LINCOLN TRANSIT DEVELOPMENT PLAN

Final Report

DRAFT

November 2015

NELSON
NYGAARD

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STARTRAN GUIDING PRINCIPALS

Mission Statement:

To provide a customer focused, forward thinking public transportation system for the good of the Lincoln community.

Vision:

StarTran will be an exemplary agency on the local, regional, and national level.

Values:

Safety – Safety is not just a passing thought but is part of the culture of StarTran. We think first about safety in everything we do.

Reliability – We are committed to continuous improvement in the area of on-time performance.

Convenience – The people of Lincoln depend on us to get them where they need to go in a quick efficient manner.

Customer Focused – We exist because of our customers. We strive to meet their expectations and exceed them.

Teamwork – We understand that each employee is an important piece of the puzzle.

Forward Thinking – We strive to implement appropriate technologies and services that are innovative, efficient, and equitable.

Sustainable – We have respect for the world in which we live and strive to implement practices that are environmentally friendly and have a positive impact on future generations.

Table of Contents

Table of Figures

1 EXECUTIVE SUMMARY

INTRODUCTION

StarTran is a division of the City of Lincoln that provides fixed-route bus service within city limits. The current bus network can be characterized a hub-and-spoke or radial system, in which all routes radiate from a single point. The primary hub for StarTran's fifteen regular routes is a two-block on-street transfer point along 11th Street and N Street in downtown Lincoln. StarTran also operates four routes connecting University of Nebraska campuses and a downtown circulator route.

Route alignments within three miles of downtown have remained virtually unchanged for decades, tracing their origins to Lincoln's streetcar alignments of the early 20th century. In contrast, route alignments beyond three miles of downtown have been extended or deviated over time in response to fringe development and major ridership generators, resulting in several large terminal loops. While the indirect and non-intuitive nature of several StarTran routes negatively impacts customer convenience, the primary deficiencies in the StarTran system are its limited service span (hours of operation) and lack of frequent service. Despite these deficiencies and minimal increases in service, StarTran ridership has grown steadily since 2011, indicating increased demand for service.

StarTran ridership gains can be attributed to several factors. Since 2000, Lincoln's population has diversified significantly and continues to grow at a rate of 3,000 persons per year. A growing number of baby boomers are considering transit as an alternative to driving as they age. Millennials are more likely to view transit as a viable transportation option than older generations. Infill development and fringe development is occurring in all quadrants of the city, resulting in new employment opportunities and expanding transportation patterns. As these changes continue to occur, the availability of convenient and reliable transit options becomes increasingly important for the City of Lincoln.

PLAN DEVELOPMENT

In January 2015, StarTran launched the Transit Development Plan effort to determine the best approach for improving and expanding transit service in Lincoln. StarTran planning and operations staff was closely involved throughout the development of the TDP. The following summaries include major tasks and identify key findings for each phase of the planning process.

Comprehensive Service Evaluation

The initial phase of the study included a comprehensive evaluation of the entire transit system and service area. Socio-economic and demographic characteristics of Lincoln were analyzed to identify concentrations of high transit demand. Employment densities and commute patterns were examined. Ridership was evaluated at the route, segment, and bus stop level to identify opportunities to add or reduce transit service based on demand. Schedule reliability was also assessed for each trip. The evaluation process also included extensive field work in which the alignment of each bus route was reviewed.

A number of important findings came from the comprehensive service evaluation process, including:

- The 7 p.m. end time of most StarTran routes does not accommodate second shift employees or students attending evening classes.
- The current radial system design and lack of crosstown service forces customers to travel in indirect patterns to reach their destinations.
- Large terminal loops on several routes force passengers beginning or ending their trip near the end of a route to "ride around" in one direction.
- The limited on-street bus capacity at Gold's forces StarTran to stagger departure times.
- Several routes (Routes 44, 51, 52, and 53) operate at irregular headways during the weekday off-peak period, thereby preventing timed connections with other routes.
- On-time performance (OTP) is poor on several routes. A high percentage of early departures are common for most routes.

Community Engagement

An extensive outreach effort was made to engage the community and determine the needs and preferences of customers. This phase of the project included static and interactive online surveys, and two rounds of public meetings, and meetings with transit stakeholders.

During this process, a wide range of feedback was provided from existing riders, community representatives and other citizens. The following comments were expressed throughout the community engagement process:

- Evening service is the most desired improvement.
- More frequent service is desired, particularly during the midday period.
- The majority of customers and stakeholders are in favor of a transition to designated bus stops.

Service Recommendations

Findings from the comprehensive service evaluation and community engagement effort were summarized in an existing conditions report that served as a basis for service recommendations.

Service recommendations are divided into two categories:

- Cost-Constrained Preferred Alternative: System restructure recommendations consisting of route design and schedule improvements.
- Phases 1-5: Service expansion recommendations.

The cost-constrained preferred alternative is projected to increase ridership on StarTran by between 5 and 10 percent. Specific service recommendations include:

- Later evening service on most routes to improve access to jobs and education.
- Midday frequency improvements on high ridership corridors.
- Improved route directness to reduce customer travel time.
- Frequent service (15-30 minute combined headways) to high-ridership neighborhoods between downtown and South Street.
- Service extension to the fast-growing Yankee Hill and 84th Street corridors.
- New crosstown connections to improve trip directness and reduce transfers.
- Consolidation or elimination of service in unproductive areas.
- New commuter bus service from Southeast Lincoln to downtown.

Policy Recommendations

The TDP includes the following policy recommendations:

- Adoption of a designated bus stop policy to improve customer safety, maximize operational safety, and better market StarTran services.
- Service standards

Report Organization

The TDP consists of twelve chapters, which are summarized below.

- Chapter 1 summarizes the TDP process and objectives.
- Chapter 2 summarizes relevant transportation plans.
- Chapter 3 provides an overview of the trends and existing conditions of StarTran.
- Chapter 4 evaluates socio-economic and demographic conditions within Lincoln to better understand transit demand and service gaps.
- Chapter 5 consists of detailed profiles that describe service characteristics, ridership patterns, and on-time performance of each route.
- Chapter 6 summarizes recent on-board survey results.
- Chapter 7 provides an overview of feedback obtained by bus operators during interview sessions held at the start of the project.
- Chapter 7 summarizes community feedback obtained through an on-board survey, stakeholder discussions, open house public meetings, and online surveys.

- Chapter 8 details service restructure recommendations and future service expansion priorities.
- Chapter 9 identifies capital needs necessary to implement service recommendations.
- Chapter 10 includes bus stop guidelines to ensure adequate spacing and placement.
- Chapter 11 consists of service standards to be utilized regularly to monitor service effectiveness.
- Chapter 12 outlines future transit governance options and the relationship between governance and funding.

2 SUMMARY OF RELATED PLANS

This chapter summarizes planning documents and performance evaluations that pertain to current or future StarTran operations and/or capital improvements. Plans reviewed include:

- City of Lincoln Strategic Plan
- StarMetro Peer Review
- StarTran Financial, Marketing, Management, and Operations Analysis
- Lincoln Downtown Master Plan
- 2040 Long Range Transportation Plan

City of Lincoln Strategic Plan (StarTran Division Plan)

The StarTran component of the Lincoln Strategic Plan addresses projected population and area growth, an aging population, and uncertain funding sources to meet the increasing needs for frequency and route coverage. The plan outlines various issues with corresponding goals, performance objectives, and actions:

- **Service Limitations vs. Growth in Public Need.** The system has been unable to meet ongoing demand for Sunday and evening service, and increased Saturday service. Identified strategies to address this include obtaining financial participation from downtown businesses and Haymarket Arena to support the downtown shuttle and exploring cooperative arrangements with UNL and special transportation providers.
- **Overcoming Stereotypes.** Although ridership has increased, the general public still has a perception that public transit is mainly for elderly, disabled, and low-income riders. Identified strategies to address this include public surveys; promoting services among UNL students, faculty, and staff; bus subsidy programs to SCC and Wesleyan; promoting employer passes; exploring increased advertizing/marketing opportunities; continuing summer youth pass program; expanding modified grid system to high density areas and mixed-use activity centers; pursuing contracted services such as that with UNL; researching fare options to facilitate ridership.
- **Lack of Consistent Funding.** Even though funding has increased every year, it is still not enough to allow service expansion to meet the growing needs of the Lincoln population. Strategies to increase funding include pursuing demonstration and non-designated federal funding, FTA funding opportunities, advocating the State Legislator, coordination with the Nebraska Department of Roads for additional capital funding, explore advertising opportunities for revenue potential.
- **Increasing Operator Costs.** Fuel, insurance, and operator salary/benefits are increasing at rates greater than farebox revenues. Strategies include agreements with alternative fuel organizations, ongoing research of alternative fuels and energy-efficient

vehicles, acquiring EPA funding associated with clean fuel utilization, and promoting the employer pass program.

- **Transit Amenities.** Unkempt shelters and areas around benches continue to be a concern for riders and inhibit the ability to attract new riders. Mitigation strategies include increasing review of shelters to determine key issues and holding planning sessions with cleaning service personnel.

StarTran Peer Review

Conducted in 2013, this peer review analysis compared service characteristics among a group of transit agencies with comparable measures among various factors, including: service areas (land area and population), revenue hours and miles, annual operating costs, peak vehicles, ridership, and passenger revenues. Consideration was also given to agencies that serve large university populations. The research team placed emphasis on researching information that would explain differences in ridership compared to StarTran. Peer agencies identified include:

- Springfield Utilities Transit (Springfield, MO)
- StarMetro (Tallahassee, FL)
- LEXTRAN (Lexington, KY)
- Capital Area Transportation Authority (Lansing, MI)
- Central Arkansas Transit Authority (Little Rock, AR)
- People Mover (Anchorage, Alaska)
- Metro Area Transit (Fargo, ND)
- Waco Transit System (Waco, TX)
- Lafayette Transit System (Lafayette, LA)

The study found that differences in ridership across peer agencies could be attributed to established partnerships with local colleges/ universities, differences in funding levels from state and local sources, and a combination of various demographic factors (income, poverty, automobile ownership, and mean travel time to work).

StarTran Financial, Marketing, Management, and Operations Analysis

This report was commissioned by the City of Lincoln to provide a detailed review of the StarTran system and provide recommendations for its improvement. Based on the findings, the report offers recommendations, grouped into six categories

- **Oversight, Guidance, and Management.** StarTran needs clear policy direction from the Mayor and City Council, and any changes to the mission should be articulated so that operations can be adjusted to meet current expectations. The Advisory Board needs clear policy direction and reporting requirements. There needs to be a clearer relationship between StarTran management, the entities they report to, and how this flow of information should be informing agency decisions. StarTran must refine internal communication to drivers and maintenance employees to provide clear, updated policy direction.

- **Service Design, Operations, and Performance.** StarTran should continue coordination with higher education institutions (UNL and SCC) to identify potential needs, opportunities for service expansion, and the potential for an expanded UNL role in campus transit service. Evaluation of fixed-route on-time performance should be conducted more regularly to better identify areas that need adjustment, and the definition of the "on-time" window should match surveillance report analysis to available AVL data. The Maintenance Plan and the Driver's manual should be updated to be consistent with current practices and procedures. The TDP should be updated within two to four years to reflect changes to policy goals/ performance thresholds.
- **Paratransit.** Recommendations focus on: increased service hours (to match fixed-route service), improving customer service and ease of access to information, adding staff to effectively manage operations, improving data management and the ability to produce driver manifestos (through a renegotiation with Route Match), reducing operating costs by contracting additional service to Transport Plus, and establishing specific performance measures in paratransit contracts (OTP of 95%, passenger ride limit of 45 minutes).
- **Costs and Revenues.** Primary recommendations include: simplifying the fare structure, raising passenger revenues while minimizing lost ridership, embracing technology to streamline accounting functions, exploring the use of part-time labor to lower operating costs, and addressing cash-handling concerns. The best opportunity for increasing revenue is by increasing ridership via improving frequencies on the best performing routes and to reconfigure how the UNL market is served.
- **Customer Service and Marketing.** Recommendations include streamlining of staff and work-flow procedures to ensure that customer service requests/ complaints are addressed in a timely manner and later accounted for during budget preparation time for possible service adjustments. The Public Works Division should establish standards for customer responsiveness and satisfaction levels.
- **Equipment and Facilities.** The size of most vehicles is adequate for current peak loading requirements and safety standards. The primary recommendations involve efficient use of technology to improve the management of operations and improve the rider experience (e.g., allowing drivers to communicate with one another via mobile data terminals as opposed to using supervisors as an intermediary, using automated vehicle location system to monitor OTP, and establishing a program to inventory all bus stops and guiding customers to safe boarding locations). Other recommendations involve facility improvements, such as improving the layout of the current maintenance facility and providing shelters and benches at high-use bus stops.

Lincoln Downtown Master Plan

Adopted in 2005 and updated in 2012, the Downtown Master Plan identifies strategies for improving the livability and economic vitality of downtown Lincoln, with specific corridors and initiatives targeted to achieve this goal. The primary recommendation pertaining to transit is the proposed Downtown streetcar. This alignment would circulate primarily on Q and P Streets, between 7th and 21st Streets.

The aims of the project include:

- Attracting choice riders
- Spurring private sector development

- Improving access within and between West Haymarket, Downtown, and Antelope Valley
- Supporting off-peak use of outlying parking garages, especially for Arena events and the University Park-and-Ride

The streetcar implementation would also rely on development on the P Street corridor that would improve pedestrian access and accommodate transit riders.

2040 Long Range Transportation Plan

This document is from the Lincoln MPO outlines the areas transportation goals for the next 40 years. These include:

- Maintain the existing transportation system
- Improve the efficiency, performance, and connectivity of a balanced transportation system
- Promote consistency between land use and transportation plans to enhance mobility and accessibility
- Provide a safe and secure transportation system
- Support economic vitality of the community
- Protect and enhance environmental sustainability, provide opportunities for active lifestyles, and conserve natural and cultural resources
- Maximize the cost effectiveness of transportation

In anticipation of population growth and land use changes, the transportation element of the Comprehensive Plan aims to support the Land Use Plan and provide alternatives that will improve mobility, safety, and livability. As it specifically relates to transit, the plan characterizes StarTran's system as having good coverage, but lacking in frequency and productivity.

The plan proposes a network with primary corridors (O Street and N 27th Street) with feeder service that passes through the neighborhoods. It identifies future express service corridors on S. 2th Street, Highway 2, and W. O Street. This network is planned in conjunction with park-and-rides and Mixed Use Redevelopment Nodes and Corridors identified in the Comprehensive Plan. The plan also recommends enhancement of the system's bike-and-bus feature and the use of ITS to provide real-time information to passengers.

The plan estimates that funding of at least $13 million per year is needed to implement these improvements. It also recognizes that effective public transportation requires a connected pedestrian network and coordinated, higher-density land development. Concerns related to future service include growing need and increasing costs of demand-response service.

3 SYSTEM OVERVIEW

StarTran Fixed Routes

StarTran operates 20 fixed routes on weekdays and 13 routes on Saturdays. Weekday service runs between 5:30 a.m. and 7 p.m. for most routes, while two UNL routes (24 and 25) run until 9pm. Saturday service runs between 6:30 a.m. and 7 p.m. Aside from the downtown circulator (Star Shuttle), all routes have bi-directional alignments, many with large terminal loops. All non-UNL routes begin and end in Downtown. Fourteen weekday routes and eight Saturday routes are interlined. As shown in Figure 1, the majority of routes operate every 30 or 60 minutes during peak times. During off-peak times, five routes operate irregular and infrequent (greater than 60 minutes) headways. Irregular headways complicate transfers and connections, and are much more difficult for existing and potential users to understand.

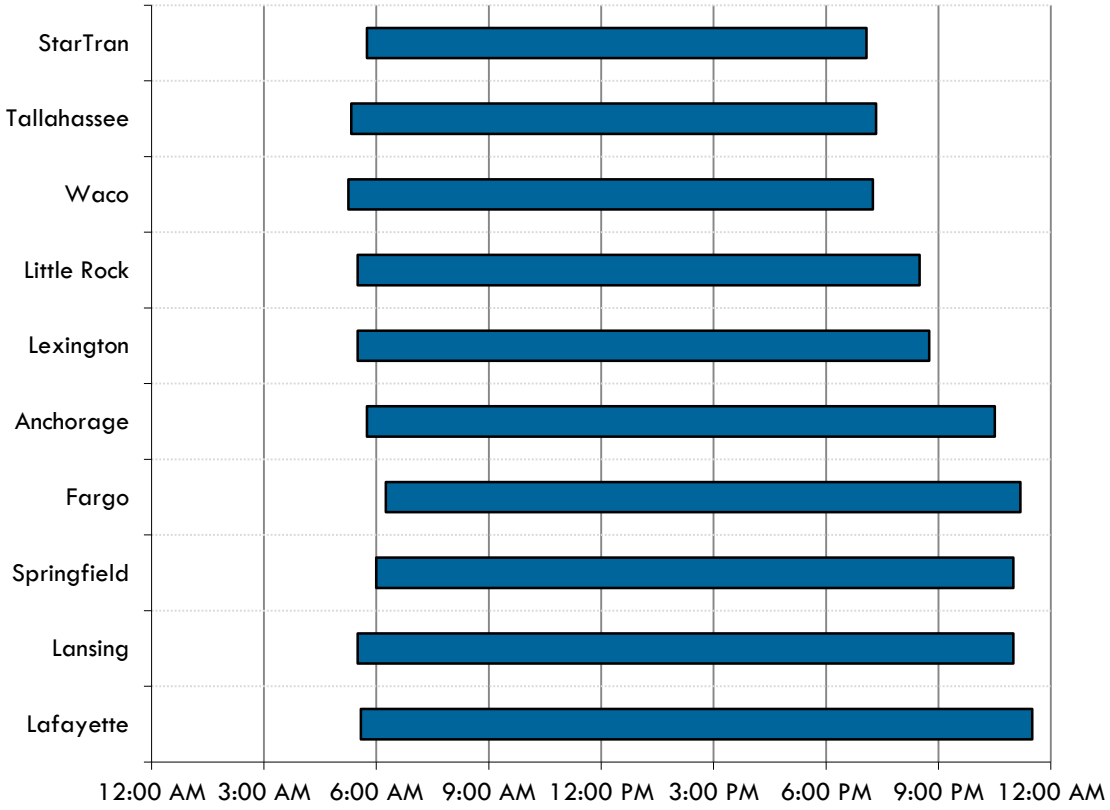
Figure 1 StarTran Fixed Routes

Route	Weekday Peak Headway	Weekday Off-Peak Headway	Weekday Service Span	Saturday Headway	Saturday Service Span	Peak Vehicles
22 – NIC City	7	7	7:00 a.m. – 6:00 p.m.	-	-	1
23 – NIC East	20	20	7:00 a.m. – 6:00 p.m.	-	-	1
24 - Holdrege	10	20	6:50 a.m. -9:00 p.m.	-	-	4
25 – Vine	10	20	6:55 a.m. -9:00 p.m.	-	-	4
40 – Heart Hospital	30	60	5:50 a.m. – 7:20 p.m.	60	7:00 a.m. – 5:35 p.m.	3
41 – Havelock	30	60	5:15 a.m. – 7:05 p.m.	60	6:30 a.m. – 6:55 p.m.	3
42 – Bethany	30	60	6:15 a.m. – 6:45 p.m.	60	7:00 a.m. – 6:00 p.m.	2
43 – Normal	30	60	6:15 a.m. – 6:45 p.m.	60	7:00 a.m. – 6:00 p.m.	2
44 – "O" Street/SCC	30	70	6:10 a.m. – 7:05 p.m.	60	6:30 a.m. – 6:25 p.m.	2
45 – Arapahoe	30	60	6:10 a.m. – 6:40 p.m.	60	7:00 a.m. – 6:00 p.m.	2
46 – Arnold Heights	30	60	5:40 a.m. – 7:10 p.m.	60	7:00 a.m. – 6:30 p.m.	2
47 – Belmont	30	60	5:45 a.m. – 6:45 p.m.	60	7:00 a.m. – 6:00 p.m.	2
48 – Salt Valley	30	60	6:15 a.m. – 6:45 p.m.	-	-	2
49 – University Place	30	60	6:15 a.m. – 6:45 p.m.	60	7:00 a.m. – 6:00 p.m.	2
50 – College View	30	60	6:15 a.m. – 6:45 p.m.	60	7:00 a.m. – 6:00 p.m.	2
51 – West "A"	60	120	5:45 a.m. – 6:15 p.m.	60	7:00 a.m. – 5:30 p.m.	1
52 - Gaslight	60	120	5:45 a.m. – 6:40 p.m.	60	7:30 a.m. – 6:00 p.m.	1
53 – SouthPointe	30	70	6:05 a.m. – 6:45 p.m.	-	-	2
54 – Veteran's Hospital	30	70	6:40 a.m. – 6:45 p.m.	60	7:00 a.m. – 6:00 p.m.	2
Star Shuttle	15	15	6:15 a.m. – 6:44 p.m.	-	-	1
Total	**-**	**-**	**-**	-	-	**39**

*Routes 24 and 25 have reduced service levels during the non-academic year

As shown in Figure 2, reveals that StarTran provides significantly less service than transit systems in peer cities, in terms of service span.

Figure 2 Peer City Service Span Comparison



Dial-a-Ride

StarTran operates Handi-Van, a demand-response, door-to-door service that carries passengers with disabilities who are unable to ride fixed-route service. Service operates Monday to Friday between 5:15 a.m. and 7 p.m. and on Saturdays between 6:30 a.m. and 6:55 p.m. The service area is strictly within the city limits of Lincoln.

Fare Payment

Figure 3 below shows the various payment categories for StarTran riders. A one-way fare for the general public is $1.75 and $0.85 for seniors, disabled, and low-income riders. Transfers are free. The Handi-Van costs $3.50 for a one-way fare. StarTran also offers 20 Ride passes and 31 Consecutive Day passes for both fixed-route and Handi-Van service at varying prices dependent on rider characteristics (senior, low-income, etc). UNL student ride free with a UNL Bus Pass and photo ID. Children under four years old also ride for free.

StarTran offers a unique 31-day pass for low-income users. The Low Income Bus Pass is priced at $8/month, and is available at 13 different outlets. While income guidelines are provided, proof of income is not a requirement to purchase a pass.

Figure 3 Fare Payment Categories

Category	One-Way Fare	20 Ride Pass	31 Consecutive Day Pass
General Public	$1.75	$33	$17
Senior	$0.85	$16	$17
Low-Income	$0.85	$16	$8
Star Shuttle	$0.25	-	-
Star Shuttle Senior/Medicaid	$0.10	-	-
Handi-Van	$3.50	$66	$34*

*Low-income Handi-Van 31 Consecutive Day Pass available for $16

Vehicles

StarTran maintains a fleet of 55 fixed-route buses and 22 paratransit vehicles. All 77 vehicles are lift equipped. Photos of StarTran vehicles and tables detailing vehicle characteristics are provided in the following figures.

Figure 4 StarTran Fixed-Route Vehicles

Figure 5 Fixed-Route Fleet

Year	Manufacturer	Fuel Type	Seating Capacity	Wheelchair Seating Capacity	Total Vehicles
2001	Gillig	Diesel	32	2	17
2004	Gillig	Diesel	32	2	9
2006	Gillig	Diesel	32	2	15
2011	Gillig	Diesel	26	2	13
2014	New Flyer	Diesel	32	2	13
Total	**-**	**-**	**-**	**-**	**67**

Figure 6 StarTran Paratransit Vehicles

Figure 7 Dial-a-Ride Fleet

Year	Manufacturer	Fuel Type	Seating Capacity	Wheelchair Seating Capacity	Total Vehicles	Average Mileage per Vehicle
2010	Glaval	Unleaded	14	2	9	98,374
2010	Glaval	Unleaded	17	2	2	98,763
2012	Starcraft	Unleaded	14	2	1	70,925
2013	Starcraft	Unleaded	11	2	1	29,745
Total	**-**	**-**	**-**	**-**	**13**	**-**

Downtown Connections

The primary connection point for StarTran routes is located on-street along the east and south sides of the Gold's Building at N & 11th Streets. This two-block transfer point can only accommodate six buses at a time (three buses along N Street and three buses along 11th Street), so timed connections between all routes serving downtown is not possible. As a result, bus routes arrive at Gold's Building in two waves that are 5 minutes apart.

The 11th Street stop on the east side of the Gold's Building provides three partially enclosed shelters, seating, and a real-time arrival information display. The N Street stop on the south side of the Gold's Building includes seating and limited shade/shelter in the form of the building awning.

Figure 8 Gold's Building bus stops

Photo Credit: Lincoln Journal Star

Peak weekday frequencies and pulse/departure times for each StarTran route serving the Gold's Building are provided in Figure 9. Variations in running time for Routes 44, 53, and 54 result in inconsistent headways and missed transfer opportunities between routes.

Figure 9 Existing Pulse Times at Gold's Building

Transfer Location	Route Number	Peak Headway	Existing Peak Departure Times
Gold's Building 11th Street Stop	40 Heart Hospital	30	:10/:40
	43 Normal	30	:15/:45
	44 O Street/SCC	30-40	6:10 a.m. / 6:50 a.m. 7:20 a.m. / 8:00 a.m. 3:00 p.m. / 3:30 p.m. 4:10 p.m. / 4:40 p.m. 5:20 p.m. / 5:50 p.m.
	45 Arapahoe	30	:10/:40
	48 Salt Valley	30	:15/:45
	50 College View	30	:15/:45
	51 West A	60	:45
	53 SouthPointe	30-70	6:05 a.m. / 6:40 a.m. 7:10 a.m. / 7:50 a.m. 8:20 a.m. 3:30 p.m. / 4:00 p.m. 4:40 p.m. / 5:10 p.m. 5:50 p.m.
	54 Veteran's Hospital	30-70	6:35 a.m. / 7:15 a.m. 7:45 a.m. / 8:25 a.m. 3:25 p.m. / 4:00 p.m. 4:35 p.m. / 5:10 p.m. 5:45 p.m.
	55 Star Shuttle	15	:00/:15/:30/:45
Gold's Building N Street Stop	41 Havelock	30	:10/:40
	42 Bethany	30	:15/:45
	46 Arnold Heights	30	:10/:40
	47 Belmont	30	:15/:45
	49 University Place	30	:15/:45
	52 Gaslight	60	:45

Figure 10 provides existing bus volumes at the Gold's Building during morning and afternoon peak period trips.

Figure 10 Existing Gold's Building Bus Volumes

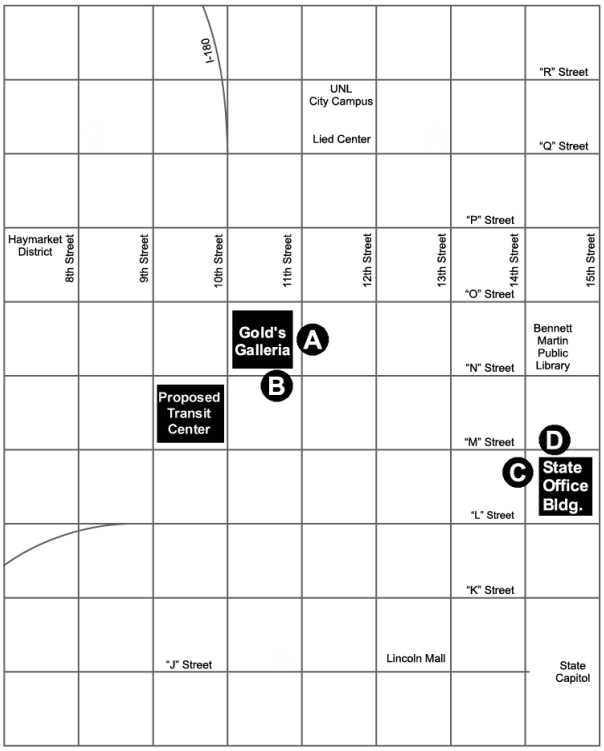
Departure Time	11th Street Stop	N Street Stop	Total
Morning Peak			
6:10 a.m.	3	2	12
6:15 a.m.	4	3	
6:40 a.m.	3	2	14
6:45 a.m.	5	4	
7:10 a.m.	3	2	13
7:15 a.m.	5	3	
7:40 a.m.	2	2	14
7:45 a.m.	6	4	
8:10 a.m.	2	2	11
8:15 a.m.	4	3	
8:40 a.m.	2	2	13
8:45 a.m.	5	4	
Afternoon Peak			
3:10 p.m.	2	2	11
3:15 p.m.	4	3	
3:40 p.m.	2	2	13
3:45 p.m.	5	4	
4:10 p.m.	3	2	12
4:15 p.m.	4	3	
4:40 p.m.	4	2	15
4:45 p.m.	5	4	
5:10 p.m.	4	2	13
5:15 p.m.	4	3	
5:40 p.m.	2	2	14
5:45 p.m.	6	4	

To facilitate transfers between more routes, a secondary transfer point exists at the State Office Building on M & 14th Streets. Both transfer points, along with the proposed transit center site, are depicted in Figure 11. Most bus routes make a loop through downtown Lincoln to serve each transfer location. While downtown Lincoln is an important transit destination in itself, it is likely that the majority of customers boarding at each transfer point are making connections between routes due to the radial design of the StarTran route network.

While the dual transfer point design increases opportunities for customers to connect between routes with offset arrival times, it also results in indirect route alignments and late arrivals within downtown due to one-way streets and loop patterns required to reach designated transfer points.

Supervisory staff may also hold buses arriving late to downtown for up to five minutes to maintain connections with other routes. Bus operators have described this policy as a negative impact on schedule reliability and operator recovery time.

Figure 11 Downtown Transfer Points



Source: StarTran

A *Gold's - 11th Street Side*

Serves Routes:
40 Heart Hospital
43 Normal
44 "O" Street/SCC
45 Arapahoe
46 Arnold Heights
48 Salt Valley
50 College View
51 West A
53 SouthPointe
54 Veteran's Hospital
55 Star Shuttle

B *Gold's - N Street Side*

Serves Routes:
41 Havelock
42 Bethany
45 Arapahoe
47 Belmont
49 University Place
52 Gaslight

C *State Office Building - 14th Street Side*

Serves Routes:
41 Havelock
42 Bethany
45 Arapahoe
46 Arnold Heights
47 Belmont
49 University Place
52 Gaslight
53 SouthPointe
55 Star Shuttle

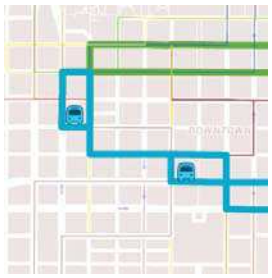
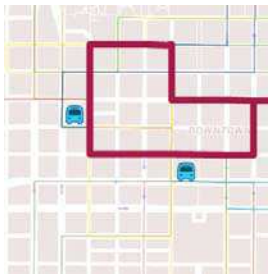
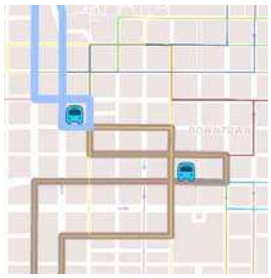
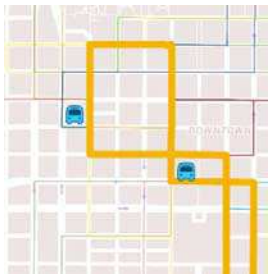
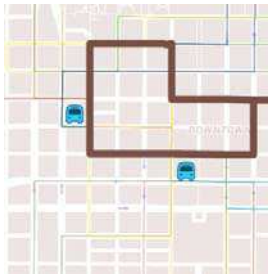
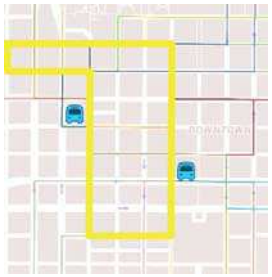
D *State Office Building - M Street Side*

Serves Routes:
40 Heart Hospital
43 Normal
44 "O" Street/SCC
45 Arapahoe
48 Salt Valley
50 College View
51 West A
53 SouthPointe
54 Veteran's Hospital

Most StarTran routes serving downtown Lincoln are "linked" or "paired" with other routes, enabling each route to pass through downtown rather than terminate at one of the aforementioned transfer locations. Existing downtown alignments grouped by route pairs are depicted in Figure 12.

The creation of a single transfer point within downtown that accommodates all routes would allow for streamlined alignments that would improve operational efficiency and reduce customer travel time.

Figure 12 Existing Downtown Alignments

40 Heart Hospital 41 Havelock	42 Bethany 43 Normal	44 O Street	45 Arapahoe 46 Arnold Heights
			
47 Belmont 48 Salt Valley	**49 University Place 50 College View**	**51 West A 52 Gaslight**	**53 SouthPointe**
			
54 Veteran's Hospital	**55 Star Shuttle**		
			

Historical Ridership Trends

StarTran has seen a steady growth in systemwide, fixed-route ridership over the previous five fiscal years. From 2010 to 2014, annual ridership increased by 26% from 1.7 million to 2.2 million (Figure 13). During the same time frame, revenue hours have only increased slightly (3%), as depicted in Figure 14. As a result, system productivity, measured in boardings per revenue hour, has increased by 23%, from 16.4 to 20.2, as depicted in Figure 15.

Figure 13 Historical Fixed-Route Ridership

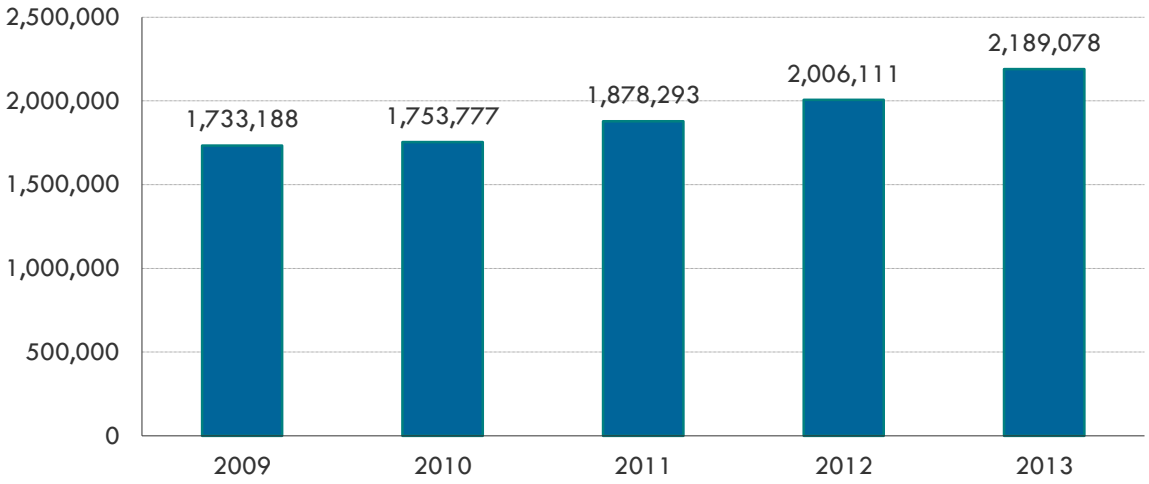


Figure 14 Historical Fixed-Route Revenue Hours

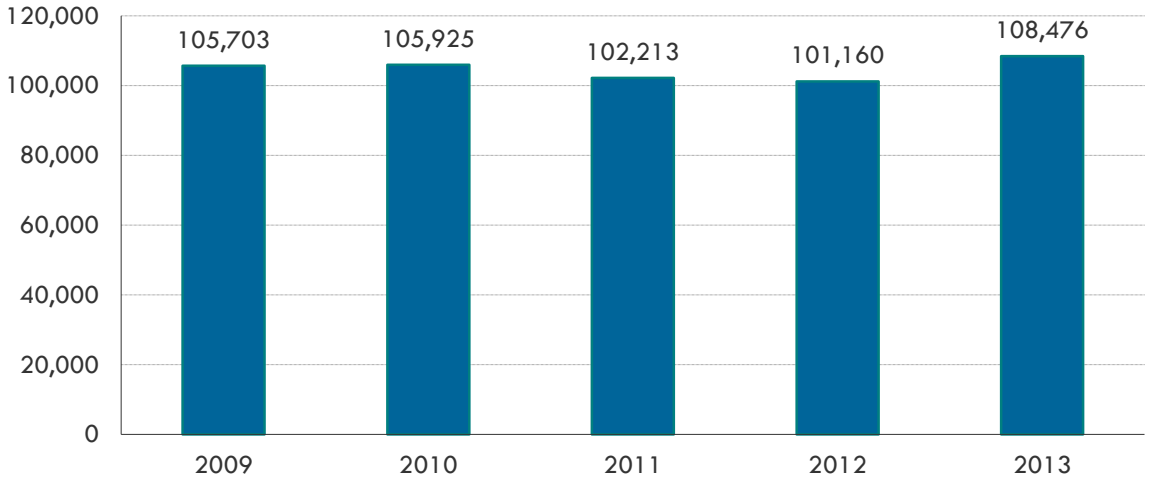
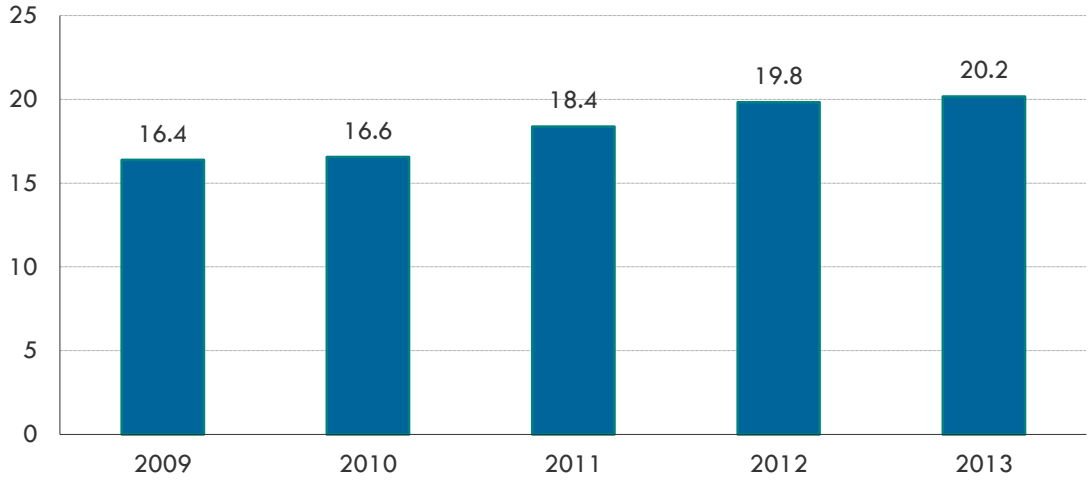


Figure 15 Historical Fixed-Route Productivity (Boardings per Revenue Hour)



Route Ridership

According to the most recent Automatic Passenger Count (APC) data from early 2015, StarTran carries approximately 9,898 riders every weekday.

Routes 24 and 25 carry the majority of the ridership, with an average of roughly 2,300 and 1,800 passengers per day (Figure 16). Both Routes 24 and 25 provide UNL intra-campus service, and operate much more frequently than any of the other routes. Of the remaining routes, only Route 41 carries over 500 passengers per day. Routes 51 and 52 carry the least amount of daily passengers.

Figure 16 Average Weekday Ridership

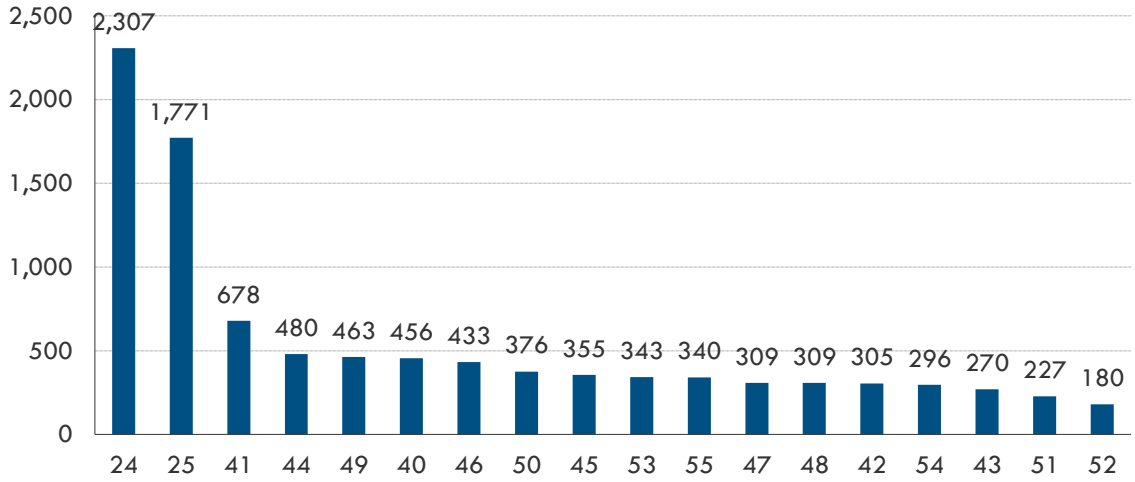
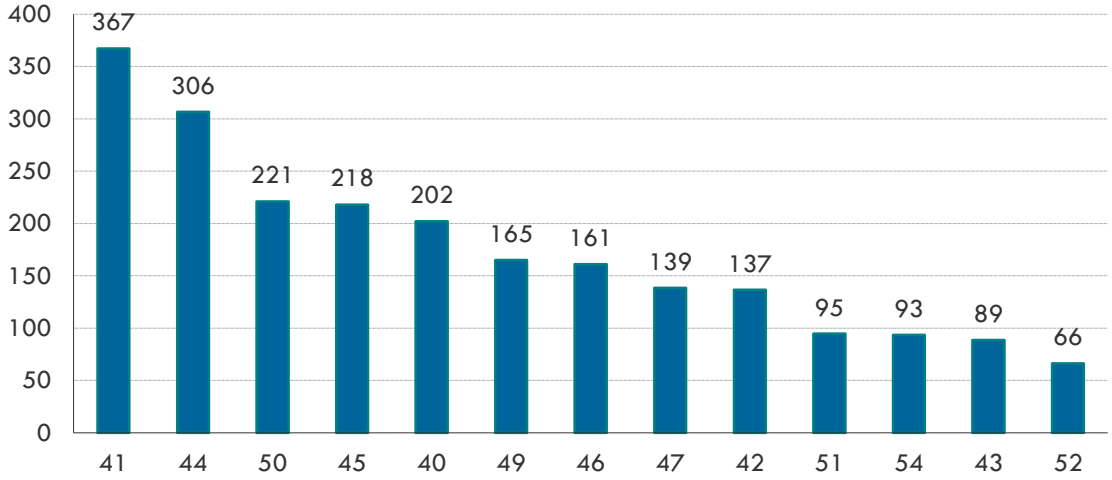


Figure 17 Average Saturday Ridership



Route Productivity

Routes 24 and 25 are also the most weekday productive routes, carrying 43.1 and 33.9 passengers per weekday revenue hour, respectively. Ten out of the 18 routes carry less than 20 passengers per revenue hour. On Saturdays, Routes 41 and 44 are by far the most productive with 29.1 and 25.1 passengers per revenue hour, respectively. The remaining 11 routes carry less than 20 passengers per revenue hour.

Figure 18 Boardings per Revenue Hour (Weekday)

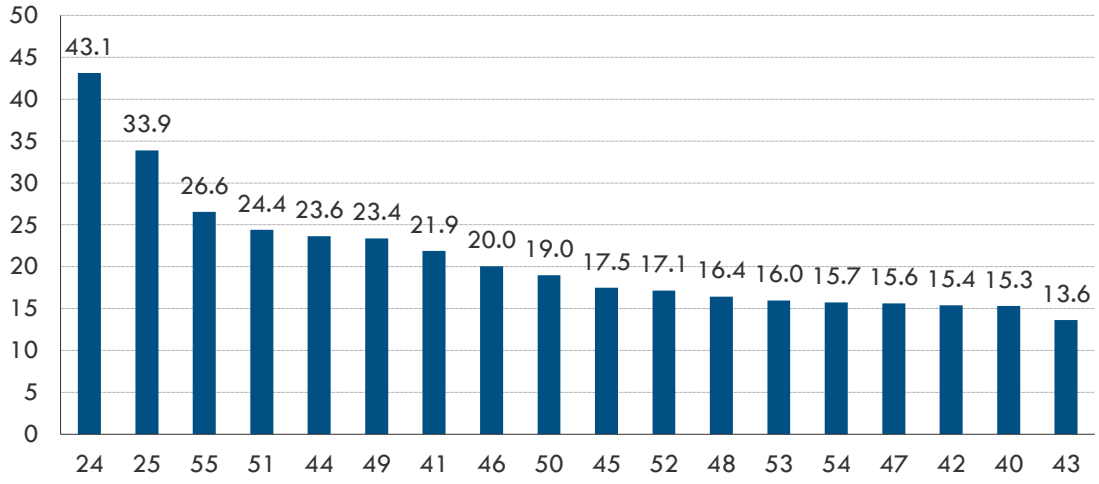
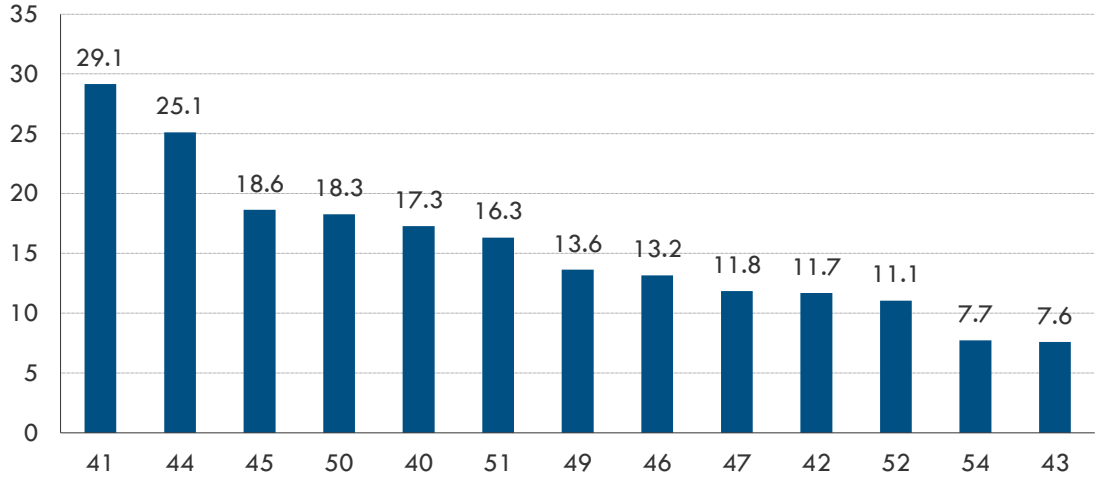


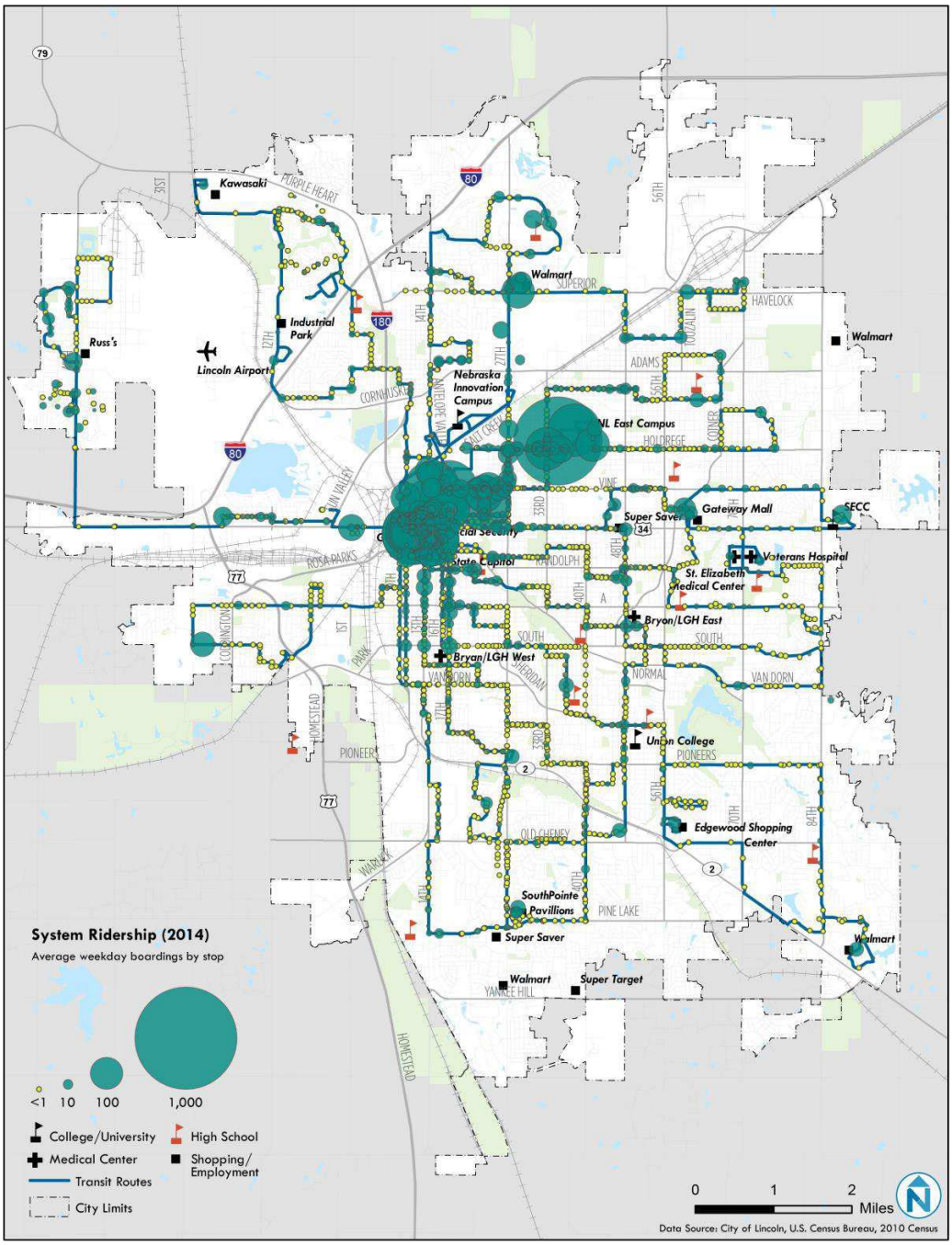
Figure 19 Boardings per Revenue Hour (Saturday)



System Ridership

Figure 20 shows the systemwide distribution of ridership. UNL's main and east campuses generate the most ridership activity. The biggest proportion of high ridership stops are in downtown Lincoln, with clusters at outlying destinations such as Walmart and the SECC. Overall ridership activity tends to be higher in the denser, closer to downtown neighborhoods.

