further transit use.

- **Automation.** Autonomous technology can eventually apply to high capacity transit, shared mobility, and personal vehicles, offering cost savings and safety benefits. However, research indicates that the network efficiency and congestion benefits of the technology will still require a long-term direction with high-occupancy shared vehicles (i.e. transit) as a key element for serving high-demand corridors.[11]

- **Car Ownership.** A distinguishing aspect of the new generation of millennial workers is that many of them have higher preference for lifestyles that do not require driving a car.[12] Supporting this is the fact that drivers' license rates have been dropping over time for younger workers.[13]

- **High Tech.** The preference for transit options in lieu of driving a car to work is particularly pronounced for high-tech business clusters, a fact that has been well illustrated in a pair of research studies. In addition, cities that are growing high-tech business clusters have explicitly supported investment in high quality transit service on key corridors in order to attract and retain high tech workers and businesses. [14]

[9] Nationally, 22% of TNC customers report using the service at least sometimes to get to/from bus or rail services; this use accounts for 10% of all trips made (rising to 15% in cities with strong transit corridors like San Francisco). Sources: Lyft. Economic Impact Report. Weblink; EDR Group. Uber's Economic Impact in the United States. Weblink; and EDR Group. Uber's Economic Impact in San Francisco. Weblink.

[10] APTA. Transit and TNC Partnerships. Weblink; New York Public Transit Association. Transit & TNCs. Weblink.

[11] Gindrat, Raphael. In a world of autonomous vehicles, this is why we'll need more public transport than ever. World Economic Forum. Weblink.

[12] APTA. Transformation of the American Commuter, pp.10-11, Weblink.

[13] Roberts, Adrien. "Driving? The Kids Are So Over It." Wall Street Journal, April 20, 2019, Weblink.

[14] APTA. Public Transit's Role in the Knowledge Economy. Weblink; APTA. The Role of Transit in Support of High Growth Business Clusters. Weblink.

- **Potential for the Future.** The convergence of the above trends was confirmed with national survey data and reported in the Shared Use Mobility Center's research study, which concluded that "The more people use shared modes, the more likely they are to use public transit, own fewer cars, and spend less on transportation overall."[15]

Bus Rapid Transit: Building a Resilient Spine

Defining BRT. The integrated transportation future is not yet here, but an important element of it – high performance, high frequency transit on key travel corridors – is now being implemented in the form of Bus Rapid Transit (BRT) in cities across America. The greater comfort, reliability, convenience and speed of BRT, enabled by its use of separate travel lanes with bus priority, has caused BRT lines to be implemented in over two dozen cities across America, including Pittsburgh (PA), Cleveland (OH), Richmond (VA), Hartford (CT), Minneapolis-St. Paul (MN), Albuquerque (NM) and Seattle (WA), as well as smaller cities like Ft. Collins (CO), Eugene (OR) and Stockton (CA).

Urban Redevelopment. A key aspect of BRT is that it supports redevelopment of higher density commercial corridors. This is possible because BRT provides high performance service that attracts and concentrates riders on key corridors with highly visible stations that signal permanence to developers and the community. The concentration of activity at these stations makes those locations more attractive for commercial development. A study from the University of Arizona confirmed that BRT corridors in cities across America are getting more real estate investment, higher commercial rents and more multi-family housing development than elsewhere in those metro areas.[16] The forms of development – more focused on walker-oriented commerce and multi-family housing – is also consistent with the lifestyle choices of millennials that have a greater focus on convenience, social options and non-car mobility than prior generations.[17] In the Omaha region, the ORBT has already started to influence development, including plans for new apartment buildings along the new BRT corridor.[18]

Better Futures. Of course, BRT does not automatically make new commercial development happen. BRT lines are being implemented in existing commercial corridors where there is already potential for new investment and higher density development. The implementation of BRT on these transportation spines supports the new development. As the new development tends to have a form of commerce and multi-family housing that is more transit oriented, it can also encourage further growth of transit ridership. This symbiotic relationship between transit and development depends on the confluence of supportive zoning, property markets and high-quality

15 APTA. Shared Mobility and The Transformation of Public Transit. Weblink.

16 Transportation for America. "New study finds positive economic development benefits associated with bus rapid transit projects." Weblink.

17 Florida, Richard. "Young People's Love of Cities Isn't a Passing Fad," City Lab. Weblink.

18 Gonzalez, Cindy. "Five-story apartment building to replace vacant furniture store near 72nd and Dodge," Omaha World Herald. August 10, 2019. Weblink; Gonzalez, Cindy. "Developer plans 8-story building with 278 apartments on Dodge, says UNMC is creating demand," Omaha World Herald. April 2, 2019. Weblink.

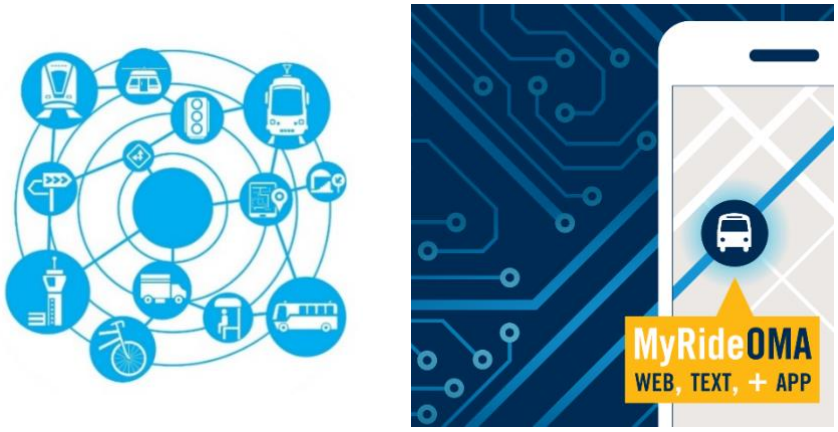
transit service. When all of these elements are in place to make it happen, it also provides a means for reducing sprawl and traffic growth.

Payoffs from Investing in the Transit Vision

The plan for improved transit with BRT on key corridors in the Omaha region follows a national trend, demonstrated by a recent national survey finding that 77% of the population and 82% of millennials see public transportation as the backbone of an enhanced set of mobility options.[19] By investing in this approach, the Omaha region can become more competitive against other urban areas in attracting new workers and business in high growth industries. This will be particularly important as the region needs to attract a body of more diverse and talented young professionals to support economic growth. As previously noted, only 17.6% of young professionals are currently satisfied with the availability of public transit in greater Omaha.[20]

Another reason for expecting the planned transit and land development vision to pay off, is its potential to provide a greater degree of success in affecting regional transportation conditions. There is clear evidence that those regions that have invested in expanding public transit to provide better frequency and reliability of service have in fact seen ridership gains that help reduce car use.[21,22] Moreover, introducing the technology of BRT services is also supportive of the movement towards a future with fully integrated transit and mobility services built around ride apps.

Figure 15: Moving Towards an Integrated Transit and Mobility Service Future



Source: MyRideOMA from Omaha Metro Transit.

[19] APTA. Transformation of the American Commuter. Weblink.

[20] Greater Omaha Chamber and the Urban League of Nebraska. Diversity and Talent Inclusion Study, May 2017, Table 5, p.26. Weblink.

