5. Service Evaluation, Issues, and Opportunities

Introduction

Previous chapters provided an overview of the environment in which StarTran operates, the services provided by StarTran, and public outreach process. This chapter presents an analysis and evaluation of the StarTran fixed routes, identifying the issues, strengths, and weaknesses of each route. This memorandum is divided into three parts -- performance evaluation, route diagnostics, and a conclusions section.

Performance Evaluation

Evaluating the StarTran system against a set of service standards or goals is the first step in the evaluation process. The process allows one to deal with a variety of issues related to the quality and quantity of bus service. This section presents proposed service standards and lists StarTran's performance for each standard. This provides initial guidance for the development of service strategies. It should be noted that viewing any system with regard to a set of standards or goals requires an understanding of local conditions as well as the trade-offs associated with providing service. As an example, in some cases, it will be acceptable to be below the target; e.g., while it is desirable to provide 30-minute peak service on all routes, doing so on routes in less productive areas might mean not meeting the standards for fiscal condition. The analysis discusses these issues and the competing requirements of providing extensive coverage and frequent service while meeting the need to maintain cost effectiveness. It will identify where standards should be met and where standards should be used as goals for StarTran to use in planning future service changes.

Table 5-1 provides a summary of proposed standards/goals that StarTran should strive towards, and the results for StarTran based on the data collected for this project, which is discussed below. The performance evaluation is based on weekday and Saturday operations.

Table 5-1: Proposed Service Standards

Category	Standard
Service Coverage	
Availability	• Residential areas -90% of population within ¼ mile of a bus route -Route spacing guide presented in Table 5-2 • 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 or 100,000 square feet of leased retail space -social service/government centers
Frequency	• Arterial Routes -30 minute peak -60 minute off-peak • Crosstown/neighborhood/shuttle services -60-minute all day service
Span	-5 AM to 10 PM on weekdays -6 AM to 7 PM on Saturdays
Directness	-Maximum 25% of transfer rate
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
Loading	-25% standees for short periods acceptable
Bus Stop Spacing	-5 to 7 stops per mile in core (every other block) -Fringe 4 to 5 per mile, as needed based on land uses
Dependability	-No missed trips -95% on-time service (0 to 5 minutes late) -No trips leaving early
Road Call Ratio	-4,000 to 6,000 miles per road call
Fiscal Condition	
Fare Structure	-Qualitative criteria
Farebox Recovery	-Significantly alter routes less than 60% of average (16% is average) -Review and modify routes between 60% and 80% average
Productivity (Pass./Mi.)	-Significantly alter routes less than 60% of average (1.26 pass/mi is average) -Review and modify routes between 60% and 80% average
Passenger Comfort	
Waiting Shelters	-25 or more boardings
Bus Stop Signs	-Denote StarTran, contact information, and route
Revenue Equipment	-Clean and good condition
Public Information	-Timetable, maps, advertising

Service Coverage

This broad category covers standards for availability, frequency, span, and directness.

Availability

One of the key decisions in providing transit is determining where service should be provided and the spacing of bus routes. Service coverage and congruency analyses provide a baseline evaluation of StarTran service availability. Service coverage analysis looks at StarTran routes and their relationship to areas of high population density and poverty status and service congruency analysis looks at StarTran routes and their relationship to the locations of major trip generators.

This standard is divided into two separate components that reflect travel concentrations, trip purpose, and the need for bus service. Availability standards are developed for the residential trip end that produces travel and the non-home end that attracts travel. A description of each of these two is provided below:

- *Production End (Coverage)* – Determination of which residential neighborhoods should be candidates for service is a function of reasonable walking distance. Numerous studies have indicated that the maximum distance an average person can reside from a bus route and still be considered to 'have service' is one-quarter mile, which is approximately equivalent to a five-minute walk. However, this rule of thumb must be applied coupled with a surrogate for income and mobility, as well as population density. Route spacing and existing service coverage are discussed in the following sections.
- *Attraction End (Congruency)* – Activity centers deserve transit service if they are large enough to attract and adequate number of transit trips. To assist in this determination, 'threshold levels' have been established for different categories of activity centers. These threshold levels, which are based on past experience and judgment, should serve as guidelines in determining which activity centers in each category should be given consideration for service. It should be noted that other factors, such as proximity of the center to existing bus routes, should be considered before providing new service to a major activity center.
    - *Employers* – Employers or concentration of employers, such as in business or industrial parks, with 200 or more employees are large enough to generate transit ridership.
    - *Health Centers* – Institutions consisting of hospitals, clinics, rehabilitations, and mental health centers, and nursing homes are significant destinations that should have access to transit services.
    - *Educational Facilities* – Colleges, universities, vocational schools, and secondary schools have been included in the availability standard. Those institutions with enrollment of at least 1,000 full-time students warrant major consideration for service. All middle and high schools also warrant consideration.

- *Shopping Centers* – Shopping trips constitute a key reason for transit travel. Shopping centers (including malls and major plazas) with at least 25 stores or more than 100,000 square feet of leased retail space are large enough to warrant consideration for service, as well as the CBD and neighborhood business districts or any other significant commercial attractions.
- *Social Service/Government Centers* – Public agencies, government centers, community facilities, and recreational complexes attract some volume of traffic. Since the nature and size of these facilities varies greatly, no numerical threshold will be set. Judgment, as well as trip purposes and characteristics of the users (e.g. elderly and low income citizens) should be considering whether to serve a facility.

Route Spacing

Table 5-2 lists the recommended route spacing guide given an area's population density and percentage of households without automobiles, which are the surrogates for income and transit dependency. Areas with low population density and low transit dependence given the number of cars available have lower requirements for transit service than to areas with high population density and greater transit dependence.

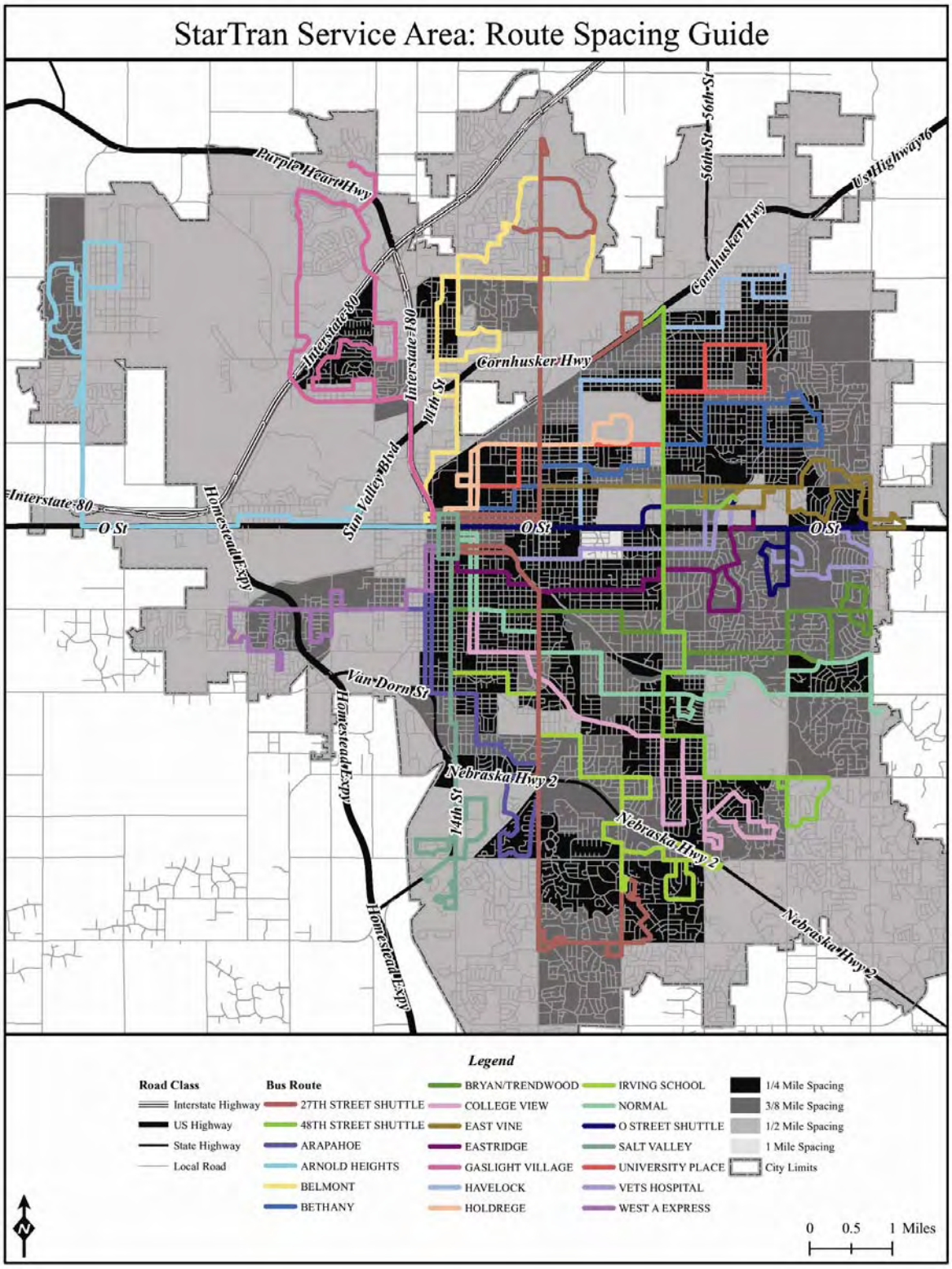
Table 5-2: Route Spacing Guide

% of Households without Automobiles	Population Density (Persons Per Square Mile)			
	Over 6,400	4,500 to 6,400	2,500 to 4,449	Under 2,500
Over 15.0	¼ mile	¼ mile	3/8 mile	½ mile
10.0-15.0	¼ mile	3/8 mile	½ mile	1 mile or Paratransit
5.0-9.9	3/8 mile	½ mile	1 mile or paratransit	*
Below 5.0	½ mile	1 mile or paratransit	*	*

Source: St Cloud, MN Transit Study 2002

Figure 5-1 applies these route spacing standards to Lincoln's population and StarTran's route structure. Recommended route spacing generally produces a pattern of rings of increasing distance necessary between transit routes as one travels farther away from downtown.

Figure 5-1: StarTran Service Area: Route Spacing Guide



The route coverage guide is just that – a guide. It is not an exact measurement. In some areas, the street pattern is not uniform or the trip generators are further apart than the guide indicates. StarTran bus service should not conform to the guide in all areas. Service should, however, meet the intent of the guide – areas with more people and/or fewer cars need more transit service than sparsely populated or relatively affluent areas. Another consideration for warranting service is concentrations of elderly and disabled populations as well as multifamily housing developments. These socioeconomic characteristics are included in the transit score analysis, which is also the base map for the coverage analysis.

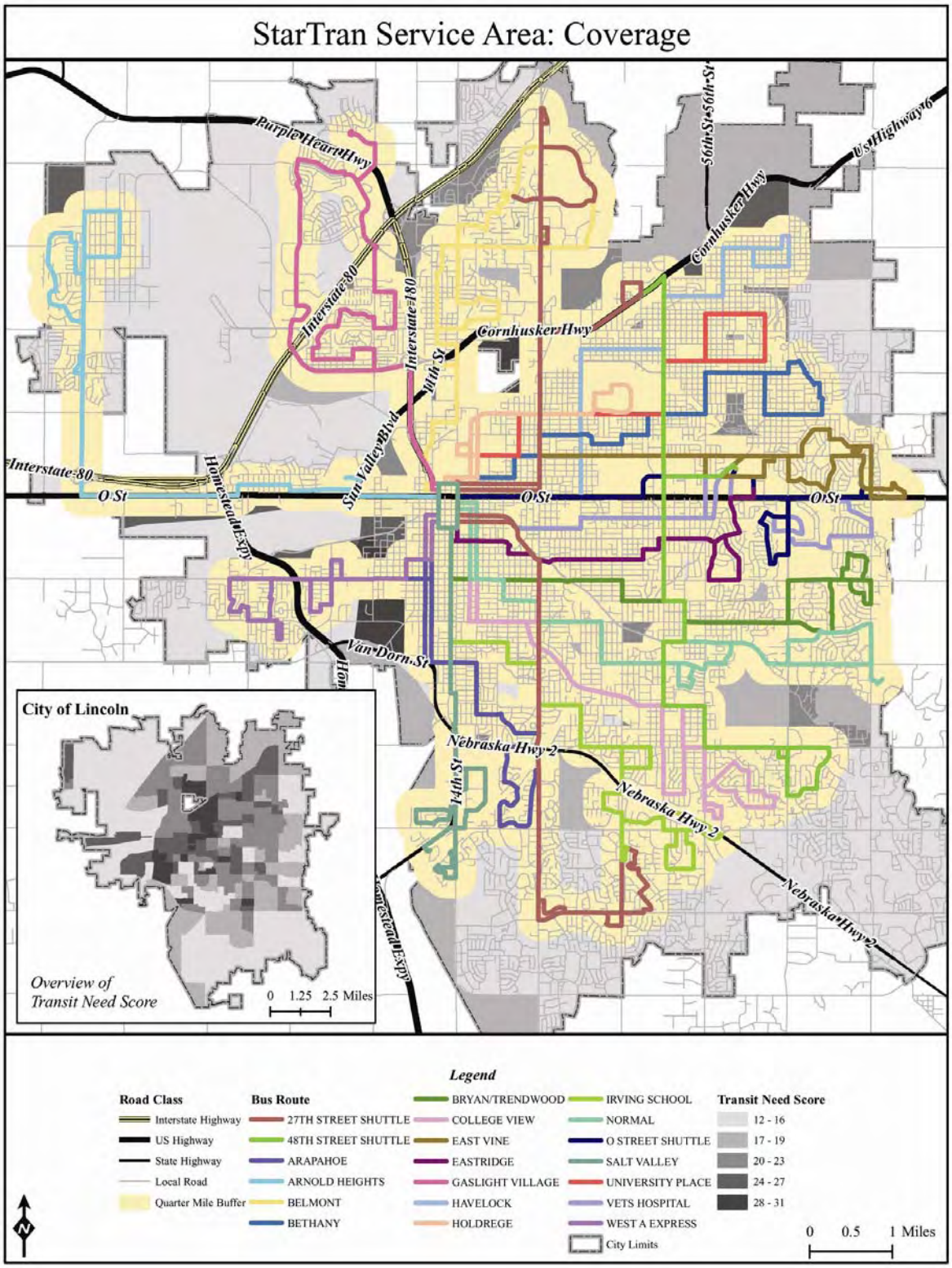
Coverage

Service coverage analysis looks at the StarTran system in comparison to the distribution of the population and their socioeconomic characteristics (transit need score) in the region to see if any needy areas are currently unserved. Figure 5-2 is a map of the transit success score along with StarTran routes and their coverage region (1/4 mile buffer). In general, StarTran's routes are spaced closer together than the standards set out in Table 5-2 through most of the city.

According to the 2025 Lincoln City/Lancaster County Comprehensive Plan, approximately 90% of Lincoln's residents and employees are currently located within a quarter mile of a StarTran bus route.

Service coverage and congruency analyses are used to evaluate the existing StarTran fixed route system. These analyses provide the opportunity to identify unserved populations and unserved destinations in the StarTran service area that have potential for transit success. Service coverage compares the StarTran fixed route system to the underlying demographic and socioeconomic characteristics of the region's population and service congruency compares the StarTran fixed route system to major transit generators in the region. Major employers in the region and their locations relative to StarTran fixed routes are also addressed in the congruency analysis.

Figure 5-2: StarTran Service Coverage



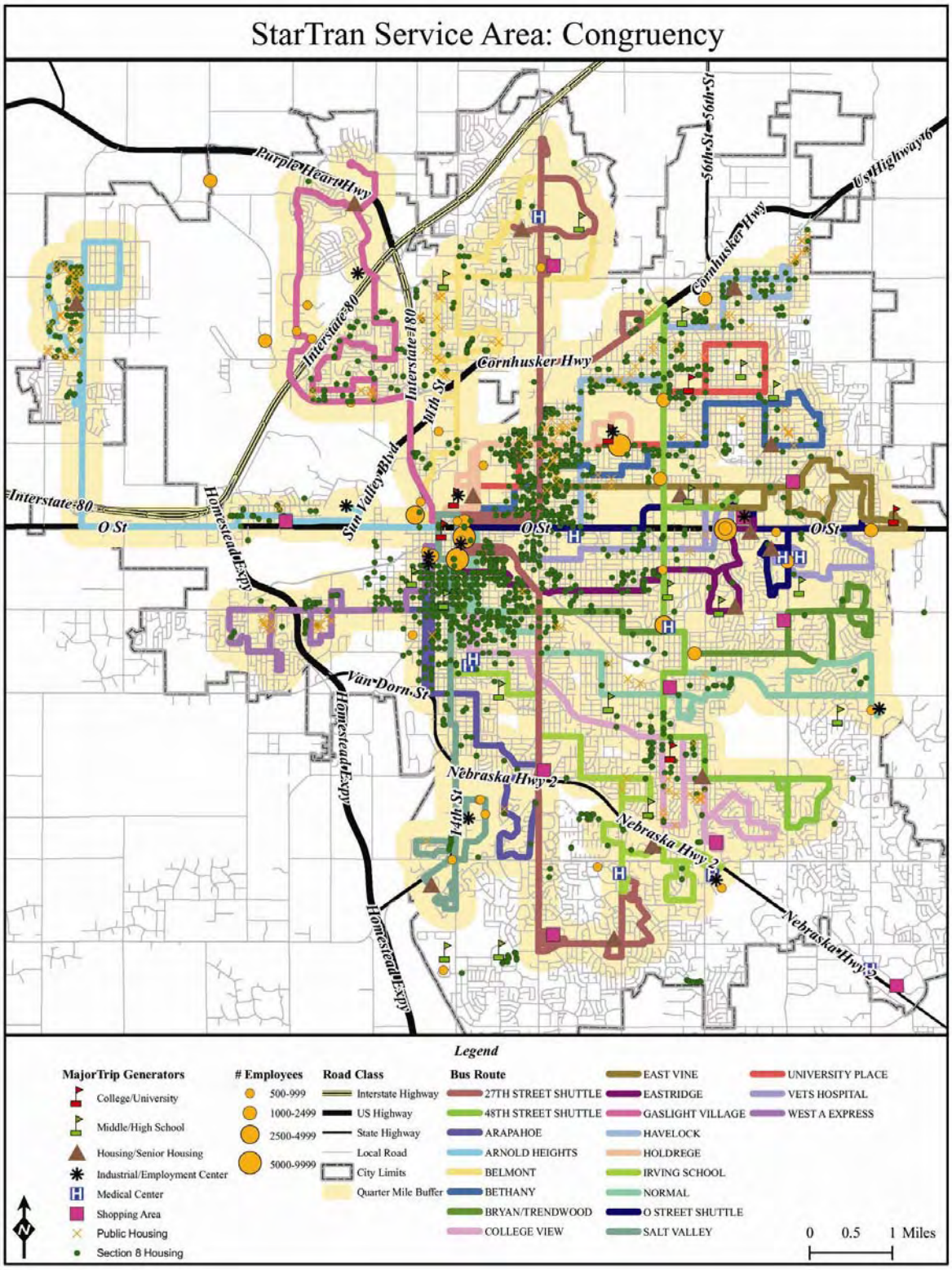
Congruency

The congruency analysis looks at the StarTran fixed route service area (the area within a quarter mile of fixed routes) in comparison to the location of major trip generators in the City of Lincoln. Major trip generators include: hospitals, shopping centers, major employers, government offices, schools, colleges and universities, public and section 8 housing and cultural and entertainment centers. Figure 5-3 provides a map of StarTran's service congruency.