Figure 20 System Ridership



On-Time Performance

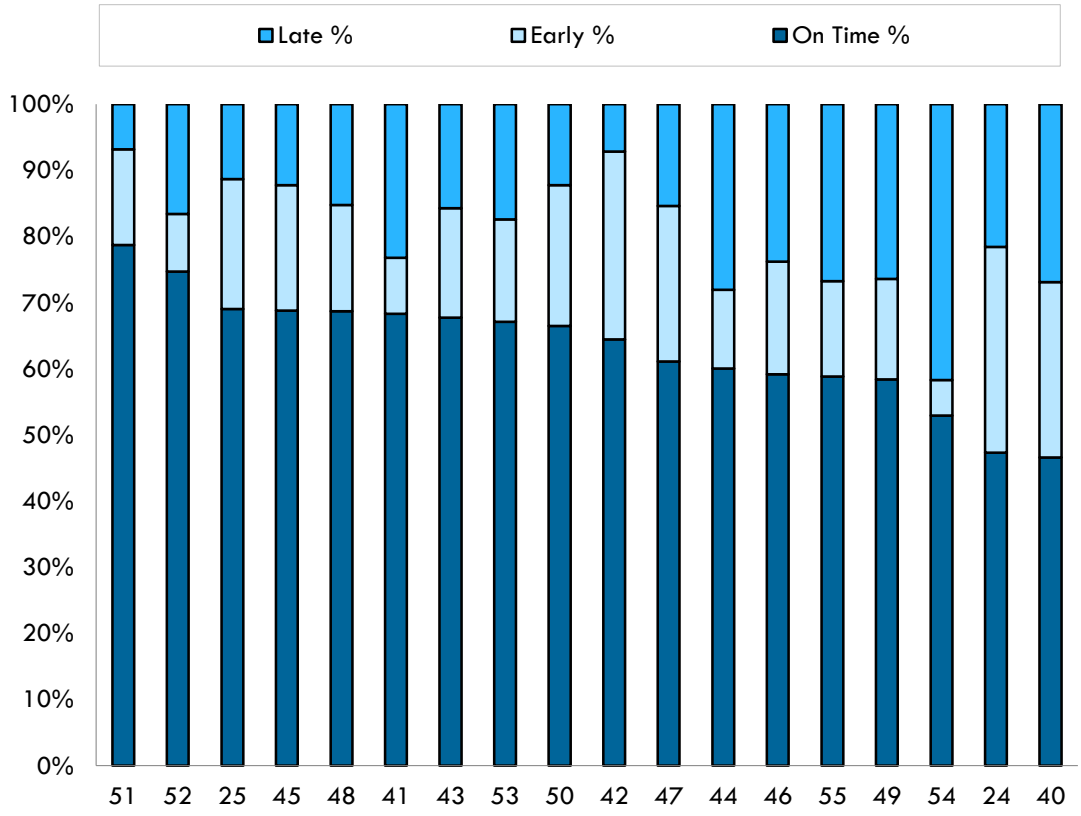
StarTran vehicles are equipped with automatic passenger count (APC) counters that also record the time vehicles arrive and depart timepoints. Using this data, a schedule adherence analysis was conducted for all StarTran fixed routes.

For the purposes of this analysis, late buses were defined as those departing five minutes or later than the scheduled arrival time. A bus leaving any time earlier than the scheduled departure time was considered early. Early arrivals at the final timepoint were not counted as part of the route assessment. The on-time performance calculation includes every timepoint along a route, not just the downtown transit center or the end of the line timepoints.

On weekdays, the average systemwide on-time performance is 61% of all trips are within zero to five minutes late at every timepoint.

Routes 51 and 52 have the best on-time performance, with 79% and 75% of trips being on-time, respectively. Route 54 has the highest percentage of late arrivals (42%). Routes 24, 40, 41, 44, 46, 49, and 55 all have late arrivals averaging 20% or higher. Both Routes 54 and 44 serve O Street, which features congested and variable traffic conditions that contribute to poor on-time performance. Routes 24, 40, and 42 have the highest averages of early trips (31%, 27%, and 28% respectively). With a few exceptions, early arrivals appear to be more prevalent than late buses. It should be noted that no StarTran routes have recovery time at terminal timepoints incorporated into their schedules.

Figure 21 Average Weekday Schedule Adherence by Route



4 MARKET ANALYSIS

The market analysis evaluates population and employment characteristics that typically support fixed-route transit operations. The demographic evaluation accounts for population and employment density, along with specific population segments that are more likely to ride transit, including: zero-vehicle households, persons below the poverty line, seniors, young adults, and renters. Population densities of these groups are used to calculate a Transit Propensity Index. The employee travel patterns evaluation uses Longitudinal Employer-Household Dynamics (LEHD) data to analyze the home-to-work commuting patterns of major employment areas in Lincoln. All together, this analysis aids in the evaluation of the system's ability to meet current travel needs, and helps inform decisions for future service planning.

Demographic Evaluation

Population Density

The geographic distribution of Lincoln's population is heavily influenced by the placement of railroads and highways through the city (Figure 22). The majority of residents live east of Downtown, south of Cornhusker Highway, west of 84th Street, and north of Yankee Hill Road. The most densely populated area of the city is just south of Downtown, bounded by Randolph and South Streets. Other dense sections of Lincoln include areas immediately northeast of Downtown (the area east of UNL and the area northeast of UNL East Campus). With the exception of two areas, one at the far north of the service area and one in the far south, all higher density areas in Lincoln are currently served by StarTran.

Zero-Vehicle Households

Figure 23 shows the presence of zero-vehicle households in Lincoln. The highest density of zero-vehicle households occurs within Downtown, immediately to the south of Downtown, and east of UNL along 27th Street. Traveling northeast of Downtown, there is a path of visible block groups with higher densities of zero-vehicle households, likely due to the presence of UNL's main and east campuses. Other notable locations include the area around Union College along Pioneers Street and the area east of downtown bounded by 40th, Holdrege, A and 70th Streets. Each of these areas is currently served by StarTran.

Population below the Poverty Line

Figure 24 shows the distribution of Lincoln's population living below the poverty line. The highest densities occur within Downtown and in adjacent areas to the south and extending northeast. There is a relatively even distribution of low-income individuals (5 to 10 per acre) living west and north of Downtown, bounded by the railroad tracks and I-80. All higher concentrations of population below the poverty line are served by StarTran.

Senior Population

As Figure 25 demonstrates, Lincoln's senior population (aged 65 and older) is more evenly distributed than other specific population segments examined in this section. They do not have a strong presence around Downtown and are more likely to reside towards the eastern half of the city. Additionally, there is some senior density within the area north of Cornhusker Highway and south of I-80. StarTran does not directly serve many of the areas with greater concentrations of seniors in East Lincoln.

Young Adult Population

The young adult population of Lincoln (ages 18 to 24) is largely concentrated in the area immediately adjacent to Downtown, especially to the north around UNL and to the northeast, past UNL East campus. Additional pockets are around Union College in southeast Lincoln and dispersed among communities to the north along I-80. Looking specifically to the population segment attending UNL (Figure 27), the distribution patterns are similar, with increased density to the areas immediately adjacent to the main and east campuses. Virtually all areas with high densities of young adults are served by StarTran.

Renter Population

Lincoln's renter population (Figure 28) is most highly concentrated within and around Downtown, radiating to the south to the northeast. Corridors with notable densities of renters include 48th Street (near Union College and UNL East Campus), Adams Street (north of UNL East Campus), Vine Street (east of Downtown), and Van Dorn Street (east of 70th Street). Additional pockets exist in Arnold Heights (west of the airport), in north Lincoln along I-80, and around Autumn Wood (north of Superior Street). Most rental areas are served by StarTran, with the exception of some newer complexes along Yankee Hill Road and north of I-80 at the far edge of the service area.

Transit Propensity Index

The Transit Propensity Index (Figure 29) is calculated based on combined density scores assigned to the specific population segments evaluated in this section (zero-vehicle households, persons below the poverty line, seniors, young adults, and renters). Based on the comparative density levels, each block group is assigned a score from one to five for each segment (for a total possible score of 25).

Areas scoring the highest are within and immediately south of Downtown. Sections with moderate scoring include the areas northeast of Downtown (south of Salt Creek Roadway and Cornhusker Highway), east of Downtown (along Cotner Boulevard and on Randolph Street), along Pioneers Boulevard (around Union College), to the south at Old Cheney Road and 27th Street, and to the north between Cornhusker Highway and I-80 (just east of Industrial Park).

It should be noted that although the Transit Propensity Index anticipates demand for transit services based on certain demographic indicators, it does not account for trip generators such as employers, shopping, and entertainment.

Figure 22 Population Density

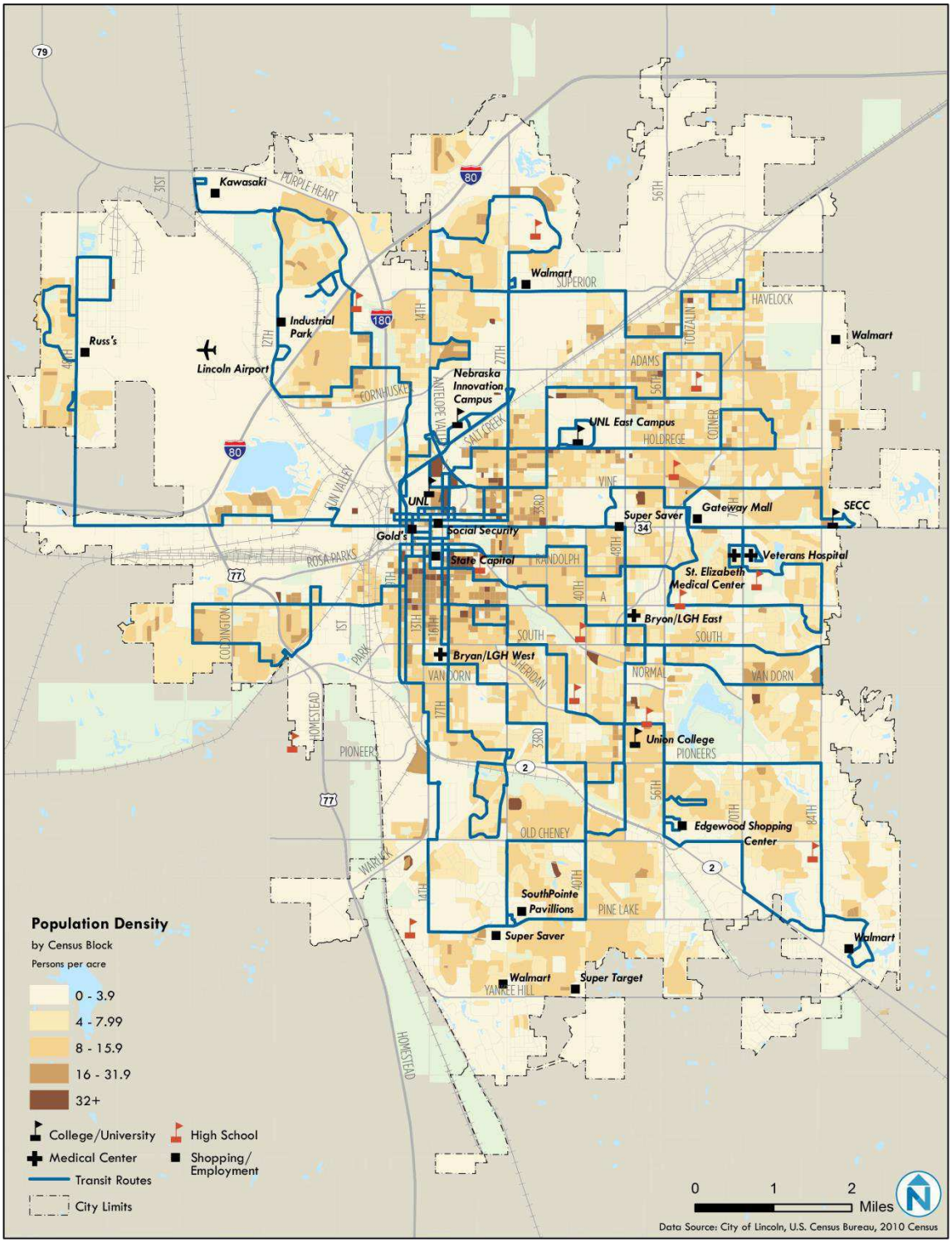


Figure 23 Zero-Vehicle Household Density

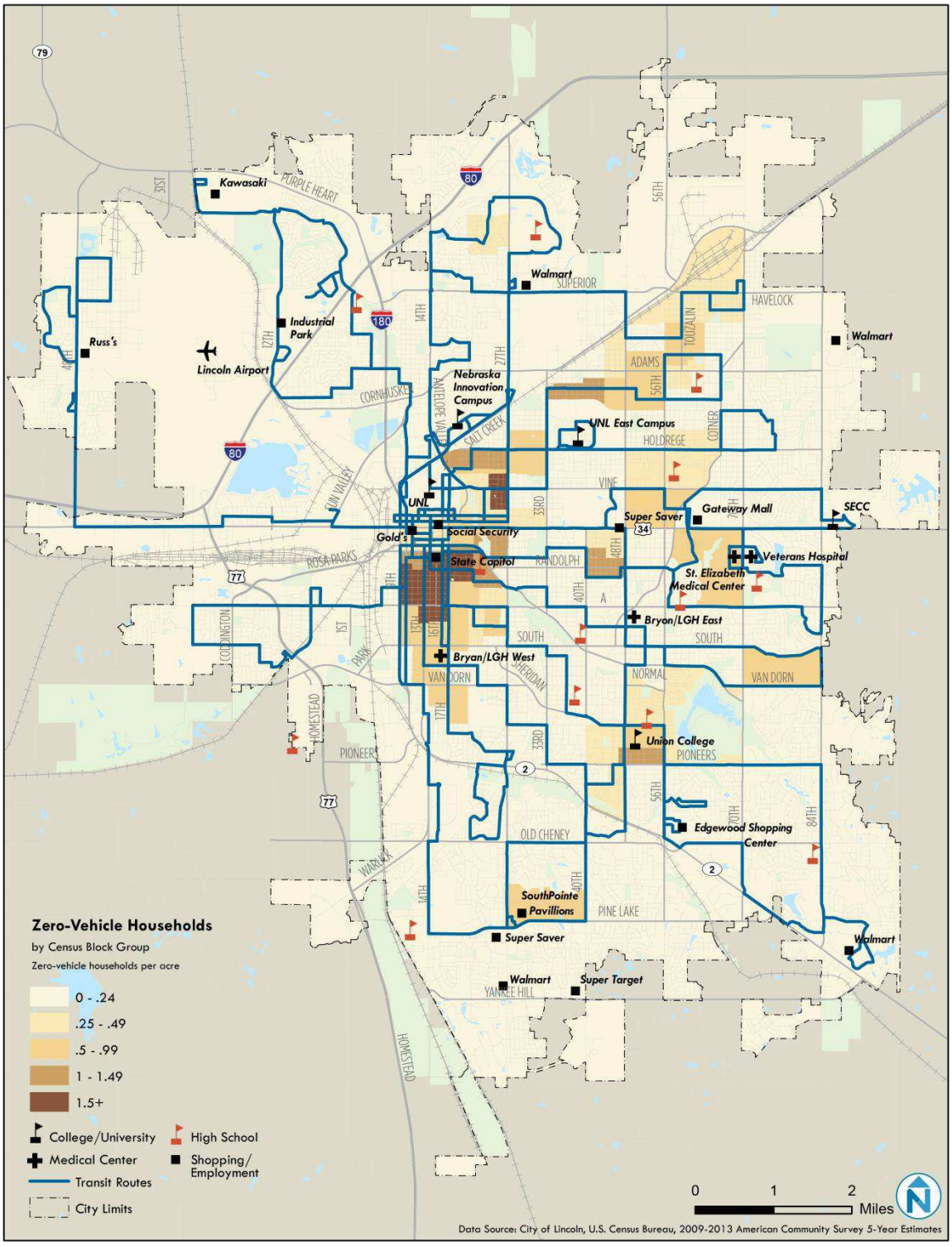


Figure 24 Low-Income Population Density

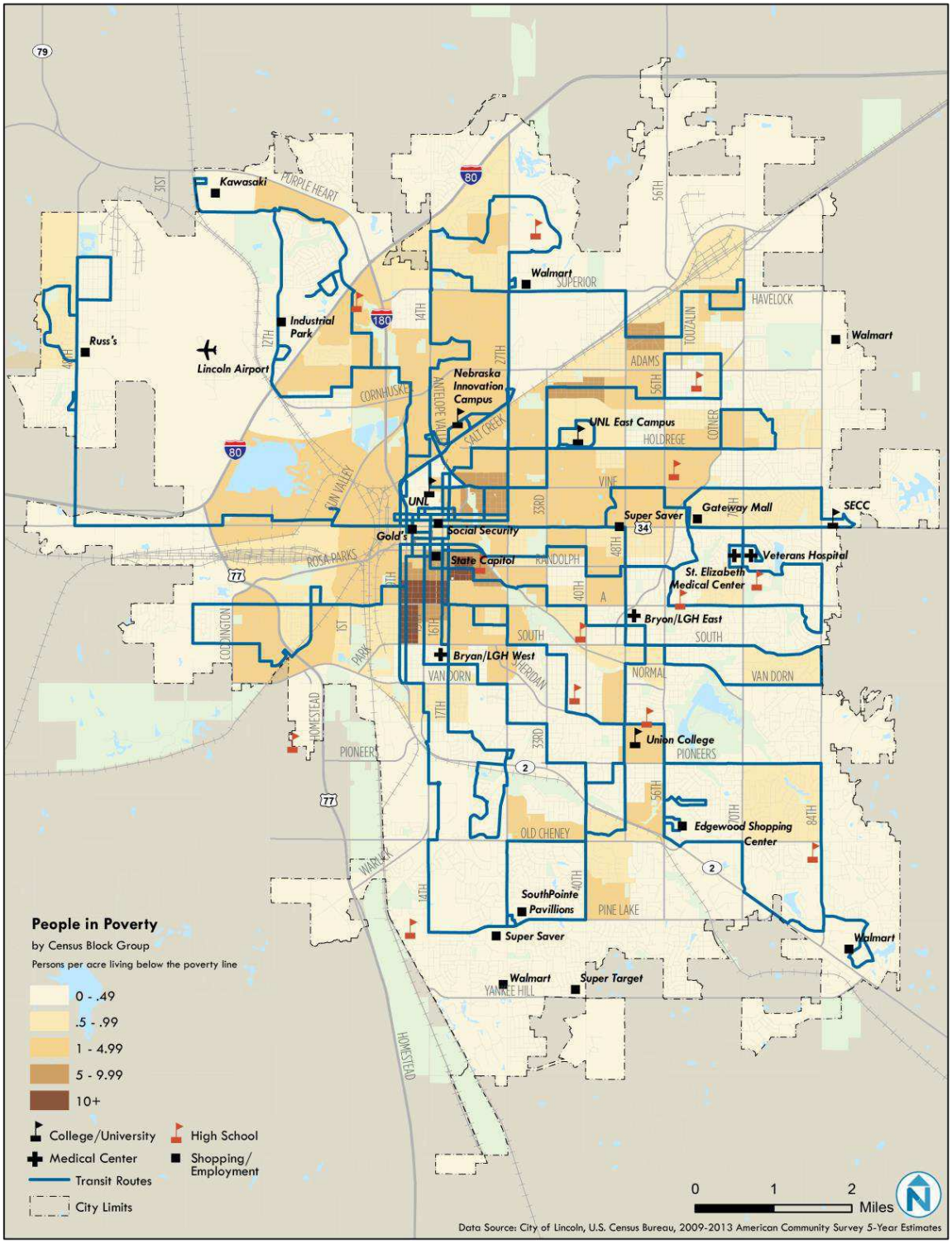


Figure 25 Senior Population Density

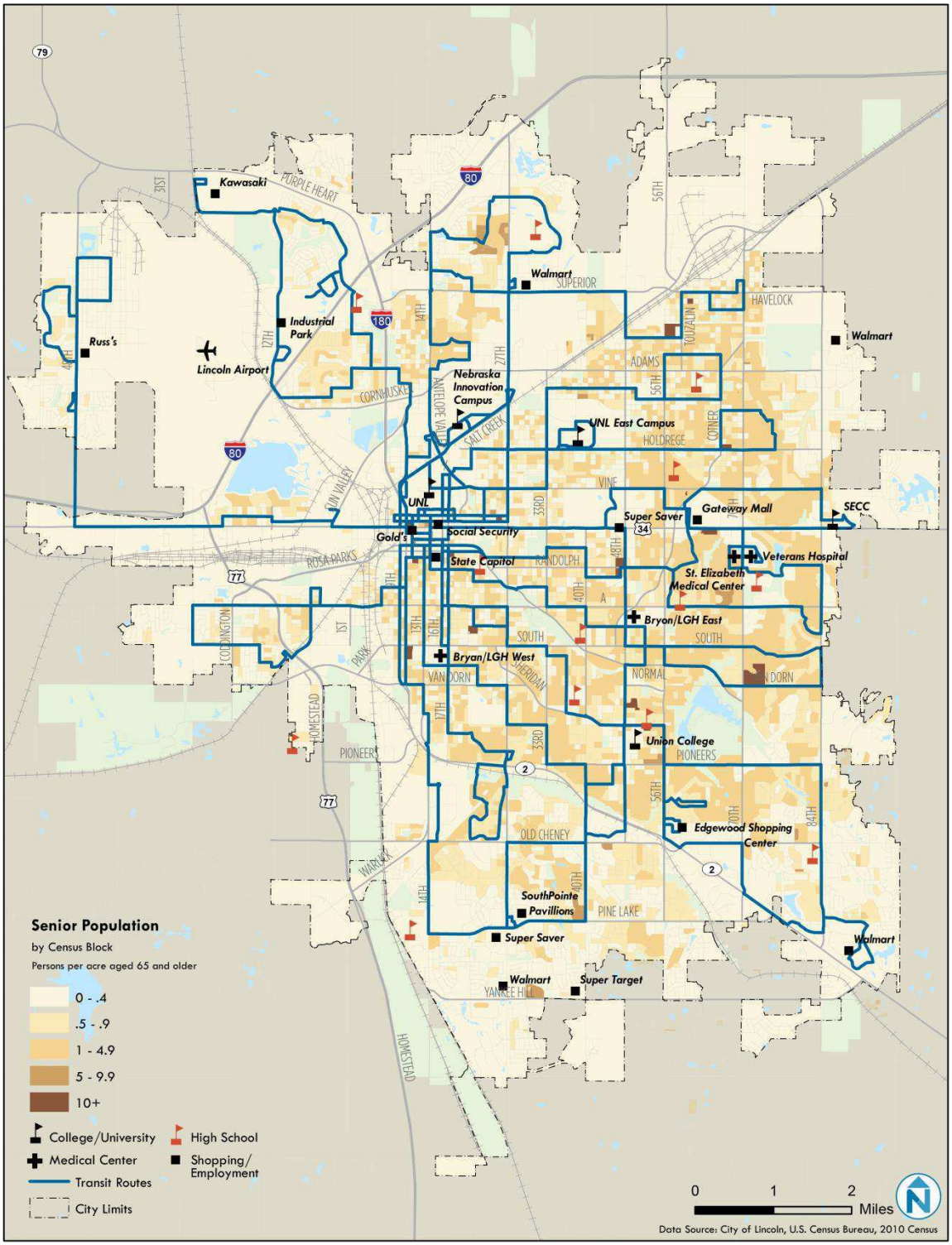


Figure 26 Young Adult Population Density

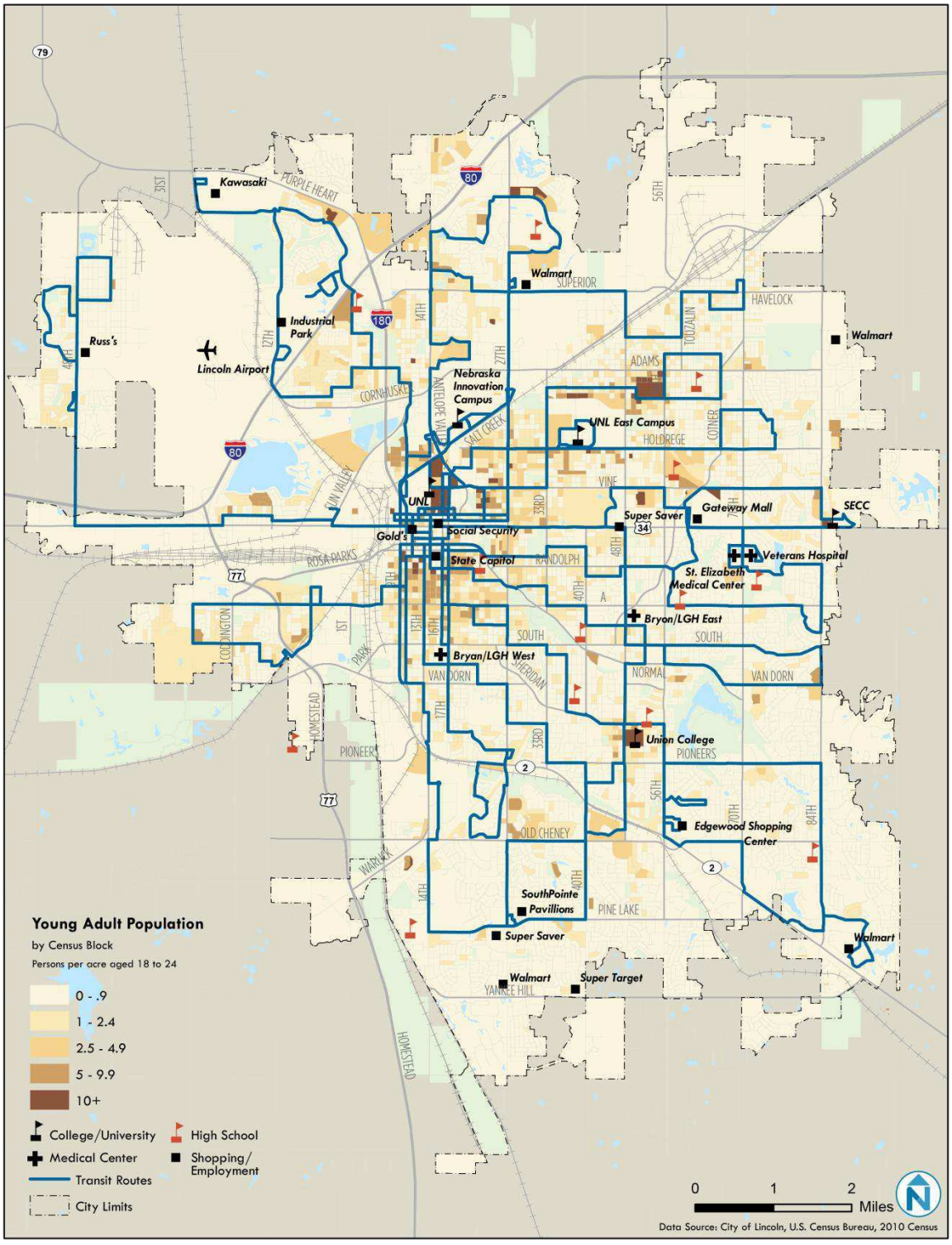


Figure 27 University of Nebraska – Lincoln Students per Acre

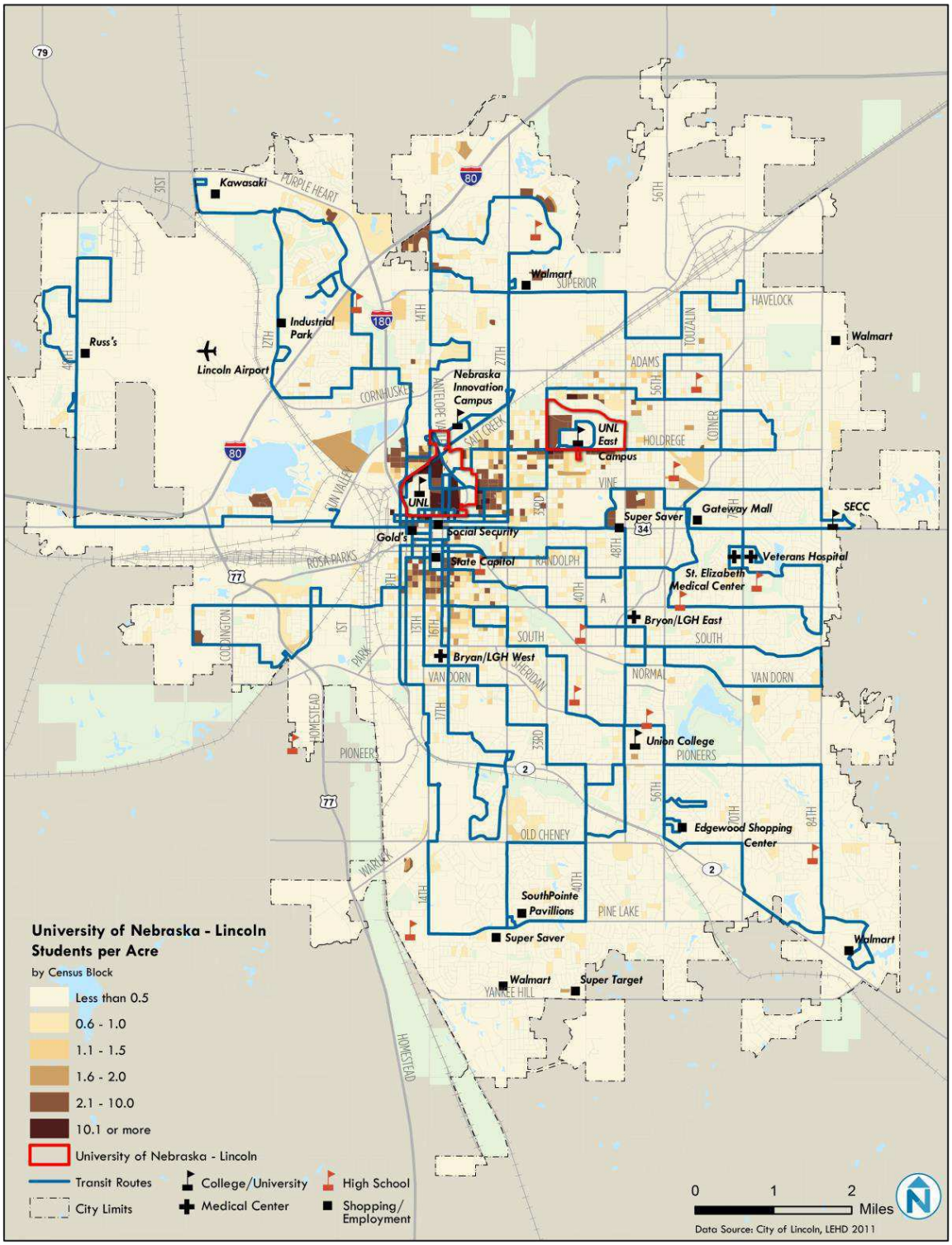


Figure 28 Renter Population Density

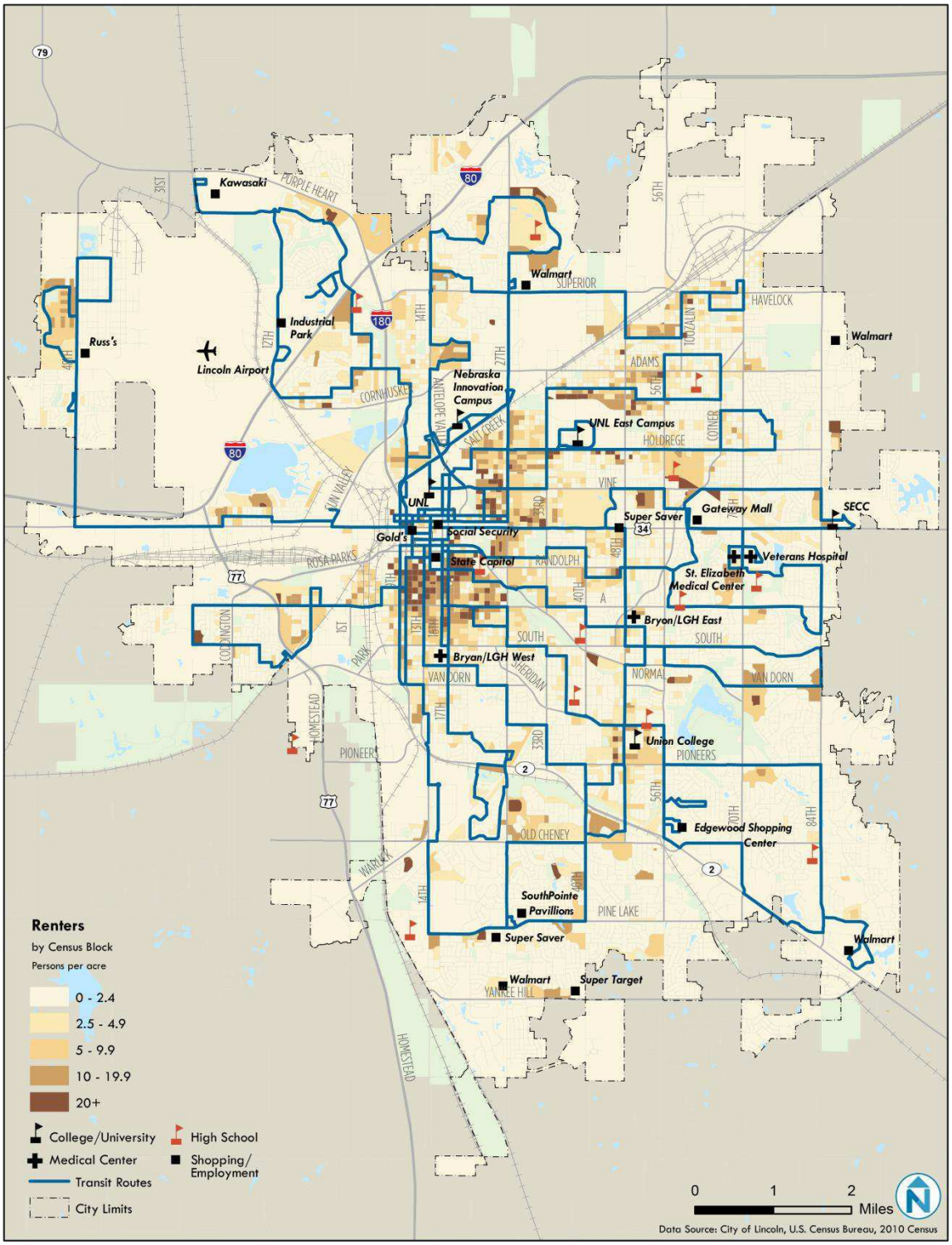
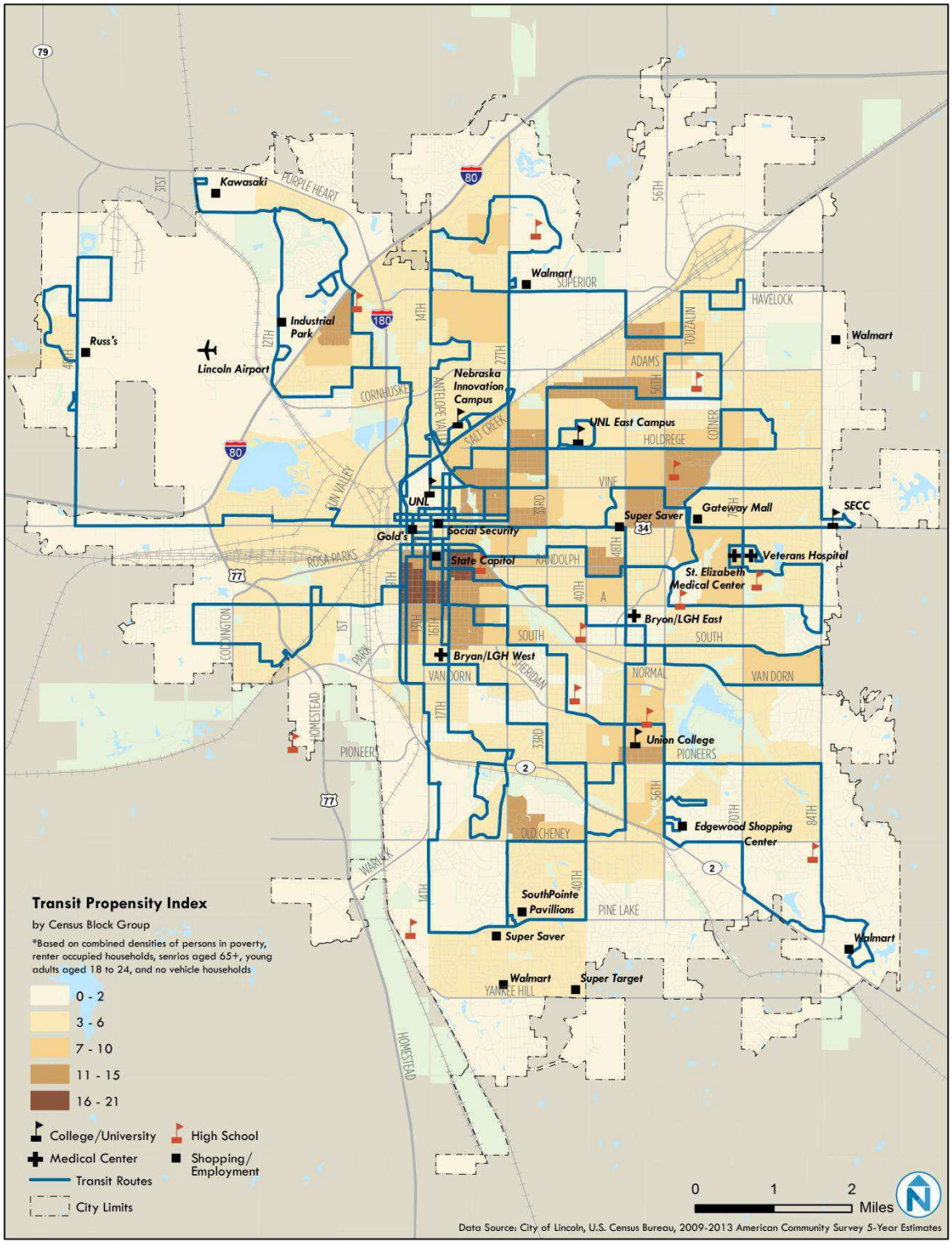


Figure 29 Transit Propensity Index



Employment Density

Lincoln's employment density (Figure 30) is largely concentrated around Downtown and UNL, and distributed along major corridors. The O Street corridor (east of Downtown) is home to a high density of jobs, including the Veterans Hospital, Saint Elizabeth Medical Center, Southeast Community College (SCC), Gateway Mall, and other shopping. The 48th Street corridor includes Bryan Medical Center, Union College, and various shopping and retail locations. The 27th Street corridor connects Downtown with employment-heavy areas around North End and SouthPointe Pavilions. Other notable areas of employment include the Kawasaki plant and Industrial Park (both in northwest Lincoln), the area adjacent to the Edgewood Shopping Center (southeast), and northeast Lincoln along Cornhusker Highway. Most major employment sites are accessible with StarTran service. The exceptions are the retail establishments on Yankee Hill Road, and industrial sites north of Havelock.

Employee Travel Patterns

The employee travel patterns evaluation accounts for high-density employment areas and the home locations of their workers. Using LEHD data, the study employment areas are analyzed at the block group level with worker home density calculated at the block level.

Downtown and UNL Employees

As demonstrated in the demographic analysis, the highest concentration of Lincoln's employment is within Downtown and UNL. As Figure 30 shows, the density pattern of these employees' home locations largely mirrors the population density map from the previous section. In other words, Downtown workers are commuting from all parts of Lincoln. The distribution of home locations among Downtown workers is densest within the area immediately south of Downtown and north of Nebraska Highway (Highway 2). Additionally, the area east of Downtown and west of 48th Street is home to numerous Census blocks with high densities of Downtown workers. Other residential pockets include Arnold Heights (west of the airport), the West "A" neighborhood west of Downtown, the area south of Pine Lake Road, and neighborhoods north of Cornhusker Highway.

Veterans Hospital and St. Elizabeth Regional Medical Center Employees

Figure 32 shows the home locations of employees who commute to Veterans Hospital and St. Elizabeth Regional Medical Center (70th Street just south of O Street). Compared to the distribution of Downtown workers, those employed at the hospitals are more likely to live in the southern and eastern portions of Lincoln. However, there are still a number of dense residential blocks immediately south of Downtown (north of Nebraska Highway) and east of Downtown (along Capitol Parkway).

Gateway Mall Employees

Figure 33 shows the home locations of employees who commute to the commercial area around Gateway Mall (O Street and Cotner Boulevard). The distribution of residential densities among Gateway Mall employees is less concentrated than that of other employment centers. However, it is most visible in the northeast quadrant of Lincoln (between O Street and the railroad tracks) and immediately south of Downtown.

Kawasaki and Industrial Park Employees

Figure 34 shows the home locations of employees who work in the block group encompassing Kawasaki and Industrial Park, with the highest concentrations occurring adjacent to the actual employment centers (north of Cornhusker Highway and south of 180). Other pockets exist in Arnold Heights (west of the airport), around Autumn Wood (north of Superior Street), south of Downtown, and within the northeast quadrant of the City.

North 27th Street Corridor Employees

Figure 35 shows the home locations of employees who work in the commercial area in the north end of Lincoln along the 27th Street corridor. The highest concentration of residential densities occurs in north Lincoln, along 14th Street, 27th Street, and Purple Heart Highway corridors. The remaining home locations are generally distributed south of Downtown and northeast of Downtown.

SouthPointe Pavilions Employees

Figure 36 shows the home locations of employees who work in the commercial areas surrounding SouthPointe Pavilions (roughly bounded by Yankee Hill Road, 14th Street, Old Cheney Road, and 40th Street). The population distribution among workers is highest within and around the same block groups that are home to the employment centers. The remaining workers' home locations tend to be evenly dispersed on within the eastern and northeastern quadrants of the city (with some concentration occurring immediately south of Downtown.