[21] APTA. Understanding Recent Ridership Changes: Trends and Adaptations, 2018, see page 8. Weblink.

[22] Schmitt, Angie. "Only a Few American Cities Are Growing Transit Ridership – Here's What They're Doing Right." Streetsblog USA, 2018. Weblink.

Examples of BRT Implementation and Success in Other U.S. Cities

BRT has been successfully implemented in a variety of ways across the U.S., as shown in the examples below:

PITTSBURGH: The Martin Luther King, Jr. East Busway[23]

- 9.2 mile two-lane bus-only highway
- Opened in 1983, one of the first BRT systems in the United States
- 15 bus routes and more than 25,000 riders daily
- Traveling from Wilkinsburg to Downtown takes 15 minutes on the busway, compared to 53 minutes on local streets
- 2015 East Liberty Station Transit Oriented Development yielded 360 multifamily housing units, 43,000 sf of retail, and 142 full-time equivalent jobs
- Pittsburgh also has two other busways

Source: Port Authority of Allegheny County.[24]

CLEVELAND: The HealthLine[25]

- 7.1 mile corridor opened in 2008
- 4.4 miles of exclusive mid-street lanes and 2.7 miles in mixed traffic
- Connects Cleveland's two largest employment areas: Downtown and University Circle
- 10-minute frequency during peak travel periods; 10-15 minutes during off-peak
- Reduced corridor travel time from 46 minutes to 34 minutes
- $9.5 billion in development along the corridor
- Annual ridership increased about 60 percent over the Number 6 bus line, which it replaced

Source: Greater Cleveland Regional Transit Authority

MINNEAPOLIS-ST. PAUL: Bus Rapid Transit Projects[26]

- Planning a network of METRO BRT
- First opened in 2016: The A Line
  - 94% On-time performance (January 2018)
  - 25% faster than previous Route 84
  - Overall customer satisfaction above local bus, equal to LRT
  - 40% more rides per service hour than before BRT (more efficient and productive)

Source: Metro Transit

[23] Port Authority of Allegheny County. FY2014 Operating and Capital Improvement Budgets. Weblink; TCRP Report 90: Bus Rapid Transit, Volume 1: Case Studies in Bus Rapid Transit. Pittsburgh, Pennsylvania: South, East, and West Busways. Weblink; URA. East Liberty Transit Oriented Development. Weblink; Lotshaw, Stephanie. Profiles of American BRT: Pittsburgh's South Busway and East Busway. June 20, 2011. Streetsblog USA. Weblink.

[24] Port Authority of Allegheny County. The Economic Impact of The Port Authority Of Allegheny County. Figure 3.3. Weblink.

[25] Greater Cleveland Regional Transit Authority. RTA's HealthLine -- the world-class standard for BRT service. Weblinkv.

Returns from Strategic Transit Investments

Drivers of Economic Development Impacts

Providing better transit and achieving smarter growth in greater Omaha will support regional economic growth. Findings in the following sections were developed using outputs from MAPA's Regional Travel Demand Model, validated through benchmarking of transit performance against other regions nationwide, and the TREDIS® "Transportation Economic Development Impact System."[27]The results represent a difference in benefits and impacts between the scenario with better transit and smarter growth and the business-as-usual scenario with sprawl and no additional transit investments.

Economic development impacts result primarily from a more efficient transportation network, which reduces time and money spent on transportation, and better connects workers to businesses.

Labor Market Access

Better transit service can expand the effective size of the labor market from which businesses can attract workers. By enabling better matching between companies and workers, expanded transit service can improve business productivity and enable additional growth.

Vehicle Operating Costs

An enhanced and expanded transit network would allow people to take transit more frequently, thus saving money on vehicle operating costs. People can then spend these savings on other non-transportation expenditures. Improved transportation performance, therefore, leads to an increase in economic activity within industries supported by consumer spending.

Travel Time Savings

Similarly, transit services paired with smarter growth can relieve congestion on major corridors allowing commuters and freight deliveries to reach their destination faster and via more direct routes. These transportation performance changes save businesses money they would have spent on vehicles, fuel, worker time, and on paying employees a wage premium to compensate for high commute costs. Faster and more reliable freight deliveries additionally result in improved supply chain efficiencies that reduce logistics costs for those shipping and receiving goods.

[26] Metro Transit. Bus Rapid Transit projects. Weblink; Carlson, Charles. Rapid Bus Update. Metro Transit. TAC, May 2, 2018. Weblink.

[27] Inside TREDIS. Weblink.

Reliability Savings

Businesses can do many things with money they save. They may retain it as profit, improve competitiveness by reducing prices, or invest in workers, new equipment, and research and development efforts. Each choice by a business results, one way or another, in expanding economic activity and income.

The direct effects on cost savings and income growth for households and businesses also lead to increased regional competitiveness and business attraction. The additional income and spending in turn creates broader multiplier effects within the economy, as it supports further orders from business suppliers ("indirect effects') and re-spending of additional worker income ("induced effects"). All of these effects will further grow the region's economy.

Benefits to People

Under a scenario with better transit and smarter growth, as compared to business-as-usual scenario with sprawl and no additional transit investments, people in the Omaha region will benefit in a number of ways:

- **Shorter travel times** will mean that people have more time for other activities including work, spending time with family and friends, and education. Average network speeds are forecast to increase by 29%, shaving between three and four minutes off an "average" regional trip. Using valuations of travel time based on people's "willingness to pay" for time savings, this amounts to upwards of $1.3 billion in travel time savings for individual travelers in 2050.
- **More reliable trips** will allow people to reduce the "buffer" or "planning time" that they add to start a trip earlier to ensure on-time arrival. The value of these reliability savings for individuals is over $141 million by 2050.
- **Reducing travel costs** will increase individual and family disposable income, giving people more flexibility to spend resources on items such as housing, education, medical care, food, and recreation. In 2050, Omaha regional travelers could save $1.3 million in passenger vehicle fuel costs from associated with less stop-and-go driving conditions.

Personal benefits of transit translate directly into wide-ranging economic benefits. Savings in fuel costs directly affect the flow of money in the economy and change the pattern of demand for regional goods and services as expenditures are reallocated from fuel to other consumer goods. Travel time and reliability savings for personal travel are socially important but do not directly affect economic growth. However, savings for commute trips do affect businesses, due to their reflection in wage premiums paid by businesses to attract employees.

Benefits to Business

Investing in an enhanced BRT network in the Omaha region, coupled with successful encouragement of transit-supportive development along key corridors, can generate real benefits for Omaha area businesses. These include the following:

- **Crew cost savings** from truck drivers spending less time in traffic. In 2050, freight operators can save $85 million on labor costs.
- **Shipper and logistics cost savings** associated with the opportunity cost of having goods tied up in transit. When travel time and reliability improve for truck shipments, businesses can save on inventory carrying costs, can see improved fleet efficiency, and can potentially avoid costs from late deliveries that affect just-in-time operations. Nearly $70 million in costs savings of this type are forecast in 2050 due to improvements in network efficiency.
- **Additional fuel cost savings.** As is the case with passenger car travel, improvements in congestion on the network can lead to reductions in fuel costs for trucking, to the tune of just under $1 million annually by 2050.