StarTran fixed routes currently serve the vast majority of major employers and trip generators in the overall service area. Major trip generators currently not served by StarTran include:

- Major Employers: Kawasaki Motors, Duncan Aviation, and Landscapes Unlimited
- Schools: Southwest High School, Scott Middle School
- Medical Centers: Cardiac Hospital
- Shopping Centers: Wal-Mart at the intersection of 84th Street and Highway 2
- Section 8 Housing:
    - Western Lincoln: Capitol Parkway West
    - Eastern Lincoln: Holdrege St.
    - Southern Lincoln: west of 56th St. and near Pine Lake Rd.
    - Others around the City

Figure 5-3: StarTran Service Congruency



Frequency

For a city of Lincoln's size, the goal for headway/frequency for arterial routes is 30 minutes during weekday peak periods, and 60 minutes during off-peak periods and Saturdays. These standards and guidelines for headways have to be balanced against the resources of the system and utilization of the routes. On weekdays half of StarTran's 20 regular routes operate on 30- or 35-minute peak headways. Route 24 operates on 15-minute headways. The remaining 9 regular routes operate between 40- and 100-minute peak headways. The Star Shuttle operates on 15 minute headways. During the off-peak period, eleven routes operate on 55-, 60-, or 65-minute headways and Route 24 operates on 15-minute headways. Route 19 is only operated during peak periods. Routes 11 and 17x operate during peak periods with a single midday roundtrip operated. The remaining seven routes operate between 70- and 280-minute headways during off-peak periods. None of the routes on Saturdays meet the 60-minute headway guideline.

The eleven routes with peak headways greater than 30 minutes are: 1, 7, 8, 9, 11, 12, 13, 17x, 18, 19 and 27. The following thirteen routes have greater than 60-minute headways in the off-peak period: 1, 3, 5, 8, 9, 10, 11, 13, 15, 16, 17x, 18, and 19.

Span

In cities of Lincoln's size, evening service is becoming more and more of a necessity. This is because of the presence of a major university with night classes, entertainment opportunities, and the growth of second and third shift jobs. Later evening service improves the mobility and access to jobs for transit users in Lincoln. The duration of service needs to consider both need/demand and the availability of funds. The minimum standard for StarTran for regular route service should be 5:00 AM to 10:00 PM (16 hours) on weekdays, and 6:00 AM to 7:00 PM on Saturdays. On weekdays StarTran bus service runs from 5:15 AM until 7:10 PM. On Saturdays service operates from 5:55 AM until 7:05 PM.

Eight weekday StarTran routes begin service after 6:00 AM (Routes 8, 9, 15, 17x, 18, 19, 24, 27). The eight routes that begin service after 6:00 AM start their service by 7:00 AM. However, none of the StarTran routes operate until 10:00 PM. The average span for the peer systems analyzed in a previous chapter was 16.7 hours on weekdays. StarTran operates 14 hours of weekday service, 19% less than the peer average.

The Star Shuttle operates from 9:30 AM until 4:54 PM. All Saturday routes exceed the 6:00 AM to 7:00 PM standard in both the morning and the evening. The Star Shuttle does not operate on Saturdays.

Directness

The identified standard for directness for this project is the percentage of transfers being made by bus riders. For a system with radial routes, the rate of transferring is usually high, and a standard of 25 percent (transfer trips/revenue trips) is the maximum rate for transferring. According to the 2006 rider survey (1,192 respondents), 30.15% of riders transfer between routes in order to complete their trips; which does not meet the standard.

Patron Convenience

This category includes standards for operating speed, loading, bus stop spacing, dependability, and road call ratio.

Operating Speed

There are a set of standards associated with the operating speed of the routes. These standards allow for the identification of routes that may be too long for the running time allotted, or may be running slowly and unreliably due to congestion. As such they are also indicators of safety, as routes that are too long require drivers to speed to keep on schedule; and reliability, since very slow routes may create problems with on-time performance and transfers, particularly in a system with radial routes.

The standards shown on Table 5-1 were as follows:

- Regular routes should not exceed 15 MPH
- Shuttle routes should not exceed 10 MPH
- Outlying service should range between 12 and 18 MPH depending on route layout

Table 5-3 lists average operating speed by route. The StarTran system as a whole averages 14.56 MPH operating speed. Routes 7, 9, 11, 12, 13, 16, 18, 19, and 27 do not meet the regular route standard as their average operating speed exceeds 15 MPH. However, Routes 7, 9, 13, 16, 19, and 27 operate at between 15 MPH and 16 MPH. The Star Shuttle meets the shuttle standard as it operates at less than an average of 10 MPH.

Table 5-3: StarTran Average Operating Speed by Route

Route	Average Speed (mph)
Route 1 Havelock	14.66
Route 2 Bethany	13.89
Route 3 College View	11.75
Route 4 University Place	13.32
Route 5 Bryan Trendwood	14.84
Route 6 Arapahoe	13.16
Route 7 Belmont	15.56
Route 8 Veteran's Hospital	11.75
Route 9 "O" Street	15.10
Route 10 East Vine	13.08
Route 11 Gaslight Village	17.48
Route 12 Arnold Heights	18.02
Route 13 Normal	16.00
Route 15 Eastridge	11.72
Route 16 Irving	15.67
Route 17x West "A" Express	14.05
Route 18 48th Street Shuttle	20.24
Route 19 Salt Valley	15.71
Route 24 Holdrege	14.90
Route 27 27th Street Shuttle	15.97
Star Shuttle	8.98
Average	***14.56***

Source of Data: StarTran public Timetables and route statistics

Loading

Passengers should be seated except for short periods of time associated with peak load periods, during which time there should be no more than 25 percent standees for only a limited duration. At the same time, while there is no minimum load factor in the standards, i.e. loads should not fall below a given number of riders, observations of the ridership by trip indicate that there are significant portions of the day when peak loads rarely exceed 10 passengers on some routes, which is an indicator of an over-supply of service to these routes for selected time periods. The route by route studies later in this memorandum discuss these conditions in detail to determine which routes, if any, may require less service than is presently being provided.

StarTran buses have an average seating capacity of 35 passengers. Thus, loads of 44 or more riders would result in having 25% or more standees. Very few of StarTran's weekday runs have loads of 44 or more.

Bus Stop Spacing

The spacing of stops should balance patron convenience and speed of operation. The core standard calls for a stop every other block, while in fringe areas stops can be as far apart as .2 to .25 miles (4 to 5 per mile), based on need. For customer convenience and as an incentive to ride, Lincoln allows flagging of buses at any street corner. While providing an attractive benefit, this practice can slow operations, is a safety hazard for other vehicles, and should generally be avoided on heavily traveled streets. In outlying areas, where traffic is lighter, flag stops may be preferable to signed stops for passenger convenience.

Dependability

Riders require dependable service, defined as service that arrives on time and gets them to their destination on time, particularly if they are going to work, to school, or to an appointment. The standard should be two-fold: 100.0 percent of all trips should be operated (i.e., no missed trips), and 95.0 percent of the trips should run on-time (i.e., not more than 5 minutes late). Finally, no trip should run ahead of schedule at any point along a route. Table 5-4 shows how each StarTran route performed in terms of punctuality. The StarTran system as a whole averaged 97% on-time performance, with all routes having on on-time performance that is better than the 95% standard.

Table 5-4: StarTran On-Time Performance

Route	% On-Time
Route 1 Havelock	96%
Route 2 Bethany	97%
Route 3 College View	98%
Route 4 University Place	98%
Route 5 Bryan Trendwood	96%
Route 6 Arapahoe	99%
Route 7 Belmont	97%
Route 8 Veteran's Hospital	98%
Route 9 "O" Street	96%
Route 10 East Vine	98%
Route 11 Gaslight Village	97%
Route 12 Arnold Heights	98%
Route 13 Normal	97%
Route 15 Eastridge	97%
Route 16 Irving	98%
Route 17x West "A" Express	97%
Route 18 48th Street Shuttle	N/A
Route 19 Salt Valley	98%
Route 24 Holdrege	96%
Route 27 27th Street Shuttle	96%
Star Shuttle	98%
Average	97%

Road Call Ratio

This is a measure of dependability and quality for the customer, as the fewer the road calls, the fewer times customers are inconvenienced. The standard for road calls is between 4,000 and 6,000 miles per road call. For fiscal year 2004-2005, StarTran operated 1,752,324 miles and had 168 mechanical failures and 108 other failures, resulting in a road call ratio of 6,349 miles per call. StarTran performs very well in this arena and exceeds the road call ratio standard.

Fiscal Condition

These standards assess financial situation, the use of the StarTran system, and the relationship of service used to the amount of service provided. While there are any number of possible criteria that can be used to define fiscal condition, many of which will be studied in detail in the route diagnostics, for the purpose of defining general standards and overall condition, three were selected: fare structure, farebox recovery, and productivity.

Fare Structure

The fare structure should meet qualitative considerations set by City policy. It should be simple to understand, offer convenience to the user, and generate reasonable revenues for the system.

With regard to equity issues, the fare policy offers a number of discounts based either upon age, income, or disability, or upon the use of a variety of media. Free transfers should be provided so that those needing to use two buses for a trip are not penalized.

StarTran has a very simple fare policy. The base cash fare is $1.25 with a $0.60 for elderly and disabled patrons. There are multi-ride pass options and transfers between routes are free. Systemwide, fares generate approximately 16% of operating costs.

The following two standards (farebox recovery and productivity) for individual routes relate to the system average as well as the average for each category of service. Deviations from the standard identify routes that require different levels of analysis and change. Routes achieving less than 60 percent of the category average should be studied and significantly altered. Routes falling between 60 and 80 percent of the category average need to be carefully reviewed and possibly modified. And routes that exceed 80 percent, particularly those which might exceed the average, may need adjustments as well to increase service.

Farebox Recovery

Farebox recovery measures the percent of operating cost covered by fares and is an outcome heavily influenced by the ridership productivity of a route against its total operating cost, as well as the fare policy of the system. It is calculated by dividing fare revenue by operating cost. It is also discussed in the route diagnostic section.

Systemwide, StarTran averages 16% farebox recovery on weekdays. Two routes have recovery ratios below 60% of the system average – Routes 18 and 19. Routes 6, 8, 10, and 17x have farebox recoveries between 60% and 80% of the system average.

Productivity

Similar to farebox recovery, this route by route standard relates individual route performance to the performance of the category of each route. Productivity is measured in passengers per mile for this report.

StarTran averages 1.26 passengers per mile system-wide. Three routes fall below 60% of the system average – Routes 12, 18, and 19. Routes 5, 6, 10, 13 and 16 fall between 60% and 80% of the system average.

Passenger Comfort

Passenger comfort standards pertain to the passenger environment that StarTran provides. These standards examine the placement and condition of shelters and bus stop signs, the comfort and condition of the revenue equipment, and the quality of public information.

Waiting Shelters

The recommended standard for waiting shelters for a system of this size is to place one at any location having 25 or more daily boardings, generally spread throughout the day (e.g., not 25 boardings for a single load and no boardings for the remaining part of the day). StarTran has 61 shelters. Shelters are listed by location in Table 5-5.

Table 5-5: StarTran Shelter Locations

11th Street & "N" Street	10th Street & Garfield Street	Portia Street & Knox Street
11th Street & "J" Street	10th Street & South Street	45th Street & Vine Street
13th Street & "J" Street	19th Street & "A" Street	Cotner Boulevard & Holdredge Avenue
14th Street & "J" Street	17th Street & "E" Street	42nd Street & Holdredge Avenue
14th Street & "L" Street	13th Street & "D" Street	"R" Street & 46th Street
14th Street & "O" Street	Leighton Avenue & Cotner Boulevard	"R" Street & 45th Street
13th Street & "Q" Street	48th Street & Huntington Avenue	Westfield Shoppingtown Gateway
14th Street & "R" Street	11th Street & Cornhusker Highway	25th Street & Sumner Street
14th Street & "R" Street	60th Street & Street	"L" Street
10th Street & "J" Street	Fremont Street & Touzalin Avenue	Eldon Drive & Mulder Drive
16th Street & "O" Street	22nd Street & "R" Street	Tipperary Trail & Essex Road
17th Street & "G" Street	Holdredge Street & Idylwild Drive	40th Street & "L" Street
9th Street & "J" Street	14th Street & Superior Street	Ruskin Place
17th Street between "K" and "L" Street	70th Street & Vine Street	16th Street & Central Park
18th Street & "J" Street	48th Street & Madison Avenue	47th Street & Randolph Street
West "O" Street & 1st Street	60th Street & Havelock Avenue	48th Street & Bancroft Avenue
17th Street & "A" Street	67th Street & "O" Street	48th Street & Woodland Avenue
17th Street & South Street	33rd Street & Holdredge Avenue	52nd Street & Normal Boulevard
27th Street & "O" Street	69th Street & Havelock Avenue	13th Street & South Street
25th Street & "O" Street	Fremont Street & Way Street	37th Street & Sheridan Boulevard
		48th Street & Van Dorn Street

Table 5-6 shows StarTran stop locations with total daily boardings of 25 or more. Stop locations highlighted in yellow do not have shelters. Of the 29 stops with 25 or more boardings, 16 (55%) do not have shelters.

Table 5-6: Stop Locations with 25 or more Boardings

Stop Location	Total Daily Boardings
N & 11th	607
Burr & Fedde (East Campus)	392
14th & Vine	324
O & 11th / 11th & O	323
Q & 12th / 12th & Q	230
O & 14th	146
L & 14th	123
R & 14th / 14th & R	111
Abel/Sandoz (17th & Vine)	105
J & 11th	102
J & 14th	76
W Craw & 49th	66
N & 14th	61
Wal-Mart (4700 N 27th St)	55
48th & Huntington	48
J & 12th	42
P & 14th	42
33rd & Ridge Park	40
Henzlik Hall (14th & Vine)	34
Q & 11th	33
11th & Nance	30
23rd & Lynn	30
23rd & Y	29
O & 27th	29
11th & G	28
Holdrege & Idylwild	28
Gateway Mall	26
M & 14th	26
Shopko (4200 S 27th St)	26

StarTran should review the stop locations with high activity for potential shelter construction.

Bus Stop Signs

The standard for bus stop signs is to denote the name of the system and the route/routes served, as well as to provide a telephone number for schedule information. Where available, bus stops generally do have route numbers. However, many do not have route names or destinations to accompany route designation. Most signs are also out-of-date. This is an area where StarTran could make an improvement.

Revenue Equipment

General examination of the buses' condition and cleanliness indicate that the buses are clean and in good working order. Half of StarTran's 60 transit buses are from before the year 2000 and half

are later models. Ten transit buses are model year 2004 and twenty are model year 2001. StarTran also has 9 model year 2003 vans. In their capital program, StarTran has plans to replace their older model transit buses by fiscal year 2010-2011.

Public Information

Public information including timetables, maps and advertising should be widely available and be easy to read and understand. The system map is available online and a hard copy began distribution in July 2006. Timetables are available in hard copy format. The public information is clear and easy to read.

Summary

Overall, StarTran provides service to those people who need it and to those destinations that warrant it, with a network that provides coverage for about 90% of the population. However, some of the larger employers should be reviewed for potential service. Service is generally provided for an adequate span, but service frequency is an area where improvement could be made.

Many StarTran routes have buses traveling too fast but there are never any issues with loads being too high and patrons needing to stand for lengthy periods. Buses are in good working condition and break down less frequently than the standard recommends. Bus stops are conveniently located at every intersection along routes (flag stops and signed stops).

StarTran has many (61) shelters for patron comfort, but they are not necessarily located in the correct places. Sixteen stops that have 25 or more boardings per day do not have waiting shelters. Bus stop signs are also inadequate in many places; they are often out-of-date and lacking useful information. Other public information, however, like the timetables, is widely available and easy to read and understand.

This comparison to industry service standards has identified several places where StarTran excels and several places where StarTran could improve. These indications are studied in more detail in subsequent sections of this paper, which deal with individual route performance.