Figure 30 Employment Density

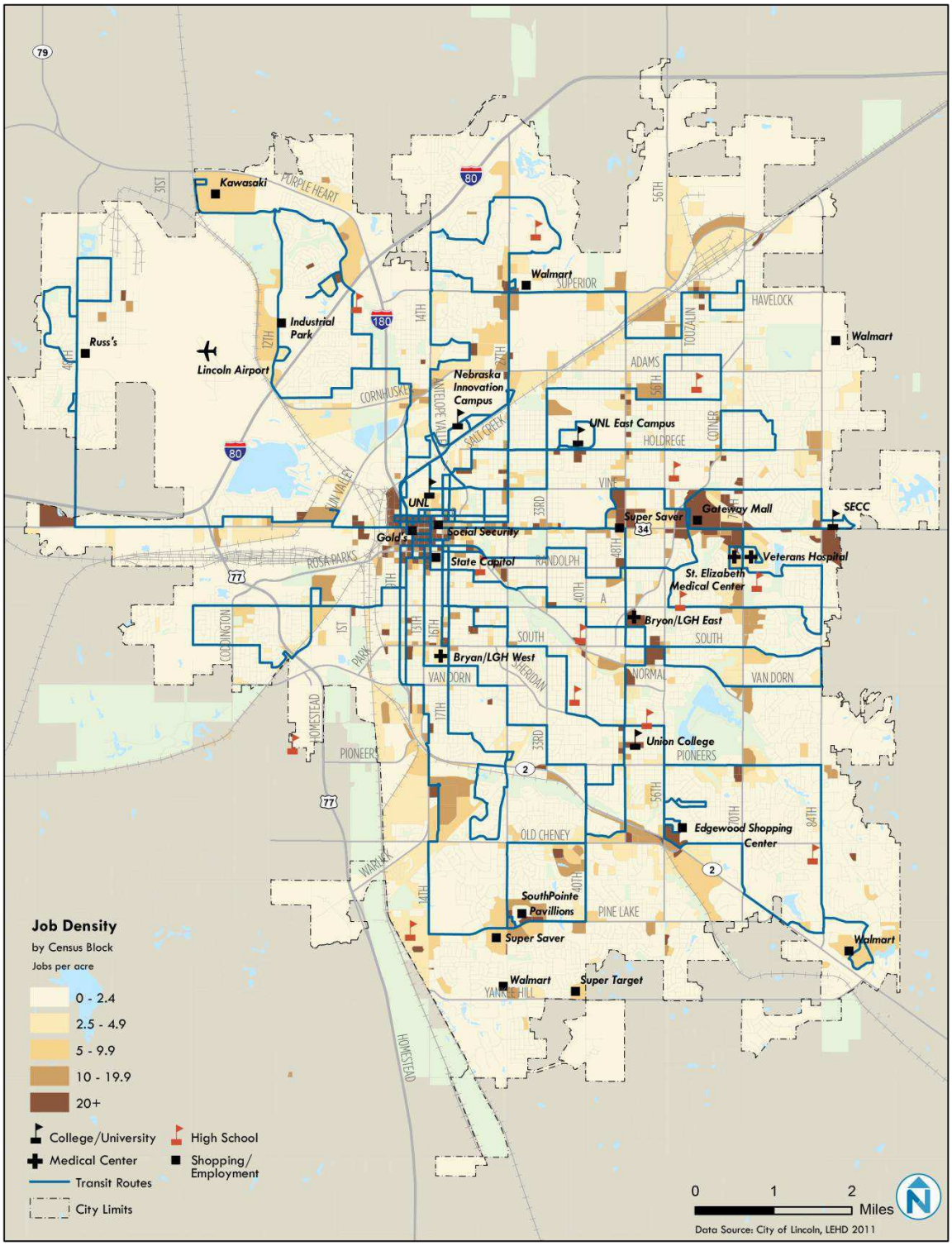


Figure 31 Home Locations of Downtown and UNL Employees

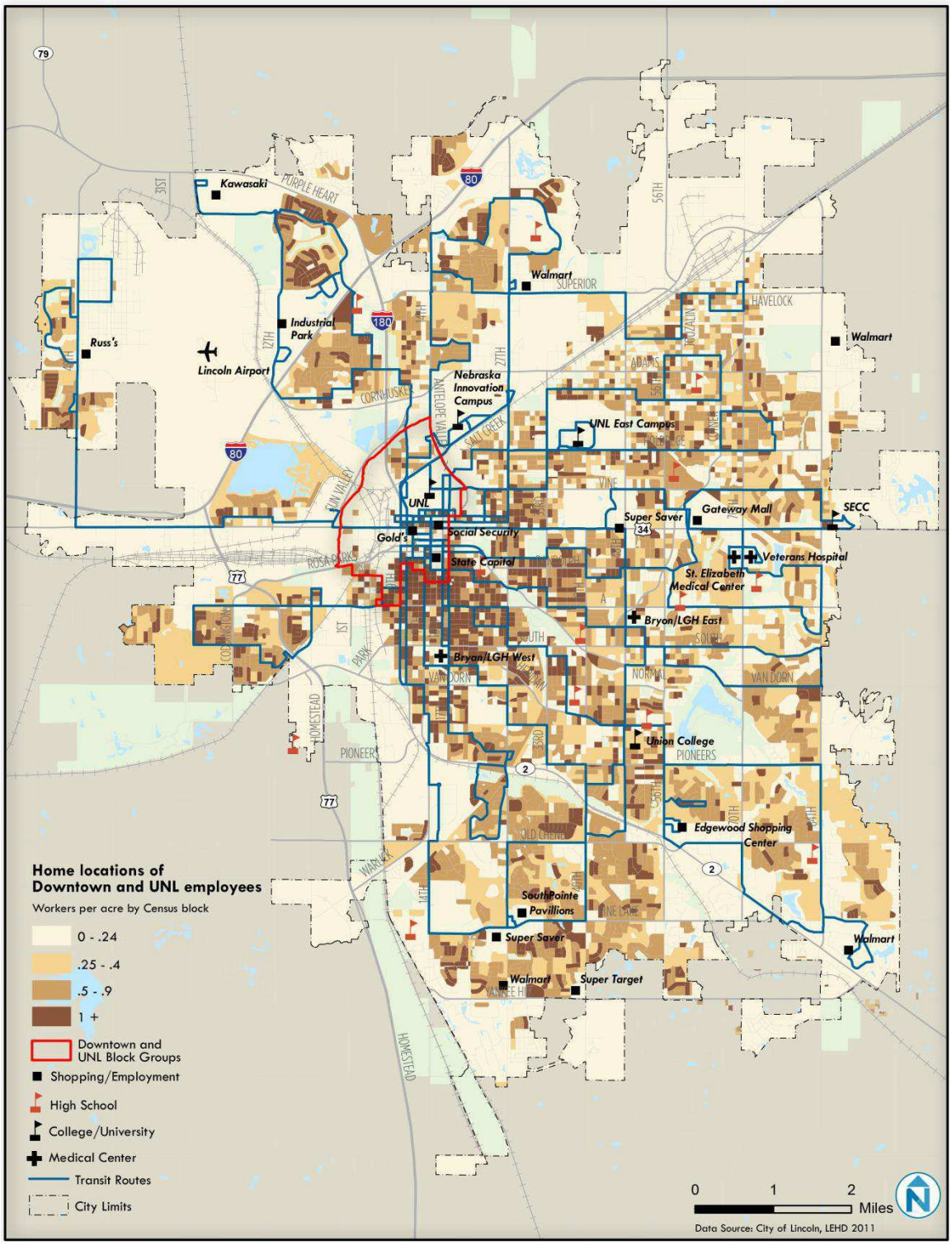


Figure 32 Home Locations of Veterans Hospital and St. Elizabeth Medical Center Employees

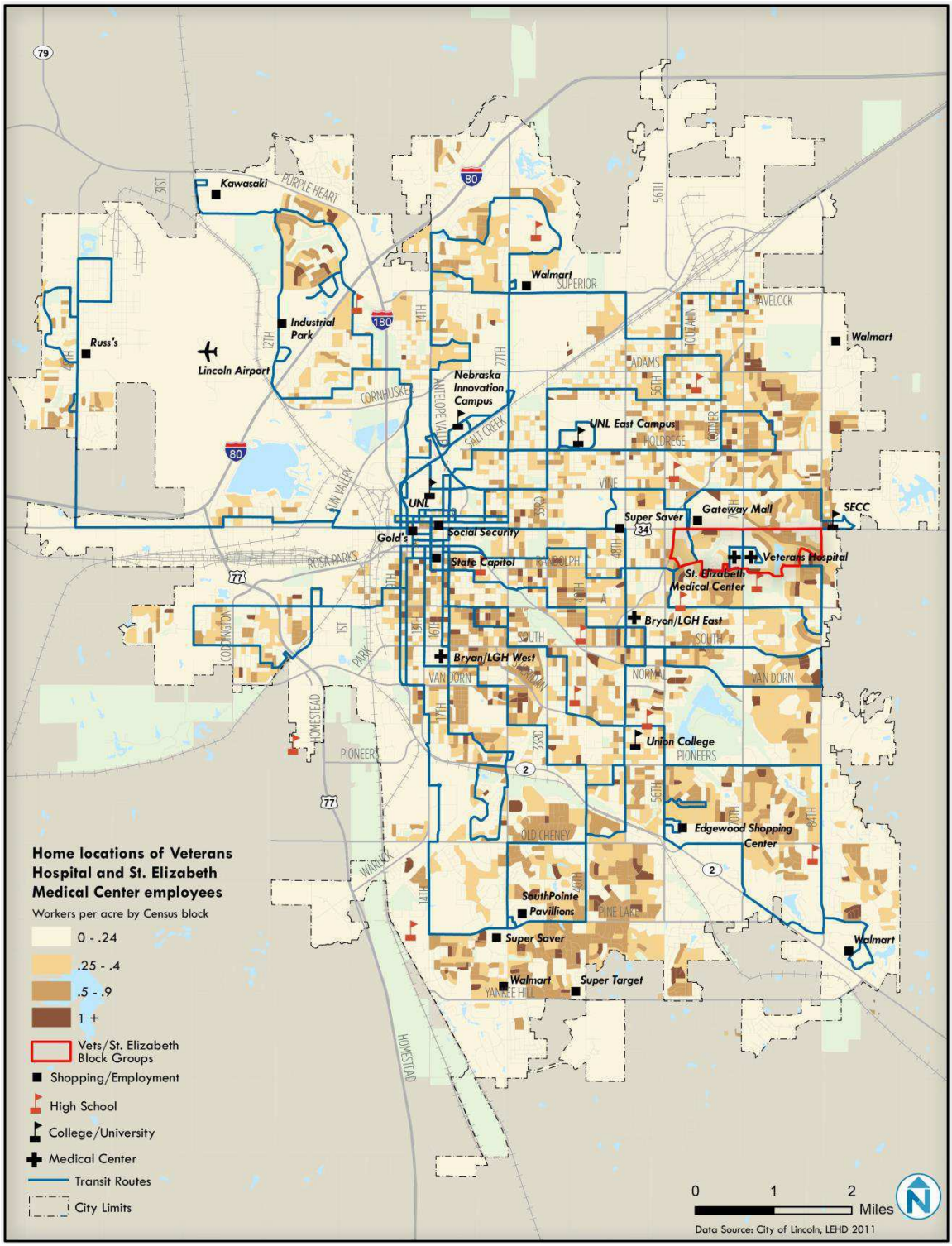


Figure 33 Home Locations of Gateway Mall employees

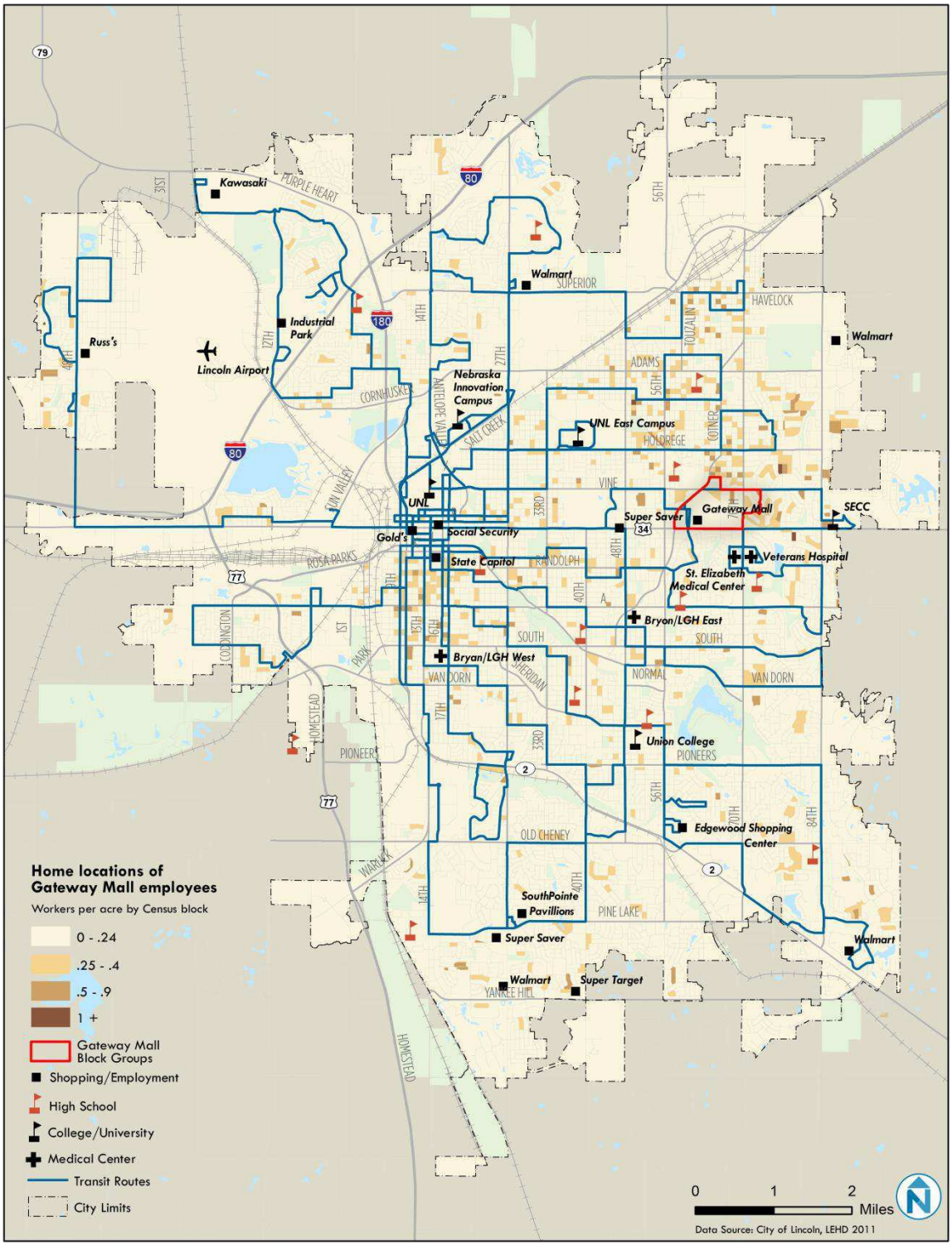


Figure 34 Home Locations of Kawasaki and Industrial Park Employees

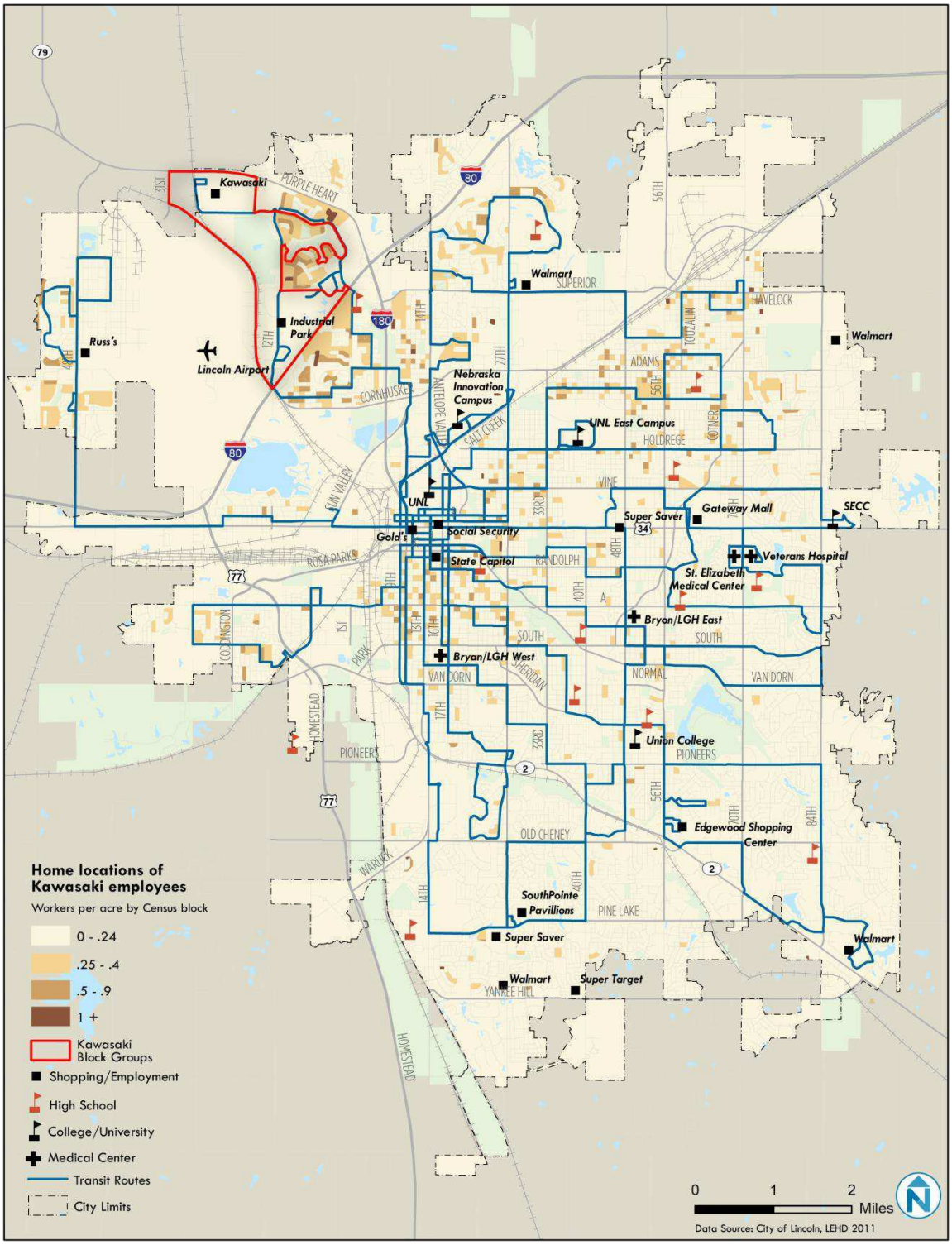


Figure 35 Home Locations of North 27th Street Corridor Employees

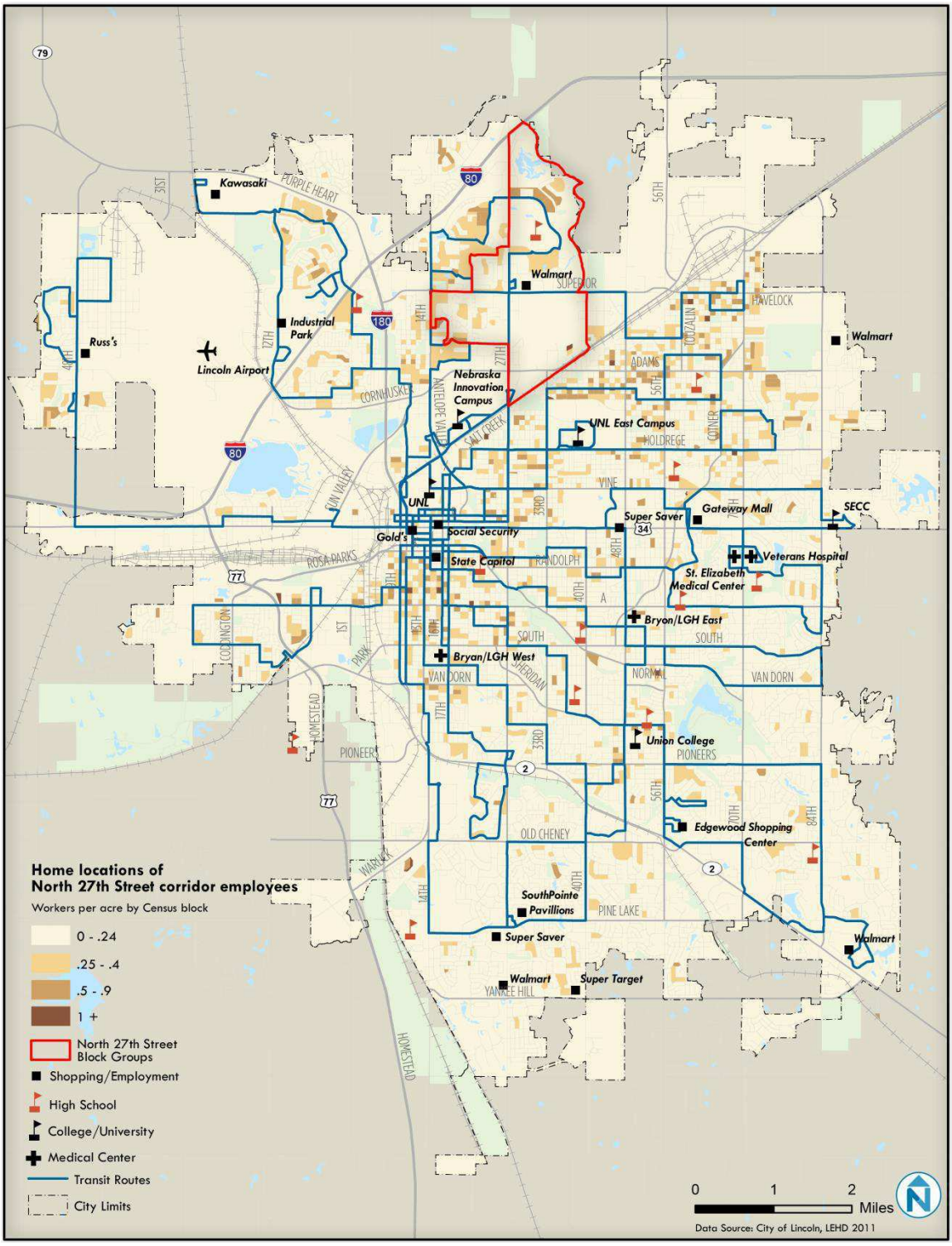
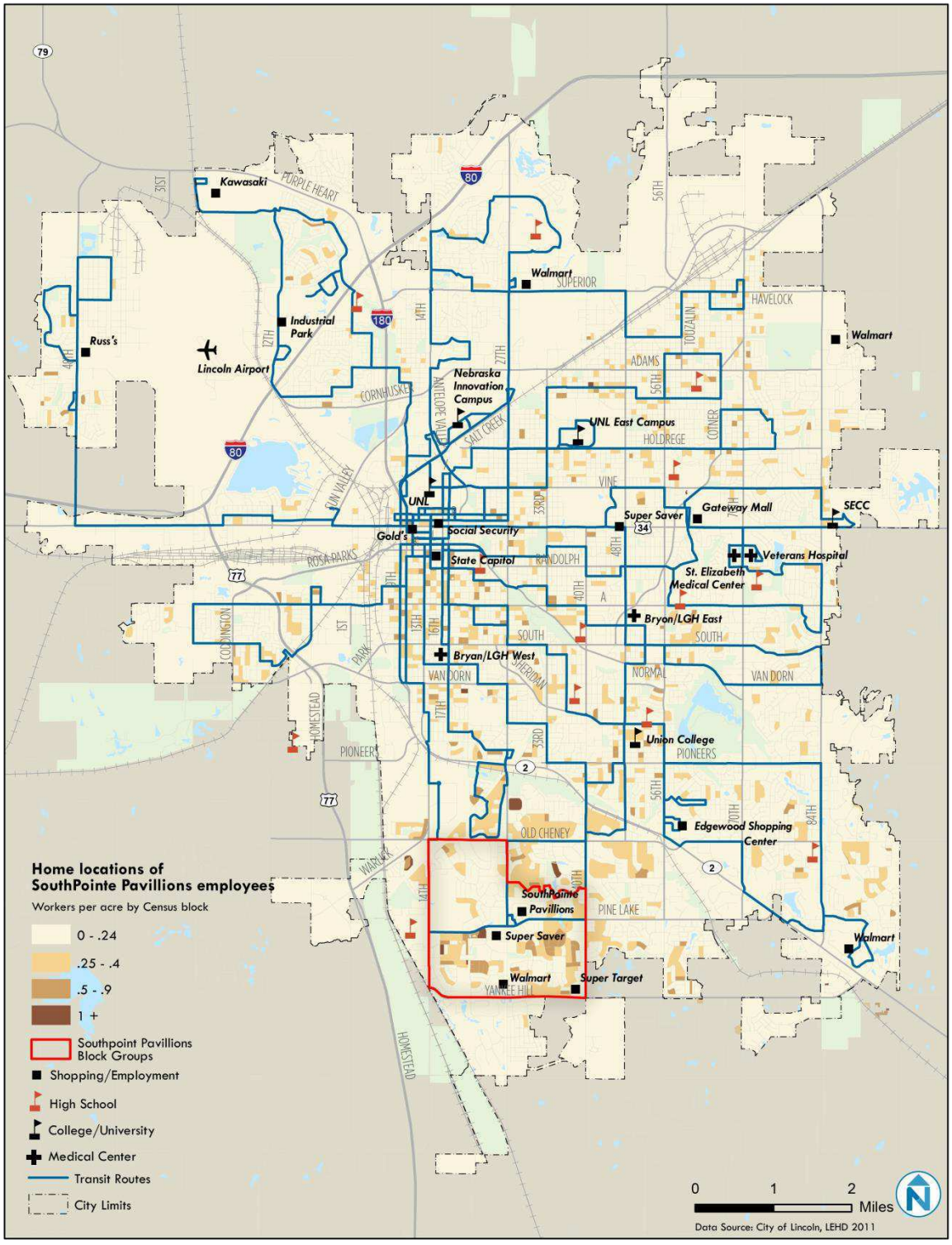


Figure 36 Home Locations of SouthPointe Pavilions Employees



5 ROUTE PROFILES

This section outlines service characteristics of StarTran's fixed routes, including general alignment, destinations served, number of stops, service span, number of one-way trips, ridership, productivity, and on-time performance.

Weekday service for most routes begins after 5:30 a.m. and ends before 7 p.m. (with the main exception being Routes 24 and 25, with service ending at 9 p.m.). Weekday frequencies for most routes run every 30 minutes during peak service and every 60 minutes for off-peak service (again with the exception of Routes 24 and 25, which operate every 10 to 20 minutes).

Saturday service for most routes begins after 6:30 a.m. and ends before 7 p.m. Saturday service runs on 60 minute frequencies.

Route 24 Holdrege

Route 24 operates Monday to Friday between UNL's Main and East campuses. The route travels clockwise around Main Campus and counterclockwise around East Campus. Each terminal loop includes stops near the center of each campus. Route 24 operates every 10 minutes between 6:40 a.m. and 5:30 p.m. when UNL is in session.

Route 24 has the highest average for both weekday ridership (2,307 daily boardings) and ridership productivity (43.1 boardings per hour) systemwide.

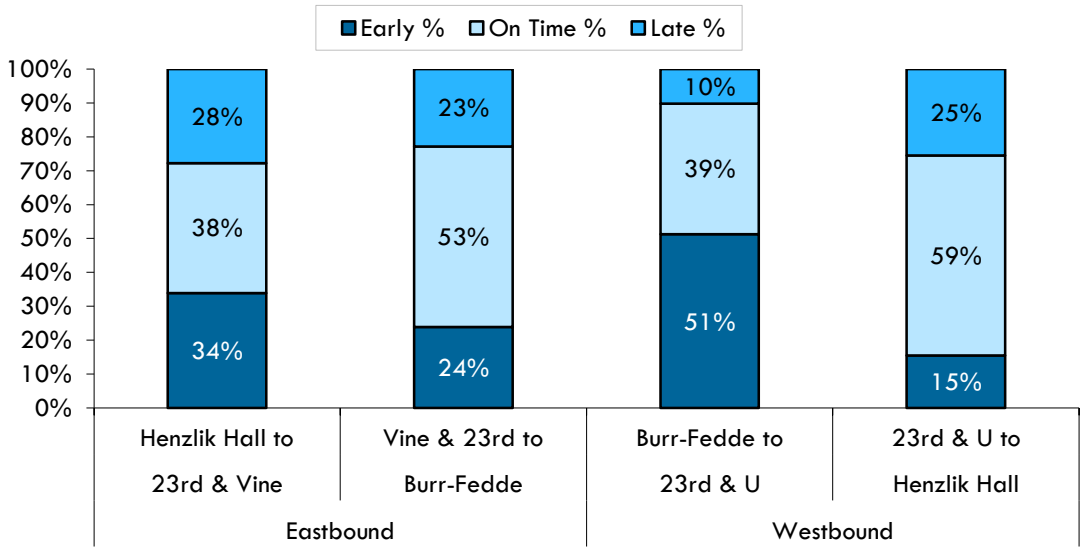
Route 24 Characteristics	
Weekday	
Service Span	6:40 a.m.–9 p.m.
Headway (peak/off-peak)	10/20
One Way Trips	151
Ridership	2,307
Revenue Hours	53.5
Productivity (boardings per hour)	43.1
On-Time Performance	47%

Route 24 operates a clockwise loop around UNL Main Campus and a counterclockwise loop around UNL East Campus. Ridership activity on each campus is distributed across several stops.

Ridership activity between the eastern edge of main campus and the western edge of East Campus is significantly lower than ridership along each campus loop. Route 49 travels along street segments that connect each campus (Vine, 27th and Holdrege).

Route 24 is on-time 47% of the time, which is tied for the lowest of all StarTran routes. Route 24 is also early 31% of the time, which is the highest rate of any route in the system. The high incidence (22%) of late trips can be attributed in part to the high number of boardings that regularly occur at specific stops on each campus during certain times of day, which can result in significant delay. While passenger boarding and alighting activity varies by direction and time of day, Route 24 has no variation in running times.

Figure 37 Route 24 On-Time Performance



Route 25 Vine

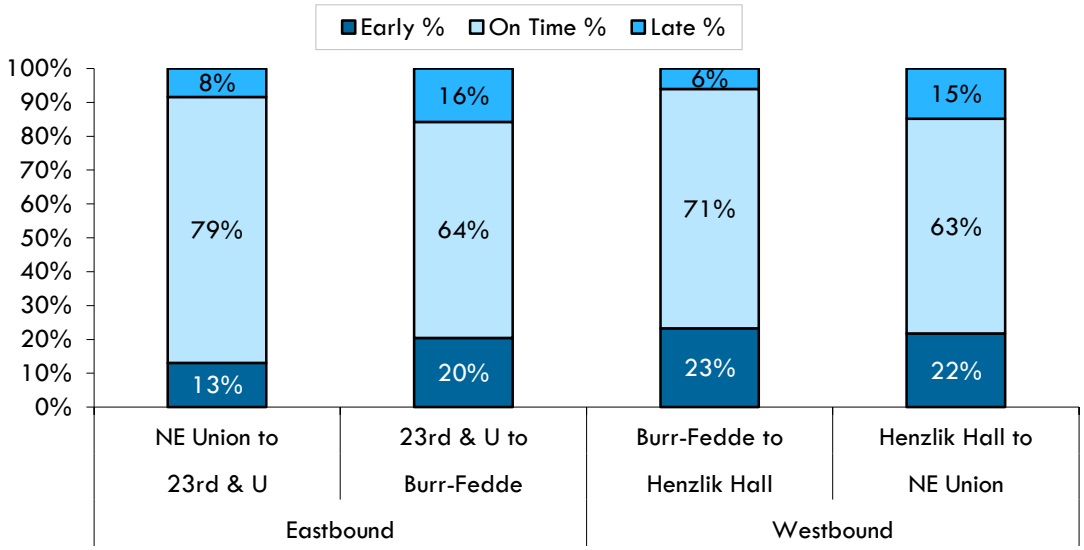
Route 25 operates Monday to Friday between UNL's Main and East Campuses but runs in the opposite direction of 24 around the Main campus (counterclockwise instead of clockwise, and along 9th Street instead of Stadium Drive). Route 25 operates every 10 minutes between 6:55 a.m. and 5:35 p.m. when UNL is in session.

Route 25 Characteristics	
Weekday	
Service Span	6:55 a.m.–9 p.m.
Headway (peak/off-peak)	10/20
One Way Trips	148
Ridership	1,771
Revenue Hours	52.3
Productivity (boardings per hour)	33.9
On-Time Performance	69%

Route 25 has the second-highest average weekday ridership (1,771 daily boardings) and ridership productivity (33.9 boardings per hour) systemwide.

Ridership within Main Campus is approximately 10% higher than East Campus. Like Route 24, ridership activity on each campus is distributed across several stops. Ridership at stops within UNL East Campus is nearly identical to Route 24 stops, suggesting that students traveling to or from East Campus students are taking the first route that arrives. However, UNL main campus ridership is approximately 20% higher on Route 24, suggesting a preference for the clockwise alignment.

Route 25 is on-time 69% of the time, which is among the highest of all StarTran routes. The ratio of early, on-time, and late trips is fairly even for each route segment.



Route 40 Heart Hospital

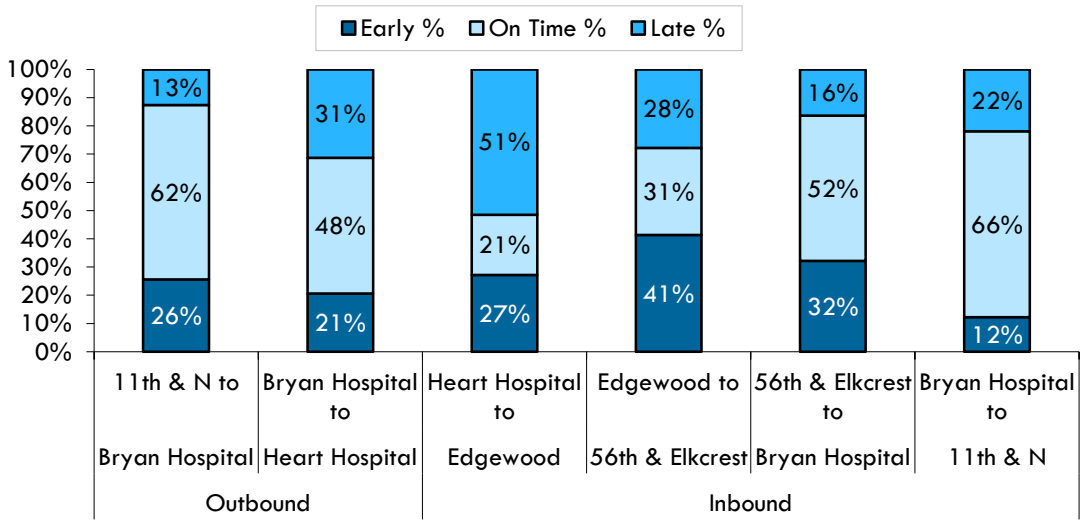
Route 40 operates Monday through Saturday. It is interlined with Route 41 and runs between Downtown and southeast Lincoln. The route leaves Downtown and travels south and east along a series of short street segments in a staircase fashion.

Systemwide, Route 40 ranks sixth for weekday ridership at 460 daily boardings. However, at 15.3 boardings per hour, it ranks second-to-last in terms of weekday ridership productivity. On Saturdays, it ranks fifth for productivity (17.3 boardings per hour).

Most passenger activity occurs between Downtown and Normal Boulevard. Route 40 ridership drops significantly south of Pioneers Boulevard, with a few stops generating moderate activity (Super Saver and Super Walmart). The southern terminal loop of Route 40 takes approximately 30 minutes to traverse and includes three deviations (Heart Hospital, Super Saver, and Colonial Hills).

Route 40 Characteristics	
Weekday	
Service Span	5:40 a.m.–7:20 p.m.
Headway (peak/off-peak)	30/60
One Way Trips	40
Ridership	456
Revenue Hours	29.8
Productivity (boardings per hour)	15.3
On-Time Performance	47%
Saturday	
Service Span	7 a.m.–5:35 p.m.
Headway	60
One Way Trips	21
Ridership	202
Revenue Hours	11.7
Productivity (boardings per hour)	17.3

Route 40 is on-time 47% of the time, which is tied for the lowest of all StarTran routes. The segment between the Heart Hospital and Edgewood Shopping Center is late on 51% of all trips. The route travels along Nebraska Highway for two portions of this segment and encounters several major intersections.



Route 41 Havelock

Route 41 operates Monday through Saturday. It is interlined with Route 40, connecting Downtown with northeast Lincoln. The alignment is primarily along 27th Street, Superior Street, Fremont, and Havelock Avenue.

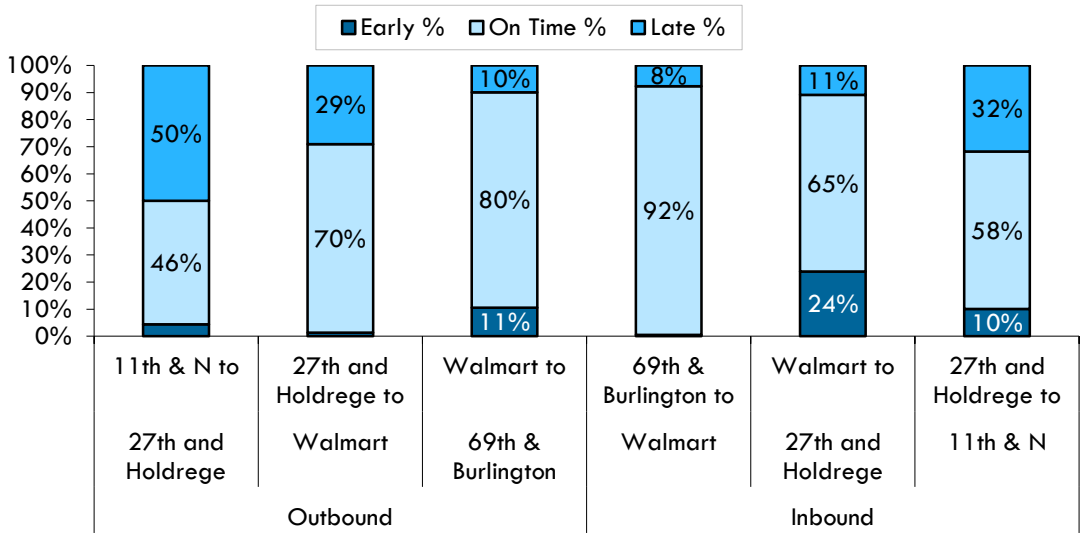
Route 41 Characteristics	
Weekday	
Service Span	5:15 a.m.–7:05 p.m.
Headway (peak/off-peak)	30/60
One Way Trips	41
Ridership	678
Revenue Hours	31
Productivity (boardings per hour)	21.9
On-Time Performance	68%
Saturday	
Service Span	6:30 a.m.–6:55 p.m.
Headway	60
One Way Trips	24
Ridership	367
Revenue Hours	12.6
Productivity (boardings per hour)	29.1

Route 41 has the third highest ridership systemwide (678 daily boardings). At 21.9 boardings per hour, it is just above the systemwide average for weekday ridership productivity. On Saturdays, Route 41 ranks first both for average ridership (367 boardings) and productivity (29.1 boardings per hour).

Route 41 deviates from 27th Street to serve the Walmart in North Lincoln, which is the highest ridership stop at 137 average daily boardings. There is also high ridership activity in and around Downtown and moderate activity along the 27th Street corridor. Route 41 travels within three blocks of Route 49 as it serves Fremont. Route productivity east of Walmart on Superior Street and in Havelock is almost 50% lower than the remainder of the route.

On-time performance is poor in the outbound direction. Half of all trips departing 27th & Holdrege are late, which is among the worst of all route segments in the system. Twenty-nine percent of trips departing the next timepoint (Walmart) are also late. In the opposite direction, on-time performance issues are also present along 27th Street and into Downtown.

Figure 38 Route 41 On-Time Performance



Route 42 Bethany

Route 42 operates Monday through Saturday, and is interlined with Route 43. It connects Downtown with northeast Lincoln, operating primarily along Holdrege Street.

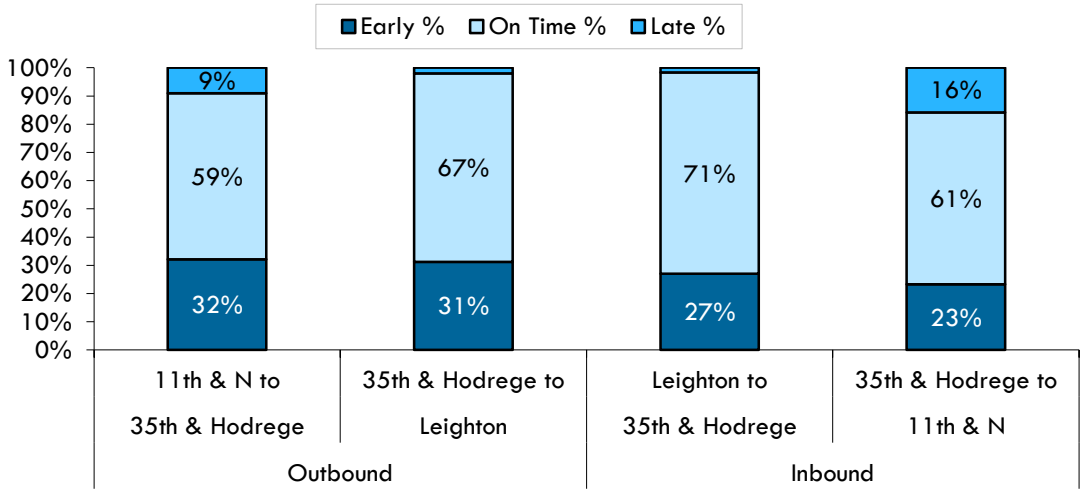
Route 42 ranks among the bottom third of routes in terms of average weekday ridership (305 daily boardings) and third-to-last in terms of weekday ridership productivity (15.4 boardings per hour). Among Saturday routes, Route 42 ranks in the lower half for average ridership (137 boardings) and productivity (11.8 boardings per hour)

Route 42 travels along the southern edge of the UNL East Campus. However, the only substantial ridership activity along the route occurs within or immediately adjacent to Downtown.

Route 42 has the lowest incidence of late trips of all StarTran routes (7%). This statistic is likely due to its direct alignment and low ridership activity on each route segment.

Route 42 Characteristics	
Weekday	
Service Span	6:15 a.m.–6:45 p.m.
Headway (peak/off-peak)	30/60
One Way Trips	38
Ridership	305
Revenue Hours	19.8
Productivity (boardings per hour)	15.4
On-Time Performance	64%
Saturday	
Service Span	7 a.m.–6 p.m.
Headway	60
One Way Trips	22
Ridership	137
Revenue Hours	11.7
Productivity (boardings per hour)	11.8

Figure 39 Route 42 On-Time Performance



Route 43 Normal

Route 43 runs Monday through Saturday, and is interlined with Route 42. It connects Downtown with southeast Lincoln. It travels east from Downtown primarily via J, L, and F Streets, turns south on 48th Street, then loops clockwise via South Street, 84th Street, Van Dorn, and Normal Boulevard. The eastern terminal loop creates a ½ mile gap between eastbound and westbound stops for approximately two miles.

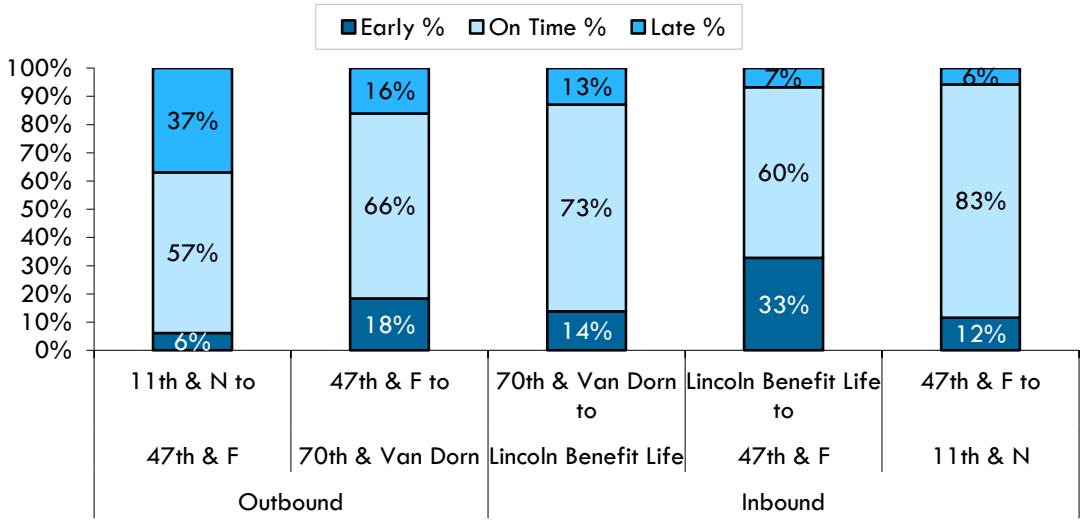
Route 43 Characteristics	
Weekday	
Service Span	6:15 a.m.–6:45 p.m.
Headway (peak/off-peak)	30/60
One Way Trips	38
Ridership	270
Revenue Hours	19.8
Productivity (boardings per hour)	13.6
On-Time Performance	68%
Saturday	
Service Span	7 a.m.–6 p.m.
Headway	60
One Way Trips	22
Ridership	89
Revenue Hours	11.7
Productivity (boardings per hour)	7.6

Route 43 ranks in the bottom third of routes in terms of average weekday ridership (270 daily riders). At 13.6 boardings per hour, it ranks last for weekday ridership productivity. Among Saturday routes, Route 43 ranks second-to-last for average ridership with 89 boardings and last for productivity (7.6 boardings per hour).

Ridership drops significantly east of 48th Street, and productivity east of 48th Street is only 6.8 passengers per hour. The highest amount of ridership activity occurs Downtown, along J Street, and in the vicinity of 48th & Randolph.

Route 43 is on-time 68% of the time, which is better than the system average of 61%. Thirty-seven percent of trips departing 47th & F Streets in the outbound direction are late. Route 43 travels along several neighborhood streets east of Downtown prior to reaching this timepoint.

Figure 40 Route 43 On-Time Performance



Route 44 "O" Street/SCC

Route 44 operates Monday through Saturday, connecting Downtown with east Lincoln. Major destinations along the route include Gateway Mall and Southeast Community College.

The route runs primarily along O Street and Vine Street. The route runs bi-directionally between downtown and Gateway Mall. East of Gateway Mall, the route operates a counterclockwise loop along O Street and Vine. The eastern terminal loop creates a ½ mile gap between eastbound and westbound stops for approximately two miles.

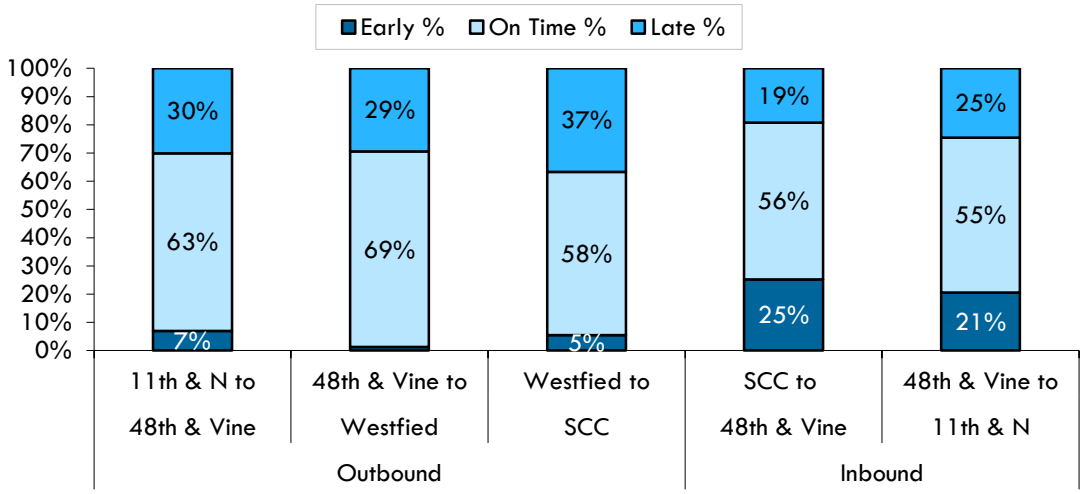
Route 44 ranks in the top third for both average weekday ridership (480 daily boardings) and for weekday ridership productivity (23.6 boardings per hour). The highest ridership stops outside of Downtown are Gateway Mall (80 boardings) and Southeast Community College (34 boardings). On Saturdays, Route 44 ranks second highest for both ridership and productivity.

Route 44 Characteristics	
Weekday	
Service Span	6:10 a.m.–7:05 p.m.
Headway (peak/off-peak)	30/70
One Way Trips	35
Ridership	480
Revenue Hours	20.3
Productivity (boardings per hour)	23.6
On-Time Performance	60%
Saturday	
Service Span	6:30 a.m.–6:25 p.m.
Headway	60
One Way Trips	24
Ridership	306
Revenue Hours	12.2
Productivity (boardings per hour)	25.1

The weekday off-peak headway is an inconvenient 70 minutes, which prevents timed transfers with other StarTran routes. Routes 44 and 54 operate on the identical alignment between 44th Street and Downtown. The schedules are not coordinated during peak times, so buses are often five minutes apart on the corridor.

Route 44 ranks second among all routes for late trips at 28%. High traffic along O Street is likely the primary cause of delay, particularly during peak hours. The on-time performance is also one of the reasons StarTran shifted midday frequencies to 70-minute service.

Figure 41 Route 44 On-Time Performance



Route 45 Arapahoe

Route 45 operates Monday to Saturday and is interlined with Route 46 on weekdays and with Route 47 on Saturday. It connects Downtown with south Lincoln, operating primarily along 13th Street, Lake Street, 17th Street, and Canterbury Lane. On Saturdays, it operates along 9th and 10th Streets in place of 13th Street.

Route 45 Characteristics	
Weekday	
Service Span	6:10 a.m.–6:40 p.m.
Headway (peak/off-peak)	30/60
One Way Trips	40
Ridership	355
Revenue Hours	20.3
Productivity (boardings per hour)	17.5
On-Time Performance	69%
Saturday	
Service Span	7 a.m.–6 p.m.
Headway	60
One Way Trips	22
Ridership	218
Revenue Hours	11.7
Productivity (boardings per hour)	18.7

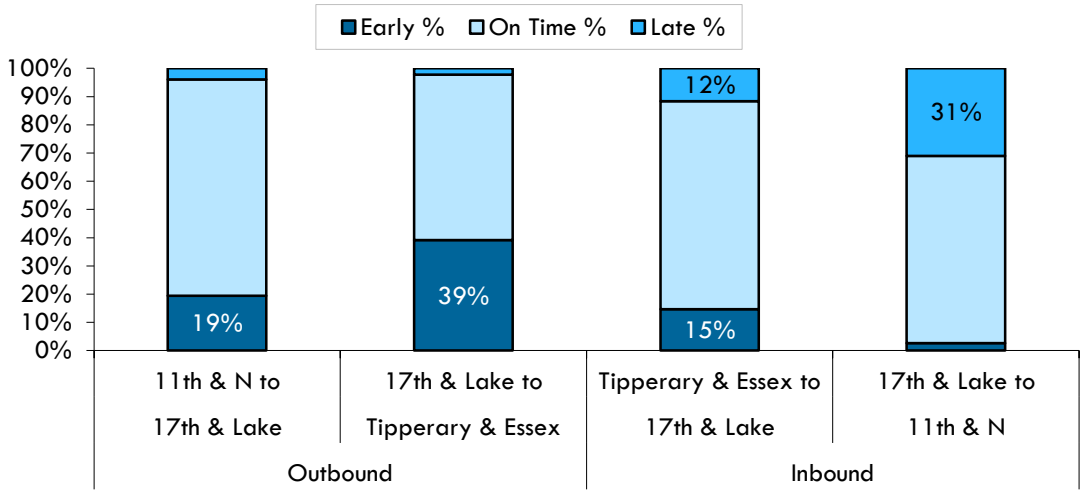
Route 45 ranks in the middle of system routes in terms of average weekday ridership (355 daily boardings) and below the system average of weekday ridership productivity (17.5 boardings per hour). Route 45 has the fourth highest Saturday ridership (218 boardings) and third highest productivity (18.7 boardings per hour).

Between Downtown and 17th/ Lake, Route 45 carries 27.5 passengers per hour, while south of Lake Street, productivity drops to eight passengers per hour. The only stops generating significant ridership along the southern half of the route are at the Shopko shopping center north of Nebraska Highway (39 boardings) and the Southwood Clubhouse (14 boardings).

Route 45's primary ridership market on 13th Street is within walking distance of both Routes 48 and 53, as it is approximately 0.25 miles to either route from 13th Street.

While late trips are not an issue in the outbound direction, 31% of trips departing Downtown are late. A high percentage of outbound trips are early, indicating excess running time within the schedule.

Figure 42 Route 45 On-Time Performance



Route 46 Arnold Heights

Route 46 operates Monday to Saturday and is interlined with Route 45 on weekdays. It connects Downtown to northwest Lincoln, terminating just west of the Lincoln Municipal Airport. The route operates primarily along West O Street and NW 48th Street.

Route 46 Characteristics	
Weekday	
Service Span	5:40 a.m.–7:10 p.m.
Headway (peak/off-peak)	30/60
One Way Trips	42
Ridership	433
Revenue Hours	21.6
Productivity (boardings per hour)	20
On-Time Performance	59%
Saturday	
Service Span	7 a.m.–6:30 p.m.
Headway	60
One Way Trips	23
Ridership	161
Revenue Hours	12.3
Productivity (boardings per hour)	13.2

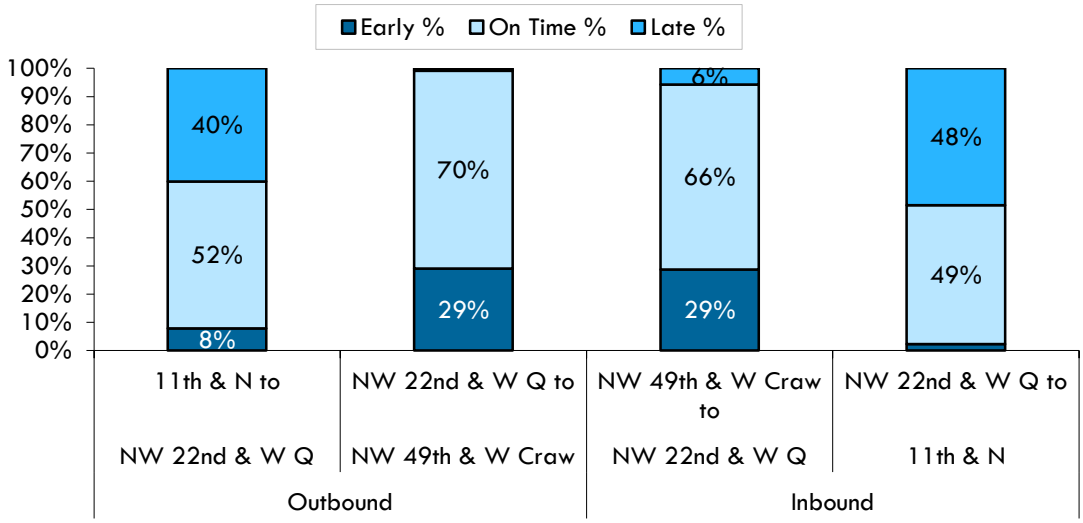
Route 46 ranks seventh overall in terms of average weekday ridership (433 daily riders) but falls just below the systemwide average for weekday ridership productivity at 20 boardings per hour. Route 46 ranks in the middle of Saturday routes in terms of average ridership (161 boardings) and below average for productivity (13.2 boardings per hour).