Each of these costs savings enhances the competitiveness of regional businesses and contributes to economic growth. In addition to these direct savings, businesses will also benefit from improved labor market access, resulting in increased business productivity. Both direct cost savings to businesses and productivity effects are reflected in the economic impacts described in the following section.

Final Results: The Business Case for Transit

If the Omaha region chooses to invest in an enhanced BRT network and succeeds in encouraging development along designated transit corridors, the regional economy can add as many as 8,000 jobs and see an economic impact of $1.8 billion in added annual business revenue by 2050, relative to a business-as-usual base case (Figure 16). These economic development gains are driven by both direct cost savings for households and businesses and by improved productivity from expanded labor market access.

Figure 16: Economic Impact of Better Transit, Smarter Growth Scenario Compared to Business-As-Usual, in 2050

8,000
more jobs created

$750 million
in labor income earned in the region (annual)

$1.8 billion
in business revenue in the region (annual)

Source: Analysis Using outputs from MAPA's Regional Travel Demand Model, benchmarking of transit performance against other regions nationwide, and the TREDIS® "Transportation Economic Development Impact System."[28]

Outcomes in this report are driven by compact land development patterns and increased transit usage. Approximately 85 percent of the economic impact depicted in this report is associated with compact land development patterns, while the other 15 percent is based upon higher transit usage. In order to see either benefit, these two factors (land use decisions and transit ridership) must be addressed simultaneously. Higher-density land use requires higher frequency of transit routes; and higher frequency and ridership in transit routes requires higher density or compact development at each transit stop.

Both societal benefits and impacts on the economy accumulate over time. For illustrative purposes, the following figures assume the two BRT corridor projects are built in 10 years starting in 2020 and then accumulate benefits and associated impacts on the economy out to the year 2050. Benefits and economic impacts grow over time as a function of the region's population growth, the pace of transit-oriented land development, and the phasing of BRT construction (see Appendix for more detail):

- **Costs:** Based on construction costs of up to $10 million per mile[29] and estimated annual operations and maintenance costs of $11 million per year,[30] the discounted present value of BRT implementation costs from 2020 to 2050 would be $313 million (discounted at 7 percent). Actual costs may vary, depending on both the BRT configuration and timing.
- **Societal Benefits:** The net present value of BRT benefits is $715 million. With complementary land use, this could reach up to $2.8 billion. Actual benefits may vary, depending on both public and private investment and timing.
- **Cumulative Economic Impacts:** From 2020 to 2050, BRT combined with compact land development could generate up to $26 billion in business revenue in the Omaha regional economy. This is

28 Inside TREDIS. Weblink.

29 MAPA. Close the Gap: Analysis of Potential Transportation Corridors in the Omaha-Council Bluffs Metro Area. July 2018.

30 Derived from estimates developed by Metro as part of the Transit Development Plan.

equivalent to an average 1% increase in total regional output per year. As with the societal benefits, future results will depend on the effects and timing of both public transit investments and private development.

Even though costs and benefits may play out differently in the future from what is assumed here, there are likely to be significant benefits outweighing the costs of BRT.

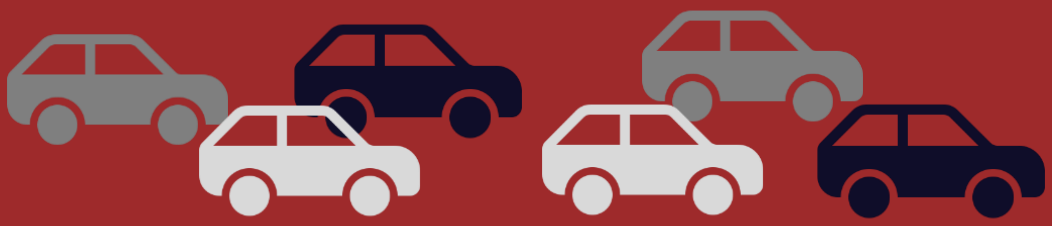
Given these findings, greater Omaha has two options going forward:

- **Without intentional action, congestion and access challenges will create a drag on the Omaha regional economy:** Without intervention, pressures from outward population growth with increase congestion and delay, further restricting labor market access and economic competitiveness.
- **Transit investments coupled with progress towards more compact land development can enable a more competitive future:** Investing in high frequency and rapid transit on key corridors, coupled with land use strategies to encourage compact development around transit, can reduce congestion, improve regional access, and help the Omaha region build a more attractive and competitive economy.

Figure 17: Omaha's Options Going Forward

BUSINESS AS USUAL

Erosion of quality of life and business competitiveness



OR

BETTER TRANSIT, SMARTER GROWTH

Progress towards accessibility & competitiveness goals.
Proactively mitigate burdens of growth.

TECHNICAL APPENDIX

Technical Appendix

I. Overview

The study, “Transit Return on Investment: Examining the Business Case for Transit in the Omaha Region” was carried out with a three-pronged methodology. This approach utilized three information sources: (1) public input, (2) regional economic modeling, and (3) benchmarking results achieved in other cities. This approach enabled the study team to achieve a more complete and robust analysis than would be possible if only one or two of the sources was used. The three sections that follow provide further information on the methods used for these three elements of analysis.

II. Study Process – Public Involvement

Public involvement served as an integral component of this study process. The primary goals of the public involvement approach was to a) establish a shared understanding of the definition and sources of return from transit investments that align with community values and; b) directly involve stakeholders who represent a diverse cross section of industries and major employers who are situated in locations throughout the metropolitan area, especially including areas outside of the urban core.

The public involvement process for this study begin in August 2018 and concluded in December 2019.

Key objectives for public involvement to support the study process included:

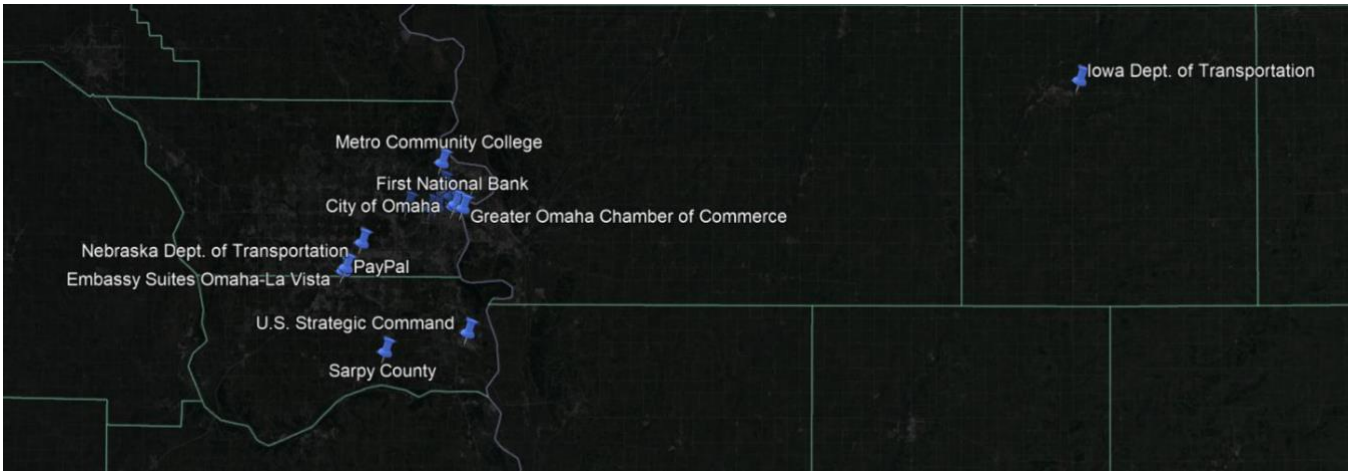
- Engage business leaders, policy makers, community development and transportation experts, major employers and multi-modal transportation end-users through the various levels of study process and public outreach effort.
- Demonstrate that stakeholder input and general public involvement initiatives will have a meaningful effect on the study’s approach to defining and quantifying transit return on investment.
- Encourage public policy decision makers to adopt a decision framework for planning and policy actions going forward that is driven by stakeholders’ understanding of a productive and valuable transit market.