Weekday Route Diagnostics

Five important data sets were collected or calculated from StarTran 2005 records to create the database and calculations for the route diagnostics: ridership statistics, revenue hours, revenue miles, operating cost, and farebox revenue. Route diagnostics are split between the 20 regular routes and the Star Shuttle. These statistical data are shown in Table 5-7. StarTran averages 6,424 passengers on the typical weekday when UNL is in session, while operating 378 hours of service and 5,002 miles of service. Daily operations accumulate $23,391 in costs. Nearly $4,000 of the operating costs is recouped through daily farebox revenue.

Table 5-7: 2005 Weekday Route Level Ridership, Operating Data, Cost and Revenue Estimates

Route	Average Daily Ridership	Daily Revenue Hours	Daily Revenue Miles	Daily Operating Cost	Average Daily Farebox Revenue
Weekday					
Route 1 Havelock	493	21.8	306.5	$1,347	$301
Route 2 Bethany	298	20.2	268.3	$1,250	$182
Route 3 College View	319	21.3	276.9	$1,321	$195
Route 4 University Place	518	25.9	334.9	$1,605	$316
Route 5 Bryan Trendwood	292	21.1	297.6	$1,306	$178
Route 6 Arapahoe	243	21.4	267.1	$1,326	$148
Route 7 Belmont	312	16.5	229.5	$1,022	$190
Route 8 Veteran's Hospital	181	14.9	162.1	$924	$110
Route 9 "O" Street	247	13.4	188.2	$831	$151
Route 10 East Vine	223	20.8	281.5	$1,290	$136
Route 11 Gaslight Village	176	9.3	152.1	$578	$107
Route 12 Arnold Heights	200	14.5	277.2	$898	$122
Route 13 Normal	291	20.3	315.9	$1,259	$178
Route 15 Eastridge	314	19.6	131.1	$1,213	$192
Route 16 Irving	284	21.4	320.3	$1,326	$173
Route 17x West "A" Express	54	4.5	51.5	$279	$33
Route 18 48th Street Shuttle	82	13.6	230.3	$841	$50
Route 19 Salt Valley	73	8.2	119.4	$507	$45
Route 24 Holdrege	1110	27.9	269.5	$1,729	$677
Route 27 27th Street Shuttle	432	24.9	387.2	$1,540	$264
Star Shuttle	282	16.2	134.6	$1,001	$172
Weekday Total	***6,424***	***378***	***5,002***	***$23,391***	***$3,919***

For each of the diagnostic indicators, each route is ranked compared to the other routes in the system and also compared to the system average. Performance by route is shown in both table and chart format for each indicator. Routes that are less than 60% of the system average may require substantial modification or possibly elimination. Routes that are between 60% and 80% of the system average need to be looked at in further detail to determine if small modifications are necessary.

Service Effectiveness

Service effectiveness describes the amount of service utilized per unit of transit service provided. Service effectiveness is measured based on two indicators, passengers per mile and passengers per hour. While both passengers per mile and passengers per hour are presented, only passengers per mile is included in the route scoring and ranking presented at the end of the route diagnostics section to avoid duplication.

Passengers per Mile

The passenger per mile figures and rankings are presented in Table 5-8 and Figure 5-4 for weekdays. This indicator measures the number of passengers carried each day by each route versus the number of miles per day the route operates.

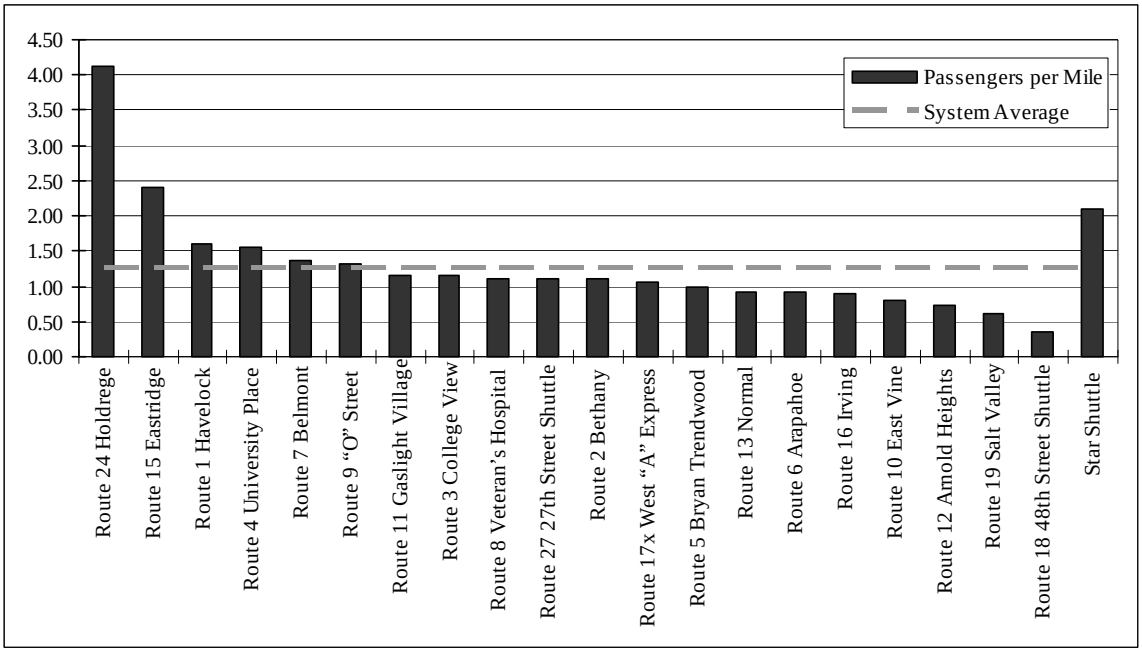
StarTran averages 1.26 passengers per mile system-wide. Fourteen of the 20 regular routes operate below the average and 6 operate above. Route 24 (Holdrege) has the highest passengers per mile, with 4.12 passengers per mile on average daily. On the other end of the scale, Route 18 (48th Street Shuttle) has only a 0.36 passengers per mile daily on average. The Star Shuttle performs better than the system average at 2.09 passengers per mile.

Table 5-8: StarTran Weekday Passengers per Mile by Route

Route	Weekday Passengers per Mile	Weekday Rank	% of System Average
Route 24 Holdrege	4.12	1	326.6%
Route 15 Eastridge	2.39	2	189.9%
Route 1 Havelock	1.61	3	127.6%
Route 4 University Place	1.55	4	122.7%
Route 7 Belmont	1.36	5	107.8%
Route 9 “O” Street	1.31	6	104.1%
Route 11 Gaslight Village	1.16	7	91.8%
Route 3 College View	1.15	8	91.3%
Route 8 Veteran’s Hospital	1.12	9	88.5%
Route 27 27th Street Shuttle	1.12	10	88.5%
Route 2 Bethany	1.11	11	88.1%
Route 17x West “A” Express	1.05	12	83.1%
Route 5 Bryan Trendwood	0.98	13	77.8%
Route 13 Normal	0.92	14	73.0%
Route 6 Arapahoe	0.91	15	72.1%
Route 16 Irving	0.89	16	70.3%
Route 10 East Vine	0.79	17	62.8%
Route 12 Arnold Heights	0.72	18	57.2%
Route 19 Salt Valley	0.61	19	48.5%
Route 18 48th Street Shuttle	0.36	20	28.2%
Star Shuttle	2.09	N/A	166.1%
System Average	***1.26***		

(Higher is better.)

Figure 5-4: Weekday Passengers per Mile by Route with System Average



Passengers per Hour

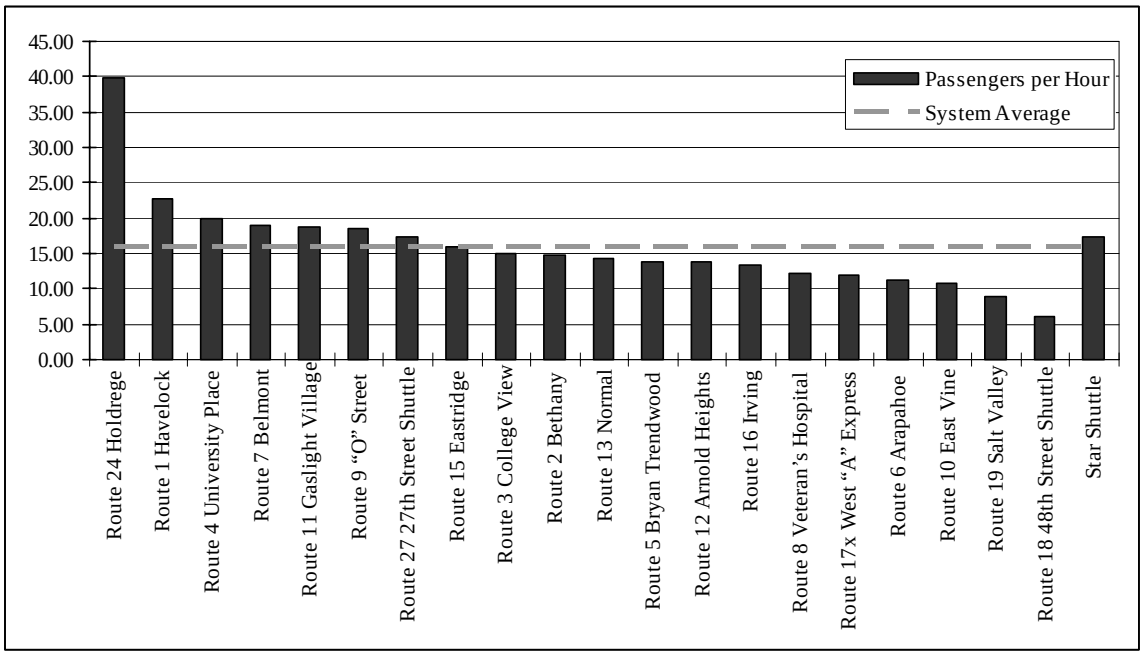
The passengers per hour figures, which include rankings, are presented for StarTran in Table 5-9 and Figure 5-5. This indicator measures the number of passengers carried each day by each route versus the number of hours per day the route operates.

StarTran averages 15.91 passengers per hour system-wide. As with the other measure of service effectiveness, passengers per mile, Route 24 is the most effective (39.77 passengers per hour) and Route 18 is the least effective (6.04 passengers per hour) route. Twelve of the regular routes operate below the system average and eight operate above. The Star Shuttle operates a little better than the system average at 17.45 passengers per hour.

Table 5-9: StarTran Weekday Passengers per Hour by Route

Route	Weekday Passengers per Hour	Weekday Rank	% of System Average
Route 24 Holdrege	39.77	1	250.0%
Route 1 Havelock	22.67	2	142.5%
Route 4 University Place	19.99	3	125.7%
Route 7 Belmont	18.91	4	118.9%
Route 11 Gaslight Village	18.86	5	118.6%
Route 9 "O" Street	18.42	6	115.8%
Route 27 27th Street Shuttle	17.38	7	109.2%
Route 15 Eastridge	16.04	8	100.8%
Route 3 College View	14.96	9	94.0%
Route 2 Bethany	14.77	10	92.8%
Route 13 Normal	14.32	11	90.0%
Route 5 Bryan Trendwood	13.85	12	87.0%
Route 12 Arnold Heights	13.79	13	86.7%
Route 16 Irving	13.26	14	83.4%
Route 8 Veteran's Hospital	12.14	15	76.3%
Route 17x West "A" Express	12.00	16	75.4%
Route 6 Arapahoe	11.35	17	71.4%
Route 10 East Vine	10.71	18	67.3%
Route 19 Salt Valley	8.92	19	56.1%
Route 18 48th Street Shuttle	6.04	20	38.0%
Star Shuttle	17.45	N/A	109.7%
System Average	***15.91***		

Figure 5-5: Weekday Passengers per Hour by Route with System Average



Financial Efficiency

Financial efficiency measures the cost of providing transit service per unit of service provided. Two indicators, cost per mile and cost per hour, can be used to determine financial efficiency. Since the daily operating cost was determined using an average cost per hour figure for the system as a whole and not for each individual route, only the cost per mile indicator varies from route to route in this analysis and therefore is presented for the review of financial efficiency.

Cost per Mile

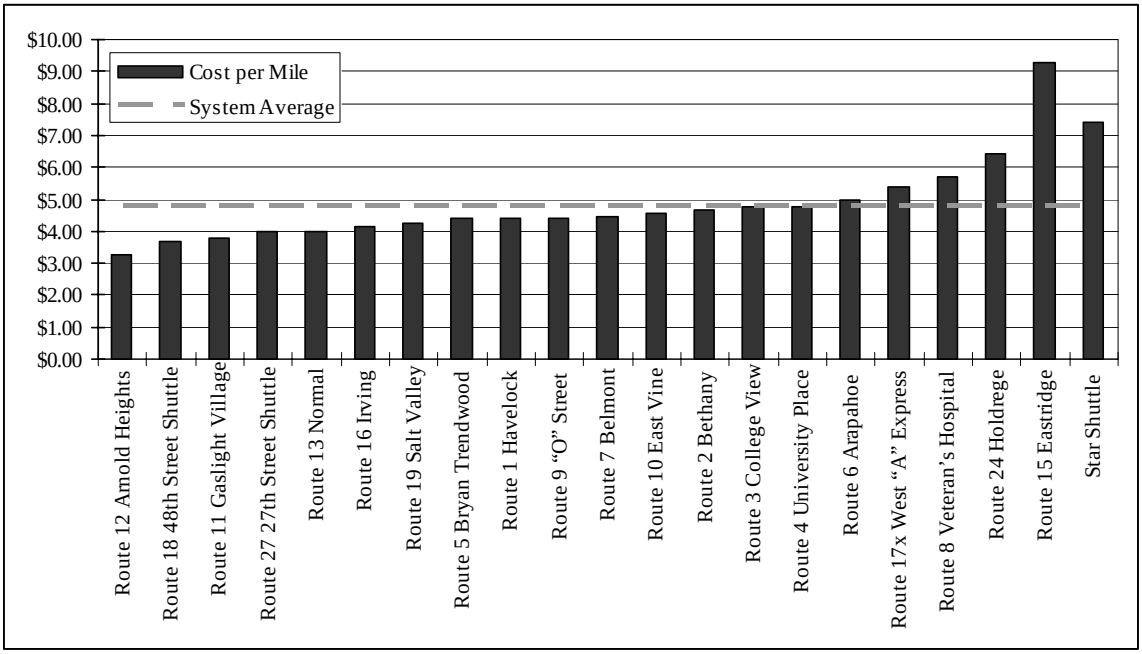
Table 5-10 and Figure 5-6 present the cost per mile for each route and the route rankings. This indicator presents the total daily route cost per revenue mile operated, and is an indicator of how well resources are being used to produce a unit of service. StarTran averages $4.76 in costs per mile operated. Thirteen of the 20 regular routes are more efficient than the system average and 7 are less so. Route 12 (Arnold Heights) is the most efficient route at $3.24 per mile and Route 15 (Eastridge) is the least efficient route at $9.25 per mile. Compared to the effectiveness measures, Routes 18 and 24 are opposite in their efficiency measurement. Route 18 (48th Street Shuttle) is the second most efficient route and Route 24 (Holdrege) is the second to least efficient route. The Star Shuttle is less efficient than the system average at $7.43 in operating costs per mile.

Table 5-10: StarTran Cost per Mile by Route

Route	Weekday Cost per Mile	Weekday Rank	% of System Average
Route 12 Arnold Heights	$3.24	1	68.0%
Route 18 48th Street Shuttle	$3.65	2	76.7%
Route 11 Gaslight Village	$3.80	3	79.8%
Route 27 27th Street Shuttle	$3.98	4	83.5%
Route 13 Normal	$3.98	5	83.7%
Route 16 Irving	$4.14	6	87.0%
Route 19 Salt Valley	$4.24	7	89.1%
Route 5 Bryan Trendwood	$4.39	8	92.2%
Route 1 Havelock	$4.40	9	92.3%
Route 9 “O” Street	$4.41	10	92.7%
Route 7 Belmont	$4.45	11	93.5%
Route 10 East Vine	$4.58	12	96.2%
Route 2 Bethany	$4.66	13	97.8%
Route 3 College View	$4.77	14	100.2%
Route 4 University Place	$4.79	15	100.6%
Route 6 Arapahoe	$4.96	16	104.3%
Route 17x West “A” Express	$5.41	17	113.7%
Route 8 Veteran’s Hospital	$5.70	18	119.6%
Route 24 Holdrege	$6.41	19	134.7%
Route 15 Eastridge	$9.25	20	194.3%
Star Shuttle	$7.43	N/A	156.1%
System Average	***$4.76***		

(Lower costs are better.)

Figure 5-6: Weekday Cost per Mile by Route with System Average



Cost Effectiveness

Cost effectiveness measures the effectiveness of the system from a financial standpoint – how well the dollars put into the system are being used to produce trips. The cost effectiveness indicators are cost per passenger, subsidy per passenger, and farebox recovery.