Route 46 makes deviations on select trips. Seven trips deviate to serve Speed Way. According to the ridership data, only one boarding and one alighting are present at this location. Four trips deviate to the Lancaster County Corrections facility by Air Park Road. Only five boarding and alighting are present in this loop. Neither deviation is generating significant ridership and both are slowing service for existing customers.

Destinations with high ridership activity include Community Action at 1st and O Streets (64 boardings), residential areas near West Q Street, and the Arnold Heights neighborhood. Three-quarters of Route 46's ridership occurs between West Q Street and Downtown. Productivity in this segment is almost 45 passengers per hour, which places it among the highest productive segments in all of Lincoln. Ridership in the remaining segment is only eight passengers per hour.

A high percentage of trips are late between downtown and NW 22nd Street. Conversely, a high percentage of trips are early along the western half of the route, indicating an imbalance of running times.

Figure 43 Route 46 On-Time Performance



Route 47 Belmont

Route 47 operates Monday to Saturday and is interlined with Route 48 on weekdays and with Route 45 on Saturdays. It connects Downtown with north Lincoln and operates primarily via North 14th Street and a counterclockwise loop via Hilltop Road, Superior Street, 27th Street, North Hill Road, 33rd Street, Fletcher Ave, and N. 23rd Street.

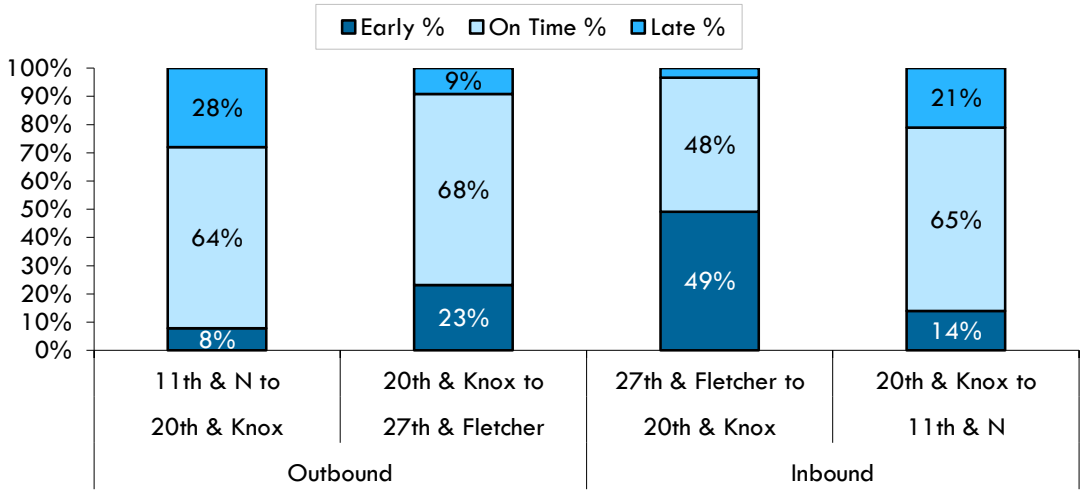
Route 47 ranks in the lower half of all routes in terms of average weekday ridership (309 daily boardings) and fourth-to-last for weekday ridership productivity (15.6 boardings per hour). Among Saturday routes, Route 47 ranks in the lower half in terms of average ridership (139 boardings) and productivity (11.8 boardings per hour).

Destinations with high ridership activity include stops serving North Star High School, the Walmart on 27th, multi-family residential housing along Superior Street, and along Knox Street. Route 47 does not serve UNL's campus effectively, as there are no stops on 10th Street between Y and Q Streets.

Route 47 Characteristics	
Weekday	
Service Span	5:45 a.m.–6:45 p.m.
Headway (peak/off-peak)	30/60
One Way Trips	38
Ridership	309
Revenue Hours	19.8
Productivity (boardings per hour)	15.6
On-Time Performance	61%
Saturday	
Service Span	7 a.m.–6 p.m.
Headway	60
One Way Trips	22
Ridership	139
Revenue Hours	11.7
Productivity (boardings per hour)	11.8

Route 46's on-time performance is average, at 61% of trips operating on-time. Late running is more common between Downtown and 20th / Knox. Approximately half of inbound trips depart at 20th & Knox early.

Figure 44 Route 47 On-Time Performance



Route 48 Salt Valley

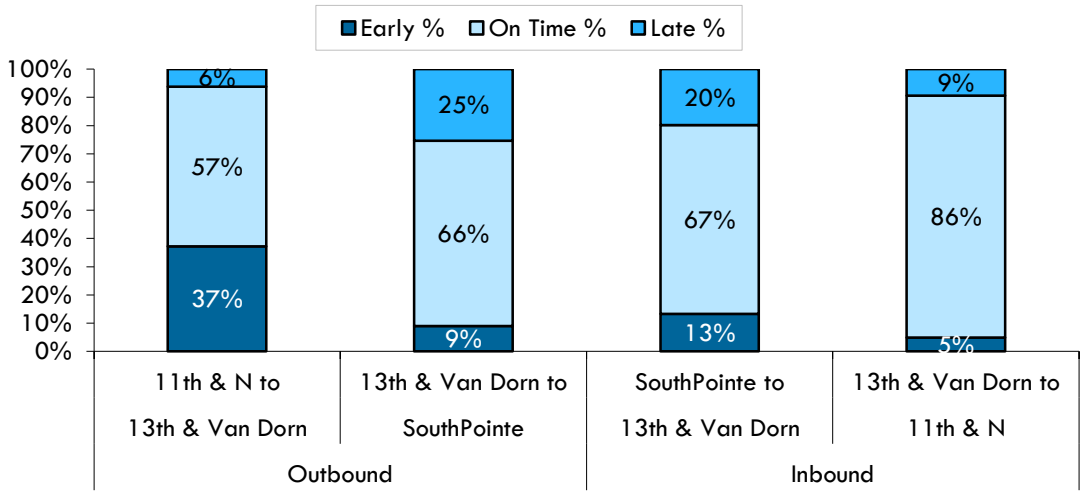
Route 48 operates Monday to Friday and is interlined with Route 47. It connects Downtown with south Lincoln. Unlike most StarTran services, Route 48 is fairly direct due to its north-south orientation.

Route 48 Characteristics	
Weekday	
Service Span	6:15 a.m.–6:45 p.m.
Headway (peak/off-peak)	30/60
One Way Trips	36
Ridership	309
Revenue Hours	18.8
Productivity (boardings per hour)	16.4
On-Time Performance	69%

Route 48 ranks among the bottom third of routes in terms of both average weekday ridership (309 daily boardings) and ridership productivity (16.4 boardings per hour). Ridership drops significantly south of South Street primarily due to reduced residential and employment densities. North of South Street, productivity is 25.6 passengers per hour, whereas south of South Street, productivity is 8.6 passengers per hour. There is virtually no ridership activity between Van Dorn and Pine Lake Road, a stretch of three miles. Moderate ridership activity is present along Pine Lake and at the Southpointe Pavilions endpoint.

Sixty-nine percent of all trips are on-time, which is higher than the system average of 61%.

Figure 45 Route 48 On-Time Performance



Route 49 University Place

Route 49 operates Monday to Saturday and is interlined with Route 50 on weekdays. It connects Downtown with northeast Lincoln. Route 49 provides an additional link between UNL Main and East campuses.

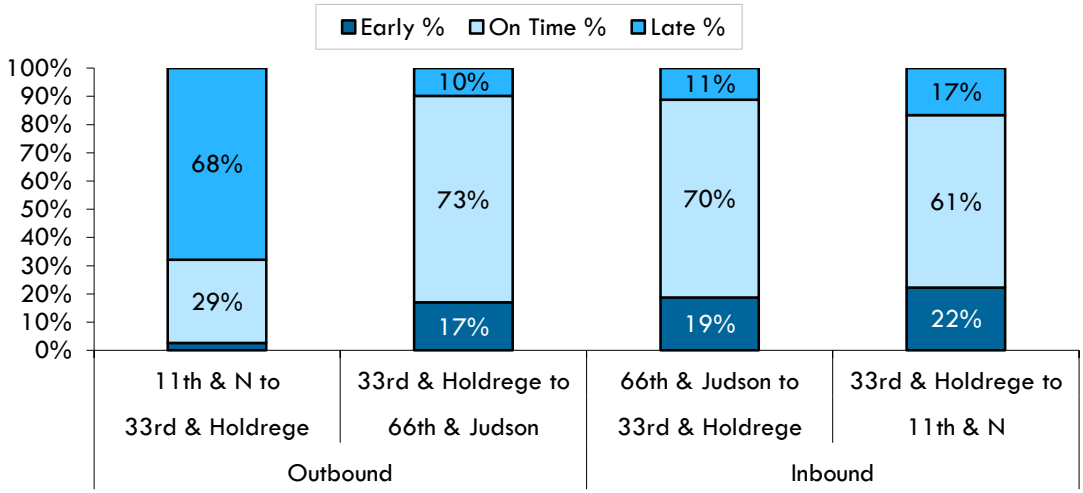
Route 49 ranks fifth systemwide for average weekday ridership (463 daily boardings) and sixth for weekday ridership productivity (23.4 boardings per hour). It falls below the Saturday systemwide average for both average ridership (165 boardings) and productivity (13.6 boardings per hour).

The route is most productive between 33rd St/ Holdrege Street and Downtown. The ridership pattern does not suggest large numbers of UNL riders—it appears most are taking Route 24 or 25 between the Main and East Campus. Additional ridership activity to note occurs along St. Paul Avenue and near Northeast High School. Huntington Avenue also has a cluster of ridership activity. The large eastern terminal loop has low ridership along 56th Street and Judson Street.

Route 49 Characteristics	
Weekday	
Service Span	6:15 a.m. – 6:45 p.m.
Headway (peak/off-peak)	30/60
One Way Trips	38
Ridership	463
Revenue Hours	19.8
Productivity (boardings per hour)	23.4
On-Time Performance	58%
Saturday	
Service Span	7 a.m. – 6 p.m.
Headway	60
One Way Trips	22
Ridership	165
Revenue Hours	12.1
Productivity (boardings per hour)	13.6

Route 49 on-time performance (58%) is below the system average (61%). A high percentage (68%) of outbound trips departing 33rd & Holdrege are late. Operators identified the St. Paul Avenue as a cause of slow operations, due to multiple uncontrolled intersections.

Figure 46 Route 49 On-Time Performance



Route 50 College View

Route 50 operates Monday to Saturday and is interlined with Route 49 on weekdays. It connects Downtown with southeast Lincoln, reaching as far south at 48th Street and Briarpark Drive. The route operates along different streets between South 21st and 27th Streets. Weekday and Saturday alignments are slightly different.

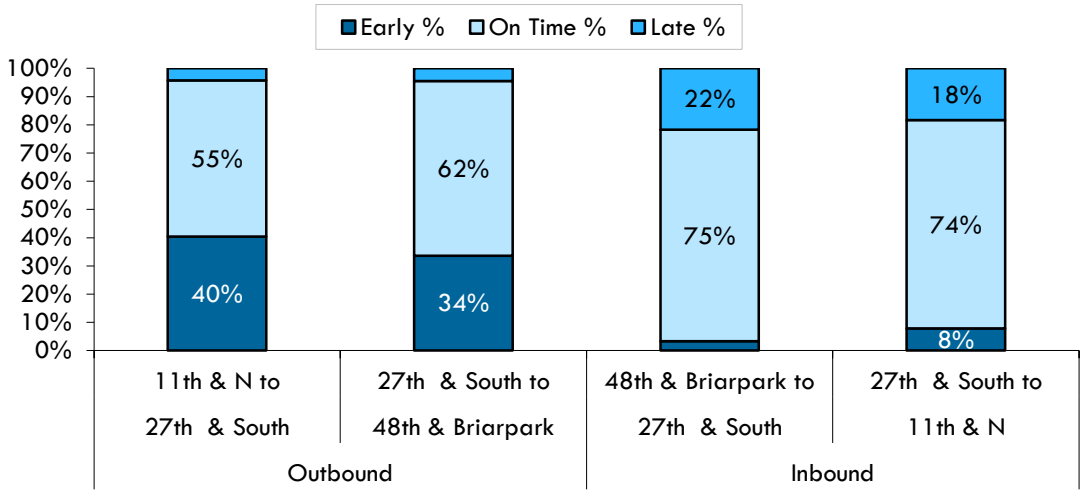
Route 50 Characteristics	
Weekday	
Service Span	6:15 a.m.–6:45 p.m.
Headway (peak/off-peak)	30/60
One Way Trips	38
Ridership	376
Revenue Hours	19.8
Productivity (boardings per hour)	19
On-Time Performance	67%
Saturday	
Service Span	7 a.m.–6 p.m.
Headway	60
One Way Trips	22
Ridership	221
Revenue Hours	12.1
Productivity (boardings per hour)	18.3

Route 50 ranks near the middle of all routes in terms of average weekday ridership (376 daily boardings) and ridership productivity (19 boardings per hour), but below the systemwide average for both. Among Saturday routes, it ranks third for average ridership (221 boardings) and fourth for productivity (18.3 boardings per hour).

The segment between 27th Street/ South Street and Downtown has twice the productivity (26.2 passengers per hour) of the segment to the south (13.3 passengers per hour). Approximately one-third of Route 50's ridership activity is between A Street and Downtown, which is duplicated by Route 53. The Route 50 and Route 53 schedules are not coordinated, so buses often come within five minutes of each other. Route 50 operates on neighborhood streets such as 37th Street that provide closer access to schools, but generate very little ridership otherwise.

On-time performance is worse in the outbound direction, with a high percentage of trips departing late at designated timepoints.

Figure 47 Route 50 On-Time Performance



Route 51 West "A"

Route 51 operates Monday to Saturday and is interlined with Route 52. It connects Downtown with southwest Lincoln, operating primarily via E Street, 6th Street, A Street, and then performing a clockwise loop via Folsom Street, South Street, and SW 27th Street.

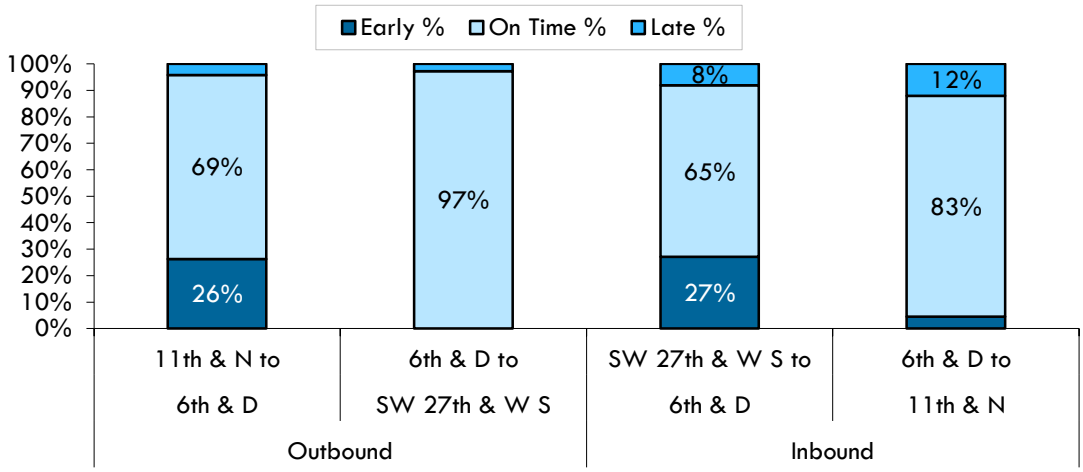
Route 51 Characteristics	
Weekday	
Service Span	5:45 a.m.–6:15 p.m.
Headway (peak/off-peak)	60/120
One Way Trips	17
Ridership	227
Revenue Hours	9.3
Productivity (boardings per hour)	24.4
On-Time Performance	79%
Saturday	
Service Span	7 a.m.–5:30 p.m.
Headway	60
One Way Trips	11
Ridership	95
Revenue Hours	5.8
Productivity (boardings per hour)	16.3

Being that Route 51 runs approximately half the amount of trips compared to other routes, it ranks second-to-last in terms of average weekday ridership (227 daily boardings). However, it ranks fourth in terms of weekday ridership productivity (24.4 boarding per hour). Among Saturday routes, Route 51 ranks among the bottom third for average ridership (95 boardings) but is above the systemwide average at 16.3 boardings per hour.

West of Downtown, the only significant ridership activity occurs at the intersection of SW 27th and South Streets (58 boardings). A large apartment complex is situated at this location, and it is the closest stop to the Lincoln Correctional Center, which has a work-release program. The route is circuitous, making out-of-direction travel in downtown as well as multiple deviations into neighborhoods that carry few passengers. Route 51 operates at an inconvenient 120 minutes during the weekday off-peak period.

Route 51 has the best on-time performance of all StarTran routes, with 79% of trips departing on-time. This statistic is likely due to the low ridership along the majority of the route.

Figure 48 Route 51 On-Time Performance



Route 52 Gaslight

Route 52 operates Monday to Saturday and is interlined with Route 51. It connects Downtown with northwest Lincoln. The northbound route travels primarily via 10th Street, 1st Street, W. Fletcher Avenue, terminating on N.W. 27th Street. The southbound route operates on a similar alignment but travels along N.W. 12th Street and W. Dawes in place of 1st Street.

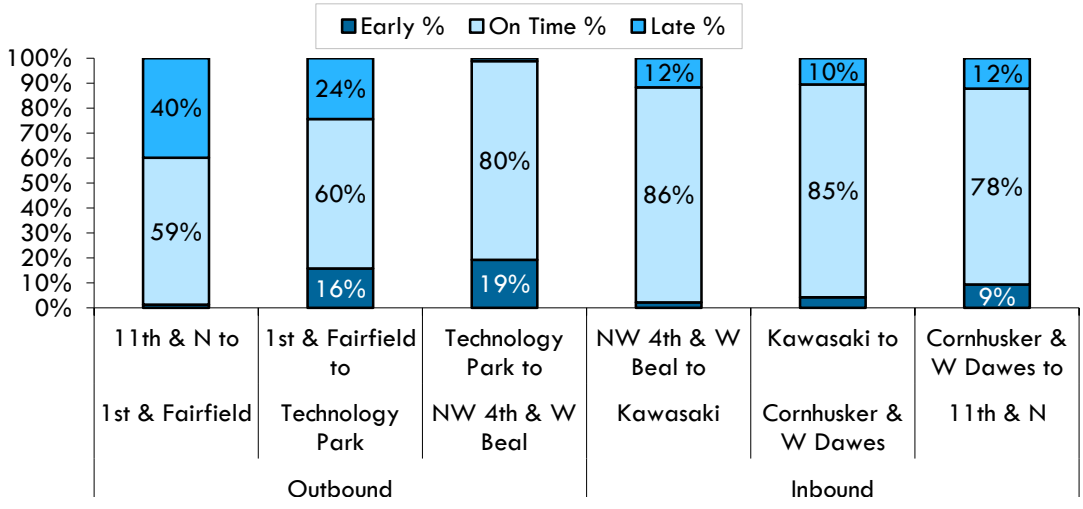
Route 52 Characteristics	
Weekday	
Service Span	5:45 a.m.–6:15 p.m.
Headway (peak/off-peak)	60/120
One Way Trips	20
Ridership	180
Revenue Hours	10.5
Productivity (boardings per hour)	17.1
On-Time Performance	75%
Saturday	
Service Span	7:30 a.m.–6 p.m.
Headway	60
One Way Trips	11
Ridership	66
Revenue Hours	6
Productivity (boardings per hour)	11.1

Like Route 51, Route 52 runs half the amount of trips compared to other routes, and consequently ranks last in terms of average weekday ridership (180 daily boardings). It ranks in the middle in terms of weekday ridership productivity (17.1 boardings per hour). Route 52 ranks last among Saturday routes for average ridership (66 boardings).

Destinations served with higher ridership include stops around Industrial Park (approximately 30 boardings) and Kawasaki (12 boardings). Route 52's alignment is confusing for existing and potential customers. It includes a one-way loop, with deviations into industrial areas. Anyone using the service in the middle part of the route has significant out-of-direction travel in at least one direction of their trip.

Furthermore, Route 52 operates at an inconvenient 120 minutes during the weekday off-peak period. Route 52 has the second best on-time performance of all StarTran routes, with 75% of trips on-time. The majority of late departures take place at outbound timepoints.

Figure 49 Route 52 On-Time Performance



Route 53 SouthPointe

Route 53 operates Monday through Friday and connects Downtown with south Lincoln. The southbound route leaves Downtown via 16th Street, then steps down southeast primarily via Lake Street, 27th Street, Calvert Street, 33rd Street, Pioneers Boulevard, then performs a clockwise loop via 40th Street, Pine Lake Road, 27th Street, and Old Cheney Road. The northbound alignment is similar, but returns to Downtown via 17th Street instead of 16th Street.

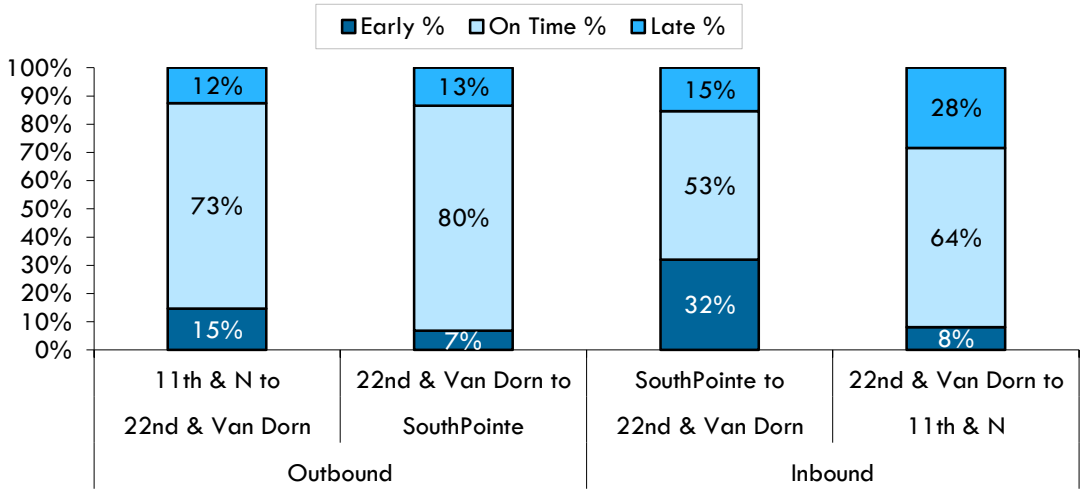
Route 53 Characteristics	
Weekday	
Service Span	6:05 a.m.–7:05 p.m.
Headway (peak/off-peak)	30/70
One Way Trips	34
Ridership	343
Revenue Hours	21.5
Productivity (boardings per hour)	16
On-Time Performance	67%

Route 53 ranks near the middle in terms of average weekday ridership (343 daily boardings) but is among the bottom third in terms of weekday ridership productivity (16 boardings per hour).

Route 53 carries only 7.7 passengers per hour on the segment south of Van Dorn. Aside from SouthPointe Pavilions, there is very minimal ridership south of South Street. Route 53's highest ridership area is duplicated by Route 50, and these two route schedules are not coordinated, so buses often leave five minutes apart.

On-time performance (67%) is slightly better than the system average (61%). The highest percentage of late departures occurs Downtown at 11th & N Streets.

Figure 50 Route 53 On-Time Performance



Route 54 Veteran's Hospital

Route 54 operates Monday to Friday and connects Downtown with east Lincoln. It operates primarily via O Street, 48th Street, F Street, then performs a clockwise loop via O Street, 7th Street, Sandalwood Drive, 84th Street, and A street.

Route 54 ranks among the bottom third in terms of both average weekday ridership (296 daily boardings) and weekday ridership productivity (15.7 boardings per hour). On Saturday, it ranks third-to-last among for average ridership (93 boardings) and second-to-last for productivity (7.7 boardings per hour)

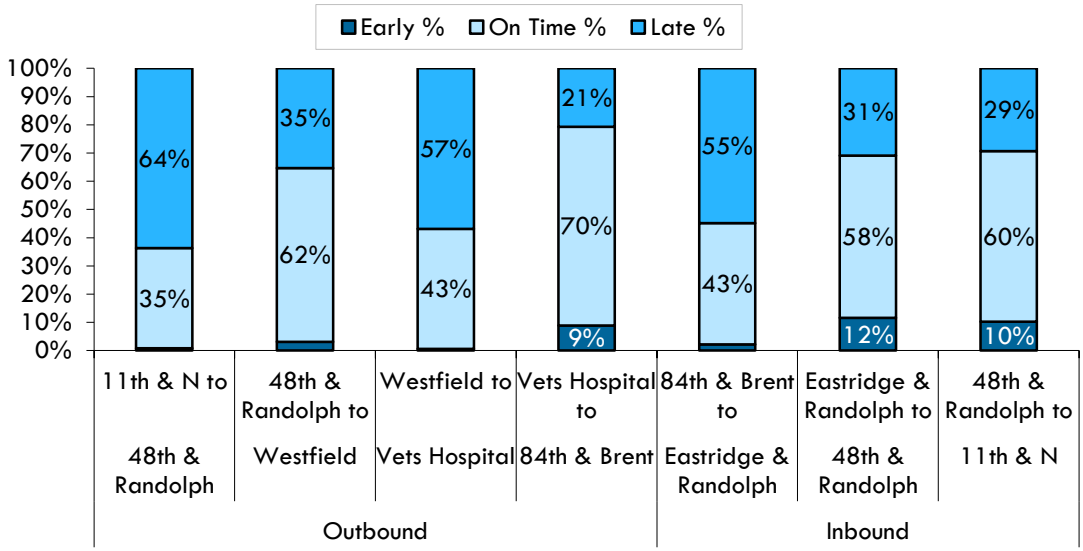
Route 54 Characteristics	
Weekday	
Service Span	6:35 a.m.–6:45 p.m.
Headway (peak/off-peak)	30/70
One Way Trips	30
Ridership	296
Revenue Hours	18.8
Productivity (boardings per hour)	15.7
On-Time Performance	53%
Saturday	
Service Span	7 a.m.–6 p.m.
Headway	60
One Way Trips	22
Ridership	93
Revenue Hours	12.1
Productivity (boardings per hour)	7.7

While on a route level, Route 54 underperforms, route productivity between 48th Street/ Randolph Street is 30.7 passengers per hour. East of Randolph, productivity is only 7.4 passengers per hour, and that includes several high ridership stops, such as the Gateway Mall, and the area around Saint Elizabeth Regional Medical Center, and Veterans Hospital (approximately 25 boardings among multiple stops). Almost all of the neighborhood streets on which Route 54 operates generate little to no ridership.

Route 54 and Route 44 operate on the identical alignment between 44th Street and Downtown. The schedules are not coordinated during peak times, so buses are often five minutes apart on the corridor.

Route 54 operates every 70 minutes during the weekday off-peak period, preventing timed connections with other StarTran routes. Route 54 has the third worst on-time performance of all StarTran routes at 53% of all trips.

Figure 51 Route 54 On-Time Performance



Star Shuttle

The Star Shuttle is a Downtown circulator that runs in a counterclockwise loop via 11th Street, Lincoln Mall, 14th Street, Q Street, 8th Street, and P Street. The Star Shuttle ranks in the middle for average weekday ridership (340 daily boardings) but ranks third for weekday ridership productivity (29.1 boardings per hour).

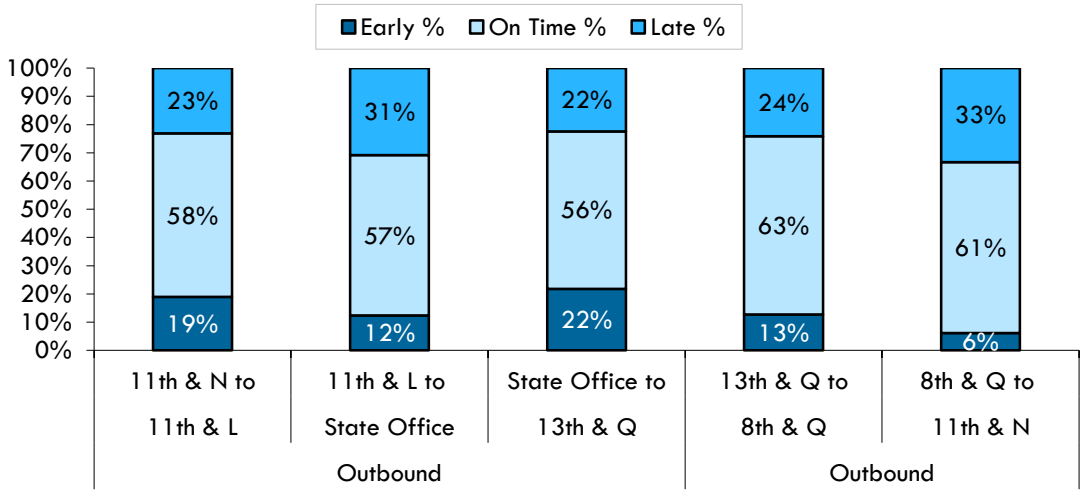
In addition to the five timepoints, Star Shuttle has eight intermediate stops. A recent service change simplified the route alignment, reduced its coverage, and improved its headway from 24 minutes to 15 minutes.

Star Shuttle Characteristics	
Weekday	
Service Span	6:24 a.m.–6:43 p.m.
Headway	15
One Way Trips	50
Ridership	340
Revenue Hours	12.8
Productivity (boardings per hour)	26.6
On-Time Performance	59%

Destinations served include the UNL Main Campus, the Haymarket District, the Lincoln Mall, and the State Office Building. The highest ridership activity occurs at the two locations where transfers occur among other StarMetro Routes: Gold's Building (111 boardings) and the State Office Building (51 boardings).

On-time performance (59%) is slightly less than the system average (61%). The ratio of early, on-time, and late trips is consistent among all route segments. However, it should be noted that only one vehicle is utilized to operate the Star Shuttle.

Figure 52 Star Shuttle On-Time Performance



6 ON-BOARD SURVEY RESULTS

In October and November of 2013, StarTran conducted an on-board survey for all fixed-routes (including both weekday and Saturday service). In total, 565 complete surveys were collected. Over three quarters of surveys collected were from weekday riders. Approximately 58% of surveys were completed by riders between 6 a.m. and 10 a.m. Key findings of the analysis are as follows:

Rider Demographics

- Many current riders may be considered transit dependent—approximately half of respondents do not have access to a vehicle at home and would not be able to make their trip without bus service.
- More than one-third of riders are 45 to 64 years old, with 18-to-29 year olds representing 28% of riders.
- Many riders have a low annual income. Nearly half of existing riders have a household annual income of less than $20,000, and only 15% reported annual incomes of $45,000 or higher.
- Most riders identified as Caucasian, with the next-highest group identifying as African American.

Travel Behavior

- Nearly 40% of riders have been using StarTran for five or more years. Approximately one-fifth of riders have been riding a year or less, which is consistent with typical mid-size city operations throughout the nation.
- Many respondents ride frequently, with nearly half of riders using the bus to take 10 or more one-way trips per week. Improving frequency and span of service would be beneficial for these riders to increase the level of convenience in completing their trips.
- Nearly half of respondents were traveling to work on their trip, followed by school, errands, and shopping. Later evening service on weekdays would be especially beneficial for passengers making work trips.
- Despite the fact that StarTran does not currently have a timed transfer in Downtown, approximately one-third of trips involved a transfer (approximately 11% of these transfers involved interlined routes). Figure 1 shows total transfer activity by route. The routes seeing most transfer activity were (from highest to lowest) 41, 53, 43, 44, 48, 49, and 40.

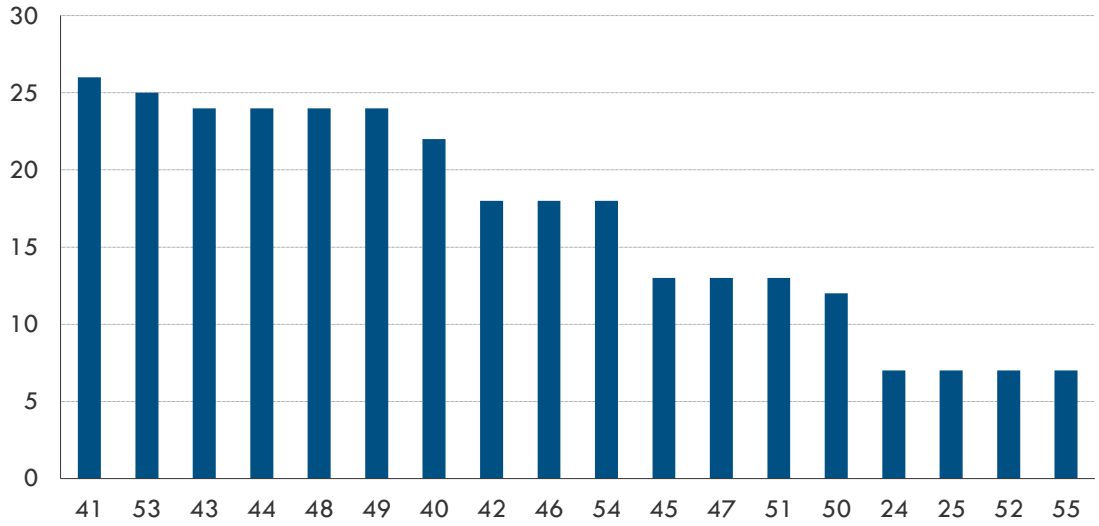
Figure 53 is a transfer matrix which illustrates the routes that respondents transferred to and from during their trip. Figure 54 shows total transfer activity by route (including riders both transferring to or from a given route. The routes seeing most transfer activity were (from highest to lowest) 41, 53, 43, 44, 48, 49, and 40.

Figure 53 Weekday Transfers

	24	25	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	Total
24		5					1												**6**
25												1							**1**
40	1			1		2	2		1		2					1	1		**11**
41			4			1	3	2			1		2	1		2			**16**
42			2	1		3	2	2			2		1			2	1	1	**17**
43		1					1			1			1		1		2		**7**
44											2					4			**6**
45			1			1	2									2	3		**9**
46				2		2	1			2	3	1					1		**12**
47						1			1		4								**6**
48				3			1											1	**5**
49			4			1	2		2	1			2		3		2		**17**
50							1			1		3							**5**
51				1	1	5	1		1			1					2		**12**
52									1		1					1			**3**
53				2		1	1			1	1	1	1				3	1	**12**
54										1						1			**2**
55											3						1		**4**
Total	**1**	**6**	**11**	**10**	**1**	**17**	**18**	**4**	**6**	**7**	**19**	**7**	**7**	**1**	**4**	**13**	**16**	**3**	**151**

*Highlighted boxes indicate interlined routes

Figure 54 Transfers Activity by Route

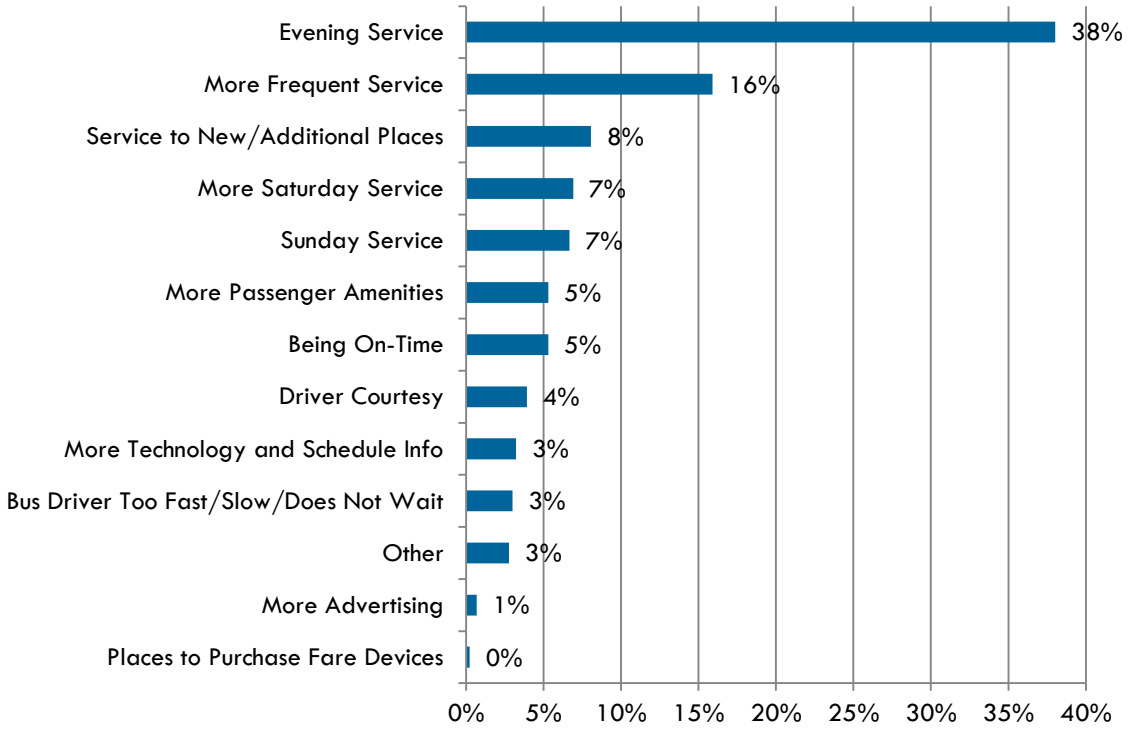


Rider Satisfaction/Desired Improvements

Riders were asked to rate various service characteristics on a scale from one to five, with the higher number, the higher level of satisfaction. The highest-ranked characteristics were driver courtesy, overall safety, and schedule information. The worst ranked were places served, service frequency, and bus stop amenities (lowest).

Riders were also given the option to provide open-ended responses to suggest service improvements. The most frequent response by far was for evening service (38%), followed by improved frequency (15.9%).

Figure 55 Suggested StarTran Improvements



7 PUBLIC OUTREACH

The primary goal of the TDP is to improve transit service in Lincoln. Convenient and cost-effective transit service requires an appropriate balance of coverage, frequency, and service span. Effective public outreach is necessary for determining the effectiveness of existing transit services as well as evaluating future improvements to serve the needs of Lincoln residents. This chapter summarizes public outreach activities conducted for the TDP, which includes meetings with the TDP Advisory Committee, operator interviews, April 2015 open houses, Build Your Transit System survey, September 2015 open houses and stakeholder meetings, and the StarTran Preliminary Service Options online survey.

Key Themes

An integral part of the TDP process is conducting a diverse public involvement effort that allows for a variety methods for the public to share ideas and identify opportunities for improvement. Key themes from public outreach are as follows:

- Straightening and streamlining routes would improve travel time and system performance.
- A crosstown north-south route would be a good option for riders to eliminate the need to transfer Downtown.
- According to the on-board survey, existing riders rank places served, service frequency, and bus stop amenities lowest in terms of customer satisfaction.
- Later service on weekdays, Sunday service, and more frequent service are desired improvements to the system.
- Express service would be beneficial on several corridors, including O Street.
- Marketing and improved information about routes and arrival times would benefit riders.
- Removing excess service to institutions during off hours (e.g., Southeast Community College service on Saturday) can provide cost savings and potentially allow for reinvestment in increased frequency on more productive routes during peak times.
- Improvements to bus facilities for safety and access during the winter would benefit riders.

STARTRAN TDP ADVISORY COMMITTEE

The TDP Advisory Committee includes StarTran Advisory Board members and other individuals representing a range of community interests. The TDP Advisory Committee convened on April 28, 2015, with 20 members in attendance to discuss existing conditions findings as well as to provide input to help inform future steps in the TDP process. TDP Advisory Committee members discussed several topics, including unmet needs in the transit system, peer systems, funding, and project goals.

Unmet Needs Identified by Advisory Committee

- Many locations in Lincoln lack residential access to both work and shopping. There are some examples in the current operating environment where it is actually faster to walk two miles to reach Gateway Mall rather than taking the bus and transferring in Downtown.
- The current hours of service are too limited. Later service in the evening would especially benefit many existing riders. Improved Saturday service as well as implementing Sunday service would also be good improvements.
- Currently, there is no transit service south of Pine Lake. Development has been occurring on the fringes of the city, including south of where existing service ends. As businesses move further out in the city, residents without other transportation options are left behind. Since development in Lincoln is expanding outward, the existing transit system will be unable to meet the needs of the community in the future. At the same time, most of the post-World War II suburbs are not very dense, and providing productive transit service is a challenge.
- The potential for implementing crosstown routes should be looked at as part of the TDP process. There are many instances when it is inconvenient for passengers to travel out-of-direction to transfer in Downtown. However, crosstown routes have been attempted in the past, and overall these were not very productive.
- For service to be successful, travel times on transit routes need to be competitive with automobiles.
- Many transit riders traveling to SouthPointe are either University of Nebraska-Lincoln (UNL) or Downtown employees.
- Implementation of a formal transit center in Downtown Lincoln would be a beneficial improvement for many riders. However, placement of a potential future transit center is important. It must be centrally located in Downtown to provide the most benefit for riders.
- StarTran is analyzing the current flag bus stop policy as part of the TDP, including what could be gained or lost by doing away with this policy. However, making walks longer could be a problem for some passengers, especially in winter. At the same time, improved passenger information and amenities that could result from formalizing bus stops could be useful for many passengers.

Funding

- More funding for StarTran is going to be necessary to meet the needs in the community. Budget is an important factor to be considered.
- There is work to be done in terms of changing attitudes in the community regarding StarTran. The agency provides a necessary service and is not a “black hole for money.” At the same time, to be successful in business, it is not possible to be a “jack of all trades and master of none.” In the same way, StarTran’s primary focus needs to be on what it does well.
- Having more information about how peer cities fund their transit systems could be useful for informing the TDP process.

Mission Statement, Goals, and Objectives

- TDP Advisory Committee members viewed a preliminary list of overarching concepts for goals for StarTran. A mission statement, goals, and objectives should consider not just the here and now, but look into the future.
- A possible concept for a mission statement is that StarTran "provides a good alternative source of transportation for the City of Lincoln." Additional concepts include the fact that StarTran is efficient, environmentally-responsible, and affordable. A statement about economics should also be considered for inclusion in the mission statement.
- Safety should be assumed as a concept and does not need to be specifically called out in the goals and objectives or mission statement. There does not seem to be a perception in the community that StarTran is unsafe.
- Overall, the public needs to understand and buy into the final mission statement, goals, and objectives for the agency.

Additional Comments

- Community goals should be part of the considerations for the TDP. It will be important to determine whether it is more important to try to grow the system and increase ridership or maintain coverage to as much of the population as possible. If the goals are to increase ridership, what naturally follows is to serve fewer areas, but serve them very well. Being able to do more with the same amount of resources could have positive implications for the future. If ridership can grow, then there might be more community support for expanding the transit system in the future and adding more service—benefiting the entire community.
- New and future technology should be considered, especially regarding how it affects the planning process. Any technologies that are implemented, such as smartcards, should be reliable for passengers.
- The City of Lincoln and UNL are considering implementing a bikeshare system. This is important since bicycles are often used as a first-mile/last-mile connection to transit services. Any changes to the transit network would have to connect with this system. Other transit providers and modes should be accounted for to help Lincoln create multimodal options for residents.
- The Planning Commission's upcoming transportation plan will reference recommendations developed as part of the TDP.
- There is agreement that StarTran has to change and evolve. However, the exact steps for accomplishing this are not entirely clear currently.
- The millennial generation has different travel habits and desires compared to other population groups and will influence system ridership potential and growth.

OPERATOR INTERVIEWS

Informal interview sessions were conducted with StarTran bus operators to capture feedback regarding operational challenges/issues, customer requests, scheduling, and service levels. Bus operators also provided comments on fares, bus stops, excess service, and route design. Interviews were held in operator break rooms and were initiated with open-ended questions regarding issues and opportunities related to fixed-route bus service. Both one-on-one and group conversations produced a series of invaluable comments and suggestions, and several comments were echoed by multiple operators.

Route design comments illustrate the fact that the current system forces customers to transfer Downtown, and some routes take a lot of time. Suggestions to mitigate these issues included straightening routes, moving routes to major streets and off of residential streets, and adding more strategic transfer locations. Operators also noted where major destinations for customers are located, including the Walmart on N 27th Street, Arnold Heights, O Street, and the Veterans Administration hospital.

Operators also noted where additional service is needed. Route 44 needs additional buses, especially during peak periods. The top request from customers is longer hours of service during the evenings and to provide Sunday service. Other operational challenges include the fact that the location of timepoints are generally not layover-friendly, more accessible bathroom locations are needed, and that operators need more recovery time. Operators noted that there is excess service to Lancaster Correctional Center (Route 46), and that it should only be served when it is open. Additionally, Southeast Community College does not need service on Saturday.

APRIL 2015 OPEN HOUSES

The public's involvement in the TDP process is integral to its success. StarTran held open houses on April 29 and 30, with 29 and 27 people in attendance, respectively. Comments were collected from attendees, including the following:

- Riders need real-time information via Google apps, an online trip planner, and better marketing for the StarTran system.
- Riders need service later in the evenings and service on Sundays.
- StarTran should gather more consistent community input.
- Routes should be more efficient so trips do not take as long, and perhaps add a cross-town route.
- Safety concerns include the bus stop facilities, and snow piles blocking the path to board the bus in the winter.
- Need more transfer points outside of Downtown, potentially on Vine Street, O Street or near Pershing Center.
- StarTran should remember the blind and those with disabilities when planning changes.
- Express service is needed on O Street.

Additional activities at the April open houses included laptops to take the "Build Your Transit System" survey, which is described below. Existing and potential customers provided feedback on future transit investments and 17 strategies that focused on bus service, bus stops, buses, and facilities.

BUILD YOUR TRANSIT SYSTEM SURVEY

An online survey was conducted to collect information from StarTran riders and non-riders in Lincoln. The survey consisted of a "Build Your Transit System" tool that presented 17 strategies that could be used to improve the StarTran system. The tool cited the benefits of each in the areas of ridership, speed and availability, access, passenger experience, and environment. The tool also presented relative costs for each strategy, and survey respondents were given a budget of 25 dollar signs to work with—respondents were instructed to select the strategies most important to them while staying within the budget. A total of 304 people took the survey.

Figure 56 ranks the preferences for transit service improvements by percentage of responses. The top five responses reflect a demand for improved service span, coverage, and frequency. More than three-quarters of respondents chose "Provide later services on weekdays" as a service improvement category, and 62% chose "Provide later services on Saturday." Adding crosstown service, providing more frequent service on weekdays, and adding Sunday service were each chosen by approximately half or more of respondents. Additionally, lighting (47%) and information at stops (45%), which are both relatively low-cost improvements, were also highly ranked in terms of transit service improvements.

A screenshot of the Build Your Transit System tool and the survey questions are included in Figure 57.