Three major public involvement initiatives were used to achieve these goals and objectives.

- Twenty-one stakeholder interviews were conducted to help frame the nature of economic returns that could be generated by transit, as well help identify community values and determine priorities regarding the evolution of future transit and land use. The results of this initiative begin on page 9 of the final report.

- A stakeholder committee was formed that consisted of study process sponsors, public policy officials and representatives from key industries affected by transit. The stakeholders committee consisted of 20 members. The stakeholder committee met four times during the course of this study process.
- Transparent, inclusive open outreach and involvement with the general public. All stakeholder committee meetings were open to the general public. MAPA used social media posts such as Facebook events, Twitter and EventBrite, as well as traditional news media announcements to help the public track the study process.

Figure 1: Stakeholder Committee Member Locations



Source: JEO Consulting Group, Inc

The Stakeholder committee identified the following priorities and values which helped to guide the ROI study:

- Make the business case for transit
    - Understand how the Omaha metropolitan area is viewed for recruiting and retention purposes by national and international employee prospects
    - Identify the effect of transit on people's decisions to move
    - Identify the affect transit can have on wages
    - Demonstrate lost opportunities due to current transit infrastructure
    - Identify the pockets of under employed workers and the location of jobs unfulfilled due to a lack of transit
    - Business community must be the driving force for transit in this community
- Evaluate and compare the Omaha metro area with Midwestern and other peer cities
    - Understand the tipping point for other communities toward future investments in transit
    - Understand the effects of transit on private investment such as reduced parking lots and garages
    - Focus on attracting and retaining "knowledge workers" and not on exporting our young people to work in other communities

- Demonstrate how transit can reduce traffic congestion and reduce individual motor vehicle owner costs
    - Focus on building a transit system of the future
    - Address lifestyle needs as more people choose to be a one or a no car family.
    - Housing choices are affected by the availability of transit

III. Economic Analysis Methodology

The regional economic analysis element of the project involved four steps: (a) development of future scenarios, (b) validation of MAPA's regional travel demand model including transit ridership calculations, (c) application of a regional economic impact and benefit assessment model, and (d) discounted time series analysis to illustrate the present value of protentional benefits and impacts.

3.1 Performance Data Inputs: Alternative Scenarios

Economic benefits and impacts are evaluated based on the difference in transportation performance between the two:

1. *Business-as-usual:* Characterized by continued sprawling land development and no further investment in transit beyond the existing and committed network.
2. *Better transit; smarter growth:* Under this scenario, two high-quality BRT corridors support denser patterns of development in transit-accessible locations along the Omaha/Bellevue North-South Spine (30th-24th-Fort Cook) as well as the 72nd and 84th Street Spine.

Each scenario was analyzed by MAPA staff using the MAPA Regional Travel Demand Model (TDM). Changes in land development were represented through the allocation of population and employment in traffic analysis zones across the region. The transit network and performance were also coded into the model.

3.2 Benchmarking Validation

Results from the TDM were validated through benchmarking of transit ridership against other against prior transit studies in the region and against outcomes in other regions nationwide, as shown in **Error! Reference source not found.**. As can be seen in the table, the expected increment in daily transit ridership from the MAPA TDM is validated by the range of forecasts in the Close the Gap analysis as well as by estimated elasticities of ridership based on other regional experiences with transit and land development (documented in Appendix Section **Error! Reference source not found.**).

Table 1: Benchmarking of Forecast Daily Increase in Ridership by BRT Implementation

Forecast by the MAPA TDM:

+ 20,666 daily transit riders

Based on Scenarios in *Close the Gap:*

Forecast daily ridership:

By Corridor:	*Mod-TOD*	*High-TOD*
Omaha/Bellevue N-S Spine: 30th-24th-Fort Crook	10,900	16,600
72nd & 84th Street Spine	4,400	8,700
TOTAL	*15,300*	*25,300*

Source: Close the Gap: Analysis of Potential Transportation Corridors in the Omaha-Council Bluffs Metro Area. (Page 25)

Derived from Elasticities of Transit Ridership to Service Improvements and Land Development:

Forecast percent increase in transit ridership:

Improvement	*Expected Outcome*
Transition to BRT "Light"	+33%
Transition to Full BRT	+60%
Better Land Use and Service Coverage	+11%

Source: Benchmarking Analysis by Metro Analytics.

Applied to MAPA baseline conditions:

From improvements to existing corridors:

2045 Sprawl Base Transit Ridership	*BRT Light*	*Full BRT*
24,952	33,186	39,923
Difference	*8,234*	*14,971*

Source: EBP Analysis, Using Inputs from Benchmarking Analysis by Metro Analytics.

From improvement in transit service coverage and supportive land use:

Additional Increment	*BRT Light*	*Full BRT*
11%	36,708	44,160
Difference	*11,756*	*19,208*

Source: EBP Analysis, Using Inputs from Benchmarking Analysis by Metro Analytics.

Transit trip characteristics were also reviewed relative to expected outcomes based on experience in other regions and current transit performance in Omaha. This resulted in some post-processing adjustments, specifically:

- Adjustments to transit out-of-vehicle times (access, wait, and egress) to better match the anticipated service characteristics of the BRT improvement scenario
- Adjustments to transit in-vehicle speeds to be no less than 40 percent that of automobile speeds – based on current transit performance in Omaha

- Adjustments to average transit trip distances to account for the proportionally shorter trips served by transit relative to driving
- Definition of an expected BRT speed premium above standard bus speeds of 36%[31]

3.3 TREDIS® "Transportation Economic Development Impact System"

To estimate the societal benefits and economic impacts of the better transit, smarter growth scenario, this study utilized TREDIS, the "Transportation Economic Development Impact System".[32] TREDIS translates transportation performance measures (such as vehicle miles, vehicle hours, trips, and other measures) into societal benefits and industry-specific responses to transportation cost savings and market access improvements.