Cost per Passenger

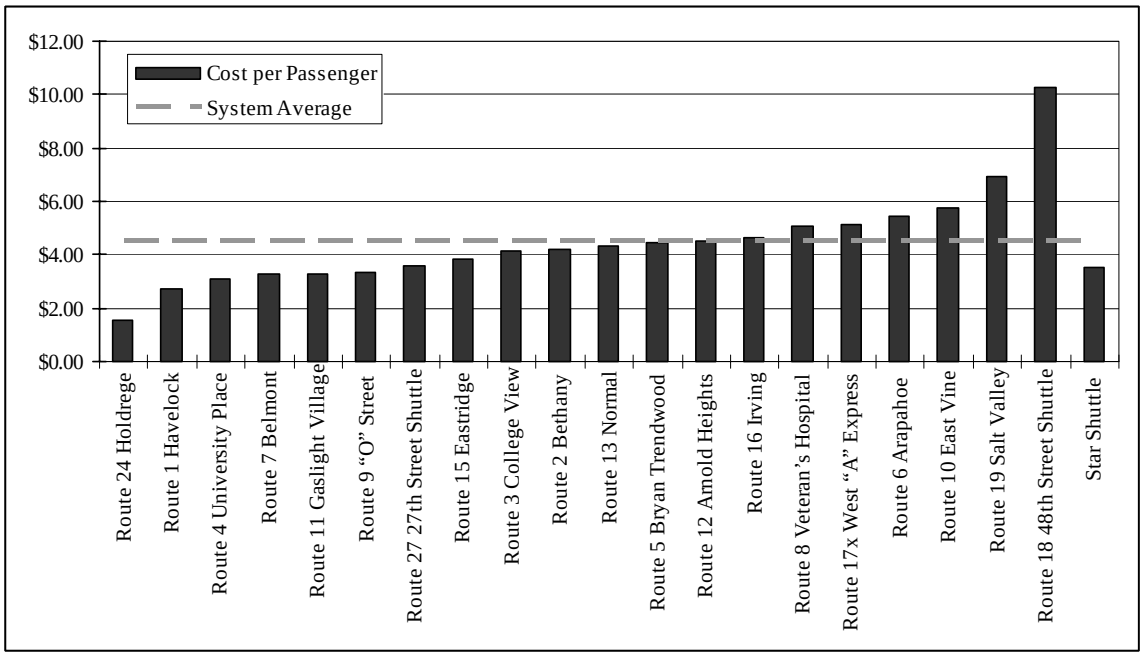
Table 5-11 and Figure 5-7 present the cost per passenger and ranking for each weekday route. This indicator divides the route operating cost among all passengers that use the route.

StarTran averages $4.49 in operating costs per passenger system-wide. Twelve routes operate more effectively than the system average and 8 do not. As with the service effectiveness measures, Route 24 ($1.56 in operating costs per passenger) is the most effective route and Route 18 ($10.26 in operating costs per passenger) is the least effective route. The Star Shuttle is less cost effective than the system average at $3.55 in operating costs per passenger.

Table 5-11: StarTran Weekday Cost per Passenger by Route

Route	Weekday Cost per Passenger	Weekday Rank	% of System Average
Route 24 Holdrege	$1.56	1	34.7%
Route 1 Havelock	$2.73	2	60.9%
Route 4 University Place	$3.10	3	69.1%
Route 7 Belmont	$3.28	4	73.0%
Route 11 Gaslight Village	$3.28	5	73.2%
Route 9 "O" Street	$3.36	6	74.9%
Route 27 27th Street Shuttle	$3.56	7	79.4%
Route 15 Eastridge	$3.86	8	86.1%
Route 3 College View	$4.14	9	92.3%
Route 2 Bethany	$4.19	10	93.5%
Route 13 Normal	$4.33	11	96.4%
Route 5 Bryan Trendwood	$4.47	12	99.7%
Route 12 Arnold Heights	$4.49	13	100.1%
Route 16 Irving	$4.67	14	104.1%
Route 8 Veteran's Hospital	$5.10	15	113.7%
Route 17x West "A" Express	$5.16	16	115.0%
Route 6 Arapahoe	$5.46	17	121.6%
Route 10 East Vine	$5.78	18	128.9%
Route 19 Salt Valley	$6.94	19	154.7%
Route 18 48th Street Shuttle	$10.26	20	228.6%
Star Shuttle	$3.55	N/A	79.1%
System Average	***$4.49***		

Figure 5-7: Weekday Cost per Passenger by Route with System Average



Farebox Recovery

Farebox recovery measures the percent of operating cost covered by fares and is an outcome heavily influenced by the ridership productivity of a route against its total operating cost, as well as the fare policy of the system. It is calculated by dividing fare revenue by operating cost. Table 5-12 and Figure 5-8 list the farebox recovery ratio for each route as well as how each route ranked compared to the other routes in the system.

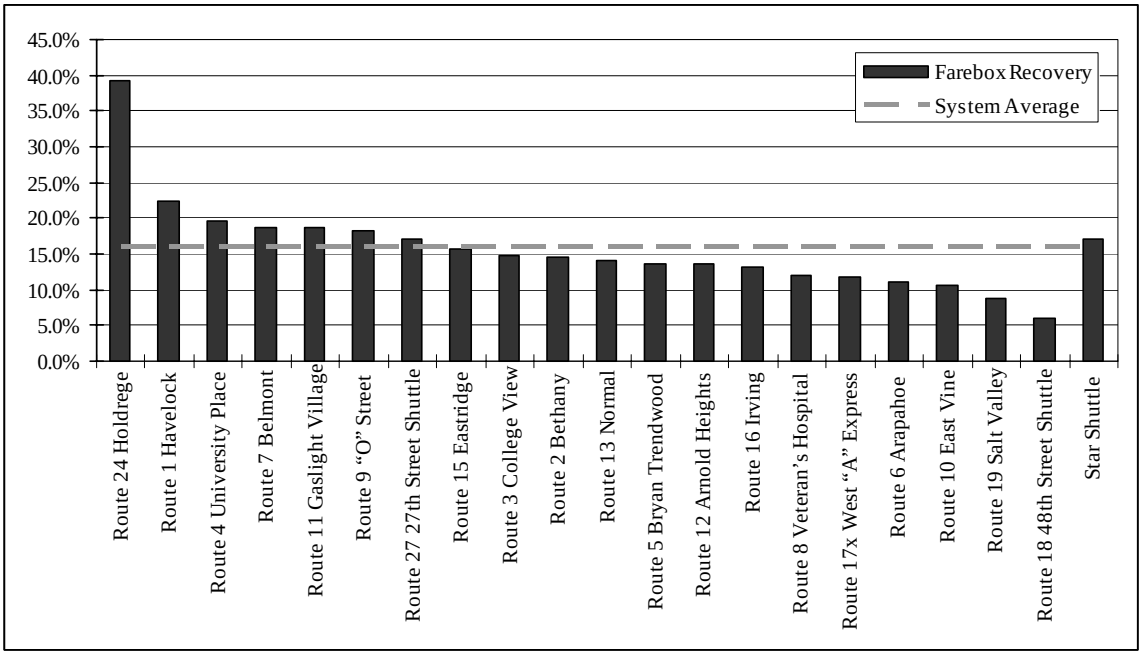
System-wide, StarTran routes recover 16% of their operating costs with farebox revenue. Eight regular routes are more cost effective than the system average and 12 are less cost effective. As with all of the other effectiveness measures, Route 24 (39.2% farebox recovery) is the most effective route and Route 18 (5.9% farebox recovery) is the least effective route. The Star Shuttle is more effective than the system average at 17.2% farebox recovery.

Table 5-12: StarTran Weekday Farebox Recovery by Route

Route	Weekday Farebox Recovery	Weekday Rank	% of System Average
Route 24 Holdrege	39.2%	1	250.0%
Route 1 Havelock	22.3%	2	142.5%
Route 4 University Place	19.7%	3	125.7%
Route 7 Belmont	18.6%	4	118.9%
Route 11 Gaslight Village	18.6%	5	118.6%
Route 9 “O” Street	18.1%	6	115.8%
Route 27 27th Street Shuttle	17.1%	7	109.2%
Route 15 Eastridge	15.8%	8	100.8%
Route 3 College View	14.7%	9	94.0%
Route 2 Bethany	14.5%	10	92.8%
Route 13 Normal	14.1%	11	90.0%
Route 5 Bryan Trendwood	13.6%	12	87.0%
Route 12 Arnold Heights	13.6%	13	86.7%
Route 16 Irving	13.1%	14	83.4%
Route 8 Veteran’s Hospital	12.0%	15	76.3%
Route 17x West “A” Express	11.8%	16	75.4%
Route 6 Arapahoe	11.2%	17	71.4%
Route 10 East Vine	10.5%	18	67.3%
Route 19 Salt Valley	8.8%	19	56.1%
Route 18 48th Street Shuttle	5.9%	20	38.0%
Star Shuttle	17.2%	N/A	109.7%
System Average	***16%***		

(Higher is better).

Figure 5-8: Weekday Farebox Recovery by Route with System Average



Route Ranking

The rankings of each of the routes for two indicators can be used to calculate a cumulative rank score for each route on weekdays and by category of service: regular routes and the Star Shuttle. The two indicators include passengers per mile to rate service effectiveness and farebox recovery to rate cost effectiveness. Financial efficiency was not rated because the ratings of the routes in this category correlated directly to route length, which does not measure performance. Routes with a higher score are indicative of poorer performing routes which need to be addressed. Routes with a lower score are generally better performing routes that may only require monitoring or minor adjustment in order to integrate better into the StarTran network or to serve new generators.

Table 5-13 presents the weekday route rankings. Route 24 (Holdrege) is the best performing route in the system. Route 1 (Havelock) is also a top performer. On the bottom end of the scale, Route 18 (48th Street Shuttle) is the worst performing route and Route 19 (Salt Valley) is also a poor performer. There are several ties, so those routes with the same cumulative rank scores are given the same overall rank.

Table 5-13: StarTran Weekday Route Ranking

Route	Passengers per Mile Rank	Farebox Recovery Rank	Cumulative Rank Score	Weekday Rank
Route 24 Holdrege	1	1	2	1
Route 1 Havelock	3	2	5	2
Route 4 University Place	4	3	7	3
Route 7 Belmont	5	4	9	4
Route 15 Eastridge	2	8	10	5
Route 9 “O” Street	6	6	12	6
Route 11 Gaslight Village	7	5	12	6
Route 3 College View	8	9	17	8
Route 27 27th Street Shuttle	10	7	17	8
Route 2 Bethany	11	10	21	10
Route 8 Veteran’s Hospital	9	15	24	11
Route 5 Bryan Trendwood	13	12	25	12
Route 13 Normal	14	11	25	12
Route 17x West “A” Express	12	16	28	14
Route 16 Irving	16	14	30	15
Route 12 Arnold Heights	18	13	31	16
Route 6 Arapahoe	15	17	32	17
Route 10 East Vine	17	18	35	18
Route 19 Salt Valley	19	19	38	19
Route 18 48th Street Shuttle	20	20	40	20

Individual routes and their positive and negative performance attributes are discussed following the Saturday diagnostics and time of day analysis.

Saturday Route Diagnostics

Saturday diagnostics use the same datasets as the weekday analysis except that the ridership data comes from the 2003-2004 average daily ridership numbers from StarTran. Route diagnostics are calculated for the twelve Saturday routes. These statistical data are shown in Table 5-7. StarTran averages 1,744 passengers on the typical Saturday while operating 164 hours and 2,169 miles of service. The average Saturday costs StarTran $10,138 to operate, with $1,064 in costs being recouped through farebox revenue.

Table 5-14: Saturday Route Level Ridership, Operating Data, Cost and Revenue Estimates

Route	Average Daily Ridership	Daily Revenue Hours	Daily Revenue Miles	Daily Operating Cost	Average Daily Farebox Revenue
Saturday					
Route 1 Havelock	123	12.8	161.0	$790	$75
Route 4/2 University Place/Bethany	84	12.8	157.0	$790	$51
Route 5/13 Bryan-Trendwood/Normal	194	12.8	168.0	$790	$118
Route 6/19 Arapahoe/Salt Valley	172	13.3	139.9	$826	$105
Route 7/11 Belmont/Gaslight	134	12.8	193.6	$790	$82
Route 8/15 Vet's Hospital/Eastridge	218	12.9	170.9	$800	$133
Route 9 "O" Street Shuttle	146	12.2	152.4	$754	$89
Route 10 East Vine	137	12.7	140.0	$788	$84
Route 12 Arnold Heights	75	11.6	120.7	$717	$46
Route 16/3 Irving/College View	234	12.8	184.0	$790	$143
Route 18 48th Street Shuttle	62	13.1	204.8	$808	$38
Route 27 27th Street Shuttle	165	24.2	376.8	$1,496	$101
Saturday Total	***1,744***	***164***	***2,169***	***$10,138***	***$1,064***

Individual routes are discussed in greater detail in a later section.

Service Effectiveness

Service effectiveness describes the amount of service utilized per unit of transit service provided. Service effectiveness is measured based on two indicators, passengers per mile and passengers per hour. While both passengers per mile and passengers per hour are presented, only passengers per mile is included in the route scoring and ranking presented at the end of the route diagnostics section to avoid duplication.

Passengers per Mile

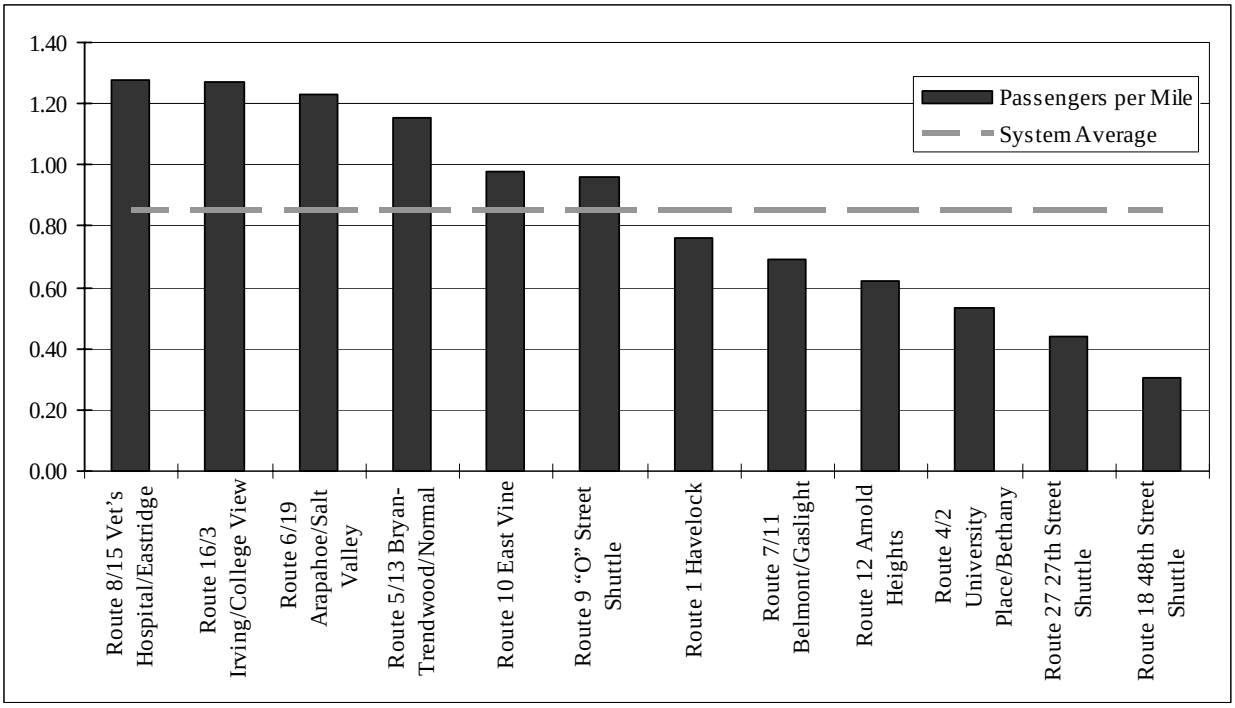
The passenger per mile figures and rankings are presented in Table 5-15 and Figure 5-9 for weekdays. This indicator measures the number of passengers carried each day by each route versus the number of miles per day the route operates.

StarTran averages 0.85 passengers per mile system-wide on Saturdays versus 1.26 passengers per mile on weekdays. The Route 8/15 combination is the most effective route and Route 18 is the least effective route. Half of the 12 Saturday routes operate above the system average and half operate below.

Table 5-15: StarTran Saturday Passengers per Mile by Route

Route	Saturday Passengers per Mile	Saturday Rank	% of System Average
Route 8/15 Vet's Hospital/Eastridge	1.28	1	150.1%
Route 16/3 Irving/College View	1.27	2	149.6%
Route 6/19 Arapahoe/Salt Valley	1.23	3	144.6%
Route 5/13 Bryan-Trendwood/Normal	1.15	4	135.9%
Route 10 East Vine	0.98	5	115.1%
Route 9 "O" Street Shuttle	0.96	6	112.7%
Route 1 Havelock	0.76	7	89.9%
Route 7/11 Belmont/Gaslight	0.69	8	81.4%
Route 12 Arnold Heights	0.62	9	73.1%
Route 4/2 University Place/Bethany	0.54	10	62.9%
Route 27 27th Street Shuttle	0.44	11	51.5%
Route 18 48th Street Shuttle	0.30	12	35.6%
System Average	***0.85***		

Figure 5-9: Saturday Passengers per Mile by Route with System Average



Passengers per Hour

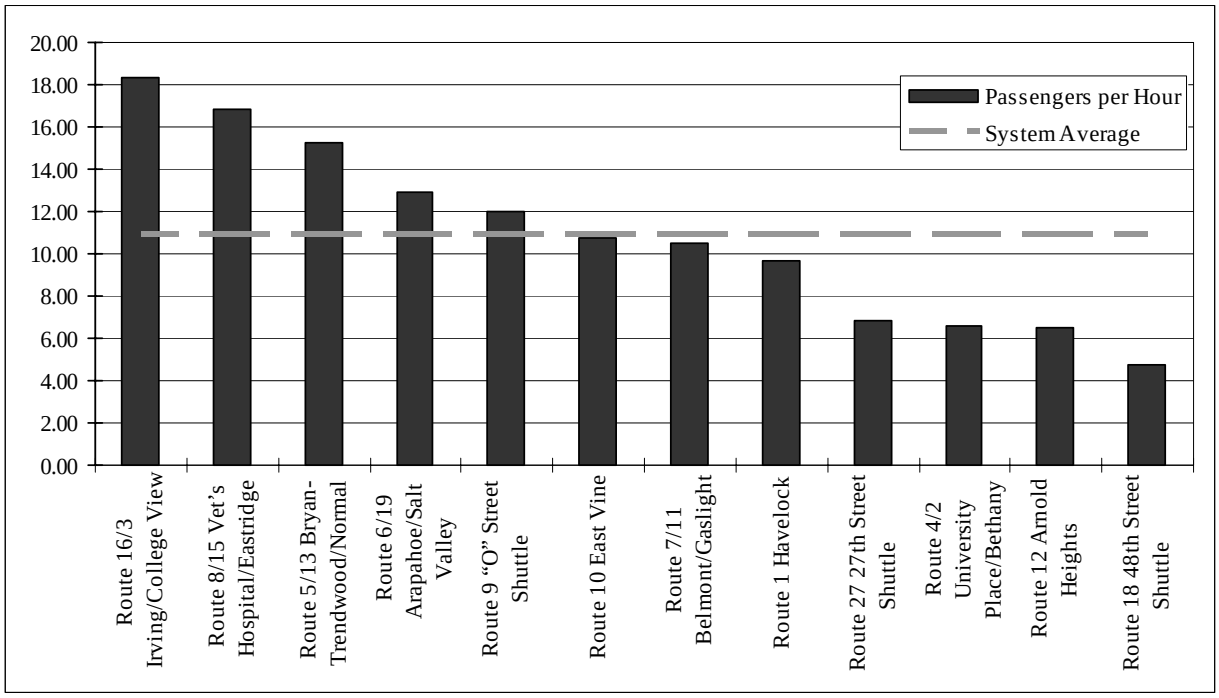
The passengers per hour figures, which include rankings, are presented for StarTran in Table 5-16 and Figure 5-10. This indicator measures the number of passengers carried each day by each route versus the number of hours per day the route operates.