Figure 56 Build Your Own Transit System Results - Preferred Service Improvements to StarTran

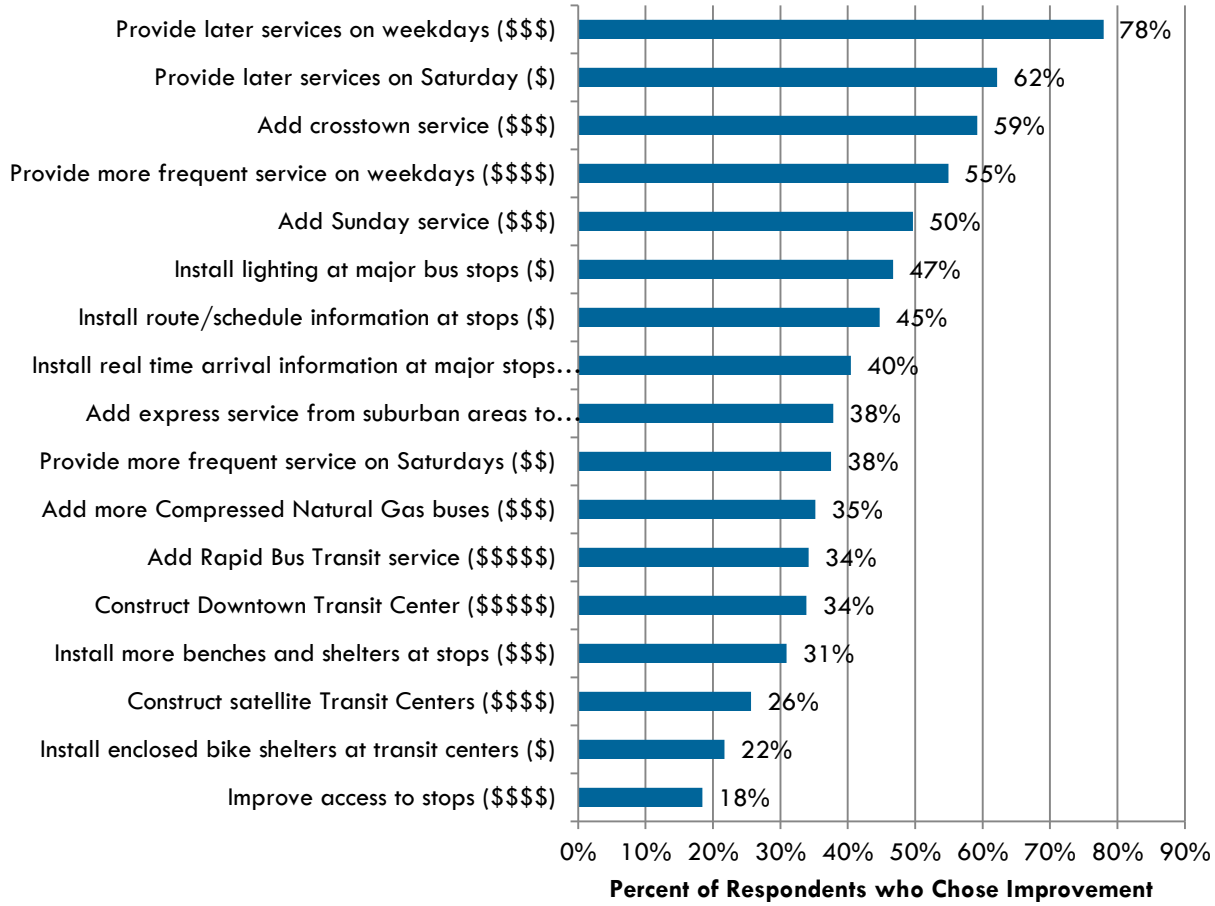


Figure 57 Build Your Transit System Tool Screenshot

DEVELOPMENT OF SERVICE SCENARIOS

Three alternative scenarios were created to improve the provision, design, and allocation of transit services. Each scenario was cost-constrained, and the goal of each scenario is increase ridership and transit mode share with a varying focus on maintaining the existing coverage-based system and emphasizing frequency.

Service scenarios were developed based on a number of inputs, including:

- Ridership distribution
- Route design
  - Directness and deviations
  - Street type (arterial, collector, residential, etc.)
  - Proximity and access to high-density residential areas and ridership generators
- Schedule reliability/ On-time performance
- Socio-economic characteristics
  - Areas of high transit demand
- Bus operator feedback
  - Operational issues
  - Customer requests and comments
- On-board survey findings
- Feedback obtained from online surveys and public meetings
- StarTran Advisory Board, TDP Project Advisory Committee, and StarTran staff input

The three scenarios were as follows:

- **Scenario 1** – This scenario focused on maintain existing coverage while streamlining and straightening routes where possible.
- **Scenario 2** – This scenario included a significant redesign of the StarTran route network and created a north-south crosstown route to the east of downtown. This scenario also extended service span on weekdays and headway improvements on high-ridership routes.
- **Scenario 3** – This scenario also included a significant redesign of the StarTran route network. This scenario also included headway improvements on select corridors and extended service span on weekdays and Saturdays.

Service scenarios were uploaded to the StarTran website and presented at two public meetings.

Figure 58 Service Scenario 1

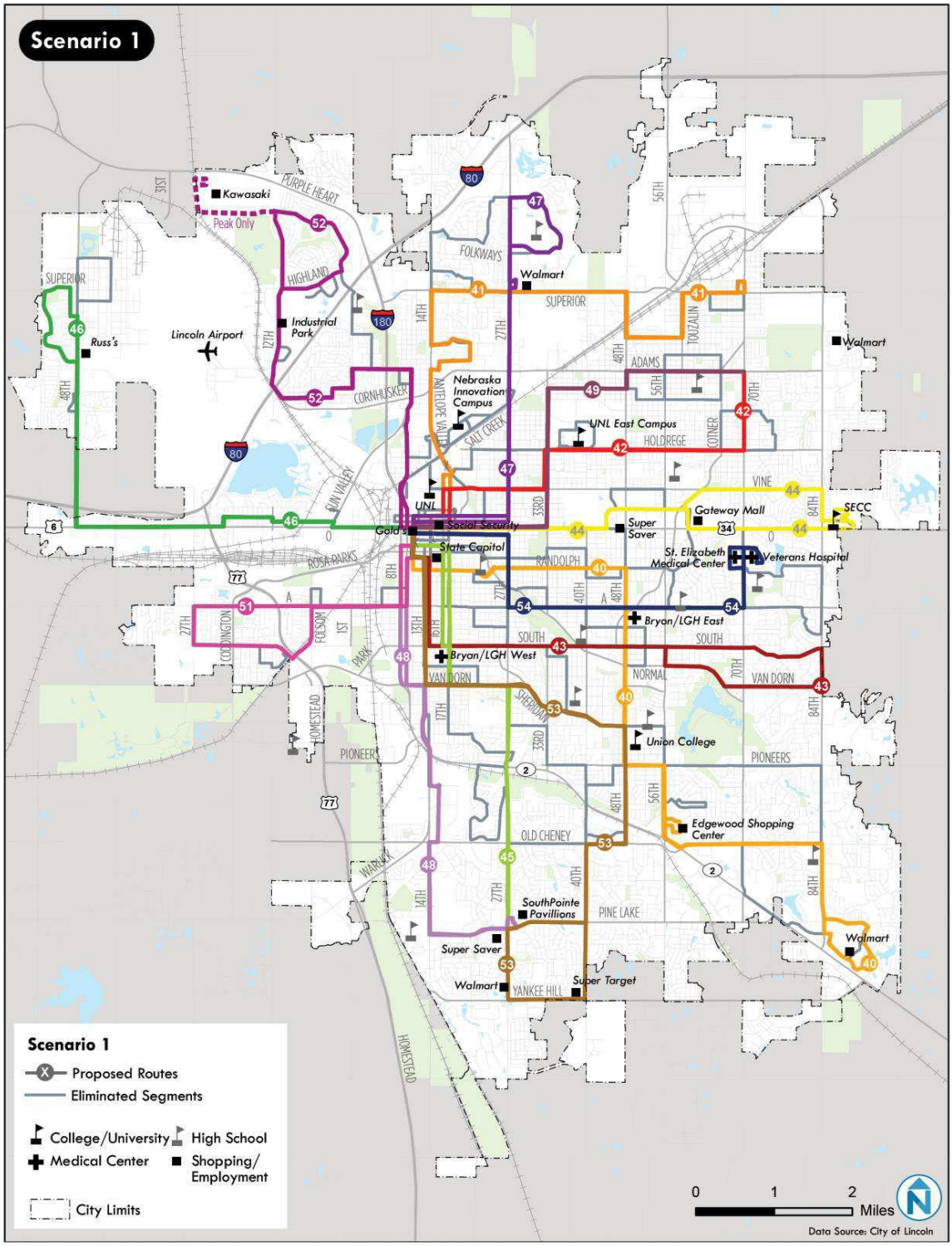


Figure 59 Service Scenario 2

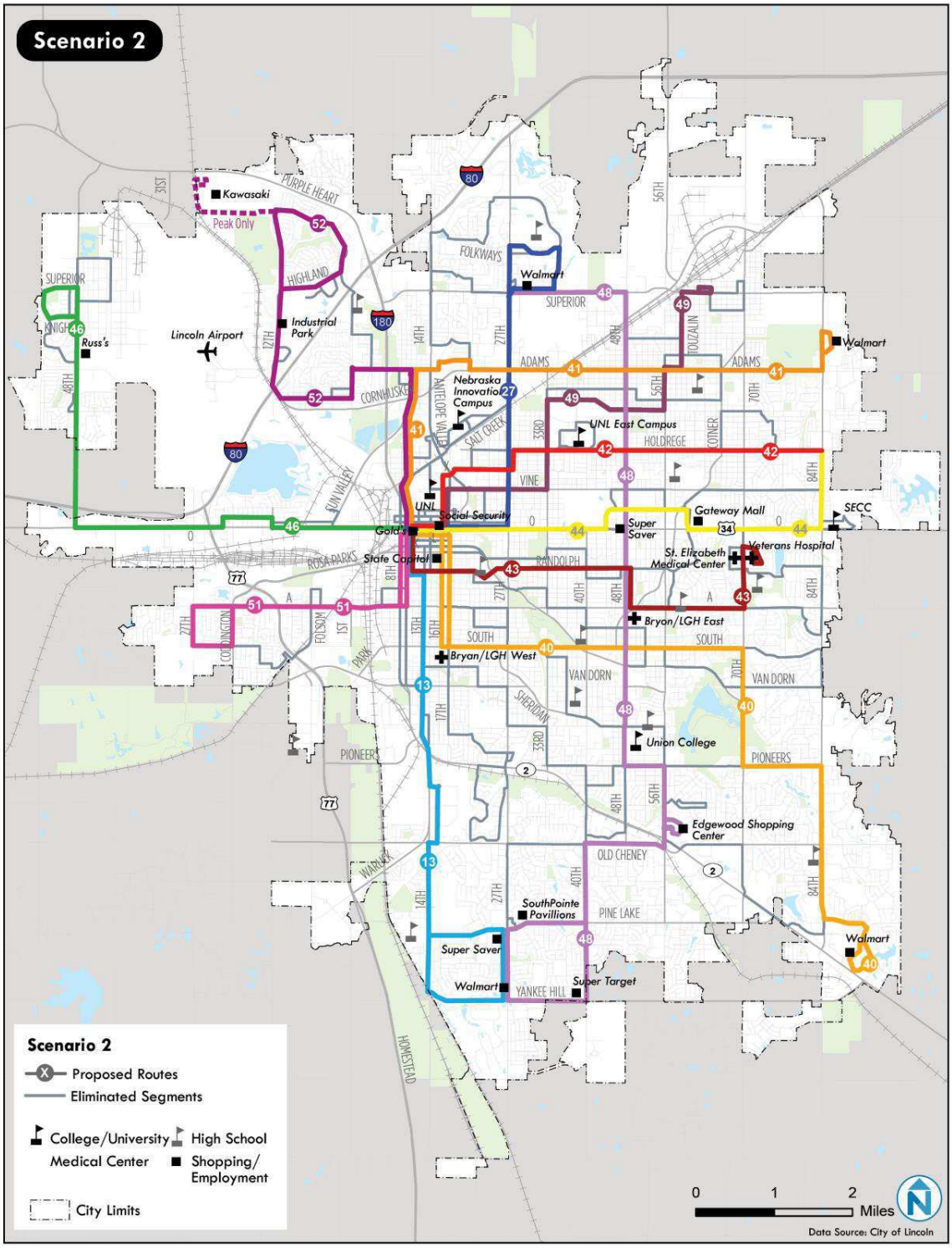
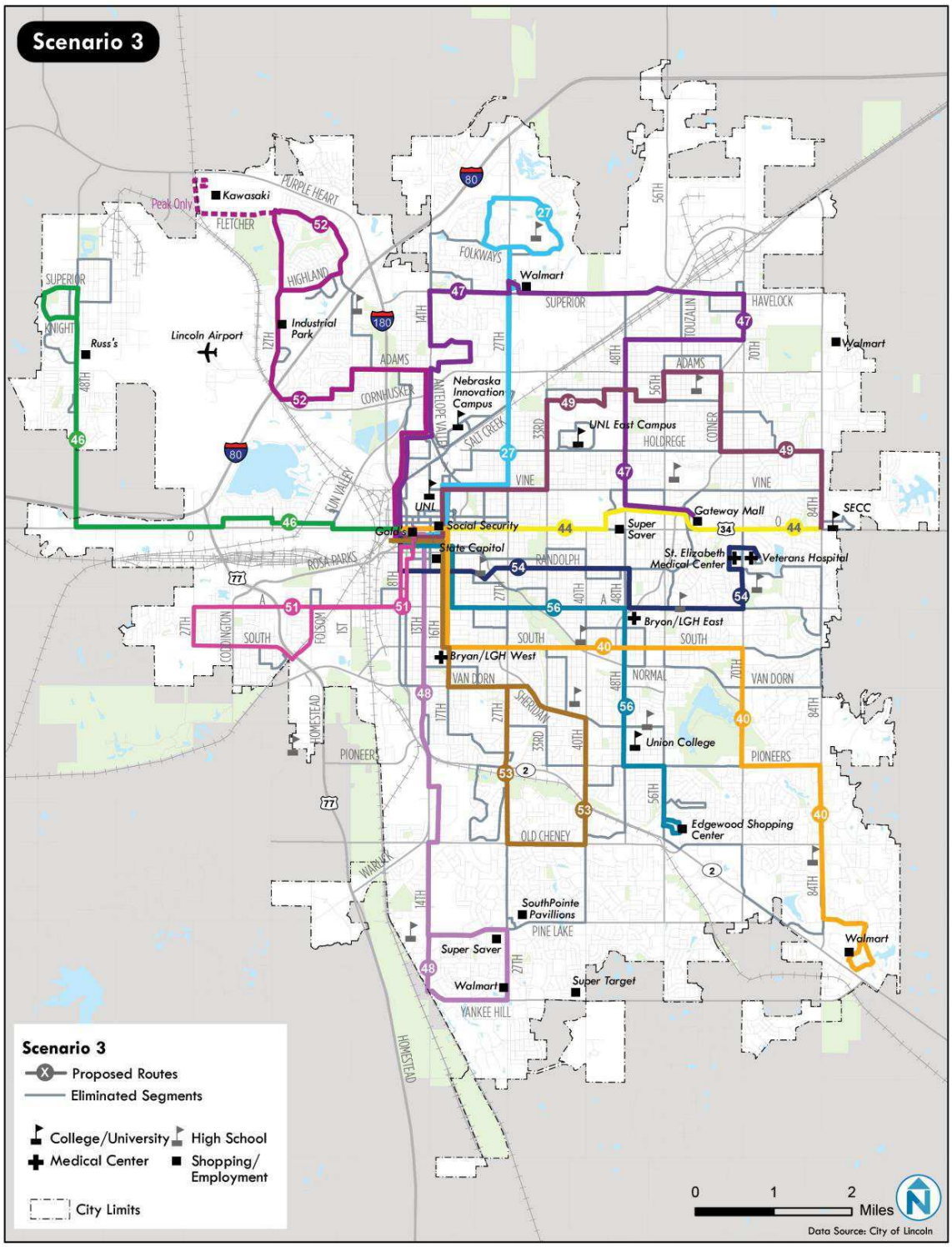


Figure 60 Service Scenario 3



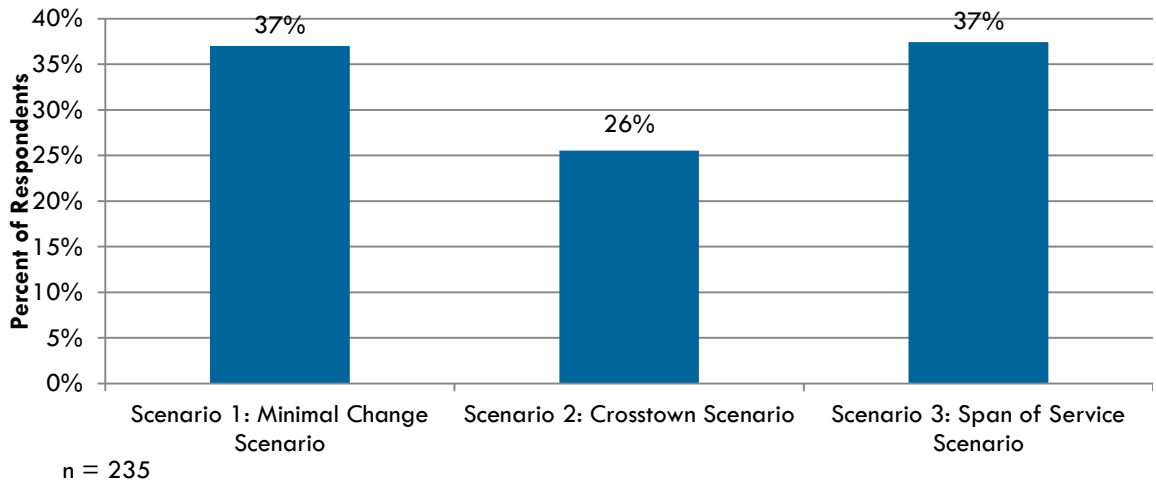
SERVICE SCENARIOS ONLINE SURVEY

An online survey (and corresponding paper survey) was created to collect feedback from existing and potential riders about three potential scenarios for future service that represent different approaches to providing transit service in Lincoln. The survey provided an overview for each scenario that includes a scenario summary, advantages and disadvantages, a table of routes with span of service and frequency, and a map showing the proposed routes, eliminated segments, and major destinations. The survey also asked participants to provide their overall opinion regarding each of the scenarios and individual routes. The survey was open from July 13, 2015 to October 5, 2015 and collected 323 responses.

The responses from the survey do not overwhelmingly support one scenario over another. As shown in Figure 61, Scenarios 1 and 3 both were chosen by 37% of survey respondents as the preferred alternative, while Scenario 2 was selected by 26% of respondents. Most survey respondents liked certain aspects of each scenario instead of a full scenario in its entirety.

This section provides an overview of scenario comments received as part of the online survey.

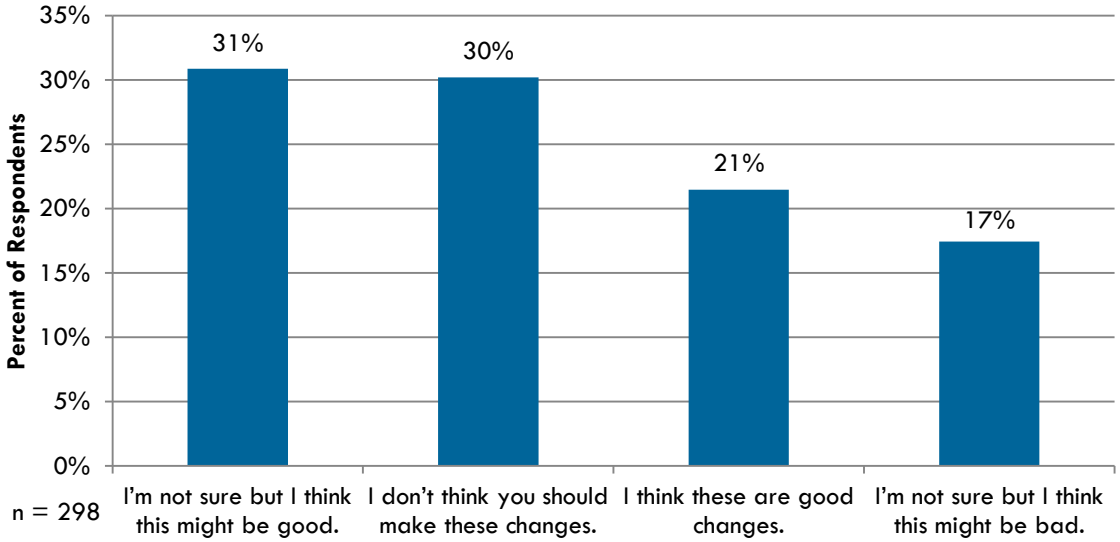
Figure 61 Which Scenario Best Reflects What StarTran Should Look Like in the Future?



Scenario 1: Minimal Change Scenario

As seen in Figure 62, overall responses for Scenario 1 are mixed. Many positive responses highlighted routes that would get riders quicker to their destination. Additional comments indicated that additional service extending later into the evening is highly desirable and is not adequately captured in Scenario 1.

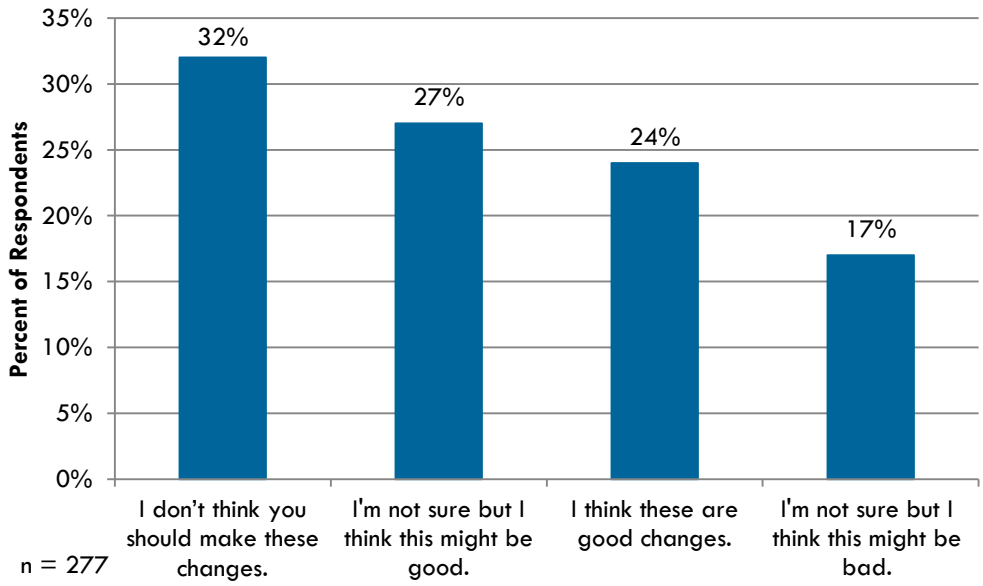
Figure 62 Overall, What Do You Think about Scenario 1?



Scenario 2: Crosstown Scenario

Responses for Scenario 2 are not definitive, as shown in Figure 63. Many comments focused on the lack of coverage to certain parts of Lincoln, most notably south of Downtown. Other comments indicated that crosstown routes that allow passengers to travel with transferring in Downtown are highly desirable. The later span of service and more frequent midday routes were mentioned as positive attributes.

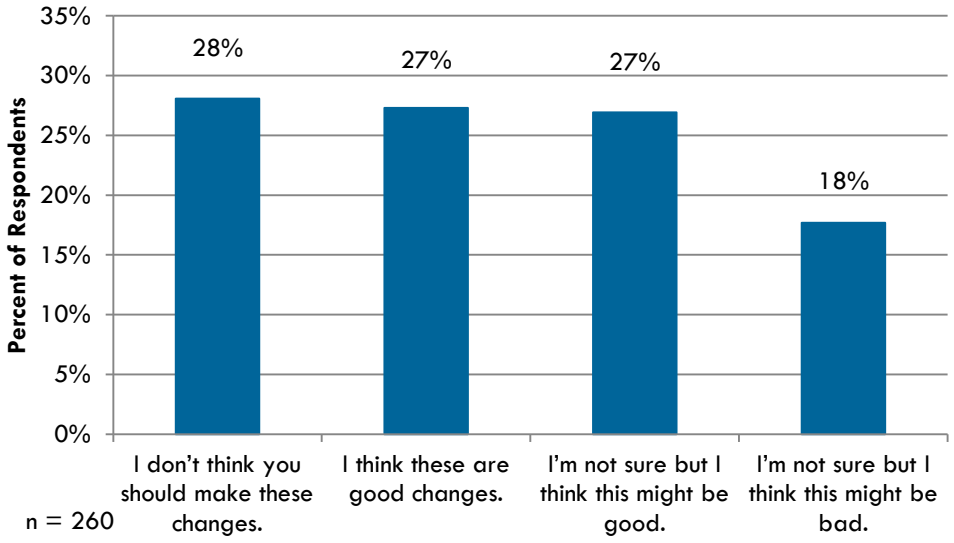
Figure 63 Overall, What Do You Think about Scenario 2?



Scenario 3: Span of Service Scenario

Similar to the other scenarios, responses for Scenario 3 are mixed (Figure 64). Many respondents included concerned about the needs of neighborhoods and specific locations in Lincoln that would not get enough service in Scenario 3, including Nebraska Heart Hospital, SouthPointe Pavilions, and areas south of Downtown Lincoln. Other responses indicated that the increase in service span is preferable, especially if passengers are able to go out to eat in the evening and travel home using transit.

Figure 64 Overall, What Do You Think about Scenario 3?



SEPTEMBER 2015 OPEN HOUSES

StarTran held open houses on September 23 City Council Chambers and on September 24 at the UNL Multicultural Center. Each meeting included a brief presentation by the consultant that summarized StarTran existing conditions, interactive survey results, the need for designated bus stops, and development of service scenarios. Following the presentation, meeting attendees were divided into two discussion groups facilitated by consultants and StarTran staff. Attendees were encouraged to ask questions regarding service scenarios and presented material. Overall, the public responded positively to the various elements of the three scenarios, most notably:

- Later evening service
- Service expansion to Yankee Hill
- Simpler route alignments
- Crosstown service
- Headways improvements on key routes
- Designated bus stops

While the majority of meeting attendees expressed excitement regarding the Transit Development Plan objectives, others expressed concern having to walk longer distances to reach bus stops as a result of route modifications. Several participants with visual impairments stressed the

importance of providing clear information regarding future route alignments as the service scenarios are a major departure from existing service.

SEPTEMBER 2015 STAKEHOLDER MEETINGS

The project team also presented the TDP summary and service scenarios at stakeholder meetings with the Lincoln Chamber of Commerce, StarTran Advisory Board, TDP Advisory Committee, and Nebraska Commission for the Blind and Visually Impaired. Each group expressed support for designated bus stops, span and headway improvements, as well as service expansion along the edge of the city.

8 SERVICE RECOMMENDATIONS

A cost-constrained preferred alternative was developed in October 2015 based on feedback obtained regarding the three service alternatives. The preferred alternative was presented to StarTran staff in a workshop format and further refined. Service expansion options were also developed to further improve StarTran service as additional funding becomes available. Five different phases of service expansion were developed. Together, the preferred alternative and service expansion options represent the final TDP service recommendations. No changes are proposed for UNL routes (22, 23, 24, and 25).

Primary benefits of the service recommendations include:

Increased Service Span

The existing early end times of service precludes employees working late shifts and students attending evening classes from riding the bus home. The on-board survey and Build Your Transit System survey revealed that later evening service was the most desired service improvement.

The cost-constrained preferred alternative extends evening to 8 p.m. for eight key routes. Phase 2 extends evening service by two hours on all fourteen TDP routes.

Improved Downtown Connections

Several current routes (Routes 44, 51, 52, and 53) operate at irregular headways during the weekday off-peak period, thereby preventing timed connections with other routes. StarTran routes operate on a number of different streets within downtown to serve Gold's transfer point and State Office Building, thereby limiting route connections.

The Gold's transfer point can only accommodate 6 buses at a time. StarTran routes arrive and depart at the Gold's transfer point in two waves that are 5 minutes apart. If buses are early or late, Gold's reaches capacity and transfers are difficult to make.

The cost-constrained preferred alternative establishes clockface (service every 30 or 60 minutes) and adjusts the schedule to have buses meet every 15 minutes. This addresses the capacity needs at Gold's, which assumes 6 bays are still available. The recommendations increase the number of transfer opportunities while reducing the average wait for passengers. By consolidating routing patterns within downtown Lincoln, the preferred alternative reduces the overall transit footprint downtown.

More Frequent Service

On-board survey respondents indicated that more frequent service is the second-most desired service improvement after later evening service. Most routes operate every 30 minutes during peak times and all routes operate, at best, hourly during midday and Saturdays.

The cost-constrained preferred alternative improves frequency to areas with higher transit demand. This reduces wait times and also improves the ability to transfer to other routes. Frequency improvements include creating Lincoln's first non-university based high frequency service, improving midday service to every 30 minutes on select corridors, and improving routes with service every 120 minute midday service.

Two corridors will have service every 15 minutes during the morning and afternoon peak, which has been shown nationwide to attract and retain customers who view transit as a choice. The two corridors with 15 minute peak service are:

- The alignment between 33rd Street and Holdrege, UNL, and downtown served by Routes 42 and 49
- The alignment between 16th and 17th Street and G Street, State Office Buildings, and downtown served by Routes 54, 56, and 40

Three different corridors would have service every 30 minutes during weekday midday periods, including:

- O Street between downtown, Gateway Mall, and SECC
- The alignment between 33rd Street and Holdrege, UNL, and downtown served by Routes 42 and 49
- The alignment between 16th and 17th Street and G Street, State Office Buildings, and downtown served by Routes 54, 56, and 40

Two corridors would have improvements from 120 minute midday service to every 60 minutes, including:

- Route 51 West A
- Route 52 Gaslight

Expansion phases improve both peak and midday service on most other routes.

Route Directness

Terminal loops on several existing routes (40, 43, 44, 47, and 54) result in inconvenient travel times for customers. In addition, the "staircase pattern", where buses make a turn every several blocks, also causes slower operating speeds and introduces schedule variability.

The cost-constrained preferred alternative reduces the number of turns each route makes and stays on arterials when possible. This will measurably improve the speed and reliability of StarTran service and make the bus more competitive with auto travel times. Also, the number of turns at unsignalized intersections and shifting service from residential streets to arterial corridors resolves many operational safety issues.

Crosstown Service

The addition of crosstown service was the third most desired service improvement as part of the Build Your Transit System survey. The proposed 48th Street crosstown route included in Scenario 2 was also well-received from the public.

The existing radial design system forces most customers to travel out-of-direction to make connections. In the cost-constrained preferred alternative, Route 48 will introduce a crosstown option for passengers wishing to travel between North Lincoln and the O Street corridor without having to transfer downtown.

Service Expansion

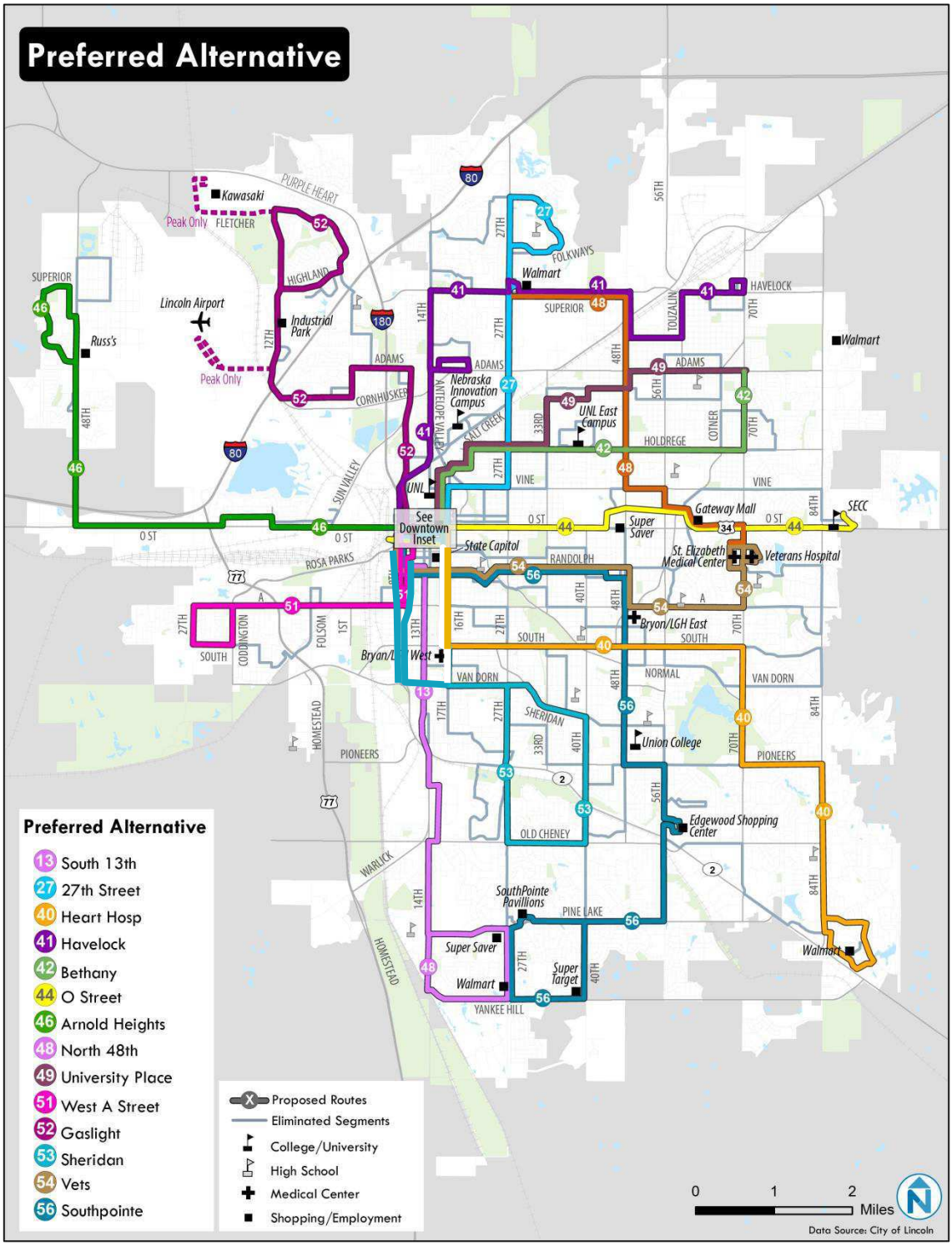
Many existing and potential customers have expressed a strong interest in extending service to the fast-growing Yankee Hill and 84th Street corridors. The cost-constrained preferred alternative extends Routes 13 and 56 to Yankee Hill Rd. Phase 4 includes the addition of Sunday service on all TDP routes, which was the fifth most desired service improvement as part of the Build Your Transit System survey.

Preferred Route Network

A map of the preferred alternative route network is depicted in Figure 65.

The remainder of this chapter describes each proposed route and details the service levels for each phase of service expansion.

Figure 65 Preferred Scenario Route Network



ROUTE RECOMMENDATIONS

Route 13 South 13th

The South 13th route would replace current Route 48 and the 13th Street segment of Route 45. The route would be renamed Route 13 to reflect primary operations on 13th Street. Instead of providing front-door service to the SouthPointe Pavilions and going into the parking lot, Route 13 would be extended to the intersection of Yankee Hill & S 27th Street, which will introduce service to the Yankee Hill Wal-Mart.

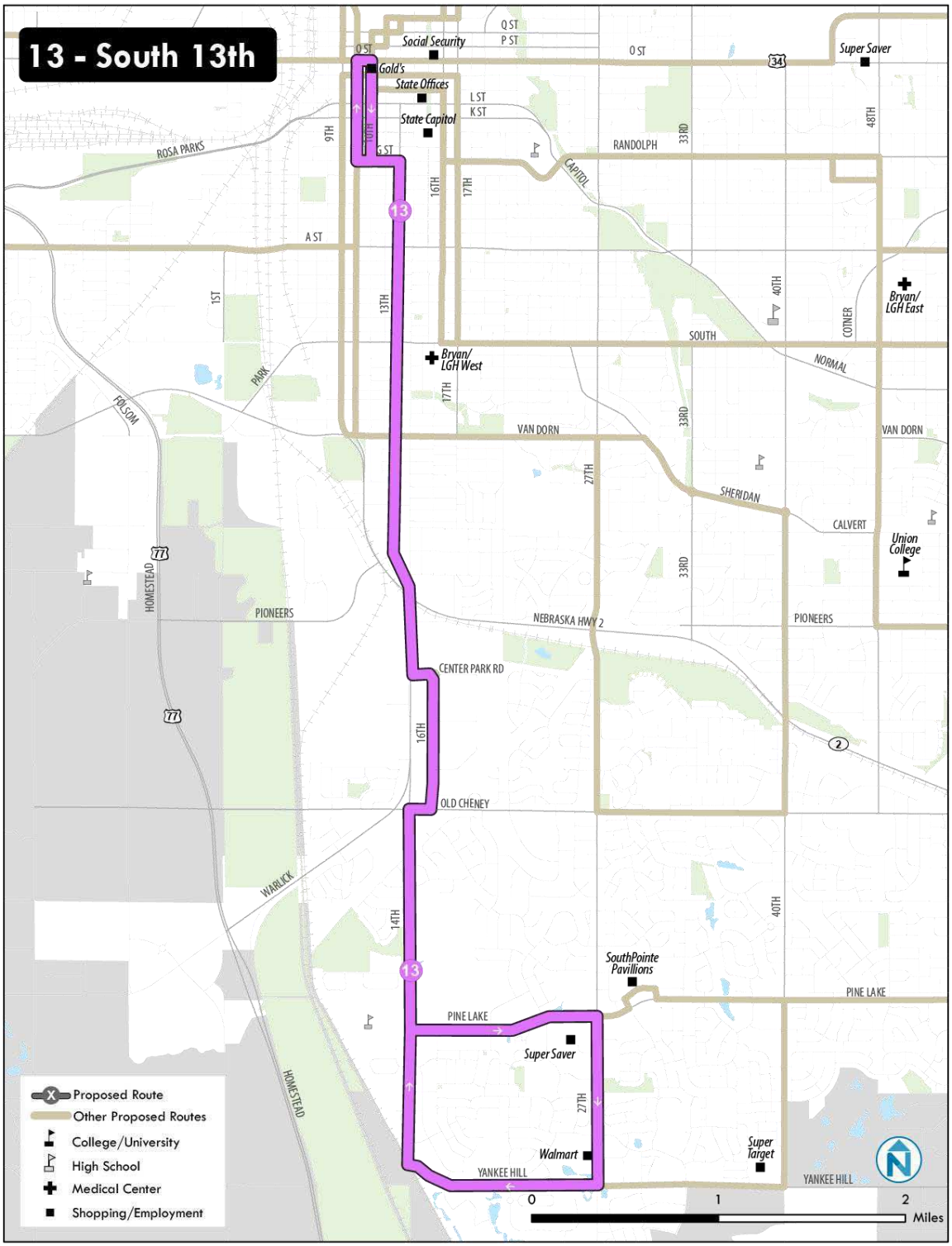
As is shown in Figure 67, Route 13 will travel from downtown Lincoln to the southern edge of the city via South 13th Street. Major destinations within a quarter mile of the route include the Lincoln library, Southwest High School, SuperSaver, and Wal-Mart. Route 13 will circle around the residential block between Pine Lake Road, Yankee Hill Road, S 14th Street, and S 27th Street before beginning its inbound trip to downtown Lincoln on South 13th Street.

Figure 66 shows the existing operating schedule and the phases of proposed service improvements for Route 13. In the cost-constrained preferred alternative, headways will be set at 30 minutes for peak headways and 60 minutes for off-peak and weekend headways. The route will require two vehicles and will operate between 6:00 AM and 8:00 PM on weekdays and from 7:00 AM to 6:00 PM on Saturdays. In Phase 1 of service expansion, weekday off-peak headways will be improved from 60 minutes to 30 minutes. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. Finally, in Phase 3, Sunday service will be added so that the route operates seven days a week.

Figure 66 Route 13 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	30	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	30	30	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 67 Route 13 Map



Route 27 North 27th

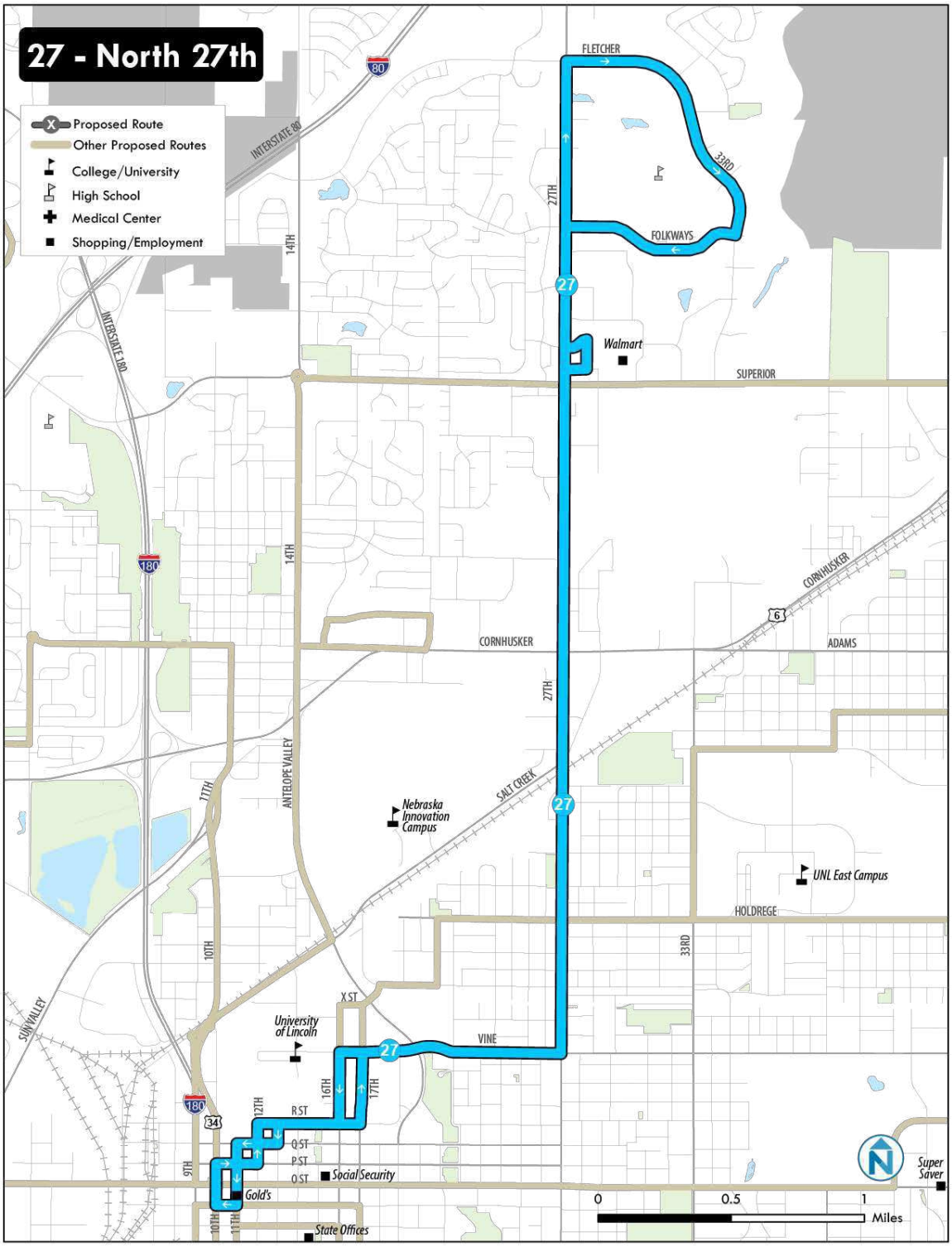
The proposed N 27th Street route would replace the southern half of Route 41 and a portion of the northern loop of Route 47. As Figure 69 shows, the route would operate a clockwise loop along N 23rd Street, Folkways, N 33rd, and Superior to serve Wal-Mart and multiple apartment complexes. Route 27 would provide front-door service to the Wal-Mart in the inbound direction only. Outbound, service would stop on 27th Street in front of the Wal-Mart. Major destinations within a quarter mile of Route 27 include Hy-Vee, Lincoln North Star High School, Sam's Club, the Nebraska Innovation Campus, the University of Nebraska Lincoln, as well as the Wal-Mart Supercenter.

Figure 68 shows the phases of proposed service improvements for Route 27. In the cost-constrained preferred alternative, headways will be set at 30 minutes for peak headways and 60 minutes for off-peak and weekend headways. The route will require two vehicles and will operate between 6:00 AM and 8:00 PM on weekdays and 7:00 AM and 6:00 PM on Saturdays. In Phase 1 of service expansion, weekday off-peak headways will be reduced from 60 minutes to 30 minutes. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. In Phase 3, Sunday service will be added so that the route operates seven days a week.

Figure 68 Route 27 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	30	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	30	30	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 69 Route 27 Map



Route 40 Heart Hospital

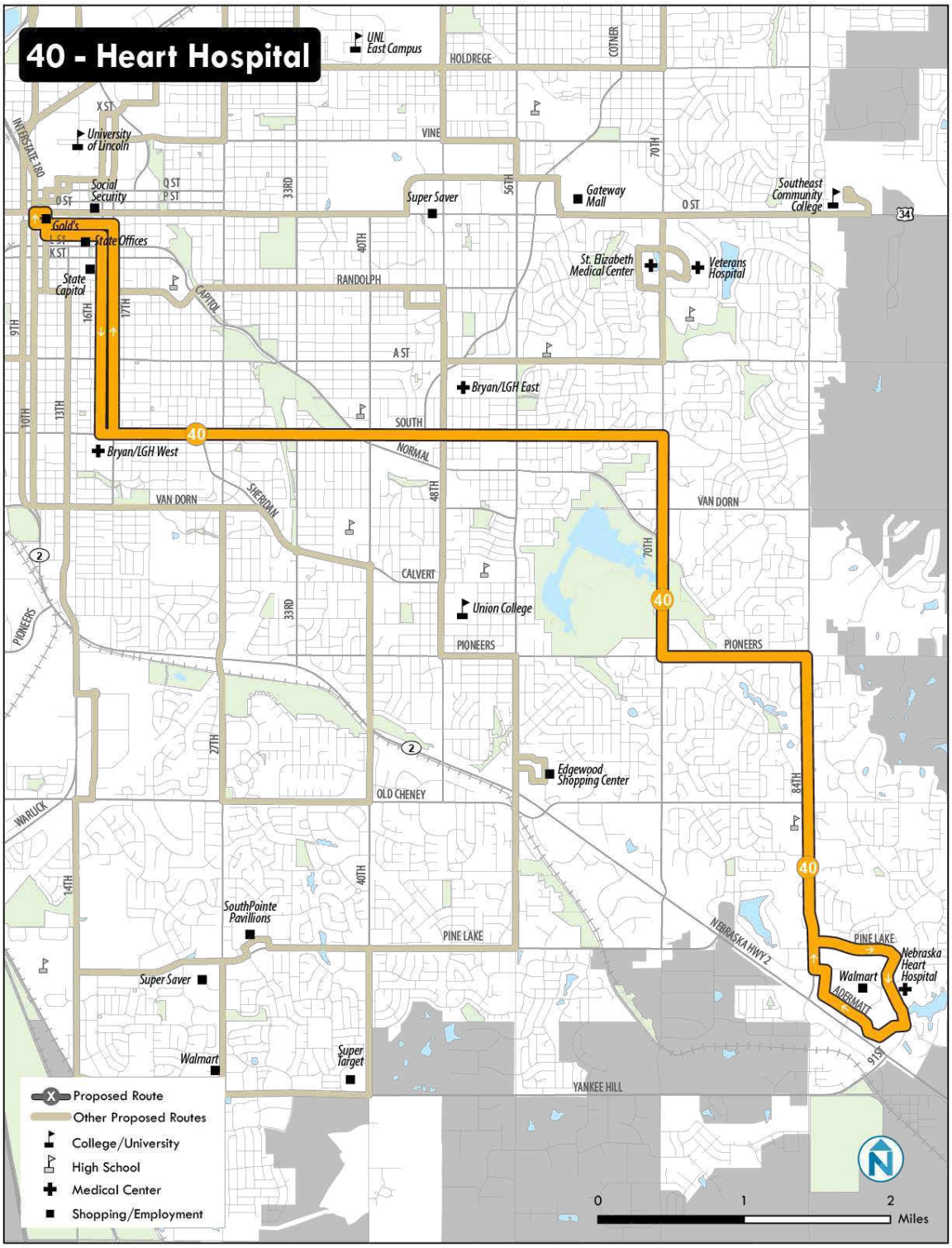
Figure 71 shows Route 40, which will serve downtown Lincoln and Heart Hospital via O Street, N 17th Street, South Street, S 70th Street, Pioneers Boulevard, and 84th Street. The route will serve major destinations including Gold's, the Social Security Offices, the Library, the State Capitol, Lincoln High School, Russ' Market, the Madonna Rehab Hospital, Hy-Vee, Wal-Mart, and Heart Hospital. The route will follow a streamlined alignment to reduce travel times between downtown and the southeastern terminus of the route. Route 40, along with Routes 53 and 54, will be scheduled to provide a bus every 15 minutes between 16th/ 17th Streets and G Street and downtown. This will facilitate downtown circulation and provide excellent connectivity for this corridor.

Figure 70 shows the current operating schedule and the phases of proposed service improvements for Route 40. In the cost-constrained preferred alternative, headways will be set at 60 minutes for peak, off-peak, and weekend headways. The route will require two vehicles and will operate between 6:00 AM and 7:00 PM on weekdays and 7:00 AM and 6:00 PM on Saturdays. In Phase 2 of service expansion, weekday evening service will be extended by two hours to better serve evening riders. In Phase 3, Sunday service will be added to Route 40's operating schedule, which will improve transit access for Sunday riders.