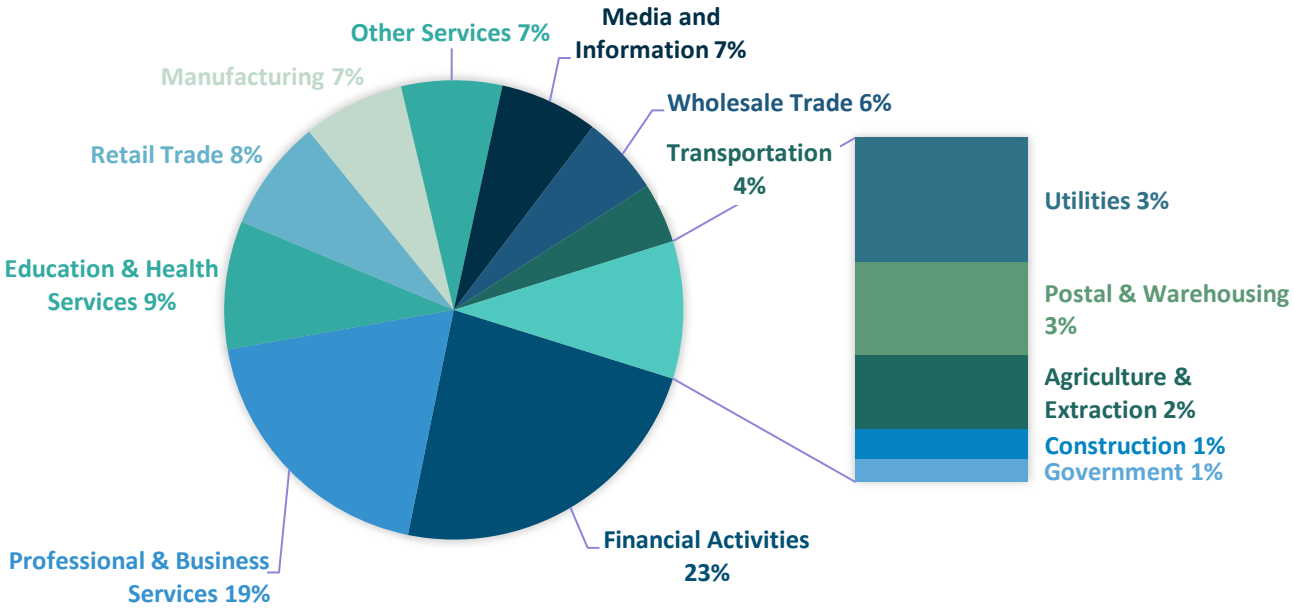
TREDIS's incorporates a dynamic, multi-regional economic-demographic model to estimate impacts on employment and income growth over time. The model accounts for changes in productivity, capital investment, labor supply and demand, employment and wage shifts, and population migration. It builds upon inter-industry buy/sell relationships and inter-regional trade flows from IMPLAN, demographic and economic model forecasts from Moody's, geospatial data from Esri and employment data from US Bureau of Economic Analysis (BEA). It incorporates economic geography and econometric response factors to represent industry responses to changes in relative costs and scale of market access, as documented in peer reviewed publications. TREDIS is the most widely used system for economic analysis of transportation projects in the United States and Canada and is now also being used in Australia.

Error! Reference source not found. illustrates the TREDIS model results in terms of the distribution of business revenue impacts by major industry group in 2050. The industries with the greatest impacts from transit investment and supportive land use in the scenario analyzed are Financial Activities, Professional and Business Services, Education and Health Services, Retail Trade, and Manufacturing.

[31] Derived from: TCRP Report 90 – Bus Rapid Transit, Volume 1: Case Studies in Bus Rapid Transit. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_90v1c2.pdf

[32] https://tredis.com/products/product-overview/inside-tredis

Figure 2: Business Revenue Impacts in 2050 by Major Industry Group



Source: Analysis using outputs from MAPA's Regional Travel Demand Model for the year 2050, benchmarking of transit performance against other regions nationwide, and the TREDIS® "Transportation Economic Development Impact System."

3.4 Time Series Evaluation of Benefits, Costs, and Economic Impacts

The following tables represent the specific timing assumptions used to generate the return on investment results in the report.

Table 2: Phasing Assumptions

Phase	Year	Discount (7%) [1]	Growth [2]	Transit Phasing [3]	Development Phasing [4]
Build	***2020***	***1.00***	***0.77***	***0***	***0***
Build	***2021***	***0.93***	***0.78***	***0***	***0.03***
Build	***2022***	***0.87***	***0.78***	***0***	***0.07***
Build	***2023***	***0.82***	***0.79***	***0***	***0.10***
Build	***2024***	***0.76***	***0.80***	***0***	***0.13***
Build	***2025***	***0.71***	***0.80***	***0.5***	***0.17***
Build	***2026***	***0.67***	***0.81***	***0.5***	***0.20***
Build	***2027***	***0.62***	***0.82***	***0.5***	***0.23***
Build	***2028***	***0.58***	***0.82***	***0.5***	***0.27***
Build	***2029***	***0.54***	***0.83***	***0.5***	***0.30***
Operations	***2030***	***0.51***	***0.84***	***1***	***0.33***
Operations	***2031***	***0.48***	***0.85***	***1***	***0.37***
Operations	***2032***	***0.44***	***0.85***	***1***	***0.40***
Operations	***2033***	***0.41***	***0.86***	***1***	***0.43***
Operations	***2034***	***0.39***	***0.87***	***1***	***0.47***
Operations	***2035***	***0.36***	***0.88***	***1***	***0.50***
Operations	***2036***	***0.34***	***0.88***	***1***	***0.53***
Operations	***2037***	***0.32***	***0.89***	***1***	***0.57***
Operations	***2038***	***0.30***	***0.90***	***1***	***0.60***
Operations	***2039***	***0.28***	***0.91***	***1***	***0.63***
Operations	***2040***	***0.26***	***0.92***	***1***	***0.67***
Operations	***2041***	***0.24***	***0.92***	***1***	***0.70***
Operations	***2042***	***0.23***	***0.93***	***1***	***0.73***
Operations	***2043***	***0.21***	***0.94***	***1***	***0.77***
Operations	***2044***	***0.20***	***0.95***	***1***	***0.80***
Operations	***2045***	***0.18***	***0.96***	***1***	***0.83***
Operations	***2046***	***0.17***	***0.97***	***1***	***0.87***
Operations	***2047***	***0.16***	***0.97***	***1***	***0.90***
Operations	***2048***	***0.15***	***0.98***	***1***	***0.93***
Operations	***2049***	***0.14***	***0.99***	***1***	***0.97***
Operations	***2050***	***0.13***	***1.00***	***1***	***1.00***

Notes: (1) Discount rate 7% per USDOT Guidelines for Benefit-Cost Analyses. (2) Growth derived from population forecasts in Heartland 2050. (3) Transit phasing assumes a 10-year construction period with one corridor completed before the other, resulting in approximately half of the system being operational before the other. (4) Transition to transit-oriented development patterns phased in linearly between now and the 2050 model year.