StarTran averages 10.91 passengers per hour system-wide on Saturdays versus 15.91 passengers per hour on weekdays. Five of the 12 Saturday routes operate above the system average and 7 operate below. The most effective route is the 16/3 combination and the least effective is Route 18.

Table 5-16: StarTran Saturday Passengers per Hour by Route

Route	Saturday Passengers per Hour	Saturday Rank	% of System Average
Route 16/3 Irving/College View	18.35	1	168.2%
Route 8/15 Vet's Hospital/Eastridge	16.87	2	154.7%
Route 5/13 Bryan-Trendwood/Normal	15.22	3	139.5%
Route 6/19 Arapahoe/Salt Valley	12.90	4	118.3%
Route 9 "O" Street Shuttle	12.00	5	110.0%
Route 10 East Vine	10.77	6	98.7%
Route 7/11 Belmont/Gaslight	10.51	7	96.3%
Route 1 Havelock	9.65	8	88.4%
Route 27 27th Street Shuttle	6.83	9	62.6%
Route 4/2 University Place/Bethany	6.59	10	60.4%
Route 12 Arnold Heights	6.48	11	59.4%
Route 18 48th Street Shuttle	4.75	12	43.5%
System Average	***10.91***		

Figure 5-10: Saturday Passengers per Hour by Route with System Average



Financial Efficiency

Financial efficiency measures the cost of providing transit service per unit of service provided. Two indicators, cost per mile and cost per hour, can be used to determine financial efficiency. Since the daily operating cost was determined using an average cost per hour figure for the system as a whole and not for each individual route, only the cost per mile indicator varies from route to route in this analysis and therefore is presented for the review of financial efficiency.

Cost per Mile

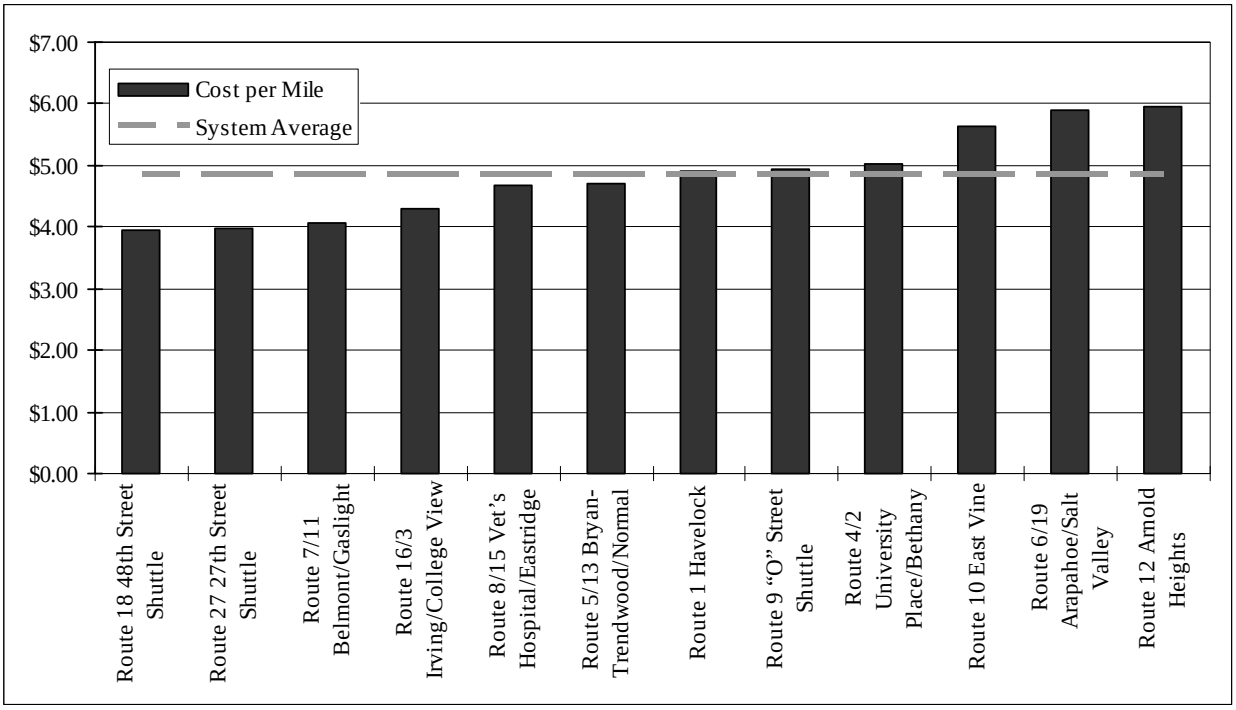
Table 5-17 and Figure 5-11 present the cost per mile for each route and the route rankings. This indicator presents the total daily route cost per revenue mile operated, and is an indicator of how well resources are being used to produce a unit of service.

StarTran averages $4.84 in operating costs per mile on Saturdays system-wide, versus an average of $4.76 on weekdays. Half of the 12 Saturday routes operate more efficiently than the average, and half operate less efficiently. Route 18 is the most effective route and Route 12 is the least efficient route.

Table 5-17: StarTran Saturday Cost per Mile by Route

Route	Saturday Cost per Mile	Saturday Rank	% of System Average
Route 18 48th Street Shuttle	$3.95	1	81.6%
Route 27 27th Street Shuttle	$3.97	2	82.1%
Route 7/11 Belmont/Gaslight	$4.08	3	84.3%
Route 16/3 Irving/College View	$4.29	4	88.7%
Route 8/15 Vet's Hospital/Eastridge	$4.68	5	96.7%
Route 5/13 Bryan-Trendwood/Normal	$4.70	6	97.1%
Route 1 Havelock	$4.91	7	101.3%
Route 9 "O" Street Shuttle	$4.95	8	102.2%
Route 4/2 University Place/Bethany	$5.03	9	103.9%
Route 10 East Vine	$5.63	10	116.3%
Route 6/19 Arapahoe/Salt Valley	$5.90	11	121.9%
Route 12 Arnold Heights	$5.94	12	122.8%
System Average	***$4.84***		

Figure 5-11: Saturday Cost per Mile by Route with System Average



Cost Effectiveness

Cost effectiveness measures the effectiveness of the system from a financial standpoint – how well the dollars put into the system are being used to produce trips. The cost effectiveness indicators are cost per passenger, subsidy per passenger, and farebox recovery.

Cost per Passenger

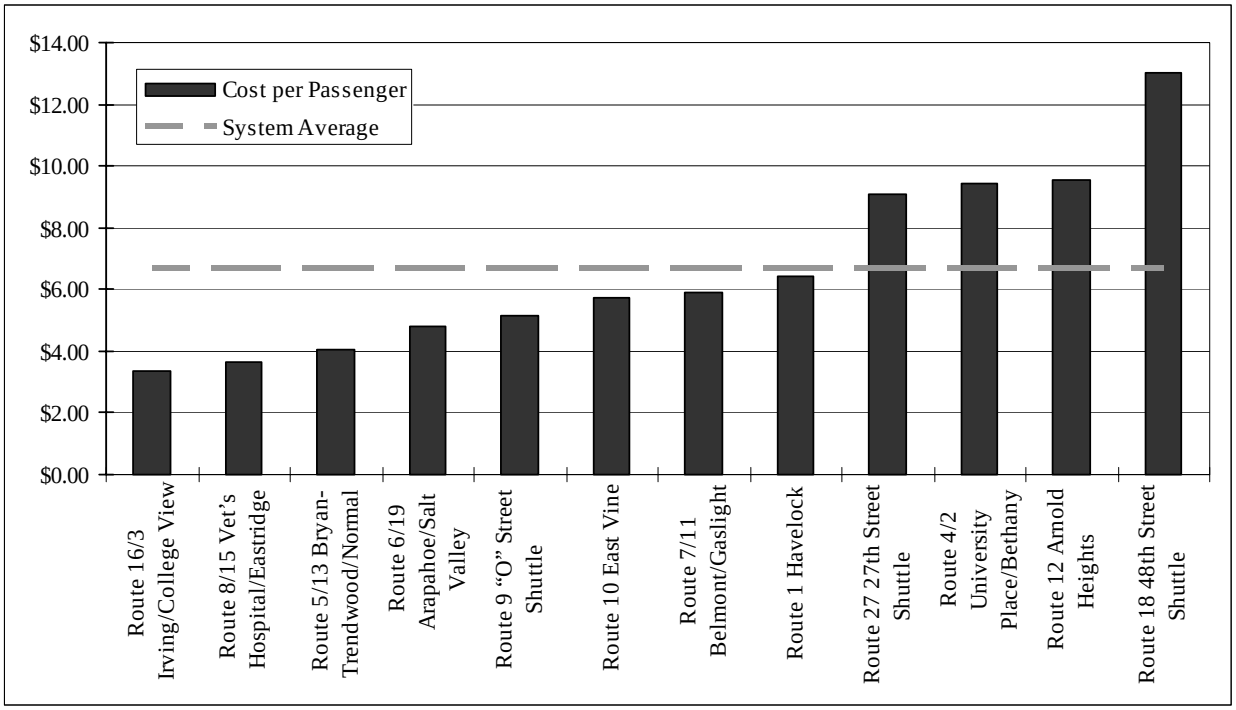
Table 5-18 and Figure 5-12 present the cost per passenger and ranking for each weekday route. This indicator divides the route operating cost among all passengers that use the route.

On Saturdays, StarTran averages $6.68 in operating costs per passenger versus $4.49 per passenger on weekdays. Eight routes are more cost effective than the average and four are less. The 16/3 route combination is the most effective route and Route 18 is the least effective route.

Table 5-18: StarTran Saturday Cost per Passenger by Route

Route	Saturday Cost per Passenger	Saturday Rank	% of System Average
Route 16/3 Irving/College View	$3.37	1	50.5%
Route 8/15 Vet's Hospital/Eastridge	$3.67	2	55.0%
Route 5/13 Bryan-Trendwood/Normal	$4.07	3	60.9%
Route 6/19 Arapahoe/Salt Valley	$4.80	4	71.9%
Route 9 "O" Street Shuttle	$5.16	5	77.3%
Route 10 East Vine	$5.75	6	86.1%
Route 7/11 Belmont/Gaslight	$5.89	7	88.2%
Route 1 Havelock	$6.42	8	96.1%
Route 27 27th Street Shuttle	$9.07	9	135.8%
Route 4/2 University Place/Bethany	$9.40	10	140.7%
Route 12 Arnold Heights	$9.56	11	143.2%
Route 18 48th Street Shuttle	$13.04	12	195.2%
System Average	***$6.68***		

Figure 5-12: Saturday Cost per Passenger by Route with System Average



Farebox Recovery

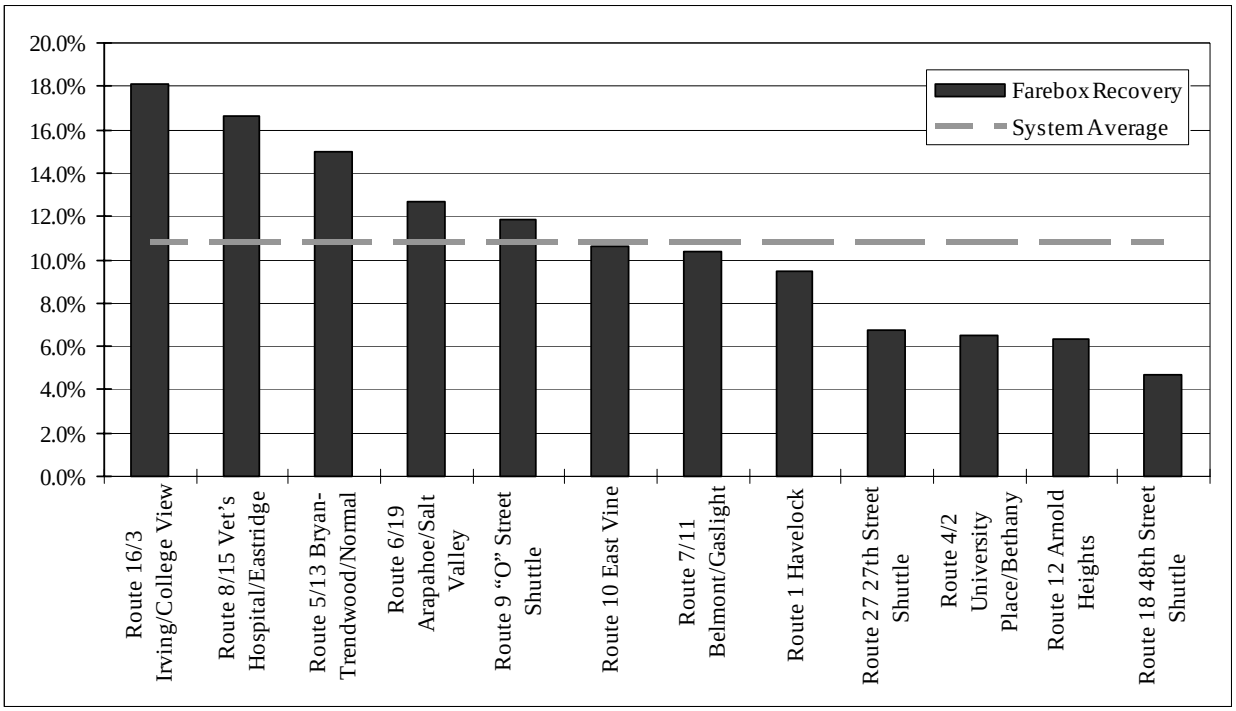
Farebox recovery measures the percent of operating cost covered by fares and is an outcome heavily influenced by the ridership productivity of a route against its total operating cost, as well as the fare policy of the system. It is calculated by dividing fare revenue by operating cost. Table 5-19 and Figure 5-13 list the farebox recovery ratio for each route as well as how each route ranked compared to the other routes in the system.

StarTran averages 11% farebox recovery on Saturdays versus 16% on weekdays. Five of the 12 Saturday routes are more cost effective than the system average and 7 are less so. The 16/3 route combination is the most effective route and Route 18 is the least effective route.

Table 5-19: StarTran Saturday Farebox Recovery by Route

Route	Saturday Farebox Recovery	Saturday Rank	% of System Average
Route 16/3 Irving/College View	18.1%	1	168.2%
Route 8/15 Vet's Hospital/Eastridge	16.6%	2	154.7%
Route 5/13 Bryan-Trendwood/Normal	15.0%	3	139.5%
Route 6/19 Arapahoe/Salt Valley	12.7%	4	118.3%
Route 9 "O" Street Shuttle	11.8%	5	110.0%
Route 10 East Vine	10.6%	6	98.7%
Route 7/11 Belmont/Gaslight	10.4%	7	96.3%
Route 1 Havelock	9.5%	8	88.4%
Route 27 27th Street Shuttle	6.7%	9	62.6%
Route 4/2 University Place/Bethany	6.5%	10	60.4%
Route 12 Arnold Heights	6.4%	11	59.4%
Route 18 48th Street Shuttle	4.7%	12	43.5%
System Average	***11%***		

Figure 5-13: Saturday Farebox Recovery by Route with System Average



Route Ranking

The rankings of each of the routes for two indicators can be used to calculate a cumulative rank score for each route on weekdays and by category of service: regular routes and the Star Shuttle. The two indicators include passengers per mile to rate service effectiveness and farebox recovery to rate cost effectiveness. Financial efficiency was not rated because the ratings of the routes in this category correlated directly to route length, which does not measure performance. Routes with a higher score are indicative of poorer performing routes which need to be addressed. Routes with a lower score are generally better performing routes.

Several of the routes are tied for places in the ranking. The 8/15 and 16/3 combinations are tied as the most effective routes. Route 18 is the least effective route all by itself. The 4/2 combination and Routes 12 and 27 are also ranked on the low end of the scale.