Figure 70 Route 40 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	60	60	6:00 a.m.-7:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	60	60	6:00 a.m.-7:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	60	60	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	60	60	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	60	60	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	60	60	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 71 Route 40 Map



Route 41 Havelock

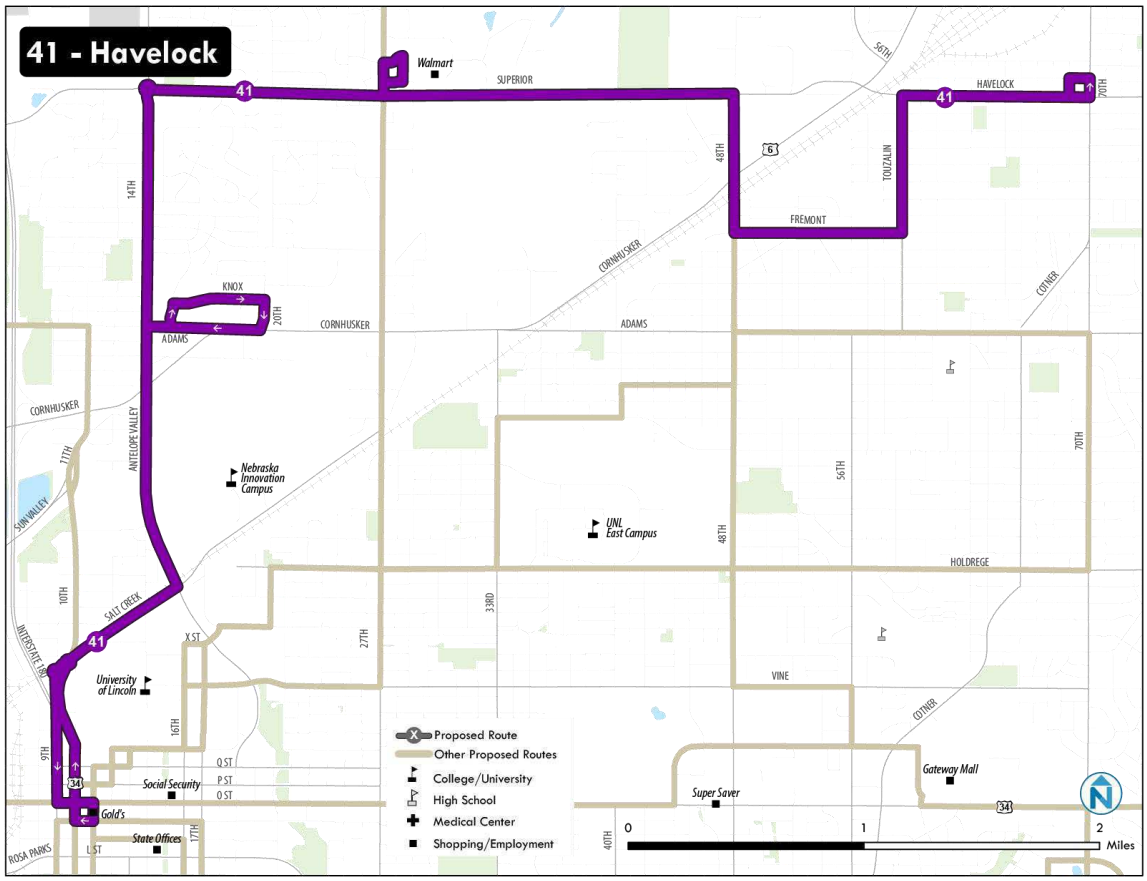
Figure 73 shows the alignment of Route 41 which serves the northeastern sector of the city and travels from downtown Lincoln to Havelock via Antelope Valley Parkway, N 14th Street, Superior Street, N 48th Street, Fremont Street, Touzalin Avenue, and Havelock Avenue. Major destinations to be served include UNL, UNL Innovation Campus, and Wal-Mart. Consideration should be given to deviating into the Wal-Mart parking lot in the eastbound direction only. The route is designed to be interlined with Route 53, which serves the southeastern sector of the city.

Figure 72 shows the current operating schedule and the phases of proposed service improvements for Route 41. In the cost-constrained preferred alternative, headways will be set at 30 minutes for peak headways and 60 minutes for off-peak, and weekend headways. The route will require three vehicles and will operate between 6:00 AM and 8:00 PM on weekdays and 7:00 AM and 6:00 PM on Saturdays. In Phase 2 of service expansion, weekday evening service will be extended by two hours. In Phase 3, Sunday service will be added. Finally, in Phase 5, the route will be extended to Wal-Mart, which will serve as a trip generator for the route. Together, these service changes will help to increase ridership on Route 41 and will make the route more attractive to choice riders.

Figure 72 Route 41 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	30	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	30	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	30	60	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	30	60	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	30	60	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	30	60	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 73 Route 41 Map



Route 42 Bethany

Figure 75 shows that Route 42 will travel from downtown Lincoln to Adams & 70th Street via Vine Street, Holdrege Street, and 70th Street. Several important destinations are served, including UNL, UNL East Campus, and Robin Mickle Middle School. The proposed recommendation removes the existing terminal loop and interlines Route 42 with Route 49 to provide service in northeastern Lincoln. (Interlining a route means that every outbound Route 42 will continue inbound as a Route 49 at 70th Street/Adams and every outbound Route 49 will turn into an inbound Route 42). This will allow for connections to Northeast High School and Nebraska Wesleyan University.

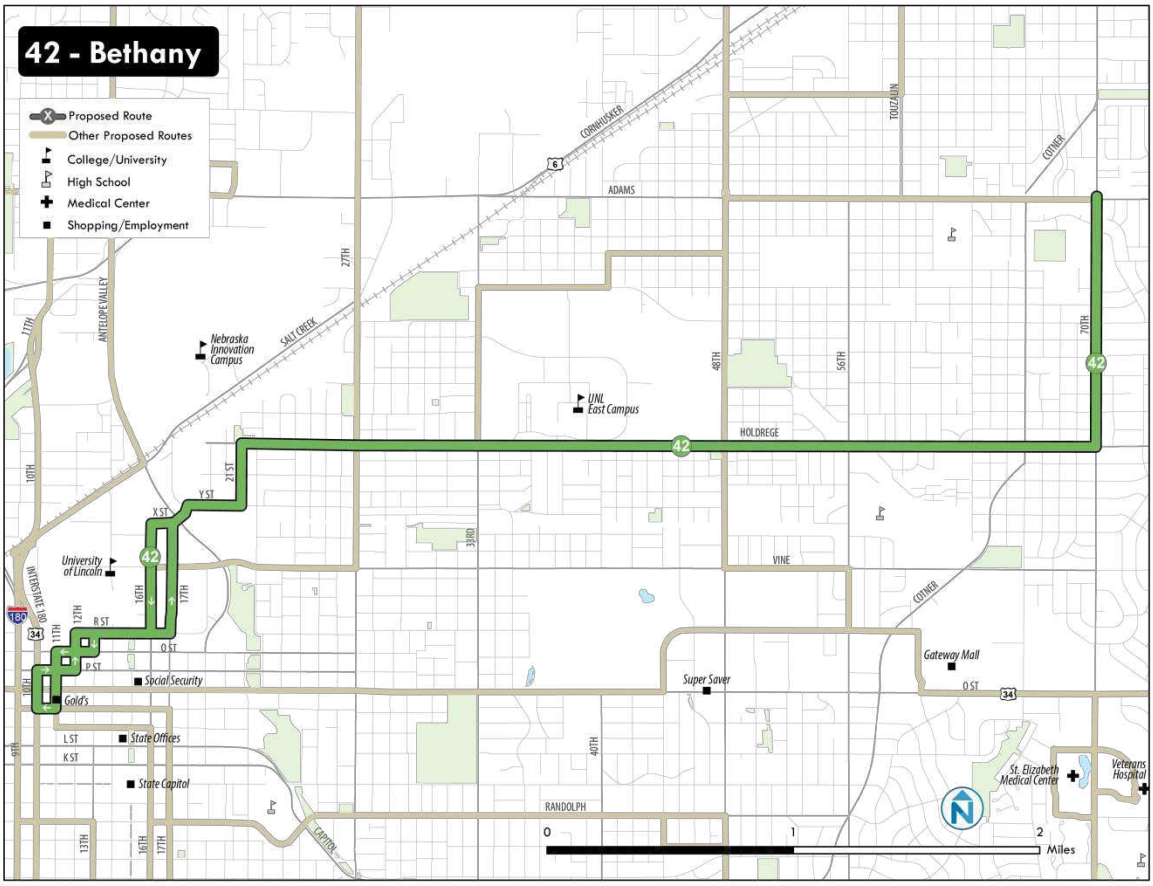
Route 42 and Route 49 operate on the same streets between downtown and 33rd Street and Holdrege. The schedules will be coordinated so that during peak times, a bus will operate every 15 minutes between 33rd Street and Holdrege and downtown in both the in and outbound directions. During off-peak times, a bus will operate every 30 minutes between these locations. This doubles the service along the corridor.

Figure 74 shows the existing operating schedule and the phases of proposed service improvements for Route 42. In the cost-constrained preferred alternative, headways will remain constant at 30 minutes for peak headways and 60 minutes for off-peak and weekend headways. The route will require two vehicles and will operate between 6:00 AM and 8:00 PM on weekdays and between 7:00 AM and 6:00 PM on Saturdays. In Phase 1 of service expansion, weekday off-peak headways will be reduced from 60 minutes to 30 minutes. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. Finally, in Phase 3, Sunday service will be added so that the route operates seven days a week.

Figure 74 Route 42 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	30	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	30	30	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 75 Route 42 Map



Route 44 O Street

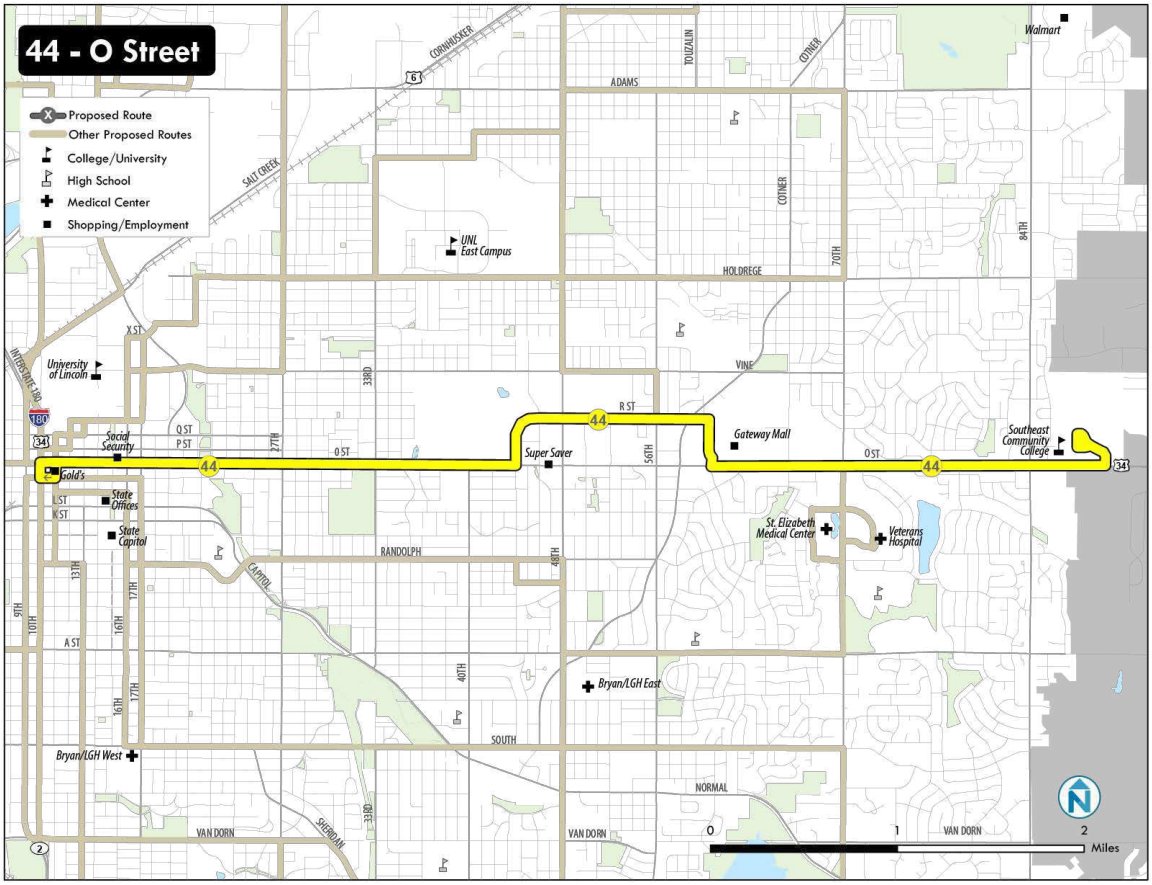
Figure 77 shows that Route 44 will operate along O Street from downtown Lincoln to SECC. Major destinations along the route include Target, Hy-Vee, Super Saver, Gateway Mall, Russ' Market, and Southeast Community College. Compared to the existing O Street route, two modifications are made to shorten the route and allow it to reliably have a 60-minute round trip travel time. East of the Gateway Mall, Route 44 will travel on O Street to SECC. The Vine Street segment would no longer be served. West of Gateway Mall, Route 44 will operate along R Street instead of Vine Street. Culler Middle School will still have service via R Street.

Figure 76 shows the existing operating schedule and the phases of proposed service improvements for Route 44. In the cost constrained preferred alternative, peak headways will remain constant with 30 minute intervals, but off-peak headways will be improved from 70 minutes to 30 minutes. The route will require two vehicles and will operate between 6:00 AM and 8:00 PM on weekdays and between 7:00 AM and 6:00 PM on Saturdays. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. In Phase 3, Sunday service will be added so that the route operates seven days a week.

Figure 76 Route 44 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	30	30	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	30	30	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 77 Route 44 Map



Route 46 Arnold Heights

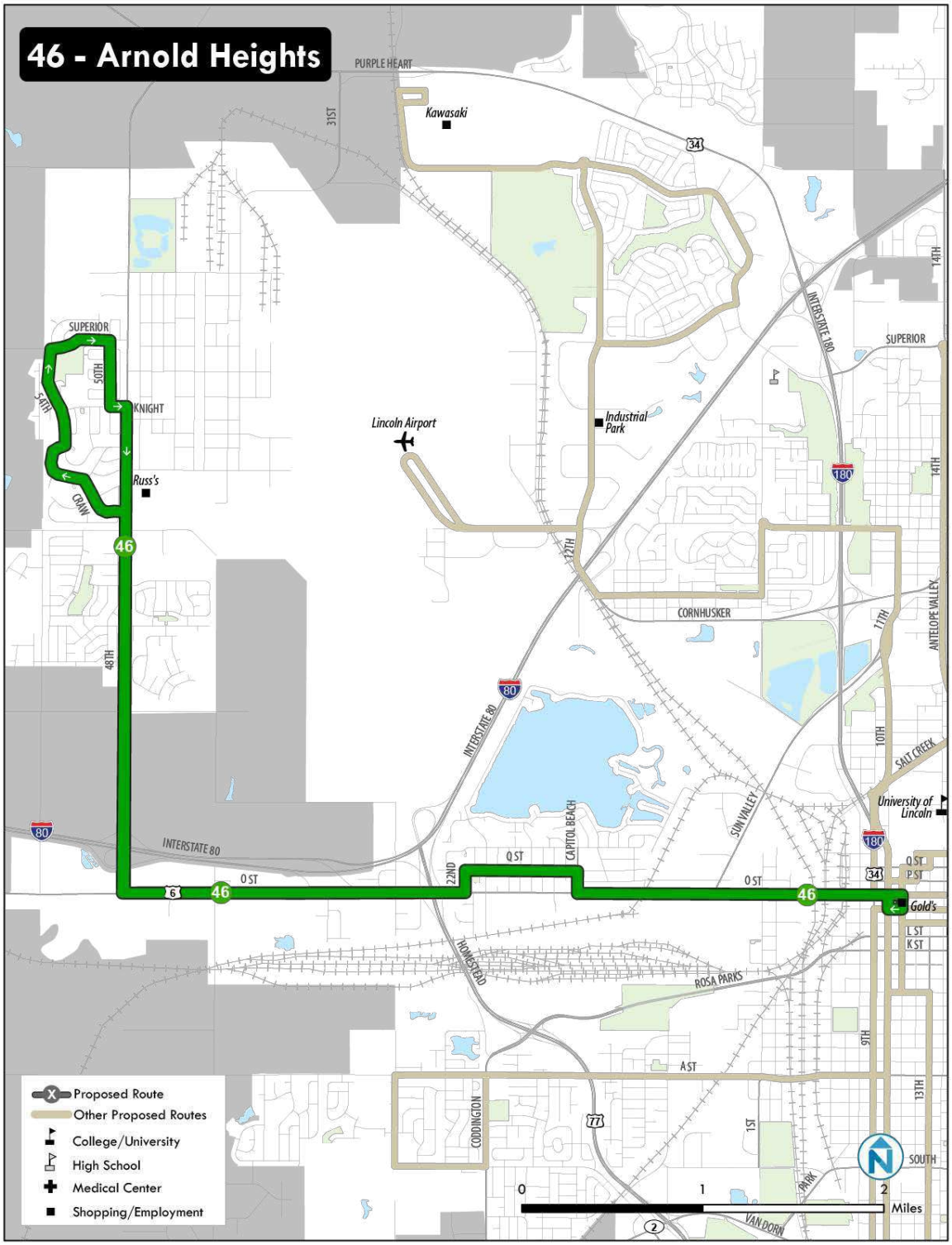
As Figure 79 shows, the proposed Arnold Heights route will remain mostly the same as current Route 46 aside from a smaller loop within the Arnold Heights neighborhood. Deviations along P Street. Victory Lane, and Air Park Boulevard were eliminated to improve directness and schedule reliability. Route 46 serves primarily residential areas. The only significant commercial destination is Russ' Market.

Figure 78 shows the existing operating schedule and the phases of proposed service improvements for Route 46. In the cost-constrained preferred alternative, headways will remain constant at 30 minutes for peak headways and 60 minutes for off-peak and weekend headways. The route will require two vehicles and will operate between 6:00 AM and 8:00 PM on weekdays and between 7:00 AM and 6:00 PM on Saturdays. In Phase 1 of service expansion, weekday off-peak headways will be reduced from 60 minutes to 30 minutes. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. In Phase 3, Sunday service will be added so that the route operates seven days a week.

Figure 78 Route 46 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	30	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	30	30	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 79 Route 46 Map



Route 48 North 48th

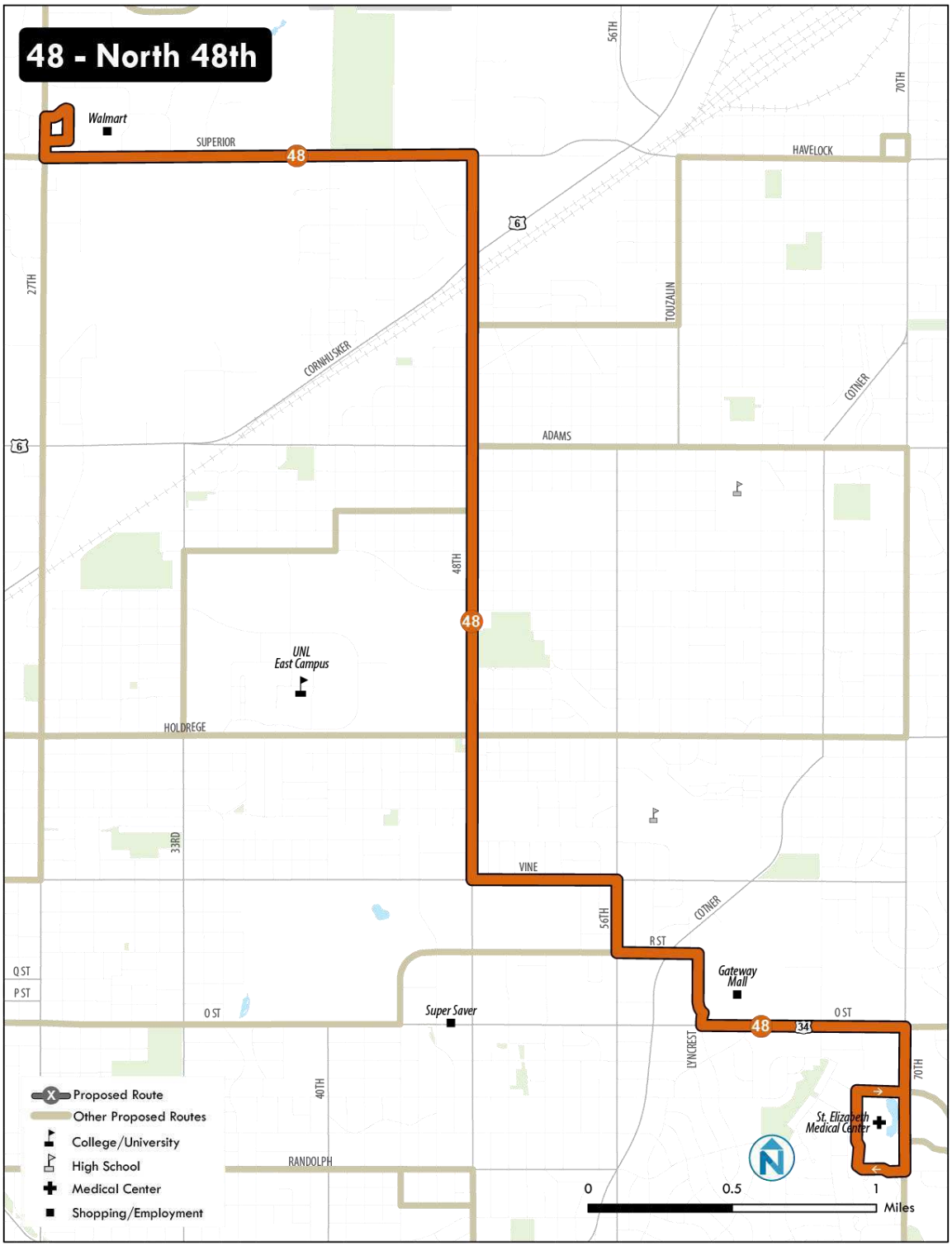
Figure 81 shows a new crosstown route connecting the North Wal-Mart, Gateway Mall, and the medical facilities on 70th Street. Route 48 will be interlined with Route 54 at Veteran's Hospital, so that every Route 54 trip will continue as a Route 48 to the N 27th Street Wal-Mart, and every southbound Route 48 will continue as a Route 54 to downtown Lincoln. This provides a one-seat ride for residents along G Street and Randolph to Gateway Mall and the commercial areas along 48th Street. At the northern terminus at Wal-Mart, riders can transfer to Route 41 or to Route 27 to reach their destinations.

Figure 80 shows the existing operating schedule and the phases of proposed service improvements for Route 48. In the cost-constrained preferred alternative, headways will be set at 60 minutes for peak, off-peak, and weekend headways. The route will require two vehicles and will operate between 6:00 AM and 7:00 PM on weekdays and between 7:00 AM and 6:00 PM on Saturdays. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. In Phase 3, Sunday service will be added so that the route operates seven days a week. In Phase 4 weekday service headways will be improved from 60 minute intervals to 30 minute intervals for all time periods.

Figure 80 Route 48 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	60	60	6:00 a.m.-7:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	60	60	6:00 a.m.-7:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	60	60	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	60	60	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	30	30	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	30	30	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 81 Route 48 Map



Route 49 University Place

As Figure 83 shows, Route 49 is proposed to connect downtown, UNL, and University Place. The alignment between downtown and 33rd Street and Holdrege will be identical to that of Route 42. The alignment north of UNL's East campus will operate more directly than today and use N 33rd Street, Huntington Avenue, N 41st Street, St Paul Avenue, N 48th Street, and Adams Street to 70th Street/Adams. Destinations along this alignment include UNL East, Nebraska Wesleyan University, and Northeast High School. Instead of completing a terminal loop at the northeastern portion of the route, Route 49 is proposed to be interlined with Route 42 to provide connections to Robin Mickle Middle School and destinations along Holdrege.

The proposed recommendation removes the existing terminal loop and interlines Route 49 with Route 42 to provide service in northeastern Lincoln. (Interlining a route means that every outbound Route 42 will continue inbound as a Route 49 at 70th Street/Adams and every outbound Route 49 will turn into an inbound Route 42).

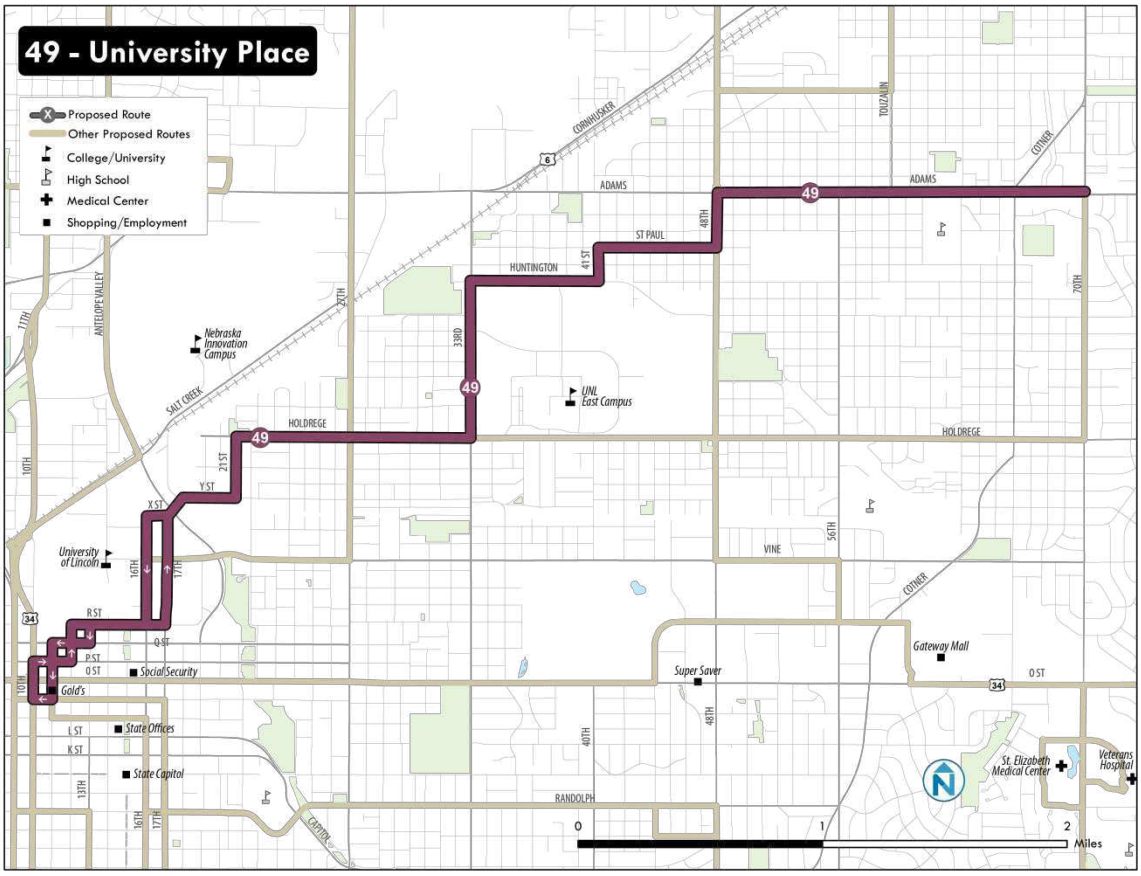
Route 42 and Route 49 operate on the same streets between downtown and 33rd Street and Holdrege. The schedules will be coordinated so that during peak times, a bus will operate every 15 minutes between 33rd Street and Holdrege and downtown in both the in and outbound directions. During off-peak times, a bus will operate every 30 minutes between these locations. This doubles the service along the corridor.

Figure 82 shows the existing operating schedule and the phases of proposed service improvements for Route 49. In the cost-constrained preferred alternative, headways will remain constant at 30 minutes for peak headways and 60 minutes for off-peak and weekend headways. The route will require two vehicles and will operate between 6:00 AM and 8:00 PM on weekdays and between 7:00 AM and 6:00 PM on Saturdays. In Phase 1 of service expansion, weekday off-peak headways will be reduced from 60 minutes to 30 minutes. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. In Phase 3, Sunday service will be added so that the route operates seven days a week.

Figure 82 Route 49 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	30	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	30	30	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	30	30	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 83 Route 49 Map



Route 51 West A

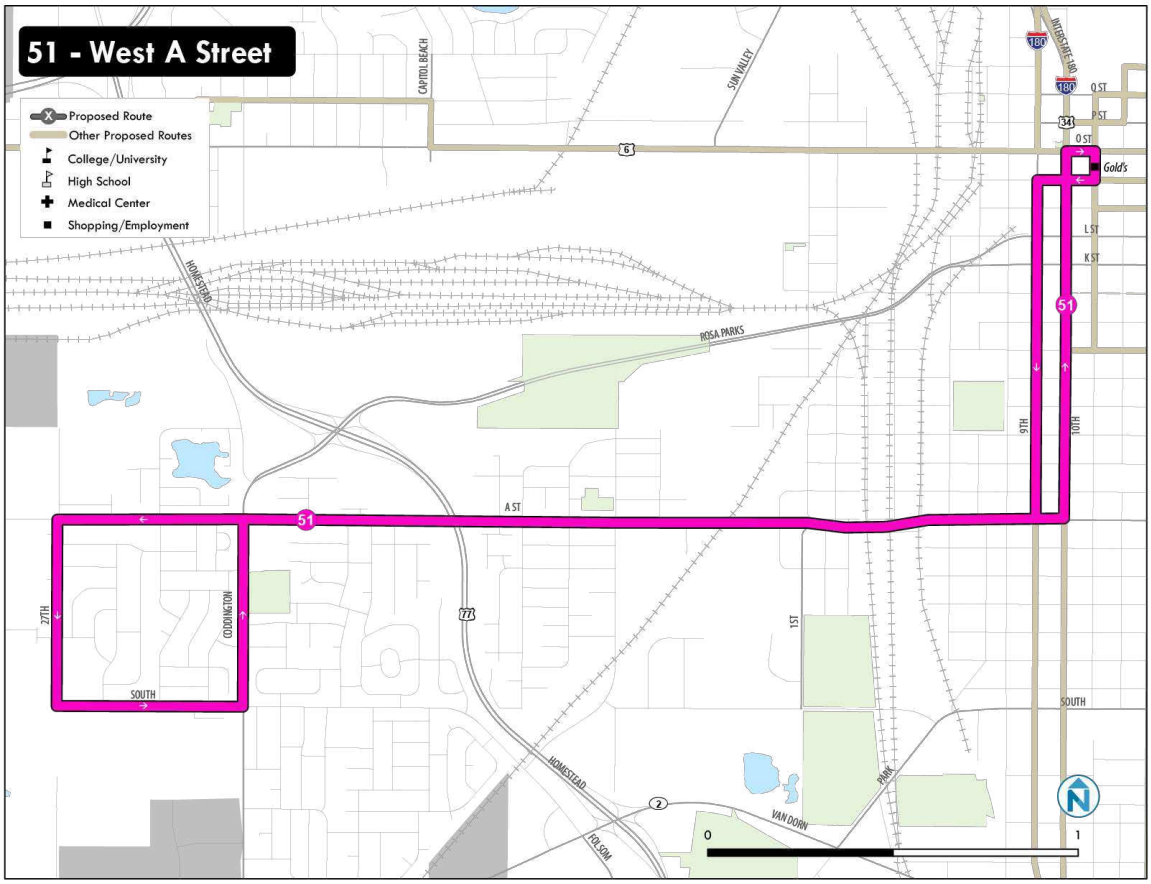
Routes 51 operates hourly between downtown Lincoln and the Lincoln Correctional Center. The terminal loop is shortened to simplify service and improve schedule reliability. The midday service levels have been improved from 120 minute frequency to 60 minute frequency. Figure 85 shows the new alignment for Route 51.

Figure 84 shows the existing operating schedule and the phases of proposed service improvements for Route 51. In the cost-constrained preferred alternative, headways will remain constant at 60 minutes for peak headways and will be shortened from 120 minutes to 60 minutes during off-peak periods. Weekend headways will remain constant at 120 minutes. The route will require one vehicle and will operate between 6:00 AM and 6:00 PM on weekdays and between 7:00 AM and 6:00 PM on Saturdays. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. In Phase 3 Sunday service will be added so that the route operates seven days a week. Finally, in Phase 5, weekend headways will be shortened from 120 minutes to 60 minutes.

Figure 84 Route 51 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	60	60	6:00 a.m.-6:00 p.m.	120	7:00 a.m.-6:00 p.m.	-	-
Phase 1	60	60	6:00 a.m.-6:00 p.m.	120	7:00 a.m.-6:00 p.m.	-	-
Phase 2	60	60	6:00 a.m.-8:00 p.m.	120	7:00 a.m.-6:00 p.m.	-	-
Phase 3	60	60	6:00 a.m.-8:00 p.m.	120	7:00 a.m.-6:00 p.m.	120	7:00 a.m.-6:00 p.m.
Phase 4	60	60	6:00 a.m.-8:00 p.m.	120	7:00 a.m.-6:00 p.m.	120	7:00 a.m.-6:00 p.m.
Phase 5	60	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 85 Route 51 Map



Route 52 Gaslight

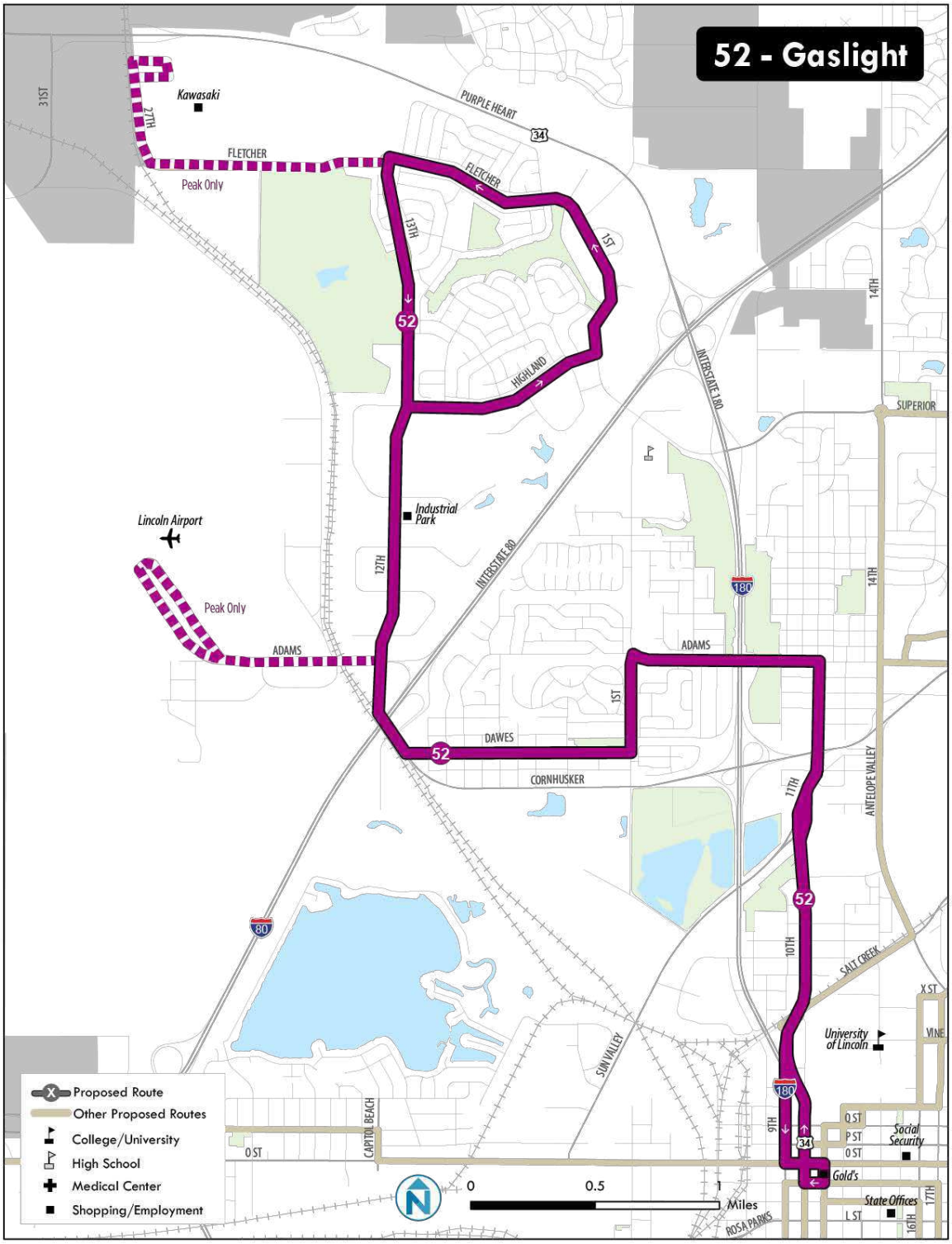
Figure 87 shows Route 52's streamlined alignment that includes a smaller terminal loop while still serving major destinations along the existing alignment, including Technology Park. The large one-way loop is reduced, which means that the majority of riders have a more direct, less time consuming trip to their destination. Trips to Kawasaki that meet shift schedules are recommended. In addition, during times when trips to Kawasaki are not made, Route 52 could serve the Airport. From a timing perspective, individual trips cannot serve both Kawasaki and the Airport; trips can serve one or the other. The midday service levels have been improved from 120 minute frequency to 60 minute frequency.

Figure 86 shows the existing operating schedule and the phases of proposed service improvements for Route 52. In the cost constrained preferred alternative, headways will remain constant at 60 minutes for peak headways and 120 minutes for weekend headways. Off-peak weekday headways will be shortened from 120 minute to 60 minute intervals. The route will require one vehicle and will operate between 6:00 AM and 6:00 PM on weekdays and between 7:00 AM and 6:00 PM on Saturdays. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. In Phase 3 Sunday service will be added so that the route operates seven days a week. Finally, in Phase 5, weekend headways will be improved from 120 minute intervals to 60 minute intervals.

Figure 86 Route 52 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	60	60	6:00 a.m.-6:00 p.m.	120	7:00 a.m.-6:00 p.m.	-	-
Phase 1	60	60	6:00 a.m.-6:00 p.m.	120	7:00 a.m.-6:00 p.m.	-	-
Phase 2	60	60	6:00 a.m.-8:00 p.m.	120	7:00 a.m.-6:00 p.m.	-	-
Phase 3	60	60	6:00 a.m.-8:00 p.m.	120	7:00 a.m.-6:00 p.m.	120	7:00 a.m.-6:00 p.m.
Phase 4	60	60	6:00 a.m.-8:00 p.m.	120	7:00 a.m.-6:00 p.m.	120	7:00 a.m.-6:00 p.m.
Phase 5	60	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 87 Route 52 Map



Route 53 Sheridan

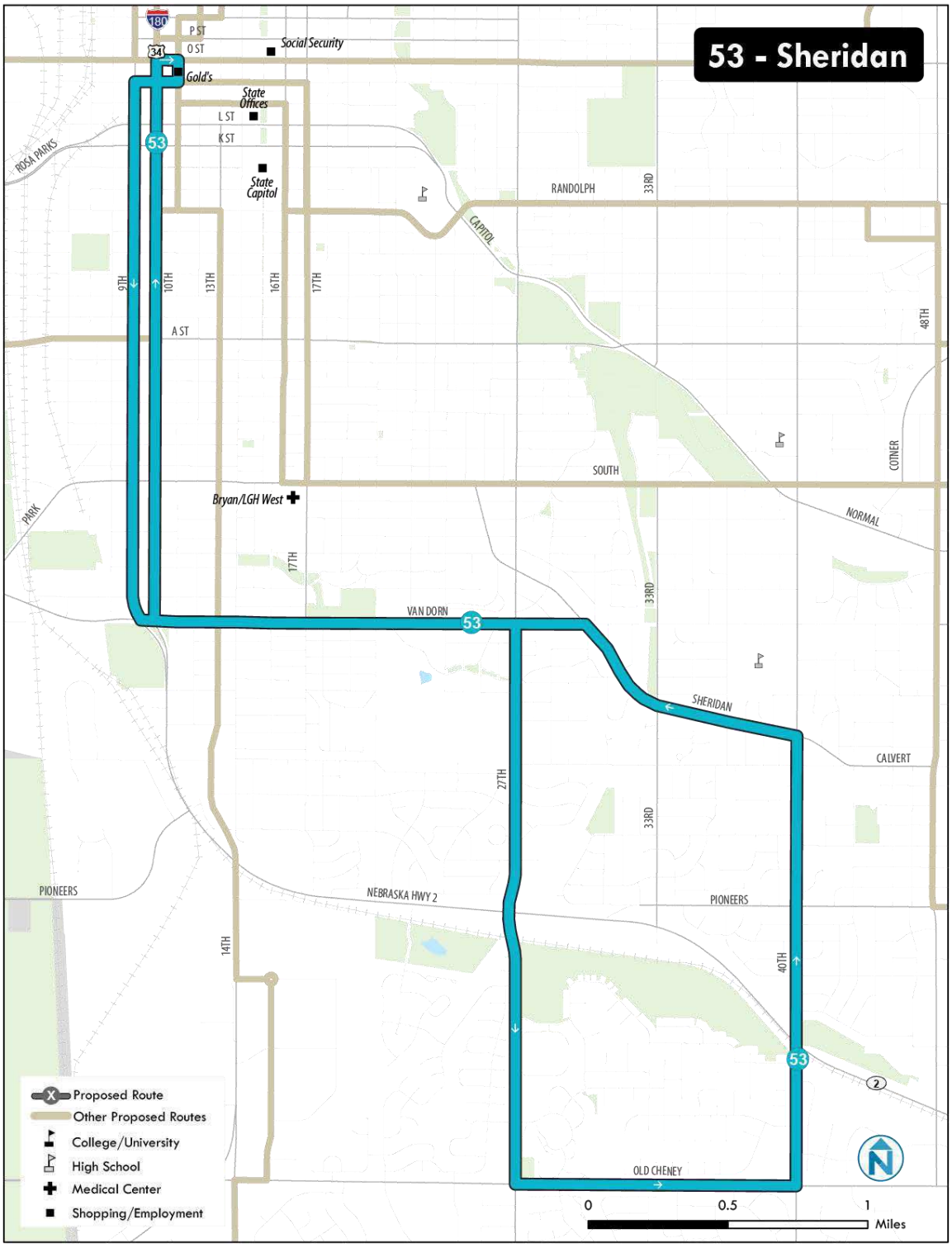
Figure 89 shows that Route 53 travels south from downtown and has a large terminal loop that centers around Tierra Briarhurst Park. The route will travel via 9th/ 10th Streets, Van Dorn, Sheridan, and 40th Street to Old Cheney Road, and will replace portions of the existing Route 45 Arapahoe and Route 48 Salt Valley. The route will complete a terminal loop along South 27th Street. Service will operate every 60 minutes throughout the day. The route will not operate on Saturdays. Major destinations along this route include Southeast High School.

Figure 88 shows the existing operating schedule and the phases of proposed service improvements for Route 53. In the cost-constrained preferred alternative, headways will be improved so that headways are held constant at 60 minute intervals for both peak and off-peak headways. The route will require one vehicle and will operate between 6:00 AM and 6:00 PM on weekdays. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips.

Figure 88 Route 53 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	60	60	6:00 a.m.-6:00 p.m.	-	-	-	-
Phase 1	60	60	6:00 a.m.-6:00 p.m.	-	-	-	-
Phase 2	60	60	6:00 a.m.-8:00 p.m.	-	-	-	-
Phase 3	60	60	6:00 a.m.-8:00 p.m.	-	-	-	-
Phase 4	60	60	6:00 a.m.-8:00 p.m.	-	-	-	-
Phase 5	60	60	6:00 a.m.-8:00 p.m.	-	-	-	-

Figure 89 **Route 53 Sheridan Map**



Route 54 Veterans Hospital

Route 54 serves Lincoln High School, Bryan Hospital East Campus, the Lincoln Family Medical Center, Ideal Grocery, and St. Elizabeth Medical Center and terminates at the Veterans Hospital, where it interlines with Route 48. Every outbound Route 54 trip will continue as a Route 48 at Veterans Hospital, and likewise, every southbound Route 48 trip will continue as an inbound Route 54 at Veterans Hospital. Figure 91 shows the streamlined alignment along Randolph Street, A Street, and S 70th Street will increase on time performance, help decrease average trip lengths, and provide a higher quality of service. Hourly trips during peak and non-peak periods will make it easier for riders to plan trips.

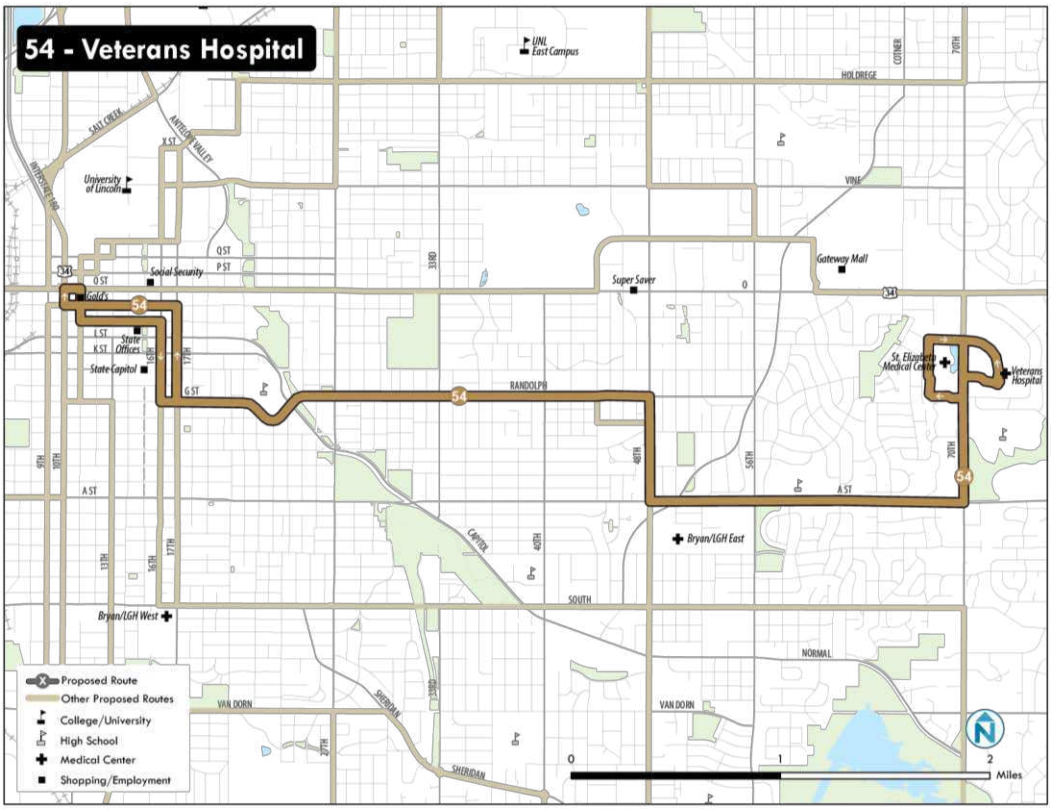
One other improvement for the majority of patrons along G Street and Randolph is that both Route 54 and Route 56 will be providing service. During peak times, three buses per hour will serve this corridor and during off-peak times, it will be two buses per hour. These high ridership areas, particularly G Street, will have service levels almost doubled weekdays and Saturdays.

Figure 90 shows the existing operating schedule and the phases of proposed service improvements for Route 54. In the cost-constrained preferred alternative, headways will be improved so that headways are held constant at 60 minute intervals for both peak, off-peak, and weekend headways. The route will require one vehicle and will operate between 6:00 AM and 7:00 PM on weekdays and between 7:00 AM and 6:00 PM on Saturdays. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. In Phase 3, Sunday service will be added so that the route operates seven days a week. In Phase 4 of service expansion, weekday off-peak headways will be reduced from 60 minutes to 30 minutes. In Phase 4, weekday headways will be shortened to 30 minute intervals for all times of day.

Figure 90 Route 54 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	60	60	6:00 a.m.-7:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	60	60	6:00 a.m.-7:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	60	60	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	60	60	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	30	30	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	30	30	6:00 a.m.-9:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 91 Route 54 Map



Route 56 SouthPointe

Route 56 will replace segments of the existing Routes 40, 43, 50, and 53. Major destinations along the route include Lincoln High School, Ideal Grocery, Lincoln Family Medical Center, Bryan Medical Center, Union College, Target, SuperSaver, Goodwill, and SouthPointe Pavilions. As Figure 48 shows, the route would have an "L" shaped alignment along O Street and S 48th Street to offer a faster and more direct trip to downtown from southeast Lincoln. The route has a terminal loop around the Edgewood Shopping Center. Route 56 would serve the front door of SouthPointe Pavilions and be extended to serve the Target and Wal-Mart on S. 27th Street and Yankee Hill Road.