Table 3: Project Costs (in Millions)

Year	Capital Costs	O&M	Total Costs	Discounted Costs (7%)
2020	**$30**	**$0**	**$30**	**$30**
2021	**$30**	**$0**	**$30**	**$28**
2022	**$30**	**$0**	**$30**	**$27**
2023	**$30**	**$0**	**$30**	**$25**
2024	**$30**	**$0**	**$30**	**$23**
2025	**$30**	**$6**	**$36**	**$26**
2026	**$30**	**$6**	**$36**	**$24**
2027	**$30**	**$6**	**$36**	**$22**
2028	**$30**	**$6**	**$36**	**$21**
2029	**$30**	**$6**	**$36**	**$20**
2030	**$0**	**$11**	**$11**	**$6**
2031	**$0**	**$11**	**$11**	**$5**
2032	**$0**	**$11**	**$11**	**$5**
2033	**$0**	**$11**	**$11**	**$5**
2034	**$0**	**$11**	**$11**	**$4**
2035	**$0**	**$11**	**$11**	**$4**
2036	**$0**	**$11**	**$11**	**$4**
2037	**$0**	**$11**	**$11**	**$4**
2038	**$0**	**$11**	**$11**	**$3**
2039	**$0**	**$11**	**$11**	**$3**
2040	**$0**	**$11**	**$11**	**$3**
2041	**$0**	**$11**	**$11**	**$3**
2042	**$0**	**$11**	**$11**	**$3**
2043	**$0**	**$11**	**$11**	**$2**
2044	**$0**	**$11**	**$11**	**$2**
2045	**$0**	**$11**	**$11**	**$2**
2046	**$0**	**$11**	**$11**	**$2**
2047	**$0**	**$11**	**$11**	**$2**
2048	**$0**	**$11**	**$11**	**$2**
2049	**$0**	**$11**	**$11**	**$2**
2050	**$0**	**$11**	**$11**	**$1**
TOTAL	*$304*	*$265*	*$569*	*$313*

Notes: Construction costs of $10 million per mile based on MAPA. Close the Gap: Analysis of Potential Transportation Corridors in the Omaha-Council Bluffs Metro Area. July 2018. Annual operations and maintenance costs of $11 million per year derived from estimates developed by Metro as part of the Transit Development Plan.

Table 4: Societal Benefits from Transit and Land Development (in Millions)

	Undiscounted Benefits			Discounted Benefits		
Year	From Transit	From Land Development	TOTAL	From Transit	From Land Development	TOTAL
2020	$0	$0	$0	$0	$0	$0
2021	$0	$0	$0	$0	$0	$0
2022	$0	$0	$0	$0	$0	$0
2023	$0	$0	$0	$0	$0	$0
2024	$0	$0	$0	$0	$0	$0
2025	$44	$41	$85	$31	$29	$61
2026	$44	$50	$94	$29	$33	$63
2027	$44	$59	$103	$28	$37	$64
2028	$45	$68	$113	$26	$39	$66
2029	$45	$77	$122	$25	$42	$66
2030	$91	$173	$264	$46	$88	$134
2031	$92	$191	$284	$44	$91	$135
2032	$93	$211	$304	$41	$94	$135
2033	$94	$230	$324	$39	$96	$134
2034	$95	$250	$345	$37	$97	$134
2035	$95	$270	$366	$35	$98	$133
2036	$96	$291	$387	$33	$99	$131
2037	$97	$312	$409	$31	$99	$129
2038	$98	$333	$431	$29	$99	$128
2039	$99	$355	$454	$27	$98	$125
2040	$100	$377	$476	$26	$97	$123
2041	$101	$399	$500	$24	$96	$121
2042	$101	$422	$523	$23	$95	$118
2043	$102	$445	$547	$22	$94	$115
2044	$103	$468	$571	$20	$92	$113
2045	$104	$492	$596	$19	$91	$110
2046	$105	$516	$621	$18	$89	$107
2047	$106	$541	$647	$17	$87	$104
2048	$107	$566	$673	$16	$85	$101
2049	$108	$591	$699	$15	$83	$98
2050	$109	$617	$726	$14	$81	$95
TOTAL	*$2,319*	*$8,343*	*$10,663*	*$715*	*$2,128*	*$2,843*

Notes: Analysis using outputs from MAPA's Regional Travel Demand Model for the year 2050, benchmarking of transit performance against other regions nationwide, and the TREDIS® "Transportation Economic Development Impact System."

Table 5: Economic Impacts from Transit and Land Development – Business Revenue (in Millions)

Year	From Transit	From Land Development	Total
2020	**$0**	**$0**	**$0**
2021	**$0**	**$0**	**$0**
2022	**$0**	**$0**	**$0**
2023	**$0**	**$0**	**$0**
2024	**$0**	**$0**	**$0**
2025	**$106**	**$100**	**$206**
2026	**$107**	**$121**	**$228**
2027	**$108**	**$142**	**$250**
2028	**$109**	**$164**	**$273**
2029	**$110**	**$186**	**$296**
2030	**$221**	**$418**	**$639**
2031	**$223**	**$463**	**$686**
2032	**$225**	**$510**	**$735**
2033	**$227**	**$557**	**$784**
2034	**$229**	**$605**	**$834**
2035	**$231**	**$654**	**$885**
2036	**$233**	**$704**	**$937**
2037	**$235**	**$755**	**$990**
2038	**$237**	**$806**	**$1,043**
2039	**$239**	**$858**	**$1,098**
2040	**$241**	**$912**	**$1,153**
2041	**$243**	**$966**	**$1,209**
2042	**$246**	**$1,020**	**$1,266**
2043	**$248**	**$1,076**	**$1,324**
2044	**$250**	**$1,133**	**$1,383**
2045	**$252**	**$1,191**	**$1,443**
2046	**$254**	**$1,249**	**$1,503**
2047	**$257**	**$1,308**	**$1,565**
2048	**$259**	**$1,369**	**$1,628**
2049	**$261**	**$1,430**	**$1,691**
2050	**$263**	**$1,493**	**$1,756**
TOTAL	*$5,613*	*$20,191*	*$25,804*

Notes: Analysis using outputs from MAPA's Regional Travel Demand Model for the year 2050, benchmarking of transit performance against other regions nationwide, and the TREDIS® "Transportation Economic Development Impact System."

IV. Benchmarking Approach and Findings

This section of the appendix outlines the benchmarking approach and findings developed by Metro Analytics in support of the MAPA Transit ROI Study.

4.1 Ridership Responses to Improved Quality of Bus Service to BRT-Lite or BRT

The purpose of this section is to articulate reasonably expected ridership differences from improved transit, quality, specifically BRT. This section memo defines BRT, contrasts it with express bus and BRT-lite. Examples of ridership difference between different systems are then presented. A system based on express buses, consisting only of increasing stop spacing, would likely enjoy an 8 percent increase in ridership. A system based on increasing route quality to what the Federal Transit Administration refers to as 'BRT-lite' or 'corridor BRT' would enjoy a 33-35 percent increase in ridership. A system based on Bus Rapid Transit, with separated guideway except at intersections, could be expected to enjoy a 60 percent increase in ridership. These numbers represent generalizations of corridor specific performance to the general metropolitan area.