In a few instances the route rankings show an interesting pattern versus the weekday versions of the route. For example, Saturday Route 6/19 ranks quite high, while these two routes do not rank well on weekdays. The best performing route combination on Saturday, Route 8/15, is made up of a route that is ranks well on weekdays and another that is ranked 10th. Some of the routes that are good are weekdays, such as Route 4, do not rank well on Saturday, when it is paired with Route 2. Route 1, which is a good performer during the week, is ranked 7th of 12 routes on Saturdays. Route 18 is ranked the worst on both Saturdays and weekdays.

Table 5-20: Saturday Route Ranking

Route	Passengers per Mile Rank	Farebox Recovery Rank	Cumulative Rank Score	Saturday Rank
Route 8/15 Vet's Hospital/Eastridge	1	2	3	1
Route 16/3 Irving/College View	2	1	3	1
Route 5/13 Bryan-Trendwood/Normal	4	3	7	3
Route 6/19 Arapahoe/Salt Valley	3	4	7	3
Route 9 "O" Street Shuttle	6	5	11	5
Route 10 East Vine	5	6	11	5
Route 1 Havelock	7	8	15	7
Route 7/11 Belmont/Gaslight	8	7	15	7
Route 4/2 University Place/Bethany	10	10	20	9
Route 12 Arnold Heights	9	11	20	9
Route 27 27th Street Shuttle	11	9	20	9
Route 18 48th Street Shuttle	12	12	24	12

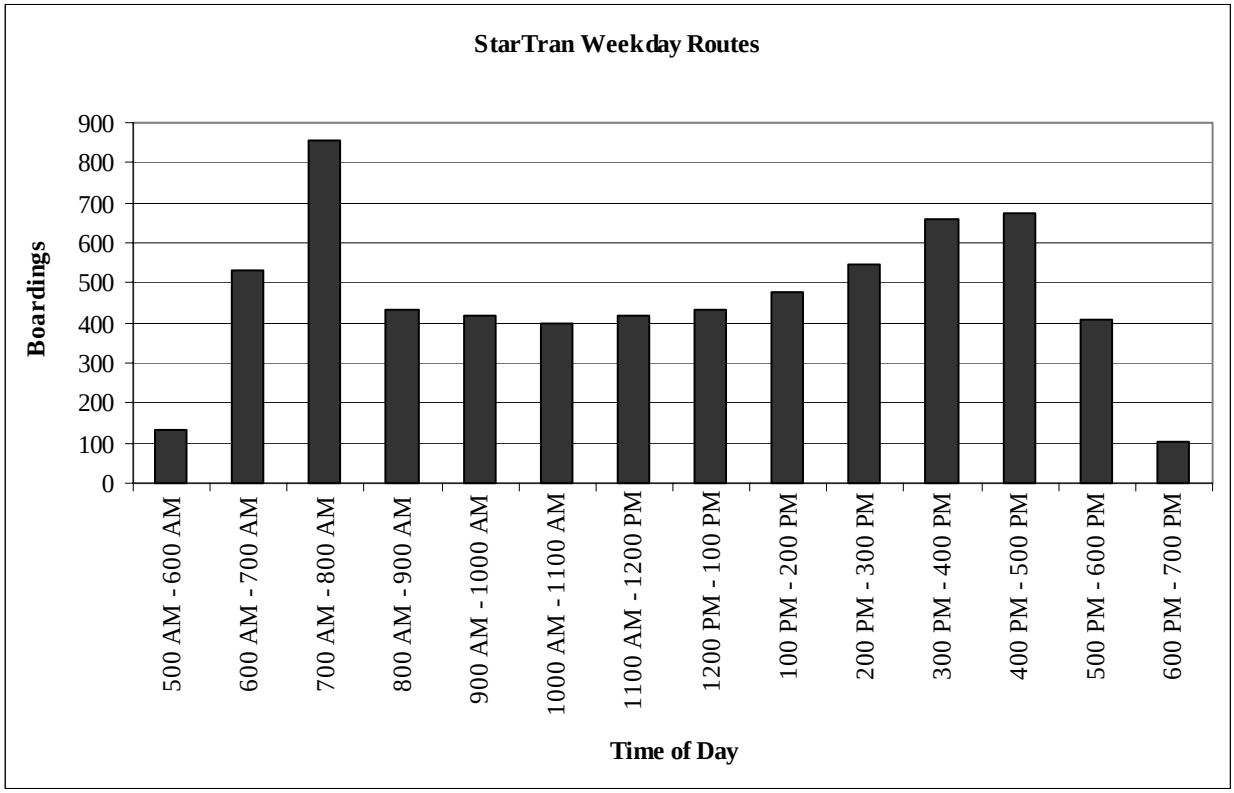
Weekday Time of Day Analysis

An analysis of ridership by time of day is important to understanding some of the dimensions of the performance described above. Looking at the system as a whole and each route by time of day, essentially by each trip, provides details that help to understand productivity levels, cost per trip data, and other quantifiable results. Furthermore, looking at each route on a per trip basis provides a profile to study ridership levels in relation to operating headways, and ultimately allows one to determine is current levels of service are appropriate to the results. This analysis includes only data from weekday operations as the Saturday dataset is incomplete.

On weekdays half of StarTran's 20 regular routes operate on 30- or 35-minute peak headways. The remaining 10 regular routes operate between 40- and 100-minute peak headways. The Star Shuttle operates on 15 minute headways.

Figure 5-14 provides a chart of ridership by time of day for the StarTran system. Systemwide, the greatest number of riders board during the morning peak between 7:00 AM and 8:00 AM. Overall, StarTran ridership reaches its maximums in the morning and afternoon peak periods, is reduced but strong during the mid-day. Like many systems its size, StarTran's very early and latest trips do have much lower ridership, however these trips allow for early workers to access jobs, and the latest trips of the day while not carrying many people are vital for people who have to work late. If these trips were eliminated the result would likely negatively impact ridership throughout the rest of the day since passengers would be uncertain if they could get home.

Figure 5-14: StarTran System: Weekday Ridership by Time of Day



Route Issues and Opportunities

The following sections provide an overview of the individual StarTran routes for weekdays and Saturdays. The weekday discussion includes data from the route diagnostics section and ridership data from StarTran's Automatic Passenger Counter (APC) for January 2005 – May 2006. The Saturday data is the average daily ridership from 2003-2004. The Star Shuttle is considered separately because of its different structure and purpose.

Weekday Regular Routes

On weekdays bus service runs from 5:15 AM until 7:10 PM. Fixed route bus service is provided on 21 routes on weekdays, which includes the Star Shuttle. The Star Shuttle is described in this section, after Route 27.

Route 1 Havelock

Route 1 is ranked second in the StarTran system based on rankings of service and cost effectiveness as discussed earlier in the report. This route provides service between downtown Lincoln and northeast Lincoln. It serves the University of Nebraska's main campus, The University of Nebraska East Campus, and Dawes Middle School. A few reasons why this route ranks highly are because it serves an area of northeast Lincoln that more traditionally uses transit, as well as providing access to a number of schools and employers. Table 5-21 lists out the performance statistics for Route 1 for an average weekday.

Table 5-21: Route 1 Weekday Performance Indicators

Route 1 Havelock	
Factor/Indicator	**Weekday**
Ridership	493
Revenue Hours	22
Revenue Miles	306
Operating Speed (MPH)	14.1
Operating Cost	$1,347.20
Farebox Revenue	$300.73
Passengers per Mile	1.61
Passenger per Hour	22.67
Cost per Mile	$4.40
Cost per Passenger	$2.73
Farebox Recovery	22%
Cumulative Rank Score	5
Rank	2

Figures 5-15 and 5-16 plot ridership by time of day for Route 1. In the inbound direction, there are two general spikes in ridership throughout the day – one during the morning peak period, and a second one in the mid-afternoon. In the outbound direction, ridership is pretty consistent throughout the day, except in the early morning and mid-afternoon.

Figure 5-15: Route 1 Weekday Inbound Ridership by Time of Day

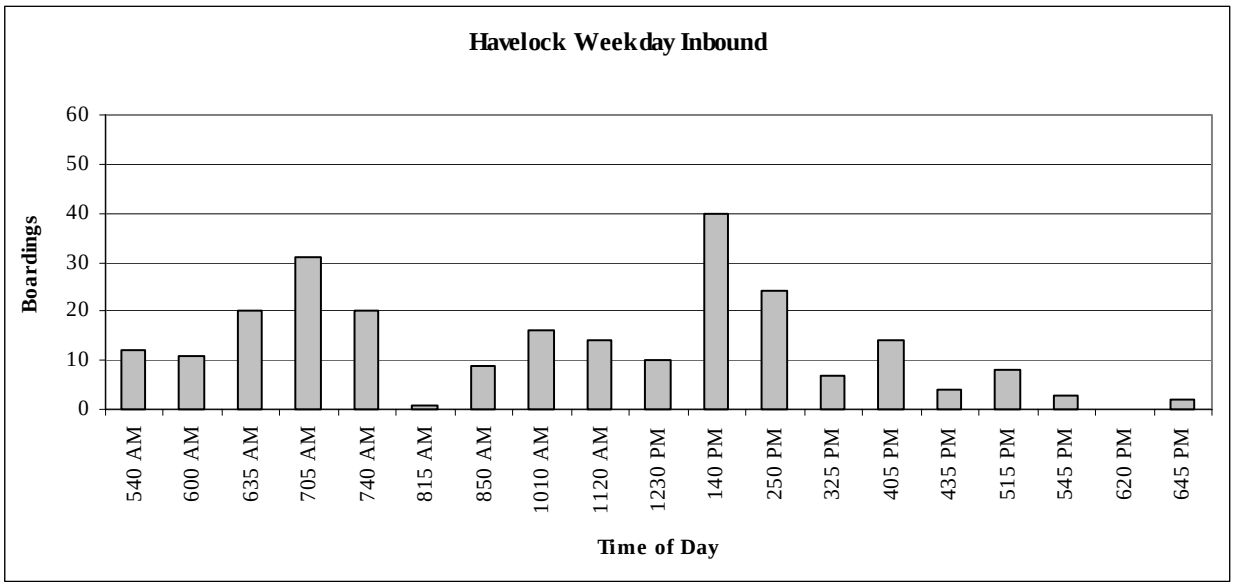
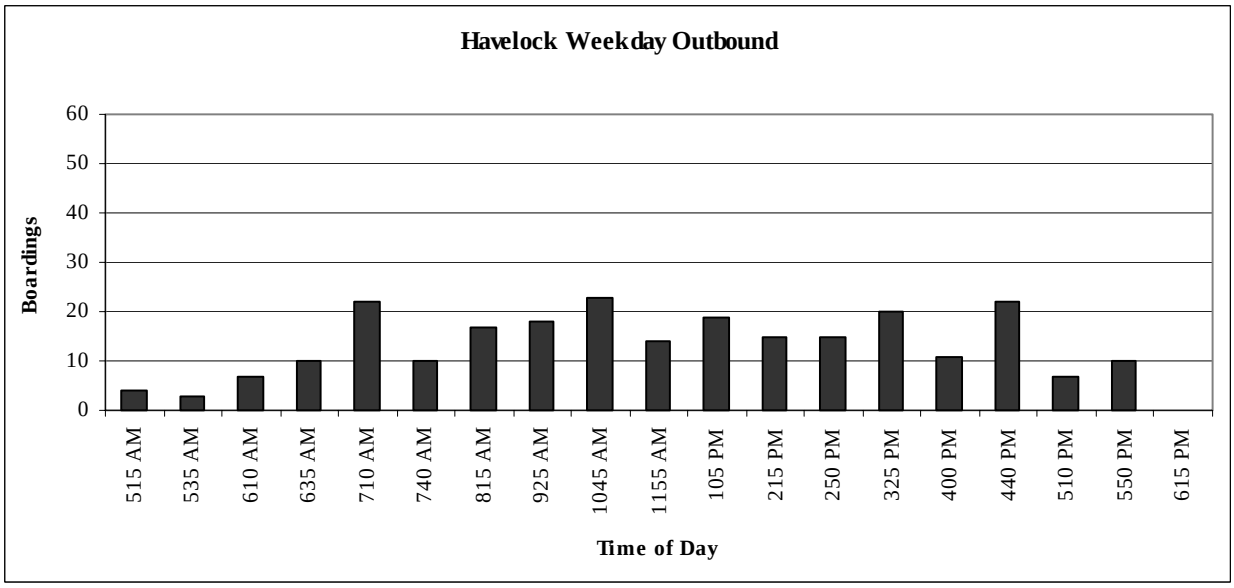


Figure 5-16: Route 1 Weekday Outbound Ridership by Time of Day



Figures 5-17 and 5-18 show the maximum number of people onboard during a given run. In either direction this route does not have any trips that are above the loading standard. The loading profile shows the same pattern as the boarding profiles, with two peaks in the inbound direction and consistent ridership throughout the day in the outbound direction. Throughout most of the day there is plenty of capacity onboard this route.