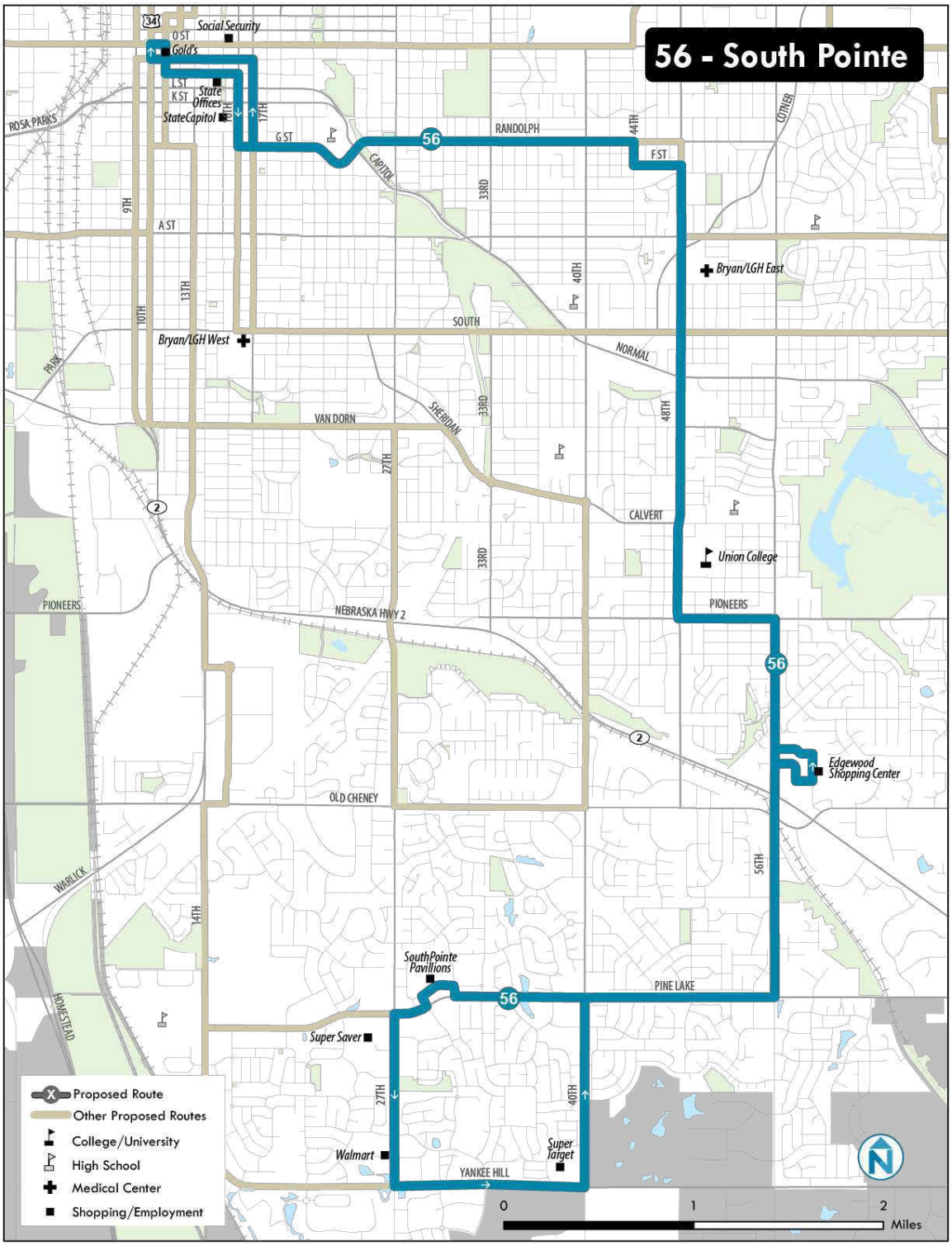
For one of the high-ridership segments, along G Street, Route 56's schedule would be coordinated with Route 54 to provide more frequent service along the corridor. During peak times, three buses per hour will serve this corridor and during off-peak times, it will be two buses per hour. These high ridership areas, particularly G Street, will have service levels almost doubled weekdays and Saturdays. In addition, Routes 56, 54, and Route 40 would create a frequent service corridor between Gold's and 16th/17th Streets and G Street.

Figure 92 shows the existing operating schedule and the phases of proposed service improvements for Route 56. In the cost-constrained preferred alternative, headways will remain constant at 30 minutes for peak headways and 60 minutes for off-peak and weekend headways. The route will require three vehicles and will operate between 6:00 AM and 8:00 PM on weekdays and between 7:00 AM and 6:00 PM on Saturdays. In Phase 2, weekday evening service will be extended by two hours to provide better service for late night trips. In Phase 3, Sunday service will be added so that the route operates seven days a week.

Figure 92 Route 56 Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	30	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 1	30	60	6:00 a.m.-8:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 2	30	60	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	-	-
Phase 3	30	60	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 4	30	60	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.
Phase 5	30	60	6:00 a.m.-10:00 p.m.	60	7:00 a.m.-6:00 p.m.	60	7:00 a.m.-6:00 p.m.

Figure 93 Route 56 Map



StarShuttle

In an effort to improve downtown mobility and provide a frequent last-mile connection between the Gold's transfer point and the State Office Building, a second vehicle will be added to the Star Shuttle during Phase 1, resulting in 7-8 minute headways throughout the day.

Figure 94 Star Shuttle Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	15	15	6:15 a.m.-6:45 p.m.	-	-	-	-
Phase 1	7-8	7-8	6:15 a.m.-6:45 p.m.	-	-	-	-
Phase 2	7-8	7-8	6:15 a.m.-6:45 p.m.	-	-	-	-
Phase 3	7-8	7-8	6:15 a.m.-6:45 p.m.	-	-	-	-
Phase 4	7-8	7-8	6:15 a.m.-6:45 p.m.	-	-	-	-
Phase 5	7-8	7-8	6:15 a.m.-6:45 p.m.	-	-	-	-

Southeast Express

A new commuter express route will be implemented during Phase 4 of service expansion. This route will connect Southeast Lincoln with downtown and UNL via Nebraska Highway 2. The ideal location for a park-and-ride facility is south of Cheney Road and within ½ mile of Nebraska Highway 2. StarTran should consider entering into a parking lease agreement with a property owner within this area. The best candidates are typically churches or movie theaters with additional parking capacity during the day.

Figure 95 Southeast Express Service Levels

	Weekday			Saturday		Sunday	
Period	Peak Headway	Off-Peak Headway	Service Span	Headway	Service Span	Headway	Service Span
Pref. Alt.	-	-	-	-	-	-	-
Phase 1	-	-	-	-	-	-	-
Phase 2	-	-	-	-	-	-	-
Phase 3	-	-	-	-	-	-	-
Phase 4	3 trips	3 trips	a.m. and p.m. peak	-	-	-	-
Phase 5	3 trips	3 trips	a.m. and p.m. peak	-	-	-	-

SUMMARY OF SERVICE RECOMMENDATIONS

The following figures summarize the resources necessary to implement the initial system restructure as well as future expansion phases.

Figure 96 Summary of Recommendations

Route	Preferred Alternative		Phase 1 Expansion			Phase 2 Expansion			Phase 3 Expansion			Phase 4 Expansion			Phase 5 Expansion		
	Annual Hours	Peak Vehicles	Service Change	Annual Hours	Peak Vehicles	Service Change	Annual Hours	Peak Vehicles	Service Change	Annual Hours	Peak Vehicles	Service Change	Annual Hours	Peak Vehicles	Service Change	Annual Hours	Peak Vehicles
13 13th Street	6,217	2	Improve midday headway	7,577	2	Extend evening service	8,087	2	Add Sunday service	8,693	2	-	8,693	2	-	8,693	2
27 27th Street	6,217	2	Improve midday headway	7,577	2	Extend evening service	8,087	2	Add Sunday service	8,693	2	-	8,693	2	-	8,693	2
40 Heart Hospital	8,183	2	-	8,183	2	Extend evening service	9,203	2	Add Sunday service	10,417	2	-	10,417	2	-	10,417	2
41 Havelock	9,325	3	-	9,325	3	Extend evening service	10,090	3	Add Sunday service	11,000	3	-	11,000	3	Extend route to 84th Street	14,667	4
42 Bethany	6,217	2	Improve midday headway	7,577	2	Extend evening service	8,087	2	Add Sunday service	8,693	2	-	8,693	2	-	8,693	2
44 O Street	7,577	2	-	7,577	2	Extend evening service	8,087	2	Add Sunday service	8,693	2	-	8,693	2	-	8,693	2
46 Arnold Heights	6,217	2	Improve midday headway	7,577	2	Extend evening service	8,087	2	Add Sunday service	8,693	2	-	8,693	2	-	8,693	2
48 North 48th	4,092	1	-	4,092	1	Extend evening service	4,602	1	Add Sunday service	5,208	1	Improve all-day headway	8,438	2	-	8,438	2
49 University Place	6,217	2	Improve midday headway	7,577	2	Extend evening service	8,087	2	Add Sunday service	8,693	2	-	8,693	2	-	8,693	2
51 West A	3,533	1	-	3,533	1	Extend evening service	4,043	1	Add Sunday service	4,347	1	-	4,347	1	Improve weekend headway	4,953	1
52 Gaslight	3,533	1	-	3,533	1	Extend evening service	4,043	1	Add Sunday service	4,347	1	-	4,347	1	Improve weekend headway	4,953	1
53 Sheridan	3,230	1	-	3,230	1	Extend evening service	3,740	1	-	3,740	1	-	3,740	1	-	3,740	1
54 Veterans Hospital	4,092	1	-	4,092	1	Extend evening service	4,602	1	Add Sunday service	5,208	1	Improve all-day headway	8,438	2	-	8,438	2
56 SouthPointe	9,325	3	-	9,325	3	Extend evening service	10,090	3	Add Sunday service	11,000	3	-	11,000	3	-	14,667	4
Star Shuttle	3,264	1	Add second vehicle	6,528	2	-	6,528	2	-	6,528	2	-	6,528	2	-	6,528	2
Southeast Express	-	-	-	-	-	-	-	-	-	-	-	New route	2,000	2	-	2,000	2
Total	**87,237**	**26**	**-**	**97,301**	**27**	**-**	**105,461**	**27**	**-**	**113,955**	**27**	**-**	**122,415**	**31**	**-**	**130,961**	**33**

SERVICE CHANGE PROCESS

In addition to the implementation of new services, regularly scheduled service changes allow an opportunity to modify route alignments due to changes in infrastructure or development, adjust schedules based on actual running times, add or remove bus stops, and implement fare adjustments. Service changes occur at least annually or semi-annually.

The service change process spans approximately six to nine months from proposed development to implementation for major service changes and four to six months for minor service changes. Major service changes include proposals to add a new route, discontinue and existing route, adjust fares, significantly alter the alignment of a route, or decrease the number of revenue hours of a route by 25% or more. Minor service changes include schedule adjustment to improve on-time performance and minor alignment modifications to improve customer access, operational safety, or on-time performance. Essential service change actions are included in Figure 97.

Figure 97 Service Change Checklist

Phase	Action(s)	
	Major Service Change	**Minor Service Change**
Proposal Development	□ Service & ridership analysis □ Review of customer and operator input □ Cost estimates □ Service equity analysis □ Initial routes and timing □ Customer outreach □ Public meetings □ Proposal revisions □ City Council approval	□ Passenger Notice & Comment □ Comment Period □ Final recommendations □ Passenger Notices
Implementation Preparation	□ Schedule development □ Operator work assignments □ Marketing and communication materials □ Capital upgrades (bus stops, facilities, etc.) □ IT updates (website, Google Transit, etc.)	
Implementation		

9 CAPITAL PLAN

The operation of fixed-route and paratransit bus service in Lincoln requires supporting capital in the form of buses, amenities, and technology. This chapter summarizes capital needs required to maintain and expand bus service over the next five years.

Vehicle Useful Life Assumptions

The minimum useful life of transit vehicles is based on Federal Transit Administration *Circular 5010.1D – Useful Life Policy*. The minimum useful life of large, heavy duty buses with a length of 35-45' is 12 years or 500,000 miles, whichever comes first. A table summarizing the useful life of all vehicle types based on years of service and mileage accumulated is provided in Figure 98.

Figure 98 Minimum Useful Life of Transit Vehicles

Category	Length	Years	Miles
Large, heavy-duty transit buses including over the road buses	35-45'	12	500,000
Small size, heavy-duty transit buses	30'	10	350,000
Trolley-replica buses	30'	10	350,000
Medium-size, medium-duty transit buses	25-35'	7	200,000
Medium-size, light-duty transit buses	25-35'	5	150,000
Other light-duty vehicles such as vans and sedans	N/A	4	100,000

Fixed-Route Peak Vehicle Requirements

StarTran peak vehicle requirements is depicted in Figure 99.

Figure 99 Peak Vehicle Requirements

Route	Peak Vehicles					
	Preferred Scenario	Phase 1 Expansion	Phase 2 Expansion	Phase 3 Expansion	Phase 4 Expansion	Phase 5 Expansion
13 13th Street	2	2	2	2	2	2
27 27th Street	2	2	2	2	2	2
40 Heart Hospital	2	2	2	2	2	2
41 Havelock	3	3	3	3	3	4
42 Bethany	2	2	2	2	2	2
44 O Street	2	2	2	2	2	2
46 Arnold Heights	2	2	2	2	2	2
48 North 48th	1	1	1	1	2	2
49 University Place	2	2	2	2	2	2
51 West A	1	1	1	1	1	1
52 Gaslight	1	1	1	1	1	1
53 Sheridan	1	1	1	1	1	1
54 Veterans Hospital	1	1	1	1	2	2
56 SouthPointe	3	3	3	3	3	4
Star Shuttle	1	2	2	2	2	2
Southeast Express	-	-	-	-	2	2
Subtotal	**26**	**27**	**27**	**27**	**31**	**33**
Spares (20%)	**6**	**6**	**6**	**6**	**7**	**7**
Vehicles Required	**32**	**33**	**33**	**33**	**38**	**40**

Fixed-Route Fleet Replacement Plan

Based on the FTA Vehicle Useful Life policy, eighteen StarTran buses purchased in 2001 have exceeded their recommended vehicle age and are due to be replaced. While it is common for transit providers to continue operating vehicles with low mileage beyond twelve years, these vehicles are now fourteen years old. Additional vehicles are recommended for replacement as detailed in Figure 100.

Figure 100 Fixed-Route Fleet Replacement Plan

Category	Preferred Scenario	Phase 1 Expansion	Phase 2 Expansion	Phase 3 Expansion	Phase 4 Expansion	Phase 5 Expansion
Peak Vehicles	26	27	27	27	31	33
Spares	6	6	6	6	7	7
Vehicles Required	**32**	**33**	**33**	**33**	**38**	**40**
Vehicles Retired	18	9	0	15	0	0
Vehicles Purchased	18	9	0	15	0	0

Bus Stop Signage and Amenities

StarTran currently has approximately 400 bus stop signs throughout its service area. Because StarTran operates with a flag stop policy, the 400 signed bus stops represent a fraction of the total number of bus stops.

For a variety of reasons, including marketing, branding, improvements in speed and reliability, as well as bus operations safety, a transition from flag stops to marked bus stops is recommended. As a result, all bus stops would need to be flagged with a bus stop.

The preferred alternative's recommended route structure will require approximately 1,200 bus stops, all of which will require new signage. All existing bus stop signs must be replaced to ensure consistent branding and marketing information. From a capital planning perspective, at 1,200 new bus stops signs should be available.

In addition to the bus stops, StarTran should embark on a program to upgrade its bus stops to ADA compliant standards. This includes landing pads for wheelchairs.

Additional bus stop amenities include shelters and benches. Given changes are recommended to the route structure, investments in shelters and benches should be made after the preferred alternative has been implemented. The guidelines for where shelters and benches are warranted are found in the Service Guidelines chapter. After preferred alternative implementation, StarTran should target a minimum of five stops for improvement annually, and prioritize the investments based on need (due to boardings) and customer requests. If additional funding is available, additional investments should be considered.

Websites

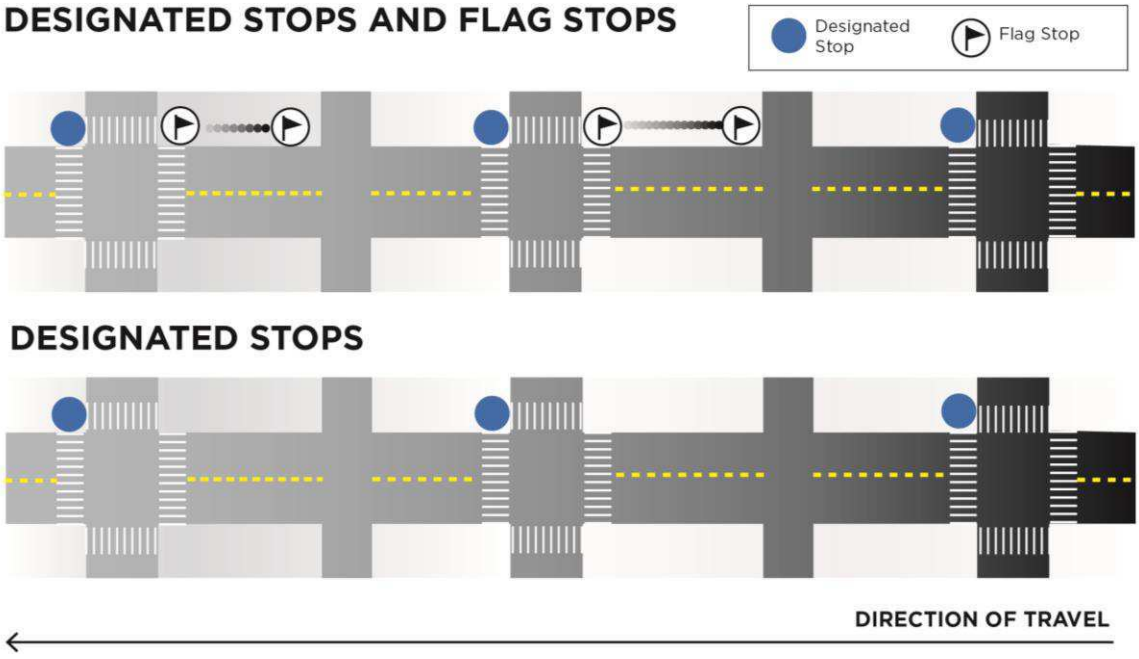
Transit system websites have become the primary source of information for most riders. Additional website features that improve customer convenience include:

- A simple, stand-alone web address that is easy to remember
- A mobile website for smartphones
- Trip planning capability, either directly on the website or through integration with third-party sites such as Google Maps
- Real-time information displaying vehicle locations and predicted arrivals
- The ability to purchase tickets and passes
- Customizable e-mail or text alerts for service disruptions, agency news, etc.
- Integration with social media such as Twitter and Facebook to provide service alerts and updates on transit initiatives
- Availability in multiple languages to make information accessible for the entire community

10 BUS STOP GUIDELINES

StarTran currently employs a unique bus stop policy that includes designated (signed) bus stops and flag stops. Under this system, passengers are permitted to board at designated bus stops or at any intersection along the route outside of downtown by flagging down an approaching bus. Similarly, passengers may exit the bus anywhere along the route by activating the on-board stop request cord or strip one block prior to their desired departure. Bus operators are not permitted to load or unload customers in the middle of a block. A diagram of StarTran's bus stop system and a traditional designated bus stop system is depicted in Figure 101.

Figure 101 Bus Stop System Comparison



While flag stops allow customers to board and exit the bus closer to their origin or destination than a typical designated stop, they also negatively impact other aspects of service such as schedule reliability and speed. While approximately 487 bus stop signs are installed throughout the City of Lincoln, StarTran does not currently have a formal process of determining where stops should be added, relocated, upgraded or removed. Current bus stop signage is inadequate in terms of providing basic information for existing and potential customers.

StarTran should transition to have designated bus stops systemwide. This memo will outline the benefits of such a transition. This memo will also describe guidelines that establish a consistent and transparent methodology for the provision, design, and placement of bus stops.

BENEFITS OF DESIGNATED STOPS

Transitioning from the current flag stop system to designated bus stops is substantial change for passengers. Changes in how to access service, especially for existing customers, can be unsettling. The benefits of the change, however, outweigh the negative impacts on existing customers.

Speed and Reliability Improvements

Eliminating flag stops helps create a more predictable transit environment by controlling how frequently a bus stops. StarTran, like most transit systems, measure schedule adherence by the time a bus departs one of several scheduled timepoints along a route. Buses departing a timepoint one minute prior or earlier than the scheduled time are considered early. Buses departing a timepoint five minutes or later than the scheduled time are considered late. Buses departing a timepoint between 59 seconds earlier or 4 minutes and 59 seconds after the scheduled time are considered on-time. On weekdays, StarTran buses depart on-time at scheduled timepoints 61% of the time. Transit systems similar to StarTran, in terms of service hours and vehicles operated, typically achieve on-time performance measures of 80% or better.

Formalizing bus stops is the most cost-effective way to improve the speed and reliability of StarTran services. While the elimination of flag stops may result in longer walks for some customers, all riders will experience faster and more reliable service. Actual and perceived time savings obtained by reducing the number of stops have a positive influence on customer satisfaction.

Access and Comfort Improvements

Most StarTran designated bus stops lack basic route/schedule information and customer amenities such as seating and shade/shelter. Most StarTran routes also lack ADA-accessible bus stop landing pads and sidewalk connections. The establishment of designated bus stops will assist StarTran in prioritizing amenity upgrades and making more stops accessible.

StarTran conducted On-board surveys of fixed-route riders during October and November 2013. Riders were asked to rate various service characteristics on a scale of one to five, with the higher number, the higher level of satisfaction. The lowest-ranked characteristic was bus stop amenities.

Signage at designated bus stops should be replaced to include the new StarTran logo, route number/name, directional endpoint, the customer service line, website, and an ADA-accessible symbol. Bus stop signage should also include the unique stop identification number, which could be used to access schedule information from Google Transit or the Get On Board application.

Market research and recent transitions in Council Bluffs, IA and Wichita, KS have shown that customers will walk longer distances to defined bus stops, particularly if capital improvements such as shelters, benches, and pads are available.

By transitioning to a designated stop system, StarTran would not be in jeopardy of violating ADA regulations if bus stop signs are installed in areas that lack accessibility so long as StarTran develops a bus stop improvement plan to phase in improvements as funding permits.

Operational Safety

Several veteran StarTran bus operators provided similar feedback regarding the current flag stop system. Bus operators indicated that flag stops reduce speeds significantly and create operational challenges. Designated bus stops at safe and visible locations enhance customer safety by controlling where pedestrians cross streets. Fewer bus stops also reduce the chance of buses getting rear-ended by automobiles traveling along the same corridor(s).

Marketing

According to passenger surveys, more than 20 percent of StarTran's riders are new each year. Bus stops are the single most important and cost effective way to show where a bus operates, stops, and what destinations are served. Bus stops help non-users figure out the system, and also raise the visibility of the system throughout the community.

Several newer model StarTran buses and a few bus stops downtown have new branding consisting of updated logo and color scheme. However, most bus stops and several buses still have the previous logo and colors.

Figure 102 New StarTran Branding

Data Collection

Designated stops help focus stop-level data collection, which is crucial to the effective analysis of service performance and productivity. Eliminating flag stops would increase ridership at many designated stops, which will provide a better understanding of how StarTran and the City of Lincoln should invest in bus stop amenities and accessibility improvements.

In 2012, StarTran completed a Financial, Marketing, Management, and Operations Analysis. A key recommendation of the report was to establish a program to inventory all bus stops and guiding customers to safe boarding locations. Another recommendation to provide more shelters and benches at high-use bus stops. Transitioning to a designated stop system is an important first step in achieving these important and worthwhile agency goals.

BUS STOP GUIDELINES

Bus Stop Spacing

Stop spacing guidelines are intended to guide the placement of future stops, while balancing customer convenience with operating efficiency. Customer convenience involves a tradeoff between distance to stops and travel speeds. Closely spaced stops reduce the distance to/from customer origins and destination. However, closely spaced stops also result in slower bus speeds as each additional stop requires the bus operator to decelerate, come to a complete stop, allow time for customers to alight and/or board, accelerate, and merge back into traffic. Despite increasing walking distance for some customers, stops spaced far apart result in faster, more reliable service for all customers.

Most arterial and collector streets in the City of Lincoln are spaced ½ mile to 1 mile apart, providing a framework for consistent stop spacing. In general, areas with high population and employment density should have shorter stop spacing than areas with moderate or low densities. Figure 103 provides stop spacing guidelines based on population and employment density characteristics. Actual stop spacing will vary based on built environment characteristics.

Figure 103 Design Criteria for Bus Stop Spacing

Density Classification	Population and Employment Characteristics	Spacing Dimensions
High Density	16+ persons or jobs per acre	Approximately every 800 feet
Moderate Density	8-16 persons or jobs per acre	Approximately every ¼ mile
	4-8 persons or jobs per acre	Every ¼ - ½ mile
Low Density	0-4 persons or jobs per acre	As needed

Areas with the highest population densities include neighborhoods just south of Downtown, student housing on and near UNL campuses, and apartment communities in North Central Lincoln.

Employment in Lincoln is largely concentrated around Downtown and UNL, and distributed along major corridors. The O Street corridor is home to a high density of jobs, including the Veterans Hospital, Saint Elizabeth Medical Center, Southeast Community College, and Gateway Mall. The 48th Street corridor includes Bryan Medical Center, Union College, and various shopping and retail locations. Other notable areas of employment include the Kawasaki plant, Industrial Park, SouthPointe Pavilions, and Edgewood Shopping Center.

Bus Stop Placement Options

Stop placement guidelines describe the considerations that are involved in making decisions regarding new or relocated bus stops. The proper location of bus stops is critical to the safety of passengers, pedestrians, and motorists, as well as the safe and efficient operation of buses. New stop requests submitted by current or potential customers should be evaluated by StarTran staff and if approved, upgraded to Americans with Disabilities Act (ADA) accessibility standards.

The initial step of determining placement of a new or relocated bus stop involves its proximity to the intersection. The placement of each bus stop can be classified as one of the following:

- Near-side—immediately prior to an intersection
- Far-side—immediately after an intersection
- Mid-block—between two intersections

Bus stops are generally located at street intersections to maximize pedestrian accessibility from both sides of the street and provide connectivity to intersecting bus routes. Bus turning movements, driveways, and dedicated turn lanes sometimes restrict the placement of stops at or near an intersection and necessitate a mid-block stop. Mid-block stops may also be considered when destinations are a significant distance from intersections.

Bus Stop Placement Considerations

Each new or relocated bus stop must be examined on a case-by-case basis to determine their exact location. The following list details bus stop placement considerations related to customer convenience and comfort, accessibility, operational safety, and adjacent land use:

- Customer Convenience and Comfort
  - Proximity to expected trip generators
  - Visibility of bus stop zone and presence of street illumination
  - Connections to intersecting bus routes
- Accessibility
  - Adequate right-of-way to ensure the bus stop meets the Americans with Disabilities Act (ADA) accessibility standards
  - Presence and conditions of sidewalks leading to trip generators
  - Marked crosswalks and curb ramps at street intersections or midblock crossings
- Operational Safety
  - Volume and turning movements of other vehicles including bicycles
  - Adequate curb space to accommodate multiple buses, if necessary
  - Adequate sight distance to/from adjacent streets, intersections, and driveways
  - Proximity to rail crossings
- Adjacent Land Use
  - Ridership potential to support the investment of new stops
  - Adequate right-of-way to prevent encroachment onto private property

Key advantages and disadvantages of each bus stop placement option are described in Figure 104.

Figure 104 Bus Stop Placement Considerations

	Advantages	Disadvantages
Near-side stops	Shortest distance from bus door to a crosswalk, which encourages riders to use crosswalks	Most exposure to traffic delays. May require more than one traffic cycle Increases conflict with right-turning vehicles May block travel lane with queuing buses May obscure motorists' view of traffic control devices and crossing pedestrians
Mid-block stops	Typically improves access to destinations on large tracts	May require bus pullout on high-speed streets Encourages riders to cross street mid-block Motorists typically do not expect mid-block crossing pedestrians
Far-side stops	Encourages riders to use nearby crosswalks Reduces delay as operators have better chance of avoiding red light Allows additional right-turning capacity before intersection	May restrict travel lanes on far-side of intersection

Bus Stop Placement Best Practices

The following situations are common determinants of bus stop placement:

- If the route alignment turns left at an intersection, the preferred location for the stop is the far-side of the intersection after the bus turns.
- If the route alignment turns right at the intersection, the preferred location for the bus stop should be on the far-side of the intersection after the bus turns.
- If there is a high volume of vehicles turning right at an intersection, the preferred location for a bus stop is on the far-side of the intersection after the turn.
- At intersections with complex, multi-phased traffic signals or dual right or left turn lanes, far-side bus stops are preferred because they eliminate buses from an area of complicated traffic movement at that intersection.
- When the route alignment requires the bus to make a left turn and it is not feasible or desirable to locate the bus stop on the far-side of the intersection after the bus turns, a mid-block stop may be warranted.
- Mid-block bus stops prior to left turns should be located a distance from the intersection that allows the bus to easily maneuver into the proper lane to turn left (a minimum of 100-150 feet for each lane change, depending on street speeds).
- When connections between two bus routes show a strong directional pairing (e.g., passengers connecting from eastbound to southbound route), placing one bus stop on the nearside and the other on the far-side can reduce pedestrian crossings at the intersection.
- Stops may be situated within the travel lane along state highways situated within the urban core with two travel lanes in the same direction (e.g., O Street).
- Bus pullouts are acceptable at high ridership stops with significant dwell times or route terminal points.

Bus Stop Dimensions

Bus stop design guidelines are based on transit best practices and incorporate street and pedestrian conditions found within the City of Lincoln. Recommended bus stop zone dimensions are illustrated in the following figures. Each drawing depicts ideal bus stop dimensions in terms of ingress, bus zone, and egress for near-side, far-side, and mid-block stops. Entry and exit tapers enable buses to return to the traffic stream without a hard left turn. No parking zones reduce conflict with parked autos and maximize line of sight for bus operators, motorists, and cyclists.

Figure 105 Near-side Bus Stop Recommended Dimensions

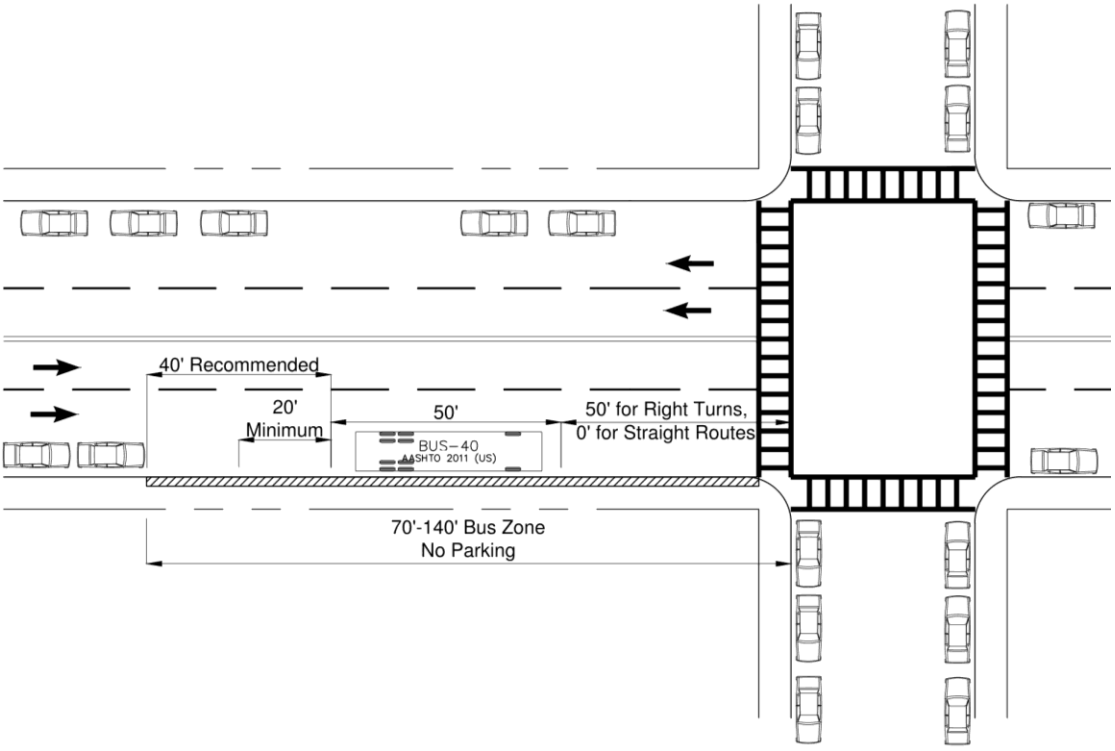


Figure 106 Far-Side Bus Stop Recommended Dimensions

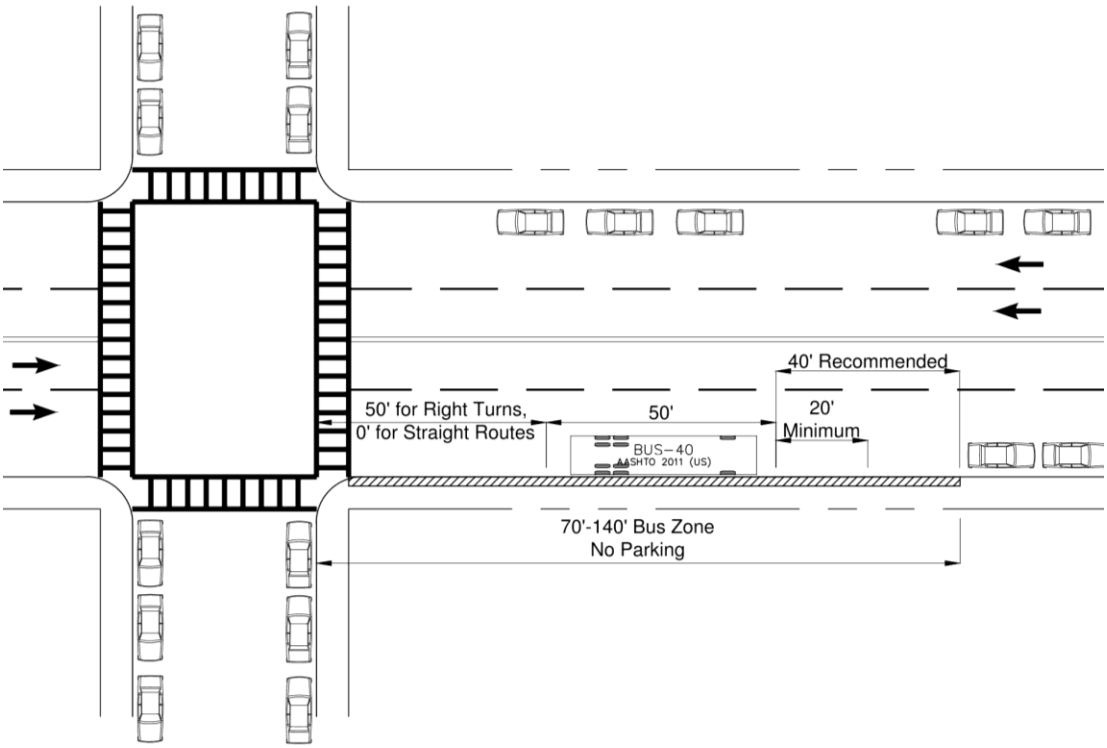
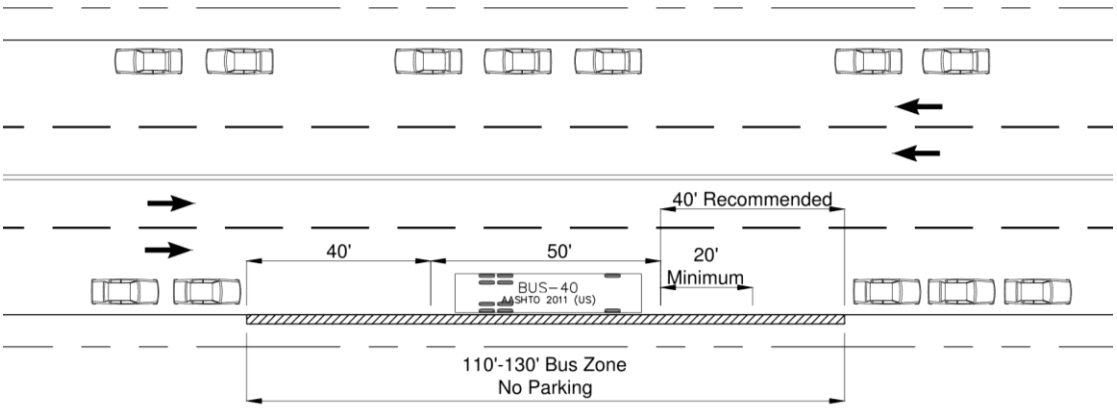


Figure 107 Mid-Block Bus Stop Recommended Dimensions



Bus Turnouts

Bus turnouts are recessed bus stop zones along arterial streets that enable traffic to move around a bus when passengers are boarding and alighting. Bus turnouts must be sited carefully to provide adequate sight distance for bus operators to safely re-renter the traffic stream while minimizing schedule delay and increased transit passenger travel time.

Bus turnouts should be considered at selected locations where passenger volumes and the flow of traffic could be significantly impeded by stopped transit buses. Bus turnouts may also be needed at locations where traffic speed exceeds 40 miles per hour.

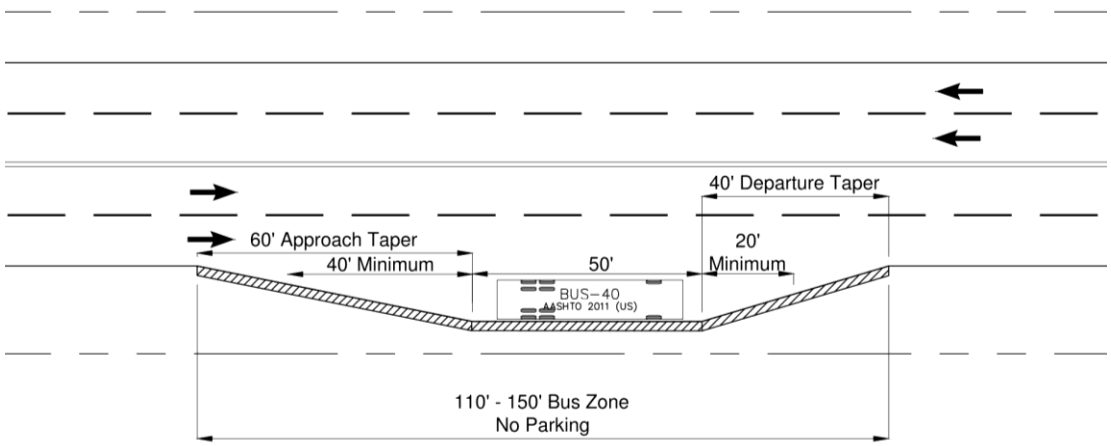
Turnouts may be warranted in areas where speeds are less than 40 miles per hour when one or more of the following conditions exists:

- Average peak-period dwell time exceeds 30 seconds per bus
- Buses are expected to layover at a designated timepoint or the end of a trip
- Potential for auto/bus conflicts warrant separation of transit and passenger vehicles
- History of repeated traffic and/or pedestrian accidents at stop location
- Right-of-way width is adequate to construct the bay without adversely affecting sidewalk pedestrian movement
- Sight distances (e.g. hills, curves, etc.) prevent traffic from stopping safely behind a bus
- A right-turn lane is used by buses as a queue jumper lane
- Appropriate bus signal priority treatment exists at an intersection
- Bus parking in the curb lane is prohibited

The minimum recommended width for bus turnouts is 10 feet to provide sufficient space to enable bus operators to properly maneuver the bus and avoid conflict with adjacent traffic.

The ideal dimensions of a mid-block bus turnout are shown in Figure 108.

Figure 108 Mid-Block Bus Pullout Recommended Dimensions



Driveways

Whenever possible, bus stops should not be placed within proximity of a driveway. However, if a driveway is unavoidable:

- Attempt to keep at least one exit and entrance open to vehicles accessing the property while a bus is loading or unloading passengers.
- Locate bus stops to allow good visibility for vehicles leaving the property and to minimize vehicle/ bus conflicts. This is best accomplished by placing bus stops where driveways are behind the stopped bus.
- Never place a bus stop that forces passengers to wait for a bus in the middle of a driveway.
- It is preferable to fully rather than partially block a driveway to prevent vehicles from attempting to squeeze by the bus in a situation with reduced sight distance.

Bus Stop Signage

StarTran should install route and schedule information panels at each bus stop pole. Route signage should be limited to one or two designs to minimize inventory and materials costs.

Bus stop signage should include the following:

- StarTran logo
- Unique panels/ stickers for each route with: name/ number/ terminal information,
- Unique stop identification number, which can be used to access schedule information
- Customer service line
- StarTran website address
- ADA-accessible symbol indicating that buses (not necessarily the stop) are accessible

The bottom of the sign should be installed seven feet from the ground. Route information panels should measure at least 4 inches wide by 12 inches tall to maximize visibility and be installed at eye level. An example of the conceptual StarTran bus stop designs are shown in Figure 109.

Figure 109 StarTran Conceptual Bus Stop Designs

Bus Stop Amenities

This section provides guidance on the installation and placement of bus stop amenities. Bus stops amenities enhance the customer experience by improving comfort and convenience. Consequently, transit systems with well-designed and maintained amenities have the potential to attract and retain riders. Bus stop amenities also influence the community's image perception of StarTran. Bus stop amenities are described in Figure 110.

Figure 110 Bus Stop Amenities

Amenity	Description
Pole and Sign	Installed at all bus stops
Seating	Installed at stops meeting specific qualifying criteria.
Shelter	Installed at stops meeting specific qualifying criteria.
Trash Receptacles	Installed at stops with seating or shelter.
Route Information	Installed at all bus stops

Three tiers of amenities are proposed for StarTran bus stops and described below.

Basic Bus Stop

Bus stops generating fewer than 10 boardings per day are classified as basic stops and should only include a pole and signage.

Bus Stop with Seating

Bus stops generating at least 15 boardings per day qualify for a 6-8' bench and trash receptacle.

Bus Stop with Shelter

Bus stops generating at least 25 daily boardings qualify for a shelter, seating, and a trash receptacle. Alternatively, stops that generate at least 10 daily boardings and meet one of the following criteria also qualify for a shelter:

- Medical, senior, social service, public or special needs facilities within ¼ mile
- Major grocery stores within ¼ mile
- Apartments, dorms, or senior housing with 100+ units within ¼ mile
- High schools, colleges, or universities within ¼ mile

Bus stop shelters should be available in two sizes due to variations in available right-of-way and boarding activity:

- Large shelter: 20' width x 5' depth x 8' height
- Medium shelter: 12' width x 5' depth x 8' height

Most existing StarTran shelters are outdated and medium in size. Large, modern shelters (as shown in Figure 111) are present at select stops in downtown Lincoln.

Figure 111 StarTran Downtown Bus Stop Shelter

Bus Stop Layout

Bus stop signage should be placed at far end of stop and mark the stopping point of the bus. Signage should typically be installed at a distance of 3' from the curb to maximize visibility. Specific signage location should take surrounding infrastructure and vegetation into consideration.

Each new or upgraded bus stop should include a landing pad aligned with the front door of the stopped bus to meet regulations included in the American with Disabilities Act. Landing pads should have a minimum dimension of 5' wide x 8' deep, which may consist of the space under a shelter so long as there are no physical obstructions such as seating or shelter posts. Landing pads should cover the back door of the bus for stops averaging more than 10 alightings per day.

Bus stop amenities should ideally be placed nearside of signage to minimize the distance to bus doors and reduce dwell times. Available right-of-way may influence the placement of amenities. When sufficient right-of-way exists, amenities should be placed behind sidewalk to allow space for snow removal.

Factors Impacting Installation of Bus Stop Amenities

Circumstances that might preclude installation of shelters, seating, or trash receptacles at a particular stop meeting recommended thresholds are as follows:

- Amenities would compromise pedestrian or operational safety
- Adequate right-of-way is not available
- Installation costs are excessive
- Plans are in place to relocate or close the stops

No Parking Restrictions

The lack of parking restrictions can negatively impact bus service by limiting sight distances and passenger access. Potential issues that may arise include:

- Buses not being able to accessing the curb/ sidewalk area to pick or drop off passengers
- Passengers forced to maneuver between parked vehicles when they board or deboard
- Buses blocking travel lanes due to inability to access the curb

In an effort to maximize safety and customer convenience while reducing conflicts with automobile traffic, StarTran may consider installing no parking restrictions at bus stops.

11 SERVICE STANDARDS

Performance measurement and benchmarking (the process of establishing reference points for performance measurement) are important parts of managing any business or activity, especially public transit. Through benchmarking, management staff monitors the performance of various activities or deliverables (i.e., transit service delivery, vehicle maintenance) and progressively sets new targets for improving performance.

StarTran developed a set of service standards in 2007 as part of a Transit Development Plan (TDP) effort. The primary purpose of this document is to update the methodology for evaluating the performance of StarTran transit services based on industry best practices and local operating characteristics. This document provides an overview of StarTran's existing service standards and policies, guidelines for modification to existing service standards, and recommended updates to StarTran's existing service standards as well as development of paratransit service standards.

Background

Service standards and service design guidelines, while related, refer to two different components that support overall service efficiency in a transit agency.

- **Service Standards:** Service standards represent quantitative metrics that an agency strives to meet or exceed in terms of performance. Examples of service standards may include meeting or beating a pre-defined *on-time performance* percentage or exceeding a *passenger per revenue hour* threshold on a monthly or annual basis.
- **Service Design Guidelines:** As compared to standards, service design guidelines are not beholden to a specific threshold, instead they provide guidance and suggested best practices to help a transit service achieve service standard goals. Examples of service design guideline standards may include guidance on service deviations, route planning and bus stop spacing.

This report uses several terms that often cause confusion:

- A ***measure*** is a category of comparison; a reference point against which other factors can be evaluated. For this project, an example measure would be the passengers per revenue hour. Measures may or may not have an associated standard.
- A ***standard*** is a quantities value or threshold that the transit agency intends to achieve. Within the context of this report, standards refer to expectations for existing services. "Service standards" is frequently used as a term to reflect both measures and standards in this document.
- A ***guideline*** is defined as a recommendation that leads or directs a course of action to achieve a certain goal. Within the context of this report, guidelines refer to decision tools that facilitate the establishment of new or substantially modified services.

In short, measures and standards set the expectations for existing services and guidelines do the same for new services or service revisions.

Need For Service Standards and Guidelines

Aside from the adage "you can't manage what you don't measure," there are several reasons why service standards and guidelines are critical for a transit agency. Attributes of well-designed policies are described below.

- **Reflect the vision and goals for the agency and system:** Transit service standards are a reflection of the values of the agency and the role that the transit system is intended to play within its service area. An agency that values extensive geographic coverage above concentrating service in high demand corridors will have a very different set of service standards than one that focuses on serving demand. While there is no single "right" set of standards, it is important that the standards consciously reflect the values of the agency.
- **Provide transparency in use of public resources:** Service standards are typically used as benchmarks and performance indicators shared with elected boards and the general public. As such, it is critical to develop standards that are easy to understand, directly relate to agency goals, and instill confidence in the organization as a whole. Service guidelines provide a similar transparency by making it clear how service-related decisions are made by the agency, and under what reasoning.
- **Establish Evaluation Criteria for All Services:** Service standards and design guidelines provide a transit agency with the evaluation metrics and tools necessary to redesign transit services. Service standards help one understand, on a systemwide or route-by-route basis, where improvements are necessary. Service design guidelines provide information on how to effectively make those improvements in a standardized and equitable manner. By having solid standards and guidelines, staff will be prepared to address questions about service changes with a consistent and common basis.
- **Prioritize Funding:** With frequent service evaluation, an agency can identify areas of short-term and ongoing additional funding needs. As an example, longer-term projects such as park-and-ride expansion may not arise in traditional transit performance measures, but they are critical in ensuring ridership growth if capacity is at its maximum.
- **Support FTA Compliance:** FTA requirements suggest that Title VI monitoring should occur no less than every three years. However, integrating similar service standards into a more regular (annual) process is recommended. This way, preemptive steps are taken to identify any negative impacts to protected groups on an annual basis.

SERVICE STANDARDS DEVELOPMENT

Service guidelines provide a valuable tool for allocating scarce transit resources and enforce consistency in the service planning process by providing consistent direction on how to allocate, prioritize, or deploy services that meet the goals of the community and the agency. Using guidelines in the service planning and allocation process will avoid potentially inequitable, and possibly inefficient, allocations of service. Without these guidelines, there is little rationale to tell constituents "yes" or "no" when necessary.

Guidelines also assist in creating consistency and predictability of responses to emerging community needs. As decision makers reach conclusions about various aspects of growth in their community, they will have some frame of reference to know how transit will respond to those changes. Guidelines can also provide insights on where to focus transit service reductions, or reallocations when those subjects inevitably arise over the life of planning efforts.

The existing StarTran service standards establish a baseline from which to evaluate StarTran service. This section describes additional industry standard guidelines considered when developing opportunities for modifications to existing service standards. Finally, this work activity is based on a joint FTA and FHWA

letter dated April 23, 2014 addressing planning emphasis areas in Moving Aread for Progress in the 21st Century (MAP-21). This letter describes the importance of a transition to performance-based planning and programming, a regional approach to transportation planning, and access to essential services.

FIXED-ROUTE SERVICE DESIGN GUIDELINES

Service design guidelines are planning tools that are used to expand service to new areas or modify existing routes. StarTran strives to serve as many local area residents, students, workers, and visitors as they can with their available resources. Service features that attract one type of rider to transit can deter other riders, and transit operators must balance these types of competing demands. However, there are certain service design principles that will improve service for nearly all riders. This section describes practices that will attract the most riders and balance competing demands.