4.1.1 Definitions

Bus, express bus, BRT-lite and BRT can all be considered steps in a progression of incremental investment a transit line, gradually increasing the capacity, performance, and reliability. The fundamental goal of these improvements is to reduce the amount of time spent not moving and increase the average speed while moving. The different steps are characterized based on the following factors:

- Right of Way
- Station Spacing
- Vehicle Characteristics
- Service Characteristics/Headway
- Intelligent Transportation Systems Elements

Full BRT is characterized by semi-rapid guideway: barrier separated except at intersections, with limited sections of mixed traffic operations. BRT stations are substantial structures with passenger amenities such as seating, off-board fare vending, trashcans, and informational posters. BRT stations are typically capable of supporting level boarding for non-low floor vehicles. BRT vehicles may be regular or articulated vehicles with distinct appearance, either low-floor or platform-height boarding, and multiple door boarding. Service consists of regular headway throughout the day, and reliability, ideally maintained through the use of Intelligent

Transportation System (ITS) features. Deriving full benefit from BRT depends on implementation of these characteristics.[33]

Express buses consist typically consist of long-distances routes with widely spaced stops, characterized by high speeds and comfortable travel. Express buses typically operate in mixed traffic conditions, with minimal semi-rapid guideway. Examples include on-highway buses operating in bus-only lanes for part of the route, but as a regular bus in mixed traffic within the central city. Many express buses provide only commuter service, operating for a limited number of hours each day. For the purposes of comparability, a non-commuter express bus is presumed. For the purposes of funding, the Federal Transit Agency has defined systems with more than 51% dedicated (semi-rapid) guideway as BRT, and bus routes sufficiently meeting the other BRT standards as 'BRT-lite'. For the purpose of selecting example cases, this was considered to be equivalent to an express bus. The characteristics of such a bus are anticipated as follows: running in mixed traffic, but with limited stops and ITS features such as queue-jumps.[34]

4.1.2 Comparison

This section compares bus to express bus conversations to bus to BRT conversions.

Express Bus/BRT-lite

- *King County, Washington Rapid Ride* – Bus to BRT-lite conversation across 6 corridors, with most BRT elements excepting right of way included. Estimated average increase in ridership was 35% greater than a conventional bus.
- *Utah Transit Authority's MAX (Salt Lake County)* – The MAX bus corridor stretches about 9 miles (including a small loop) from a light rail station to Magna, a historic minor town increasingly integrated in the commuter-shed, to the 3300 light rail station. Less than half of the line is dedicated (semi-rapid) guideway, all located in the western half of the alignment, where traffic congestion is minimal. The right-of-way includes sections of exclusive guideway, dedicated lanes, and mixed traffic operations. It began operations in 2008 and could be considered either an express bus or a low-grade BRT. Total investment was $7 million.[35] In addition to the MAX (signed 35M), UTA still operates a non-express route on an almost identical alignment, Route #35. Route 35 has an average weekday ridership of 822; the MAX has an average weekday ridership of 1,780, more than double the non-express route. Ridership on the MAX is 33% higher than the preceding bus route.[36]

[33] Vuchic, V. R. (2017). Urban transit: operations, planning, and economics. John Wiley & Sons.
[34] https://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1048&context=jpt
[35] https://www.deseret.com/2008/5/25/20254440/bus-rapid-transit-coming-soon-to-3500-south
[36] https://www.researchgate.net/publication/247835433_35M_MAX_The_first_bus_rapid_transit_system_in_Salt_Lake_County

- *Los Angeles Metro Rapid* – Multiple corridor upgrade of bus routes to BRT-lite standards. Demonstration projects included frequent service, limited stops, substantial stations with level boarding, and branded vehicles. Bus signal priority was included as an ITS feature[37]. The Wilshire corridor experienced a 42% increase in ridership, from 64,500 trips to 90,300 trips, while the Ventura corridor experienced a 27% increase.
- *Twin Cities Snelling Avenue Arterial Bus Rapid Transit* – A bus to BRT-lite conversion. Mixed traffic operations, with wider station spacing, and special vehicles. Off-board fare purchase combined with multiple door boarding and level boarding, along with enhanced service characteristics and ITS elements (Transit Signal Priority & NexTrip data from automatic vehicle locators)[38]. Ridership increased by a third.[39]

BRT

- *Las Vegas MAX* – Bus replaced by FTA-standard BRT, along a 7.5 mile corridor between Nellis Air Force Base and the downtown transit center, with 4.5 miles of dedicated guideway. It represented a higher quality alternative to route 113, with which it shares dedicated guideway. The MAX was distinct largely in terms of distinctive vehicles and ITS elements. Over time, the MAX resulted in a 25% increase in corridor ridership over prior conditions.
- *Hartford/New Britain Connecticut CTFastrack* – Bus to FTA-standard BRT conversation. A 9.4 mile BRT system built for $550 million. Increase in ridership from 9,000 riders a day to 12,000 riders a day, a 33% increase. Hartford had a 2019 population of about 123,000.
- *Cleveland Healthline* – A 10-mile corridor opened in 2008, bus to FTA-standard BRT conversion, costing $200 million, resulting in a ridership of 14,200 rides per day, compared to 8,900 rides per day for the previous bus service, a 60% increase.[40]
- *Eugene, Oregon 'Emerald Express'* – Bus to FTA-standard BRT conversion in a small metropolitan area, increasing ridership by 74%, from 2,700 to 4,700 daily riders.
- *Utah Transit Authority's UVX (Provo-Orem)* – The UVX line stretches about 10.5 miles from a commuter rail station is Orem, Utah to a commuter rail station in Provo, Utah. Along the way it passes two major universities, a major transit center, an historic downtown, and an enclosed shopping mall, and has 51% guideway. The non-express bus route it replaced (route 830) averaged about 1500 boardings per day; other buses raised the total along the BRT route to about 2,400.[41] In contrast the BRT now averages 9,400 boardings per day, about four times as many as previous buses. Fares were made free to

37 http://media.metro.net/projects_studies/rapid/images/demonstration_program_report.pdf
38 https://www.metrotransit.org/a-line
39 http://www.dot.state.mn.us/research/reports/2018/201835.pdf
40 https://usa.streetsblog.org/2018/11/05/checking-in-on-americas-pioneering-bus-rapid-transit-systems/
41 http://mrc.cap.utah.edu/wp-content/uploads/sites/8/2015/09/PORT_InitialConditions_FINAL_June13.pdf

students for the first three years of operation. When UTA experimented with free-fare, system-wide, it raised ridership by 23%[42], so perhaps of quarter of the increase can be attributed to the free fare.

4.1.3 Summary & Conclusions

Based on the example presented, professional judgement suggests that an express bus at the FTA BRT-lite standard offers about a 33% increase in ridership, assuming increases in station spacing, special vehicles capable of level boarding, operating at a 15-minute headway for extended operating hours and enjoying ITS elements. The comparison case of the Las Vegas MAX and Las Vegas Route 113 implies that these elements provide a 25% increase. Hence, failure to include the elements, and simply operating regular buses with more limited stops would likely generate a much smaller increase, in the range of 8% or so. In contrast, many bus-to-BRT conversions demonstrate larger percentage increases even in smaller cities: Eugene increased ridership by 74%, and the Provo-Orem corridor, all else equal, has likely tripled ridership. Combined, this suggests that a scenario replacing BRT-lite with actual BRT would enjoy about twice that of BRT-lite, with ridership increases of 60% possible.