Figure 5-17: Route 1 Weekday Inbound Maximum Load by Time of Day

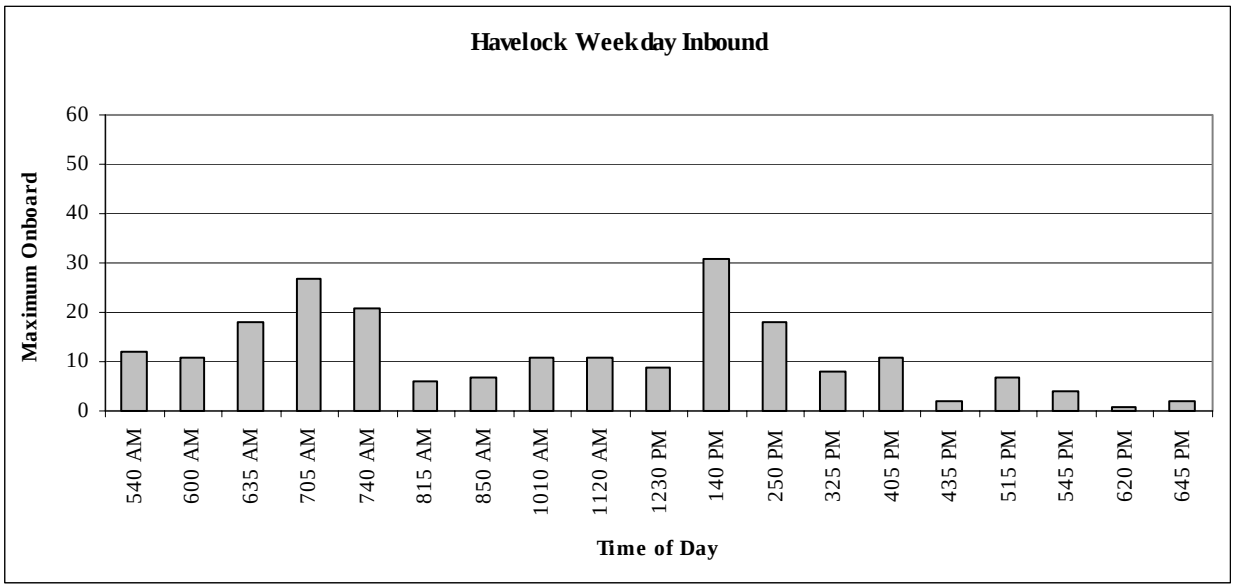


Figure 5-18: Route 1 Weekday Outbound Maximum Load by Time of Day

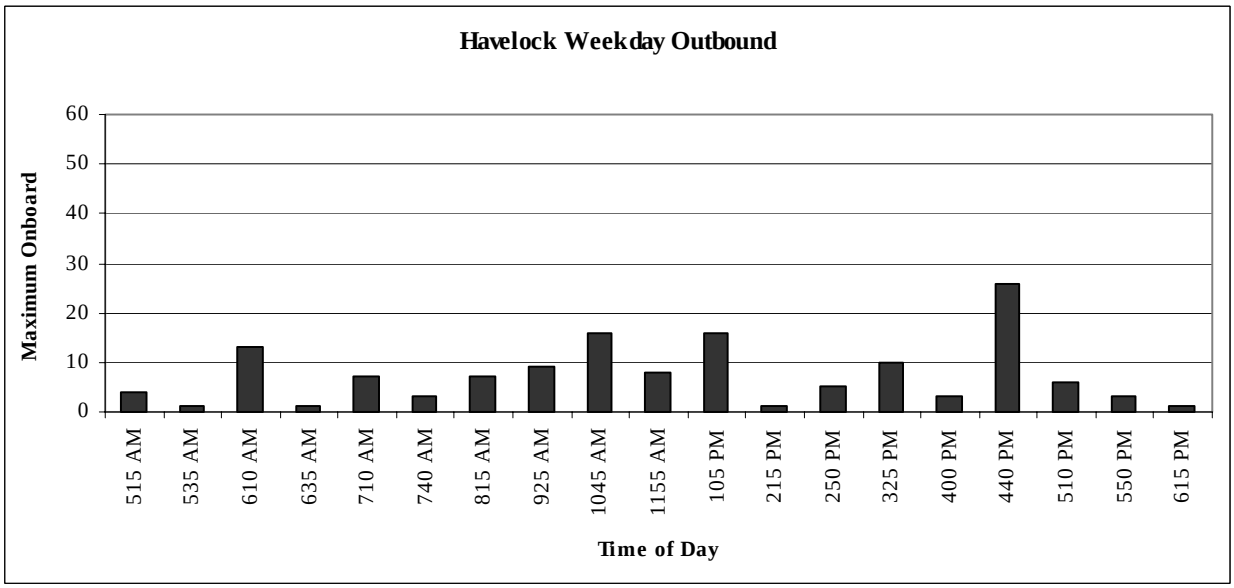
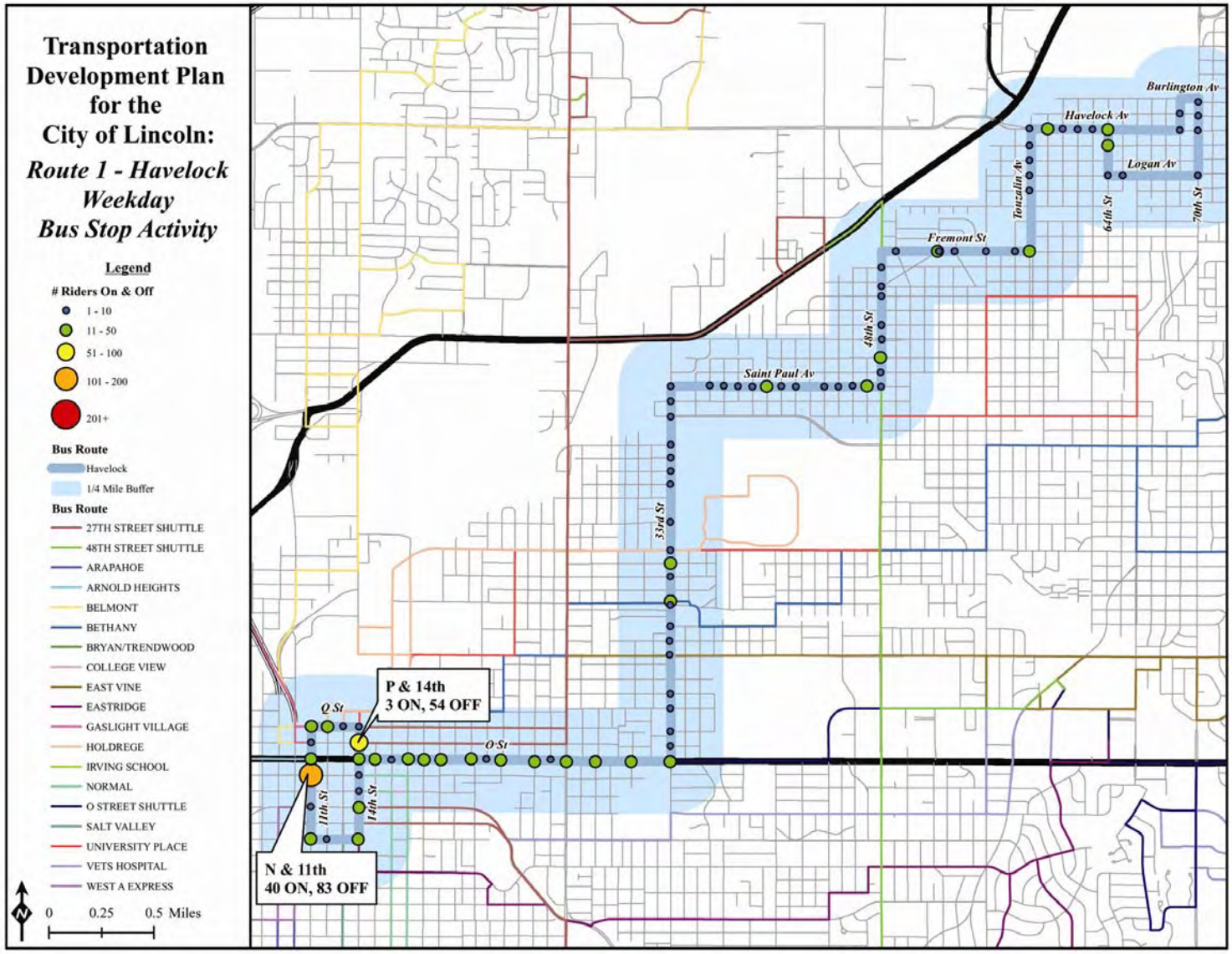


Figure 5-19 shows on/ff activity by bus stop for Route 1. There is boarding alighting activity throughout the entire route, with higher volumes along O Street. The activity is greatest in the downtown loop, especially at N &11th and at P & 14th. Ridership is also strong in the Havelock neighborhood, in the commercial areas along Havelock Avenue.

Figure 5-19: Route 1 Weekday Bus Stop Activity



Route 2 Bethany

Route 2 ranks 10th out of 20 regular routes in terms of service and cost effectiveness. Route 2 operates between downtown Lincoln and east Lincoln. This route serves the University of Nebraska's East Campus, and the Cotner Center, and Mickle Middle School. Some of the reasons why this route ranks 10th is that it operates on neighborhood streets, missing many of the passenger generators that are available on parallel routes that are located a very short distance away. Table 5-22 describes the operating statistics for Route 2 on weekdays.

Table 5-22: Route 2 Weekday Performance Indicators

Route 2 Bethany	
Factor/Indicator	**Weekday**
Ridership	298
Revenue Hours	20
Revenue Miles	268
Operating Speed (MPH)	13.3
Operating Cost	$1,249.95
Farebox Revenue	$181.78
Passengers per Mile	1.11
Passenger per Hour	14.77
Cost per Mile	$4.66
Cost per Passenger	$4.19
Farebox Recovery	15%
Cumulative Rank Score	21
Rank	10

Figures 5-20 and 5-21 are time of day charts for Route 2. They show the number of boardings that occur on each run in the inbound and outbound directions. In the inbound direction there is a defined AM peak, with fewer boardings during midday trips. In the outbound direction there is a defined AM and PM peak with rather low boardings during the midday.

Figure 5-20: Route 2 Weekday Inbound Ridership by Time of Day

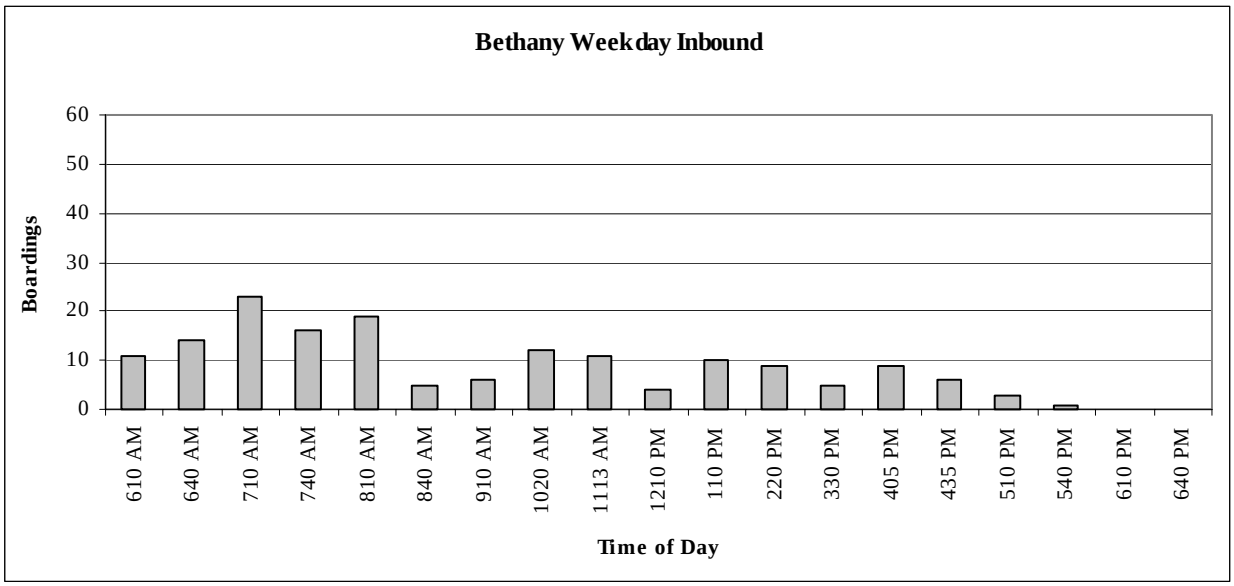
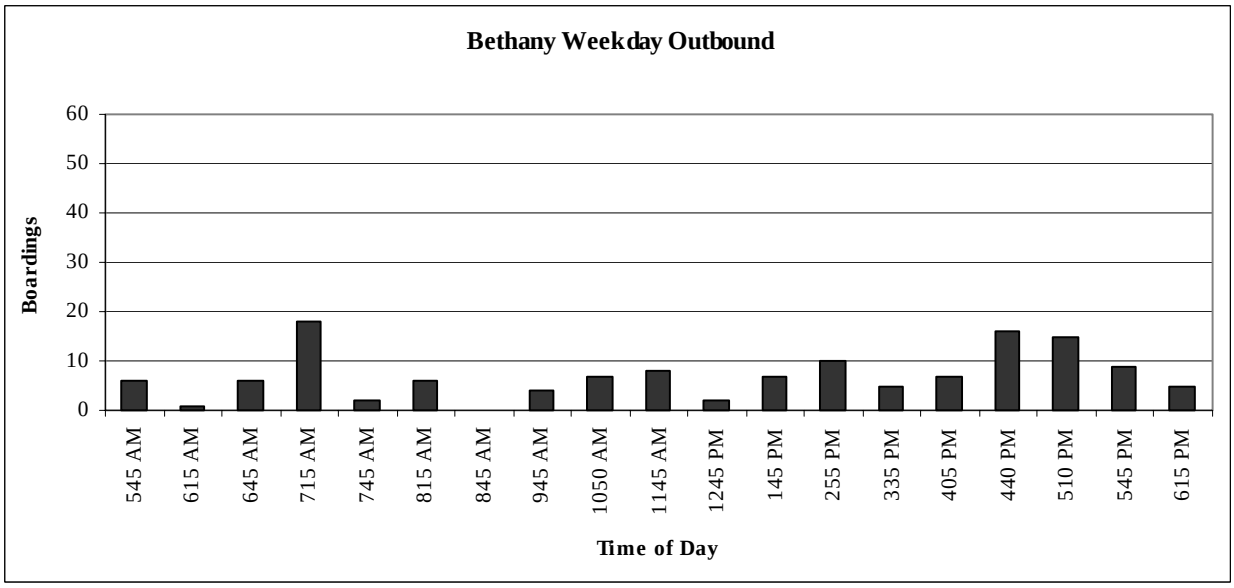


Figure 5-21: Route 2 Weekday Outbound Ridership by Time of Day



Figures 5-22 and 5-23 show the maximum number of people onboard during each run in the inbound and outbound directions. In the inbound direction loads are higher during the AM peak versus the rest of the day. Similar to the boarding profile, the outbound profile shows that the loads are higher during the AM and PM peak, with lower loads during the midday. These figures show that throughout most of the day the loads on the bus are quite load, with plenty of available capacity.

Figure 5-22: Route 2 Weekday Inbound Maximum Load by Time of Day

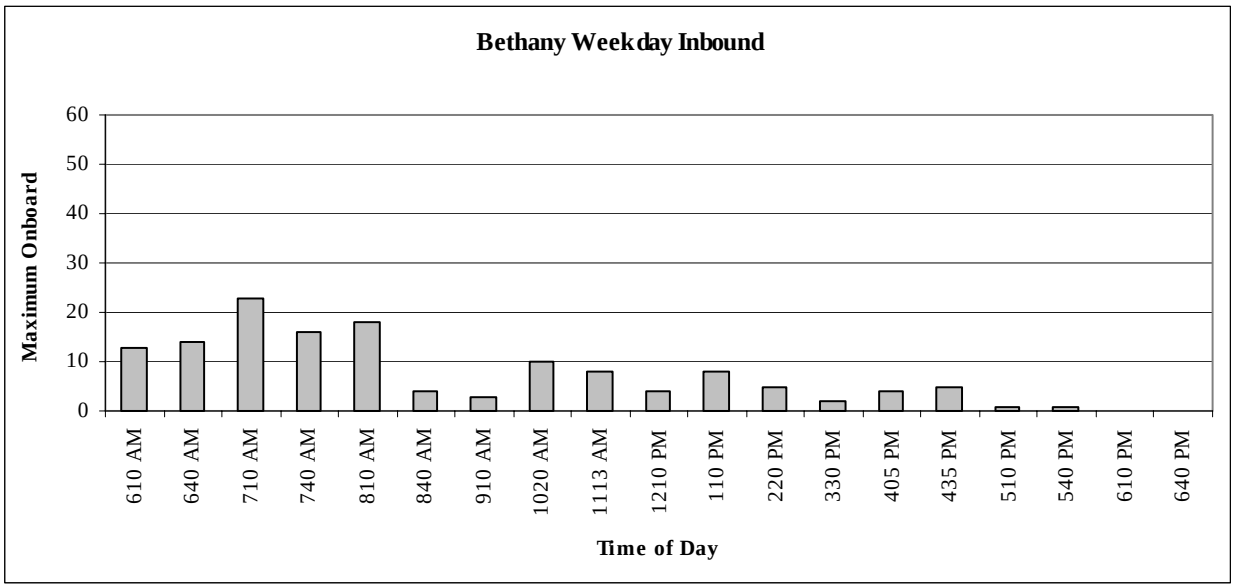


Figure 5-23: Route 2 Weekday Outbound Maximum Load by Time of Day

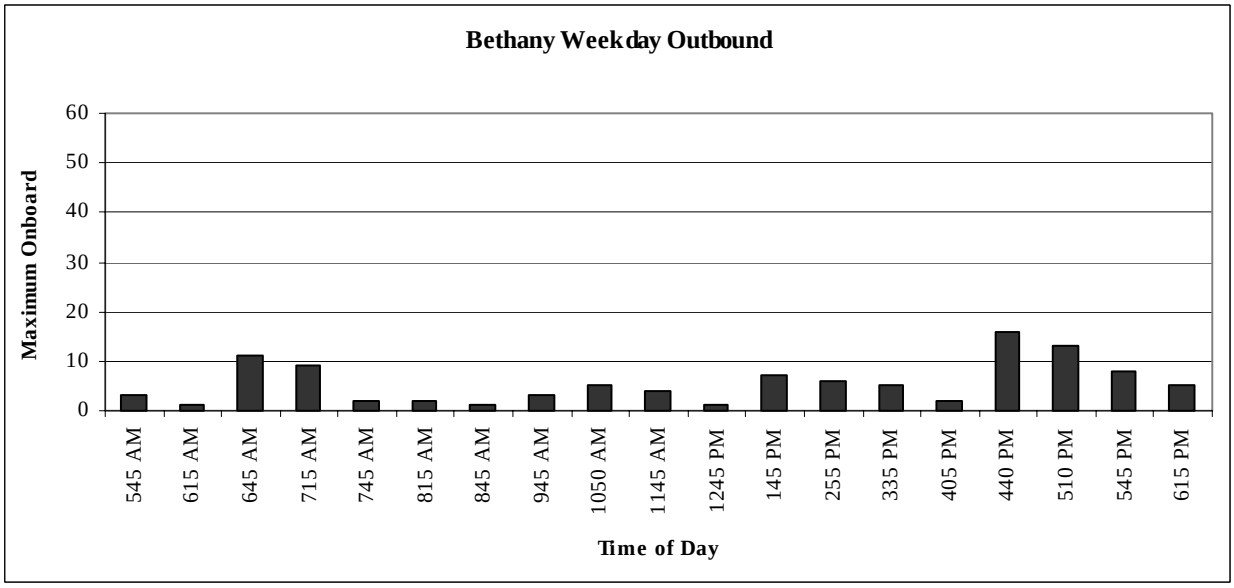
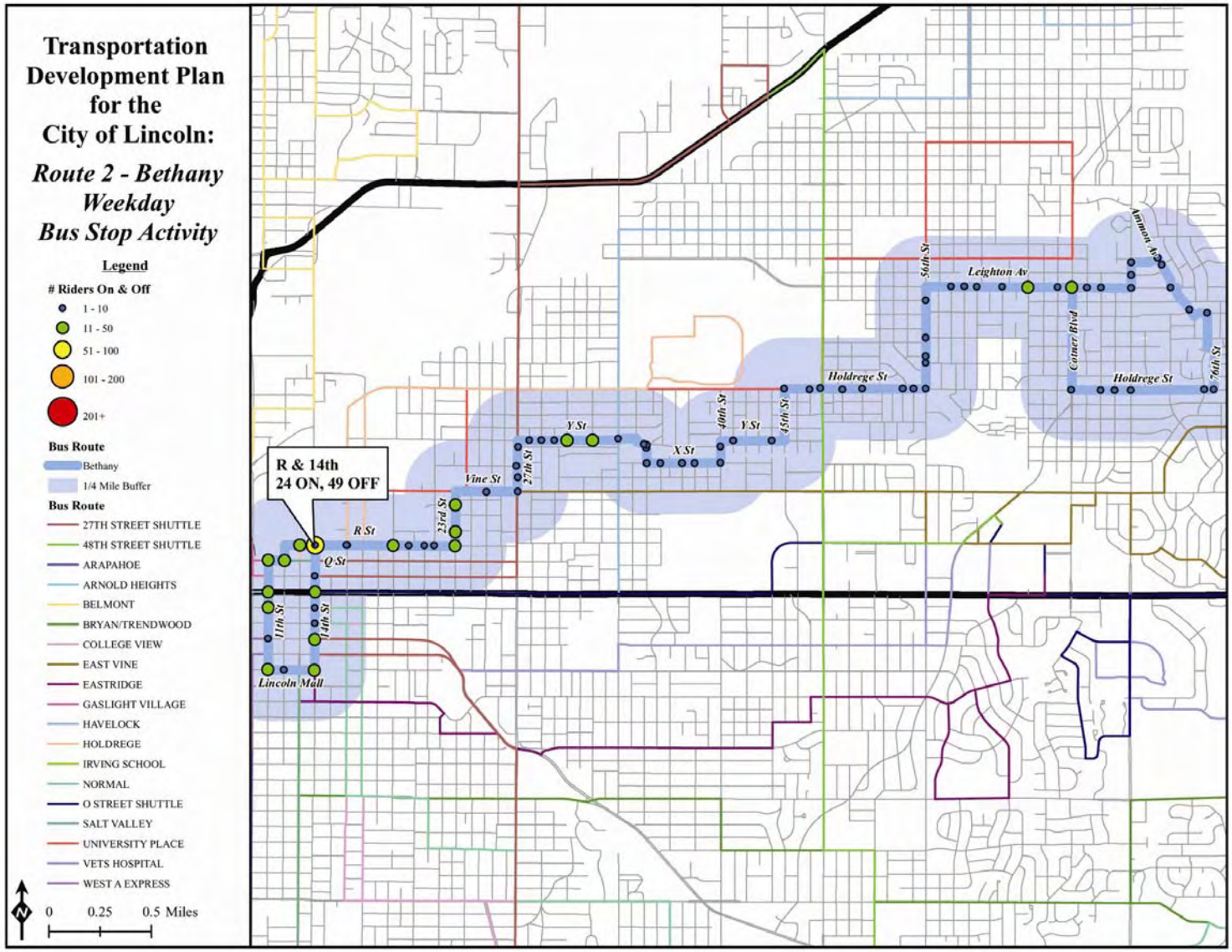


Figure 5-24 is a map of bus stop activity for Route 2 on weekdays. Ridership peaks in the downtown loop, especially at R & 14th, and drops off very quickly east of 27th Street. Other areas that have stronger are along R Street, 23rd Street, Y Street between 27th Street and 35th Street. There are also a number of stops along Leighton Avenue that have higher boarding and alighting activity.