For people to use transit, service should be designed so that it is easy to understand. In this way, current and potential riders can grasp and use the transportation options available to take them where and when they want to go with ease. Most of the guidelines in this section are aimed at making service intuitive, logical, and easy to understand. Most transit networks are very complicated, and simplification is a key value in creating networks that people can navigate easily to make many kinds of trips.

Service Coverage

Availability

Service availability is a measure of transit accessibility based on the distribution of routes and the placement of stops within a transit provider's service area. Stops spaced further apart allow for faster bus speeds and reduce customer travel times but also require customers to walk further to access the service.

Although opinions differ about how far one should be asked to walk to a transit stop, the industry experience overwhelmingly indicates that the vast majority of riders will walk up to 1/4 mile. Each transit route should be seen, then, as serving a band 1/2 mile wide (1/4 mile to each side of the route), except where the road network prevents reasonably direct pedestrian access.

Measuring a city's transit accessibility should go beyond simply measuring the amount of population that is within 1/4 mile of an existing route. Such measurements suggest that all areas within a city equally warrant transit service. Transit accessibility should measure the amount of jobs, activity centers, or populations located in transit supportive densities that are within walking distance of transit.

Existing Standard	Proposed Standard and Comments
Residential Areas ▪ High density areas within 1/4 mile of a bus route ▪ Route spacing guide ▪ Major activity centers ▪ Employers or employment concentrations of 200 or more employees ▪ Health centers ▪ Middle and high schools ▪ Colleges/universities ▪ Shopping centers of over 25 stores ▪ Social service/government centers	Provide service to at least 90%[1] of transit-supportive areas: ▪ High density areas within 1/4 mile of a bus route ▪ Major activity centers ▪ Employers or employment concentrations of 200 or more employees ▪ Health centers ▪ Middle and high schools ▪ Colleges/universities ▪ Shopping centers of over 25 stores ▪ Social service/government centers Eliminate route spacing standards

[1] Source: *TCRP Report 165: Transit Capacity and Quality of Service Manual, Third Edition (page 5-10)*

Frequency

Service headways, or how often a bus arrives, are one of the most important determinants of ridership. More frequent service attracts more passengers assuming a market is present. At the same time, headways have a significant impact on operating costs, and service requirements increase significantly with improvements in headways.

Because of the expense of frequent service, headways are normally scheduled based upon existing or potential demand. This may translate into variations in headways throughout the day, with higher headways in peak periods, and less frequent service outside of the peak.

For frequent local routes, provision of service that operates every 15 minutes is an important threshold in terms of passenger convenience. At headways of 15 minutes or better, many riders will not need to refer to the schedule, because wait time is minimal.

Market research has consistently shown that choice riders will not be attracted to service with 60-minute headways. The minimum frequency necessary to attract choice riders is 30-minute service. Likewise, research has shown that 35-minute frequencies have significantly reduced market potential when compared to 30-minute routes.

Schedule Simplicity

A consistent pattern to the schedule is strongly recommended. While headways may vary during the day according to demand, it should not vary with apparent randomness from one trip to the next. Whenever possible, routes should also have clockface headways that divide evenly into an hour, such as every 15, 20, 30, or 60 minutes.

Clockface headways are easier for passengers to remember and can help facilitate better transfer connections between routes. Whenever possible, headways should be set at regular clock-face intervals. However, there are two key exceptions:

- Where individual trips must be adjusted away from clock-face intervals to meet shift times, work times, transfer connections, or other special circumstances
- Where the desired headway of service causes round trip recovery time to exceed 20% of the total round trip vehicle time, leading to inefficient service

Clockface headways also offer greater ease in scheduling timed connections between routes that occur consistently in each hour.

Existing Standard	Proposed Standard and Comments
Arterial Routes ▪ 30 minute peak ▪ 60 minute off-peak Crosstown/neighborhood/shuttle services ▪ 60 minute all day service	Arterial Routes ▪ Minimum 30 minute peak ▪ Minimum 60 minute off-peak Crosstown/neighborhood/shuttle services ▪ Minimum 60 minute service

Span

The number of hours per day that a route operates plays a role in determining the effectiveness of transit service for potential users. Transit service must be available near the time a trip needs to be made for transit to be a viable travel option. Weekday routes should permit workers and students to make their morning start times and should end late enough to provide return trips home for second shift workers in urban areas. Service oriented to non-work travel can start later and end sooner.

Weekend Service

It is recommended that all routes maintain similar route alignments on weekdays and weekends. Potential exceptions include deviations serving destinations that are closed on the weekends and short-turns due to reduced service demand. It is also recommended Saturday service is provided on all local, local, and circulator routes that have sufficient demand to operate every 30 minutes on weekdays. If Sunday service is offered, , Saturday and Sunday should have identical schedules during the majority of the day, but Sunday span of service may vary from Saturday.

Existing Standard	Proposed Standard and Comments
▪ 5 a.m. to 10 p.m. on weekdays ▪ 6 a.m. to 7 p.m. on Saturdays	Maintain existing standard

Directness

Routes should be designed to operate as directly as possible to maximize average speed for the bus and minimize travel time for passengers while maintaining access to service. Fast and direct routes tend to be useful to more people than circuitous routes. Even if a trip requires transferring between two routes, it is likely to be faster than a trip using a circuitous route.

Travel time is a measure of directness that assesses how long it takes to make a trip by transit. Travel time can be measured based on the transit trip alone or in relation to another mode, such as the automobile. Travel time measures can also assess how quickly persons or transit vehicles can travel between two points, how many transfers are required, and how variable travel times are from day to day. Trips that take too long to make, particularly in relation to the automobile, will be unattractive to potential passengers—particularly choice riders.

Travel times and directness of service can be affected by a series of factors that are a function of the environment in which service operates. Some of these factors include:

- Traffic congestion
- Street geometry and turning movements
- Presence and operations of traffic signals
- Accessibility of streets from adjacent areas
- Stops with high ridership or mobility-impaired customers

Route Alignment

Non-circulator routes should operate along the same alignment in both directions to make it easy for riders to know how to return to their trip origin location. Exceptions can be made in cases where such operation is not possible due to one-way streets, turn restrictions, or near the end of a route where the bus must turn around. In those cases, routes should be designed so that the opposite directions parallel each other as closely as possible.

While routes that include large loops or several deviations maximize transit coverage, they also result in out-of-direction travel that is not intuitive or attractive to potential customers.

Route Deviations

Routes should not deviate from the most direct alignment unless there is a compelling reason. Potential destinations to deviate service include major shopping centers, employment sites, schools, etc.

In these cases, the benefits of operating the route off of the main route must be weighed against the inconvenience caused to passengers already on board. Additional considerations include the impact on overall route productivity, the increase time added as a result of the deviation, and the schedule coordination with connecting services. In most cases, where route deviations are provided, they should be provided on an all-day basis. Exceptions include early morning or late night trips to schools or employment centers with limited hours.

Arterial Streets

Routes should operate on major roadways. The operation of bus service along arterials makes transit service faster and easier for riders to understand and use. Current and potential riders typically have a general knowledge of an area's arterial road system and use that knowledge for geographic points of reference.

Route Length

Routes should be the appropriate length to maximize ridership potential and minimize operational issues. Two routes serving different parts of the service area with a shared terminus, such as a transit center or major destination may be combined as one route or interlined in order to operate more cost-effectively. Excessively long local routes should be avoided to minimize potential schedule adherence issues. In addition, while travel times of buses are unlikely to be directly comparable to automobile travel, they must be reasonable to offer passengers an acceptable alternative.

Existing Standard	Proposed Standard and Comments
Maximum 25% of transfer rate	Update standard to measure travel time ratio compared to automobiles, with a target ratio of 1.75[2]

[2] Source: City and County of Honolulu Department of Transit Services, *Short Range Transit Operations Plan Tools to Measure Performance*

Patron Convenience

Speed

Operating speed is a function of posted speed limits, turning movements, stop spacing, and ridership activity. As a result, unique route types often have varying average operating speeds. Express routes are expected to be designed and operate at speeds comparable with personal automobiles. At the opposite end of the spectrum, downtown circulators are afforded more time for navigating through neighborhoods and therefore have slower operating speeds.

Existing Standard	Proposed Standard and Comments
▪ Regular routes maximum of 15 MPH ▪ Maximum of 10 MPH for Downtown Shuttle ▪ 12-18 MPH for outlying services depending on layout	▪ Minimum of 12 mph for radial routes ▪ Minimum of 9 mph for Downtown Shuttle ▪ Minimum of 15 mph for outlying services

Passenger Loads

While passengers per revenue hour and passengers per trip are important measures of overall route performance, they do not provide insight into conditions along specific segments of the route. Managing passenger loads is crucial in maintaining customer satisfaction, schedule reliability, and safe operations.

StarTran has automated passenger counting systems (APCs) that provide the capability to record the size of the maximum load on each trip in the system. Passenger load data can highlight where capacity issues are creating routine standing loads or pass-by situations, and where seating capacity is going unused. Depending upon individual circumstances, service level modifications or vehicle assignment modifications may be appropriate when the peak loads approach or exceed seating capacity. Similarly, routes or trips with minimal passenger loads may warrant a closer examination of the route alignment and/or schedule.

Overcrowding on buses often indicates the need for improved headways or increased capacity. Appropriate load factors vary by time of day. During peak periods it is generally acceptable for some passengers to be expected to stand for part of the trip. Thus, during peak periods, local routes may operate with load factors exceeding 100%.

Existing Standard	Proposed Standard and Comments
25% standees for short periods acceptable (25-foot vehicles cannot accommodate standees)	Maximum seated passenger load of 125% during peak periods

Dependability

Dependability is a measure of how well a particular route adheres to its schedule. It suggests whether a customer can count on a bus being there when the schedule says it will be. For most systems, buses are considered on-time if they depart a designated timepoint between zero and five minutes later than the scheduled departure time. Buses should never depart a timepoint ahead of schedule unless operators are given explicit permission to do so.

Given the availability of regularly collected on-time performance data via the APC system, on-time performance should be measured at every timepoint, and not just at the downtown transit center. A goal of all trips arriving between zero to five minutes late 85% on-time should be considered, which is in line with agencies that collect data in this manner.

Existing Standard	Proposed Standard and Comments
▪ 95% non-peak on-time and 90% peak on-time (0 to 7 minutes late) ▪ No trips leaving early	▪ 85% on-time for all trips[3] ▪ In keeping with industry standard, update on-time definition to 0 to 5 minutes late

Road Call Ratio

The road call ratio refers to the number of unplanned tows and assists that are provided to revenue vehicles based on miles of revenue service. The road call ratio serves as a proxy for many transit agencies to determine the effectiveness of maintenance programs, including monitoring the quality of the preventive maintenance program.

Existing Standard	Proposed Standard and Comments
4,000 to 6,000 miles per road call	Maintain existing standard

[3] Source: *TCRP Report 165: Transit Capacity and Quality of Service Manual, Third Edition (page 5-30)*. According to this report, an on-time performance standard of 80% to 89% is achievable by bus services in small-to mid-sized cities.

Fiscal Condition

Fare Policies

Fare policies across the agency should provide a consistent and clear understanding of how fares are charged and under what reasons. A simple fare structure makes transit services easier to use while also reducing the number of potential conflicts between passengers and drivers about the correct fare.

Existing Standard	Proposed Standard and Comments
Should be simple, convenient for user	Develop process to monitor proof of income as a requirement for low-income bus pass purchases

Farebox Recovery

Cost-effectiveness is typically expressed in terms of operating cost per passenger or subsidy per passenger. Operating cost per passenger is calculated by dividing all operating and administrative costs by total boardings. Subsidy per passenger is a further refinement of this measure and is calculated by subtracting revenue generated by fares from gross operating and administrative costs, and dividing by total passengers.

Existing Standard	Proposed Standard and Comments
▪ Significantly alter routes less than 60% of average (21.9% is average) ▪ Review and modify routes between 60% and 80% average	▪ Maintain existing standard ▪ Route 24 and 25 are contracted services with the University of Nebraska and should be excluded from the farebox recovery analysis

Productivity

Ridership productivity measures route performance based on a unit of service. Transit routes are typically evaluated based on passengers per revenue hour, which is calculated by dividing the total number of boardings by the total number of vehicle revenue hours.

Existing Standard	Proposed Standard and Comments
▪ Significantly alter routes less than 60% of average (1.64 passengers per mile is average) ▪ Review and modify routes between 60% and 80% of average	▪ Maintain existing standard ▪ Update measure to reflect passengers per revenue hour instead of passengers per revenue mile

Passenger Comfort

Waiting Shelters

Passenger amenities increase the comfort, convenience, and safety that are available to transit passengers. These items include shelters, seating, signage, and trash receptacles. Transit amenities must be equitably distributed on a systemwide basis to reflect the demographics of StarTran. Shelters should be allocated based on ridership activity (total number of average daily boardings). Additional amenities, such as seating, should be considered for individual stops where the average daily boardings exceed 25 passengers. Priority for bus stop improvements should be given to bus stops serving senior apartments or activity centers and group residences designed for persons with disabilities.

Existing Standard	Proposed Standard and Comments
25 or more boardings	▪ Priority for waiting shelters should be given to bus stops with 25 or more daily boardings ▪ Install benches at bus stops with 15 or more daily boardings

Bus Stop Signs

A bus stop is StarTran's biggest marketing opportunity. All bus stops should be clearly marked with proper signage including the designated route number(s), the route destination, as well as a phone number for potential passengers to call for information.

Existing Standard	Proposed Standard and Comments
Denote StarTran, contact info, and route number	Maintain existing standard

Revenue Equipment

StarTran's fixed-route bus fleet consists of 61 full-size coaches. In addition to a vehicle replacement standard, vehicle assignment is an important considering for providing revenue service. Vehicle assignment refers to the process by which transit vehicles are placed into service and should be assigned based on service category and vehicle capacity. On routes with full-size bus assignments, buses should be assigned among routes to maintain service with revenue vehicles that do not exceed the systemwide average vehicle age.

Existing Standard	Proposed Standard and Comments
Clean and good condition	Maintain existing standard

Public Information

StarTran should also strive to publish route and schedule information to Google Transit to enable trip planning across the multiple transit system. Accomplishing this goal requires the development of a Google Transit Feed Specification (GTFS), which includes detailed route, trip, stop, schedule, calendar, and fare information.

Existing Standard	Proposed Standard and Comments
Timetable, maps, advertising	Develop a GTFS to enable trip planning via Google Transit

Safety and Security

Safety and security measures are used to determine the likelihood that will be involved in an accident on a transit vehicle or on agency property or become the victim of a crime. Most security measures can be easily calculated from available data and should be reported monthly[4].

Existing Standard	Proposed Standard and Comments
None	▪ Maintain and/or reduce the number of security-related complaints ▪ Maintain and/or reduce the number of incidents of vandalism of agency property according to police reports and repair records ▪ Maintain and/or improve customer satisfaction regarding perceptions of safety and security, as determined through market research

[4] Source: *TCRP Report 88: A Guidebook for Developing a Transit Performance-Monitoring System (page 125)*

PARATRANSIT SERVICE DESIGN GUIDELINES

Paratransit operations, by virtue of the fact that they are primarily demand responsive in nature, create some unique performance monitoring requirements. This section details some of these attributes and presents a set of performance measures typically employed in the industry for consideration in implementing the monitoring of Handi-Van performance.

Purpose of Paratransit Performance Measures

Public transit operators have traditionally established performance measures to evaluate the efficiency and effectiveness of their fixed-route transportation services. Transit operators typically use such measures as operating cost per revenue vehicle hour, operating cost per passenger trip, farebox recovery, and passenger boardings per revenue vehicle hour. These measures allow transit operators to assess the effectiveness of individual routes by volume, time of day, and day of week for planning purposes.

Performance measures as applied to paratransit services incorporate many of the traditional measures of revenue hours/ miles per vehicle/ passenger. However, some agencies are broadening the way performance is measured, particularly because of the different nature of paratransit versus fixed-route services. Ride statistics such as total number of rides, number of rides denied, average miles per passenger trip and average ride time are being applied to gauge the impact of paratransit services in terms of improving transportation access. Paratransit providers are also beginning to measure their performance in terms of vehicle capacity, instead of the number of vehicles in their fleet, to reflect the mixed fleet used to deliver paratransit services.

Performance measures allow paratransit administrators to:

- Track compliance with certain requirements of the Americans with Disabilities Act (ADA), including on-time performance, trip denials, and access to the reservation system
- Assess system performance based on established criteria and compare that to past measures of performance and target goals
- Document outcomes and trends related to system efficiency and communicate these to respective policy boards and/ or advisory committees that provide program oversight

Industry-Recognized Paratransit Performance Measures and Standards

Performance standards are typically developed in response to the need to show progress to agency goals or to document compliance with regulatory requirements. The following performance measures are used in the industry to assess system productivity and ADA compliance. While there is general agreement on what to measure, there are few industry-accepted standards or target values, again deferring to agency goals (except those related the showing adequate capacity to avoid a pattern of trip denials). The noted indicators are among common performance measures used for demand response transportation.[5] These performance measures rely on key performance data, and often expressed as a ratio that normalize costs or benefits per unit of service delivered, for example cost per revenue hour or cost per passenger trip.

[5] Source: *TCRP Report 124: Guidebook for Measuring, Assessing, and Improving Performance of Demand-Response Transportation (page 31)*

Trips per Revenue Hour

Trips per revenue hour is defined as annual boardings divided by annual vehicle service hours. For ADA paratransit services, it is common to include rider companions and attendants in the number of trips (i.e., total boardings). This productivity measure is a key performance indicator highlighting the number of passengers carried for a unit of service delivered. For demand response services, it reflects the level of shared rides and amount of slack time in a route.

Proposed Standard	Comments
Minimum of 1.8 trips per revenue hour	Based on industry review[6]

Cost per Revenue Hour

Cost per revenue hour is defined as annual operating costs divided by annual vehicle service hours. This measure highlights an agency's cost effectiveness, normalizing operating costs (primarily labor and fuel) to the number of hours the service is provided, which is useful when comparing operations between agencies and when analyzing the impact of service expansion or contraction.

Proposed Standard	Comments
Maximum cost of $86 per revenue hour	Based on 2013 performance plus 3% for inflation; may be adjusted based on budgeted costs

Cost per Trip

Cost per trip is defined as annual operating costs divided by the number of trips provided (including rider companions and attendants).This measure allocates operating costs on a per passenger basis which is often useful when analyzing growth trends or when comparing modes.

Proposed Standard	Comments
Maximum cost of $40 per trip	Based on 2013 performance plus 3% for inflation; may be adjusted based on budgeted costs

Safety Incidents per 100,000 Vehicle Miles

Safety is an important concern for all transit systems and extends beyond fixed-route trips. This measure examines the number of safety incidents compared to the number of miles traveled by demand response vehicles.

Proposed Standard	Comments
No more than 0.16 incidents per 100,000 miles	Based on industry review

Percent of Trips On-Time

This measure is defined as the percent of all trips where the passenger is picked up within the allotted appointment time window. This measure is a key performance indicator, especially from the customer's perspective, indicating the reliability of the service. Agencies have the ability to set the on-time performance window. A 60-minute window is typical, and a 30-minute window reflects higher quality of service for customers, but a more difficult to attain target.

[6] Source: *TCRP Report 124: Guidebook for Measuring, Assessing, and Improving Performance of Demand-Response Transportation (page 31)*

Proposed Standard	Comments
On-time performance between 80% and 95% within a 30-minute window	Based on industry review

No-Show/Late Cancellation Rate

This measure is defined as the percent of scheduled trips where the passenger is a no-show or failed to provide adequate notice that they cannot complete their trip. This measure shows how much unproductive vehicle and driver time is expended making unnecessary trips and not being available to transport other passengers. StarTran should consider implementing a no-show policy, which can limit the ability for passengers who have chronic no-show rates, to reduce the number of no-shows.

Proposed Standard	Comments
Maximum of 5% no-show/late cancellation rate; may suspend for a reasonable period of time persons who establish a pattern or practice of missed trips	Based on industry review and ADA guidelines

Missed Trip Rate

Missed trip rate is defined as the percent of scheduled trips that were not completed within the scheduled time because the agency vehicle failed to arrive within a scheduled pickup time window. The measure is a key indicator of on-time performance and customer satisfaction.

Proposed Standard	Comments
Less than 0.5% of trips	Based on ADA guidelines; upon review of actual service experience, StarTran should move this standard to zero as a pattern and practice of missed trips could be legally construed as a capacity constraint or a trip denial

Hold Time

Hold time is defined as the percent of calls answered with a maximum allowable hold time (time spent on hold waiting for a reservationist). This measure provides a reflection of the call center's capacity to handle calls and of customer satisfaction. Other associated measures such as the time to answer a call, or the time before abandonment also provide indicators of the capacity of a call center.

Proposed Standard	Comments
At least 91% of calls answered within three minutes	Based on industry review

Trip Denial Rate

Trip denials are an important measure, especially for ADA paratransit services. ADA prohibits capacity constraints and requires that ADA paratransit systems meet all expected demands for service.

Proposed Standard	Comments
None	Based on ADA requirements

Passenger Travel Time on Vehicle

This measure is defined as the amount of time a passenger has to ride in the vehicle to complete his/her trip but is not typically monitored in the industry. The sampling of individual trips is often used to make sure a customer does not spend an excessive amount of time in a vehicle (especially compared to the equivalent trip time for a fixed-route trip).

Proposed Standard	Comments
Not to exceed length of comparable fixed route trip plus 20 minutes	Based on industry review

RECOMMENDED SERVICE STANDARDS

This chapter outlines the recommended changes to the service standards. Standards are based on observed performance trends and best practices for similar services. Performance standards should be re-evaluated biennially and may also supplement existing FTA Title VI service standard requirements. Proposed fixed-route service standards are shown in Figure 112, and proposed paratransit service standards are shown in Figure 113.

Figure 112 Existing and Proposed Fixed-Route Service Standards

Category	Existing Standards	Proposed Standards and Comments
Service Coverage		
Availability	Residential Areas ▪ High density areas within 1/4 mile of a bus route ▪ Route spacing guide ▪ Major activity centers ▪ Employers or employment concentrations of 200 or more employees ▪ Health centers ▪ Middle and high schools ▪ Colleges/universities ▪ Shopping centers of over 25 stores ▪ Social service/government centers	Provide service to at least 90% of transit-supportive areas: ▪ High density areas within 1/4 mile of a bus route ▪ Major activity centers ▪ Employers or employment concentrations of 200 or more employees ▪ Health centers ▪ Middle and high schools ▪ Colleges/universities ▪ Shopping centers of over 25 stores ▪ Social service/government centers Eliminate route spacing standards
Frequency	Arterial Routes ▪ 30 minute peak ▪ 60 minute off-peak Crosstown/neighborhood/shuttle services ▪ 60 minute all day service	Arterial Routes ▪ Minimum 30 minute peak ▪ Minimum 60 minute off-peak Crosstown/neighborhood/shuttle services ▪ Minimum 60 minute service
Span	▪ 5 a.m. to 10 p.m. on weekdays ▪ 6 a.m. to 7 p.m. on Saturdays	Maintain existing standard
Directness	Maximum 25% of transfer rate	Update standard to measure travel time ratio compared to automobiles, with a target ratio of 1.75
Patron Convenience		
Speed	▪ Regular routes maximum of 15 mph ▪ Maximum of 10 mph for Downtown Shuttle ▪ 12-18 mph for outlying services depending on layout	▪ Minimum of 12 mph for radial routes ▪ Minimum of 9 mph for Downtown Shuttle ▪ Minimum of 15 mph for outlying services
Loading	25% standees for short periods acceptable (25-foot vehicles cannot accommodate standees)	Maximum seated passenger load of 125% during peak periods
Dependability	▪ 95% non-peak on-time and 90% peak on-time (0 to 7 minutes late)	▪ 85% on-time for all trips ▪ In keeping with industry standard, update on-time definition to 0 to 5

Category	Existing Standards	Proposed Standards and Comments
	▪ No trips leaving early	minutes late
Road Call Ratio	4,000 to 6,000 miles per road call	Maintain existing standard
Fiscal Condition		
Fare Structure	Should be simple, convenient for user	Develop process to monitor proof of income as a requirement for low-income bus pass purchases
Farebox Recovery	▪ Significantly alter routes less than 60% of average (21.9% is average) ▪ Review and modify routes between 60% and 80% average	▪ Maintain existing standard ▪ Route 24 and 25 are contracted services with the University of Nebraska and should be excluded from the farebox recovery analysis
Productivity (Pass/Mile)	▪ Significantly alter routes less than 60% of average (1.64 passengers per mile is average) ▪ Review and modify routes between 60% and 80% of average	▪ Maintain existing standard ▪ Update measure to reflect passengers per revenue hour instead of passengers per revenue mile
Passenger Comfort		
Waiting Shelters	25 or more boardings	▪ Priority for waiting shelters should be given to bus stops with 25 or more daily boardings ▪ Install benches at bus stops with 15 or more daily boardings
Bus Stop Signs	Denote StarTran, contact info, and route number	Maintain existing standard
Revenue Equipment	Clean and good condition	Maintain existing standard
Public Information	Timetable, maps, advertising	Develop a GTFS to enable trip planning via Google Transit
Safety and Security	None	▪ Maintain and/or reduce the number of security-related complaints ▪ Maintain and/or reduce the number of incidents of vandalism of agency property according to police reports and repair records ▪ Maintain and/or improve customer satisfaction regarding perceptions of safety and security, as determined through market research

Source: StarTran

Note: Target speeds consider current operating speeds and speeds similar route achieve in other communities. The travel time ratio to autos compares the travel time for a bus to travel from one end of the route to the other end with the time the same trip can be accomplished during afternoon commute periods when traveling by auto.

Figure 113 Proposed Paratransit Service Standards

Category	Proposed Standards	Comments
Trips per Revenue Hour	Minimum of 1.8 trips per revenue hour	Based on industry review
Cost per Revenue Hour	Maximum cost of $86 per revenue hour	Based on 2013 performance plus 3% for inflation; may be adjusted based on budgeted costs
Cost per Trip	Maximum cost of $40 per trip	Based on 2013 performance plus 3% for inflation; may be adjusted based on budgeted costs
Safety Incidents per 100,000 Miles	No more than 0.16 incidents per 100,000 miles	Based on industry review
Percent of Trips On-Time	On-time performance between 80% and 95% within a 30-minute window	Based on industry review
No-Show/Late Cancellation Rate	Maximum of 5% no-show/late cancellation rate; may suspend for a reasonable period of time persons who establish a pattern or practice of missed trips	Based on industry review and ADA guidelines
Missed Trip Rate	Less than 0.5% of trips	Based on ADA guidelines; upon review of actual service experience, StarTran should move this standard to zero as a pattern and practice of missed trips could be legally construed as a capacity constraint or a trip denial
Hold Time	At least 91% of calls answered within three minutes	Based on industry review
Trip Denial Rate	None	Based on ADA requirements
Passenger Travel Time on Vehicle	Not to exceed length of comparable fixed route trip plus 20 minutes	Based on industry review

Source: NTD; TCRP Report 88: A Guidebook for Developing a Transit Performance-Measurement System; TCRP Report 124: Guidebook for Measuring, Assessing, and Improving Performance of Demand Response Transportation

12 STARTRAN GOVERNANCE OPTIONS

How Can Governance Influence Funding Opportunities?

Transit agencies are organized in several basic ways. There are five main governance models currently in place in the U.S.: state transit agencies, general purpose transit authorities, special purpose regional transit authorities, municipal transit agencies, and joint exercise of powers/joint powers authorities.[7]

The two most common organizational models are municipal systems and independent authorities. Municipal systems are somewhat more common than independent authorities, particularly in small urbanized areas. According to *TCRP Report 129: Local and Regional Funding Mechanisms for Public Transportation*, the definitions for each governance type are as follows:

- **Independent authorities:** Authorized and enabled by state legislation to perform specific duties and provide specific services, often with authority to raise and dedicate for their sole use the revenues from specific revenue-raising mechanisms in member jurisdictions in their respective service areas.
- **Municipal transit systems:** Operated as part of general purpose municipal or county governments, often drawing on general revenues of the jurisdiction, along with other sources, both dedicated and not dedicated, to support transit services.

Regional Transit Authorities

Independent authorities, or regional transit authorities (RTAs), are generally seen as having the greatest capacity to govern and operate transit compared to other governance models available. An RTA can include representation from government and transit spheres, including the state legislature, counties, municipalities, educational institutions, or private transit providers.

The development of an RTA is intended to:

- Develop seamless regional transit
- Potentially develop dedicated funding sources
- Provide for more effective regional transit planning
- Provide for more efficient coordination and integration of transit services
- More effectively address regional congestion and air quality issues
- More effectively integrate transit and land use

An RTA's effectiveness comes from its status as a fully state-enabled organization with the ability to locate and further develop dedicated funding sources (taxes, bonds) [8] as well as develop its own policy. However, a significant hurdle to establishing an RTA is resistance toward the creation of another taxing authority

[7] Source: *TCRP Regional Organizational Models for Public Transportation (TCRP Project J-11/Task 10)*

[8] Cities and counties often see a reduction in their direct funding of transit as a result.

and the difficulty of gaining approval of the necessary enabling legislation. As such, an RTA is the most effective regional measure, but it is also the most difficult to create.

Case Studies

As part of StarTran's TDP effort, the agency is seeking to implement service enhancements to increase the attractiveness of transit services in Lincoln, including potential future service enhancements that may require additional funding. Three case studies were conducted to shed light on the emergence of transit authorities and provide insights about potential governance models for increasing revenue for transit in Lincoln. Every region is unique and changes in governance must be tailored to a region's specific need and characteristics.[9]

Omaha Transit Authority (Omaha, NE)

Governance and financing for public transportation are closely inter-related and must be addressed together.[10] Prior to 1972, multiple private transit providers served the Omaha metropolitan area, which includes Council Bluffs, IA. Due to declining ridership and farebox revenue failing to cover expenses, the remaining providers were forced to cut service.

The Omaha Transit Authority (OTA), with a five-member board, was created in May of 1972 after the Nebraska State Legislature passed a bill enabling creation of a transit authority as a governmental subdivision of the State of Nebraska. Under the new status of the OTA, the organization was eligible for federal financial assistance and was able to levy a tax on real and personal property in the City of Omaha.

The Authority is responsible for the operation of fixed-route, express, and commuter buses into downtown, as well as paratransit service within the city limits of Omaha under the name Metro Area Transit (MAT). MAT also has contracts to provide service in Council Bluffs, Bellevue, and the Tri-Communities area.[11]

Figure 114 shows the property tax rate[12] per $100 of assessed value levied by OTA and the corresponding revenue[13] from the tax. Figure 115 shows the total and local funds earned for the OTA from 1992 to 2013, the most complete range of data available from NTD. OTA's sum total of local and non-local funds has steadily increased from 2005-2006 years to 2010, and then increasing again from 2012 to 2013. The decrease in funds over the 2011-2012 years could be attributed to lag related to the recession. OTA did not report any local data to NTD for 2010, which is likely a reporting error. As shown in the chart, StarTran's total local funds are considerably less than OTA's local revenue.

Figure 114 Omaha Transit Authority Property Tax Levy and Revenue

Year	Property Tax Rate Levied	Revenue from Tax
2012	0.04933	$13,298,245
2013	0.05027	$14,080,695
2014	0.05224	$14,457,182

Source: Douglas County Comprehensive Annual Financial Report, 2014

[9] Source: *TCRP Report J11: Regional Organizational Models for Public Transportation*

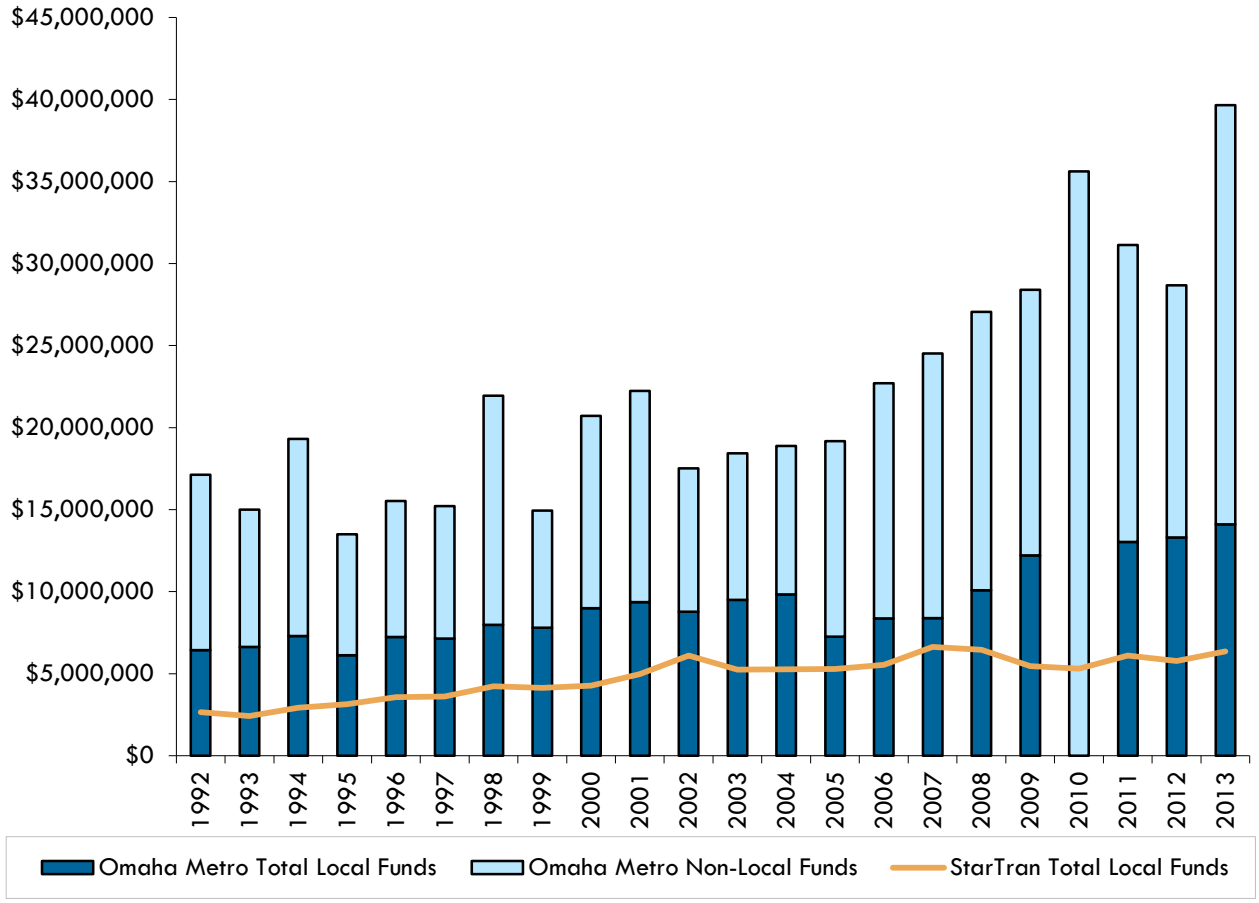
[10] Source: *TCRP Report J11: Regional Organizational Models for Public Transportation*

[11] Source: OMetro.com, "About" and "History" sections

[12] Source: Douglas County Comprehensive Annual Financial Report, 2014

[13] Source: The Transit Authority of the City of Omaha Financial Statements and Independent Auditors Report, 2013-2014

Figure 115 Omaha Transit Authority Total and Local Funds Earned (1992-2013)



Source: National Transit Database

North Central Regional Transit District (New Mexico)

Regional transit districts (RTDs) have been created in New Mexico after Governor Bill Richardson and the New Mexico Legislature signed the Regional Transit Act into law in 2003, with the purpose to provide regional networks of safe and efficient public transit systems.

The North Central Regional Transit District (NCRTD) is the first and largest RTD created in New Mexico in 2004, with a funding measure approved by voters in 2008. With funding beginning in 2009, transit service expansion has been accomplished by creation of an additional agency with larger boundaries, rather than by extending the boundaries of the existing transit agency.[14]

The NCRTD has expanded to numerous communities in Santa Fe, Los Alamos, Taos and Rio Arriba Counties and nearby Pueblos. Additionally, the NCRTD coordinates with the City of Santa Fe, which has had a municipal transit operation to serve the needs of the city prior to the formation of the transit district.[15] The benefit of the NCRTD in this case is the coordination of municipal services while expanding service to other northern counties. This model was subsequently used for two other districts in the state. The NCRTD currently provides service on 20 fixed-routes and two demand-response routes on weekdays.[16]

Figure 116 shows the gross receipts tax[17] levied by the NCRTD and the corresponding revenue[18] derived from the tax. The gross receipts tax is a tax on the gross revenues of sale of tangible property from facilities open to the general public, regardless of their source—similar to a sales tax.[19] Figure 117 shows the total local and local funds expended from years 2008 to 2013, the most complete range of data available for the agency from NTD.

Figure 116 North Central Regional Transit District Tax and Revenue

Year	Gross Receipts Tax Levied	Revenue from Tax
2012	0.125%	$7,083,927
2013	0.125%	$6,871,270
2014	0.125%	$6,720,765*

*Budgeted, not actual

Sources: Operational Effectiveness and Oversight of the North Central Regional Transit District 2014, and North Central Regional Transit District Independent Auditor's Report and Financial Statements, 2013

[14] Source: *TCRP Report J11: Regional Organizational Models for Public Transportation*

[15] Source: *TCRP Report J11: Regional Organizational Models for Public Transportation*

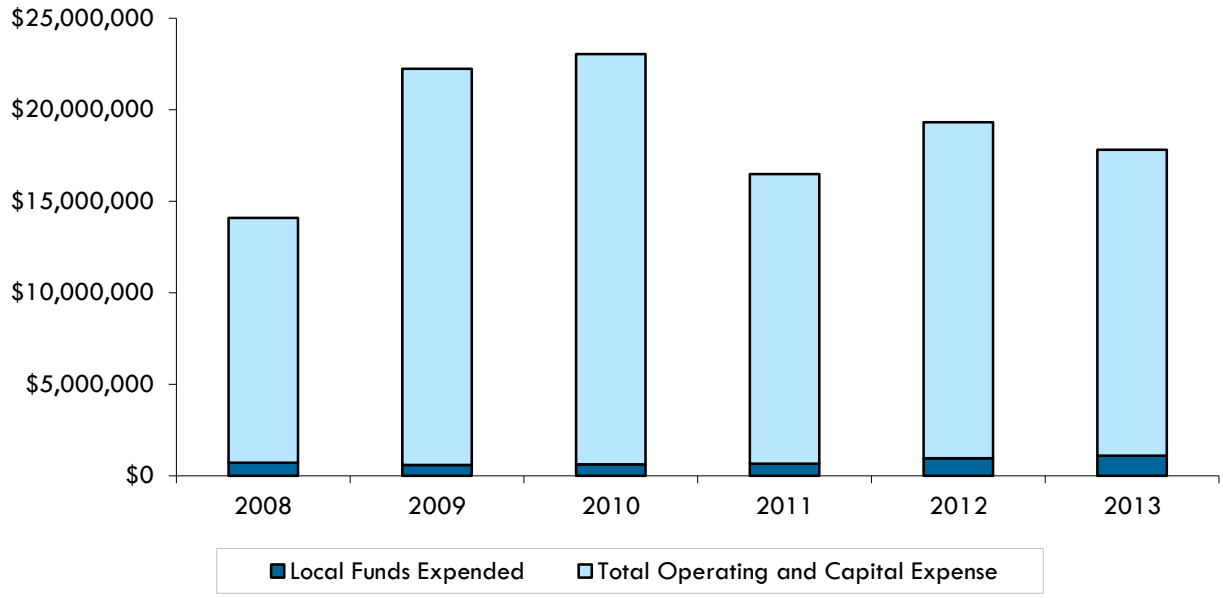
[16] Source: NCRTD.org, "Quick Facts FY2014"

[17] Source: Operational Effectiveness and Oversight of the North Central Regional Transit District, 2014

[18] Source: North Central Regional Transit District Independent Auditors' Report and Financial Statements, 2013

[19] Source: Taxation & Revenue New Mexico, Frequently Asked Questions

Figure 117 North Central Regional Transit District Total and Local Funds Expended (2008-2013)



Source: National Transit Database

Denver Regional Transit District (Denver, CO)

The Regional Transportation District (RTD) of Denver, CO is responsible for providing public transportation service to over 40 cities and towns in the eight-county area surrounding Denver. RTD was created in 1969 by the Colorado Assembly and consists of a 15-member board of directors elected by popular vote. RTD provides fixed-route, express/commuter, light rail, shuttle, paratransit, and demand-response services.[20]

Figure 118 shows the sales and use tax rate[21] imposed on certain sales within the service area levied by RTD and the corresponding revenue[22] from the tax. Figure 119 shows the total and local funds earned for RTD from years 1992 to 2013, the most complete range of data available from NTD. Overall funding levels from 2008 to 2013 have steadily increased, with the exception of a slight decrease in 2011.

Figure 120 shows the proportion of local funds as a percent of total funds for StarTran and RTD from 1992 to 2013. StarTran's local funds as a percent of total funds vary widely during this time period. In contrast, RTD's local funds as a percent of total funds tend to vary less extensively, although years with large spikes in variation may be due to capital-intensive phases. While StarTran's trend for proportion of local revenue has decreased overall since 2008, RTD's proportion of local revenue has remained between 60% and 70% of total revenue.

Figure 118 Denver Regional Transit District Tax and Revenue

Year	Sales and Use Tax Levied	Revenue from Tax
2012	1%	$449,787,000
2013	1%	$468,586,000
2014	1%	$514,721,000

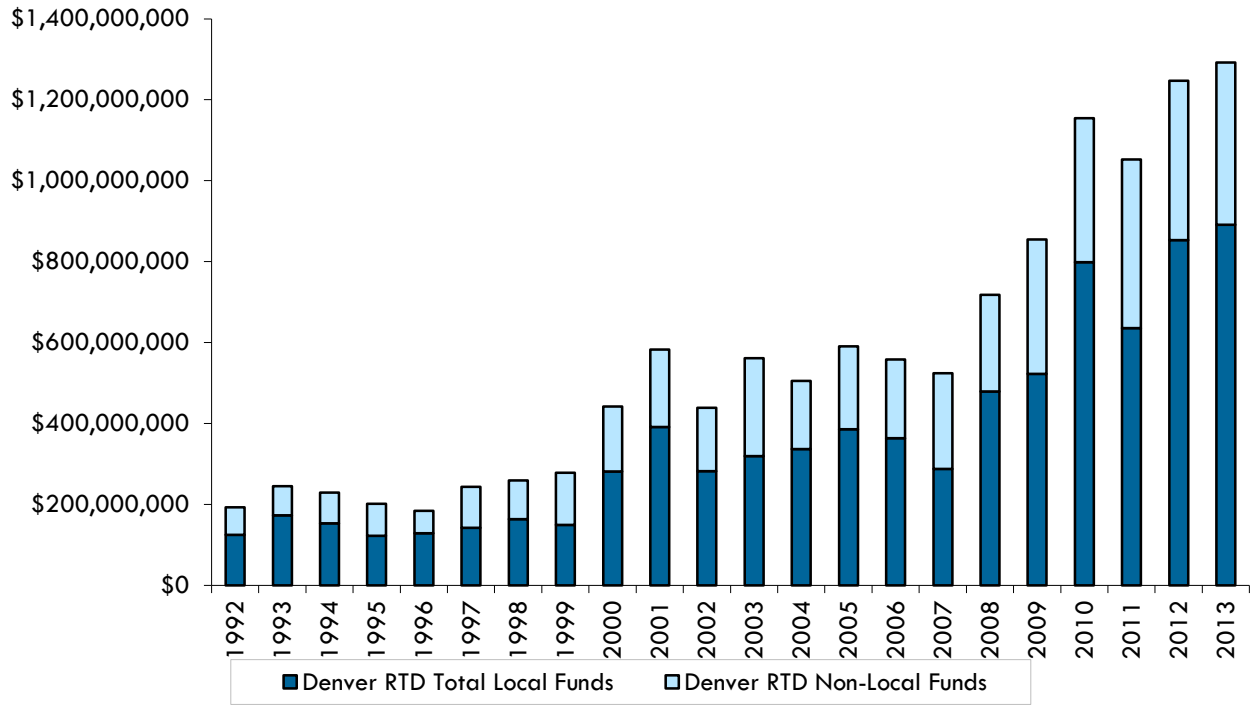
Sources: TCRP Report 159: Transforming Public Transportation Institutional and Business Models 2012, and RTD Progress In Motion: Report to the Region 2014/2015

[20] TCRP Report 159: Transforming Public Transportation Institutional and Business Models, 2012

[21] Source: RTD Progress In Motion: Report to the Region, 2014/2015

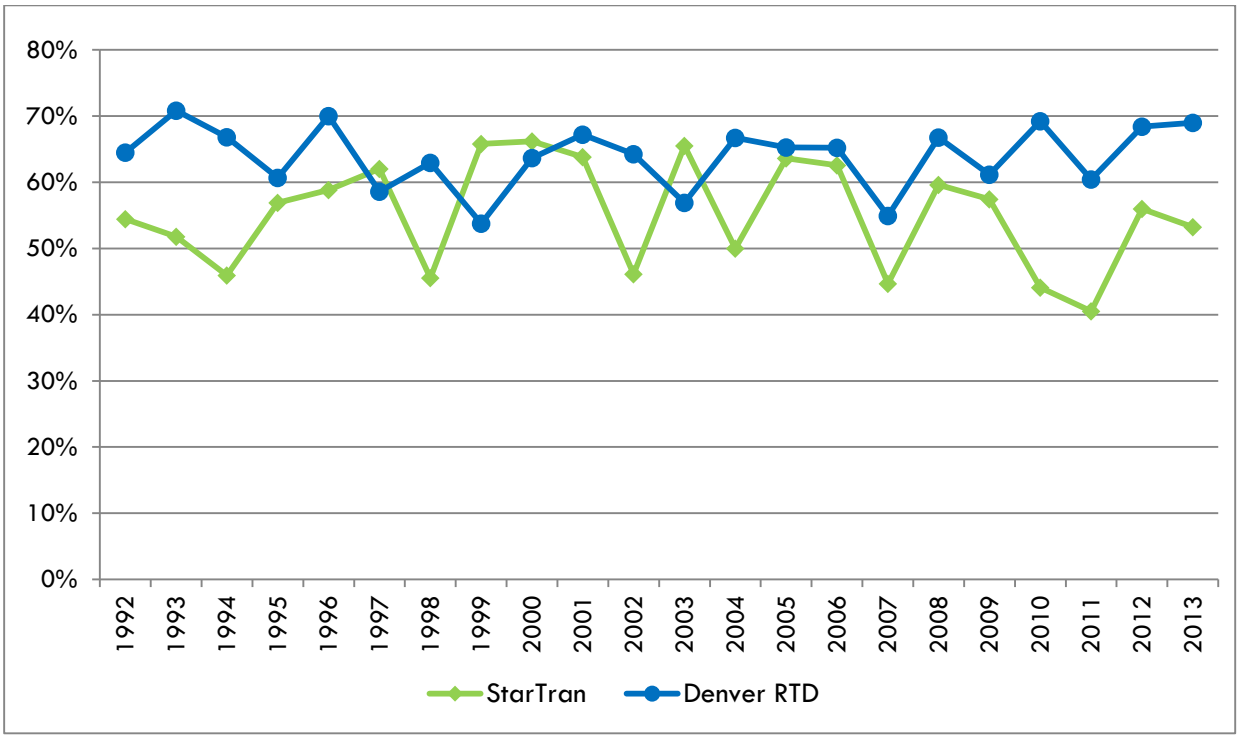
[22] Source: RTD Progress In Motion: Report to the Region, 2014/2015

Figure 119 Denver Regional Transit District Total and Local Funds Earned (1992-2013)



Source: National Transit Database

Figure 120 StarTran and RTD Local Funds as a Percent of Total Funds (1992-2013)



Source: National Transit Database

Summary

An RTA is the most robust of potential governance alternatives—it provides for a wide range of options with the fewest limitations (Figure 121). Implementation of an RTA in the Lincoln area would allow for a true regional entity that could include the city, county, UNL, and other relevant organizations, and whose sole focus would be the provision of transit service. It would also be a legal entity that would have all of the powers necessary to operate and expand transit service and facilities. Perhaps most importantly for transit service in Lincoln, an RTA could provide for the development of new dedicated transportation funding sources.

In summary, the development of an RTA or other similar entity will increase the opportunities to improve regional transit and to develop new revenue sources. However, for this to occur, the city and the county will need to be committed to working together to realize these opportunities. The development of an RTA is a well-established approach for the provision of regional transit service; creation of an RTA would require strong regional consensus. The State of Nebraska currently has enabling legislation for RTAs. One of the qualifiers is for the service area population to reach certain levels. If current growth trends continue, Lincoln will reach the population threshold necessary to be able to create an RTA.

Figure 121 Advantages and Disadvantages of an RTA or Similar Entity

Advantages	Disadvantages
Provides a direct role for the city and county in regional transit decisions and improvements	Time and effort are required to form the new institution, including state enabling legislation
Provides a stronger regional perspective, which could lead to a stronger regional system	The city may have a reduced degree of control
Streamlines planning for service improvements	
Can provide additional funding for transit, potentially through the implementation of new funding sources	