4.2 Influence of Transit Service Coverage and Land Development on Performance

In order to benchmark outputs from the MAPA TDM, this analysis applied equations from published peer reviewed research to estimate changes in transportation performance characteristics and mode share between scenarios, as a result of improved transit service coverage and increases in transit-oriented development.
The framework of analysis used is based on decades of research into the transportation-land use connection on how travel and the build environment interact. The strong connection between travel demand and the built environment is well documented in the academic literature[43], including literature reviews[44,45] and meta-analyses[46]. Following the pattern established by Cervero and Kockelman[47] the built environment constructs

[42] https://www.deseret.com/2018/1/17/20638388/uta-reports-23-increase-in-ridership-on-free-fare-fridaya

[43] Renne, J. L., Hamidi, S., & Ewing, R. (2017). Transit commuting, the network accessibility effect, and the built environment in station areas across the United States. *Research in Transportation Economics*, 1–9. https://doi.org/10.1016/j.retrec.2017.02.003

[44] Cao, X. (Jason), Mokhtarian, P. L., & Handy, S. L. (2009). Examining the impacts of residential self selection on travel behaviour: A focus on empirical findings. *Transport Reviews*, *29*(3), 359–395. https://doi.org/10.1080/01441640802539195

[45] Ewing, R., & Cervero, R. (2001). Travel and the built environment: a synthesis. *Transportation Research Record*, *1780*(Paper No. 01-3515), 87–114. https://doi.org/10.3141/1780-10

[46] Ewing, R., & Cervero, R. (2010). Travel and the built environment: A Meta-Analysis. *Journal of the American Planning Association*, *76*(3), 265–294. https://doi.org/10.3141/1780-10

[47] Cervero, Robert; Kockelman, K. (1997). Travel Demand the 3D's: Density, Diversity and Design. *Transportation Research Part D: Transport and Environment*, *2*(3), 199–219. https://doi.org/10.1016/S1361-9209(97)00009-6

related to travel behavior are given names beginning with 'D'. The first three constructs were density, diversity and design, followed by destination accessibility and distance to Transit[48].

4.2.1 How the D-variables Affect Travel Behavior

Density. Research going back decades[49] documents that density affects travel behavior. People living in denser environments drive less. This reflects both the demand for, and supply of, road capacity. Having more things closer by means less driving is needed to get to them. Analysis at regional[50] and local scales have demonstrated the effect[51]. At the same time, higher densities make the use of other modes both more feasible and more attractive—travel distances are shorter, and more things can be accessed with the same distance.

Diversity. The effects of mixed uses ('Diversity') has also been recognized to affect travel behavior[52]. Spatial interaction theory suggests that interaction increases with proximity[53]. Fundamentally, putting residential and employment uses in proximity increases the chance that commuting (home-based work trips) will be made by non-automotive modes. It also increases the potential for someone to 'park once' within a district, and walk between destinations in proximity, in much the same way that multiple destinations are visited after driving to a single shopping center.

Design. The characteristics of the street network ('Design') also affect travel behavior. Walking and cycling are much slower than automobiles, especially over longer distances. Consequently, the primary characteristic affecting travel time between destinations is path length (rather than speed limit or intersection delay), and the directness of that path is important. Routes with minimal out of direction travel are strongly preferred. Hence, pedestrian-friendly environments are characterized by a fine-grain street network with small block sizes and/or with a larger number of four-way intersections, enabling direct travel. This pattern characterizes most cities platted prior to automobility.[54] In contrast, many suburban street networks are designed to inhibit pass-through automobile traffic by being as indirect as possible.

Distance to Transit. Riders can't take a train that doesn't exist and can't take a bus that doesn't come. Hence, proximity to transit is an important characteristic in the propensity to use transit. Unlike walking or driving, transit

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[48] Transportation Research Board. (2014). TCRP 167: Making Effective Fixed-Guideway Transit Investments, Indicators of Sucess. In TCRP. https://doi.org/10.17226/22355

[49] Newman, P. G., & Kenworthy, J. R. (1989). *Cities and automobile dependence: An international sourcebook*.

[50] Ewing, R., Hamidi, S., Gallivan, F., Nelson, A. C., & Grace, J. B. (2014). Structural equation models of VMT growth in US urbanised areas. Urban Studies, 51(14), 3079–3096. https://doi.org/10.1177/0042098013516521

[51] Ewing, R., Tian, G., Lyons, T., & Terzano, K. (2017). Trip and parking generation at transit-oriented developments: Five US case studies. *Landscape and Urban Planning*, *160*, 69-78.

[52] Ewing, R., Tian, G., Lyons, T., & Terzano, K. (2017). Trip and parking generation at transit-oriented developments: Five US case studies. *Landscape and Urban Planning*, *160*, 69-78.

[53] Miller, H. J. (2004). Tobler's first law and spatial analysis. *Annals of the Association of American Geographers*, *94*(2), 284-289.

[54] Tian, G., & Ewing, R. (2017). A walk trip generation model for Portland, OR. *Transportation Research Part D: Transport and Environment*, *52*, 340-353.

trips require an access mode to reach a transit node (a stop or station). Both the proximity and abundance of transit predict transit use. Nearby households use transit more than far ones, and the count of bus stops is an important predictor of transit use[55].

Destination Accessibility refers to proximity to jobs. Jobs can represent either employment opportunities, or goods and services available. The greater the number of things available nearby, the less travel necessary. At a central location, travel in any location makes things accessible. In a peripheral location (for example, on the western edge of a large town), things are available only in one direction of travel, and reaching additional things requires additional minutes (and miles) of travel. Research shows that the magnitude of effect of this variable often dwarfs that of other D-variables[56].

This analysis does not consider demographics. The socio-economic characteristics of the scenarios are considered fixed. In reality, the D-variables affect vehicle ownership, which affects vehicle use, further affecting VMT and mode shares. Hence, this analysis likely under-represents the combined effects of the D-variables on travel behavior. Nor is demand management considered. Policies to constrain automobile usage were not part of this analysis.

4.2.2 Methodology

We applied the D-variable elasticities documented in the meta-analysis of D-variables[57]. An elasticity is a measure of the percentage change in one variable to the percentage change in another variable.

First, we estimated changes in travel behavior reasonably expected to occur in Omaha over the forecast period, regardless of the scenario. A 50% increase in population/employment while holding area constant significantly increases density in the region. Second, we applied elasticities to the scenarios, using weighted means of changes in population and employment density. Weighted means better reflect the changes in density experienced within Traffic Analysis Zones (TAZ) by the population of the zone, and hence the effects on travel behavior.

The Metropolitan Area Planning Agency (MAPA). Traffic Analysis Zone (TAZ) data supplied the density inputs. For other variables for which we lacked the ability to predict changes (such as number of four-way intersections), elasticities were derived based on density. It was presumed that as density changed, other built environments characteristics would change accordingly. Differences are based on correlations between changes in density and transit availability in analysis from five metro areas in the US: Austin, Boston, Houston,

[55] Tian, G., Park, K., & Ewing, R. (2019). Trip and parking generation rates for different housing types: Effects of compact development. *Urban Studies*, *56*(8), 1554-1575.

[56] Ewing, R., & Cervero, R. (2010). Travel and the built environment: A Meta-Analysis. *Journal of the American Planning Association*, *76*(3), 265–294. https://doi.org/10.3141/1780-10

[57] Ewing, R., & Cervero, R. (2010). Travel and the built environment: A Meta-Analysis. *Journal of the American Planning Association*, *76*(3), 265–294. https://doi.org/10.3141/1780-10

Portland, and Sacramento. This was applied to ten different variables to generate estimates of changes in the number of person trips by mode.

Trip times and trip distances were averages drawn from the five-region database and the National Household Travel Survey (NHTS), and then modified using the elasticities documented in the meta-analysis database.