Figure 5-24: Route 2 Weekday Bus Stop Activity



Route 3 College View

Route 3 is ranked 8th out of 20 regular routes in terms of service and cost effectiveness. This route provides service between downtown Lincoln and southeast portions of the city. This route provides service to Bryan LGH West Medical Center, Pound Middle School, Union College, and Edgewood Shopping Center. This route does serve many generators, however its lower rank is partially due to the fact that there are many routes located within a close proximity to this route, and all of these routes are competing for the same passengers, with many of these routes have a faster travel speed. Table 5-23 is a list of performance statistics for Route 3.

Table 5-23: Route 3 Weekday Performance Indicators

Route 3 College View	
Factor/Indicator	**Weekday**
Ridership	319
Revenue Hours	21
Revenue Miles	277
Operating Speed (MPH)	13.0
Operating Cost	$1,321.18
Farebox Revenue	$194.59
Passengers per Mile	1.15
Passenger per Hour	14.96
Cost per Mile	$4.77
Cost per Passenger	$4.14
Farebox Recovery	15%
Cumulative Rank Score	17
Rank	8

Figures 5-25 and 5-26 are ridership charts by time of day for Route 3. In the inbound direction, there is a strong AM peak and a PM peak that is has higher ridership than the midday. While there is a single trip in the AM peak that has higher ridership, the PM peak s more defined in the outbound direction. In both direction there are no trips that have more than 10 boardings.

Figures 5-27 and 5-28 show the maximum number of people onboard at a given time for Route 3. The maximum load pattern mirrors the pattern of the boardings, and shows that there is a lot of capacity on these buses throughout most of the day.

Figure 5-25: Route 3 Weekday Inbound Ridership by Time of Day

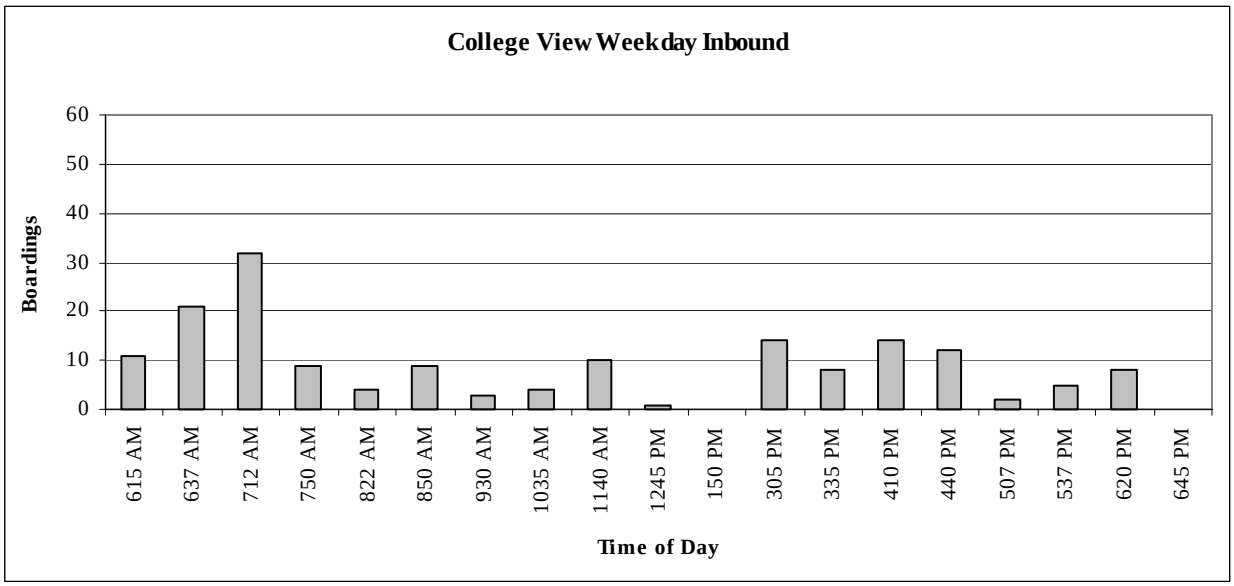


Figure 5-26: Route 3 Weekday Outbound Ridership by Time of Day

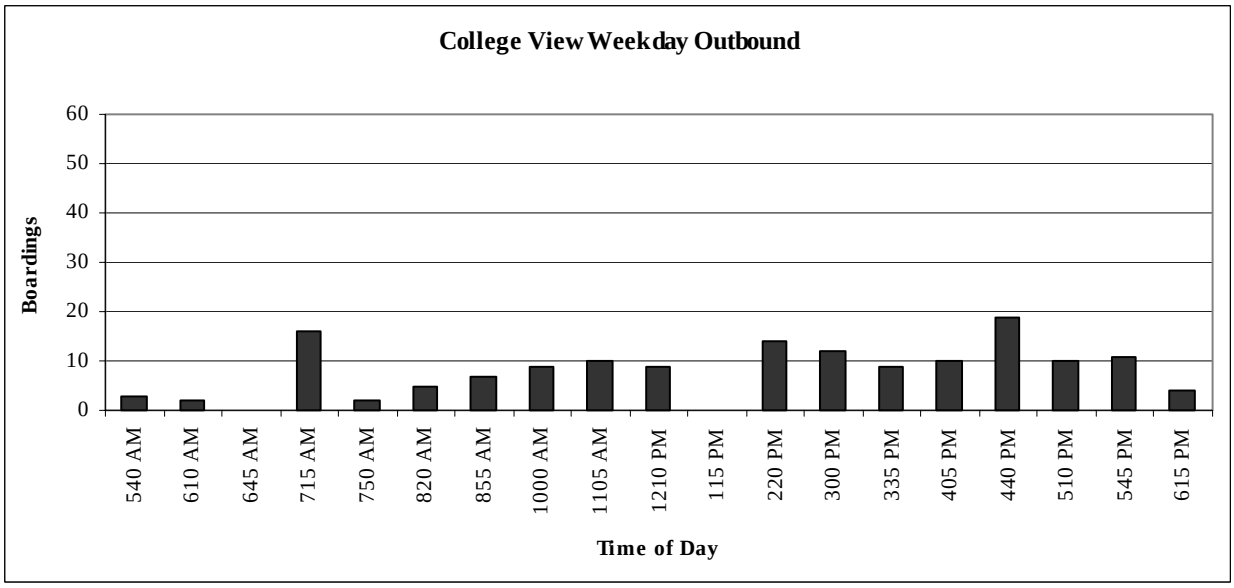


Figure 5-27: Route 3 Weekday Inbound Maximum Load by Time of Day

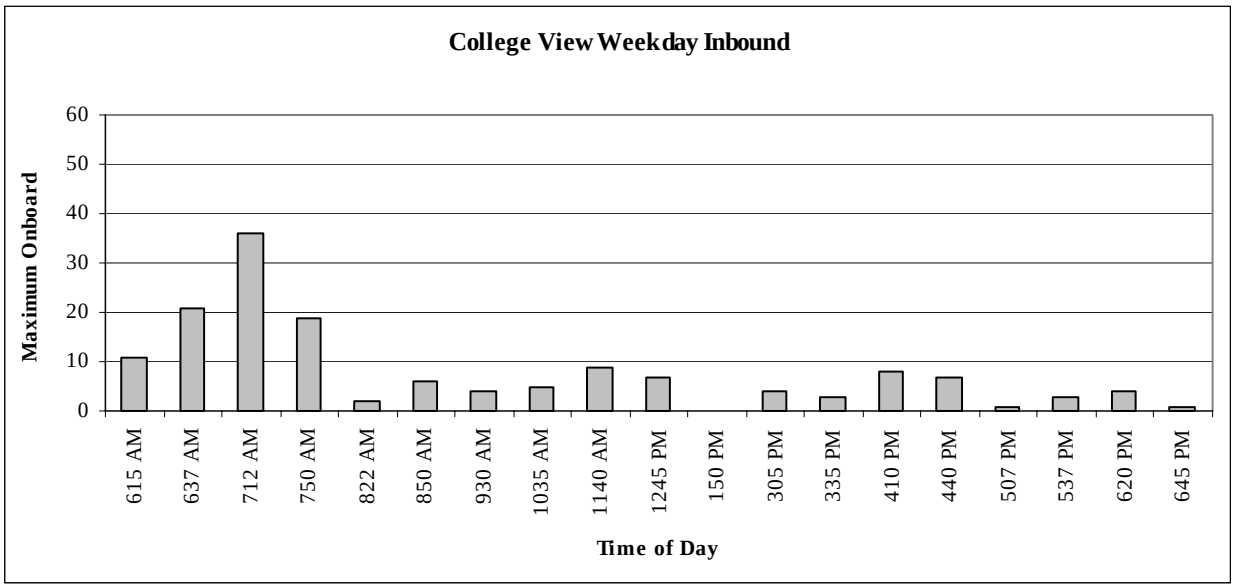


Figure 5-28: Route 3 Weekday Inbound Maximum Load by Time of Day

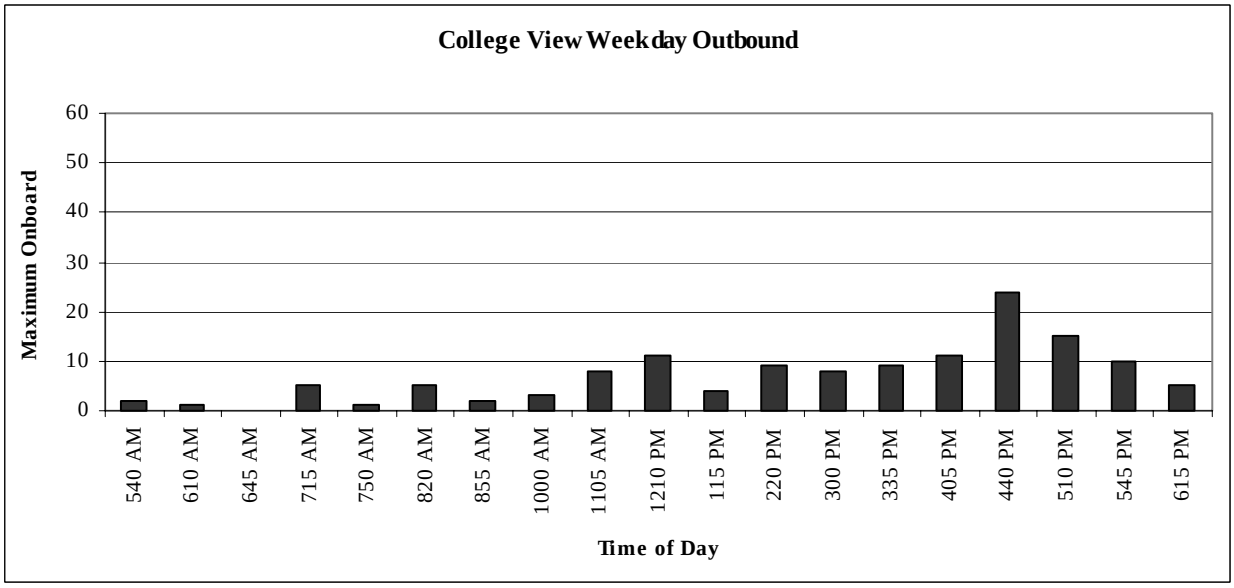
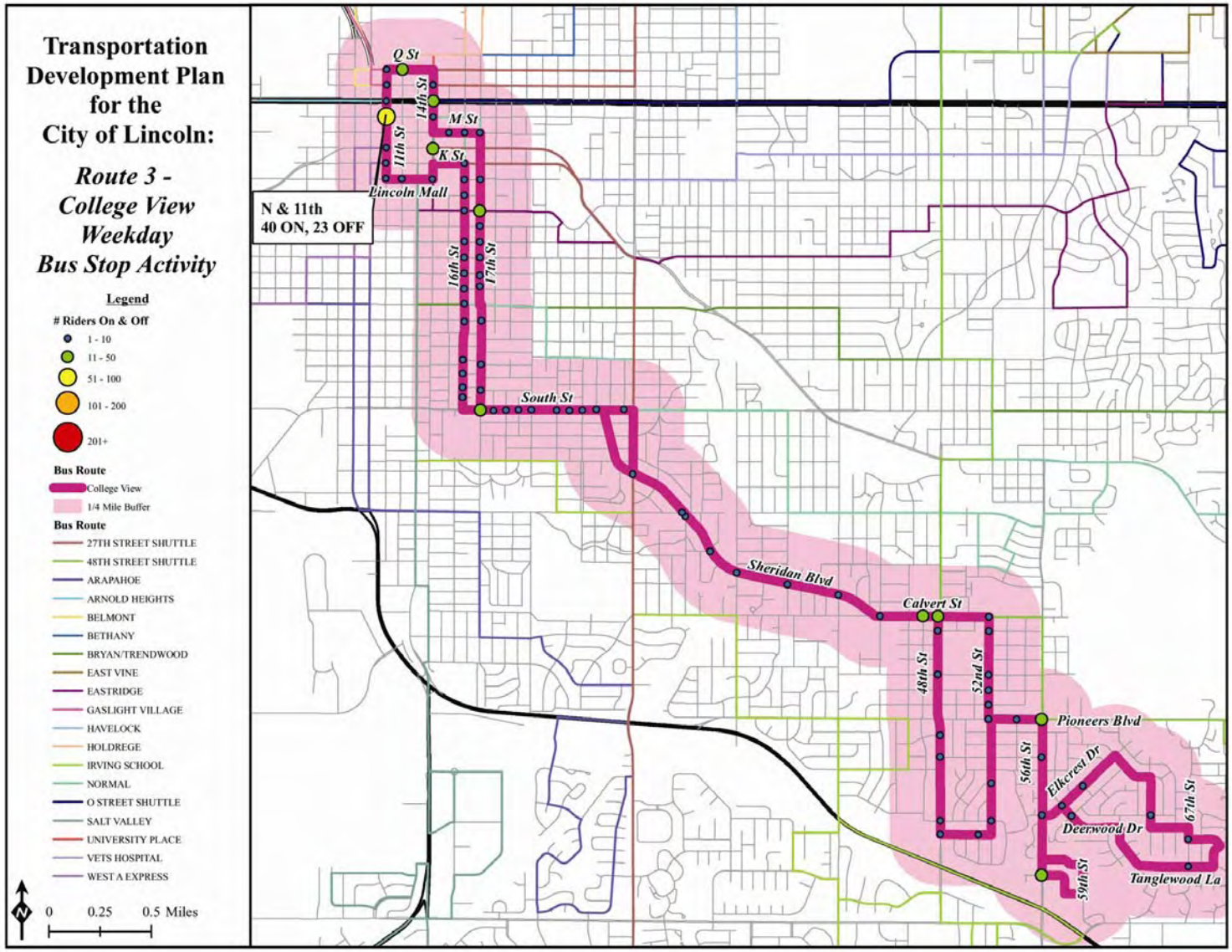


Figure 5-29 is a map of boarding and alighting activity by bus stop for Route 3. While there is ridership activity throughout the route, most stops outside of downtown have very little activity. There are a number of individual stops that have higher activity, including the intersection of South Street and 17th Street at Bryan LGH East, Calvert Street and 47th Street and Calvert Street and 48th Street near Union College, Pioneers Boulevard and 56th Street, and Edgewood Shopping Center.

Figure 5-29: Route 3 Weekday Bus Stop Activity



Route 4 University Place

Route 4 ranks 3rd out of the 20 regular routes. This route provides service between downtown Lincoln and eastern parts of the city. This route serves Nebraska Wesleyan University, the University of Nebraska's East Campus, Northeast High School, and Mickle Middle School. A reason why this route ranks so high is that it provides service to important generators, including a number of schools, and serves areas in northeast Lincoln that are more likely to use transit. Table 5-24 provides performance statistics for Route 4 on weekdays.

Table 5-24: Route 4 Weekday Performance Indicators

Route 4 University Place	
Factor/Indicator	**Weekday**
Ridership	518
Revenue Hours	26
Revenue Miles	335
Operating Speed (MPH)	12.9
Operating Cost	$1,604.87
Farebox Revenue	$315.98
Passengers per Mile	1.55
Passenger per Hour	19.99
Cost per Mile	$4.79
Cost per Passenger	$3.10
Farebox Recovery	20%
Cumulative Rank Score	7
Rank	3

Figures 5-30 and 5-31 are ridership by time of day charts for Route 4 in the inbound and outbound directions. In both the inbound and outbound direction ridership peaks during the PM peak period. Overall, throughout the day, ridership is greatest in the mid afternoon in the inbound direction and during the morning and afternoon peak periods in the outbound direction.

Figure 5-30: Route 4 Weekday Inbound Ridership by Time of Day

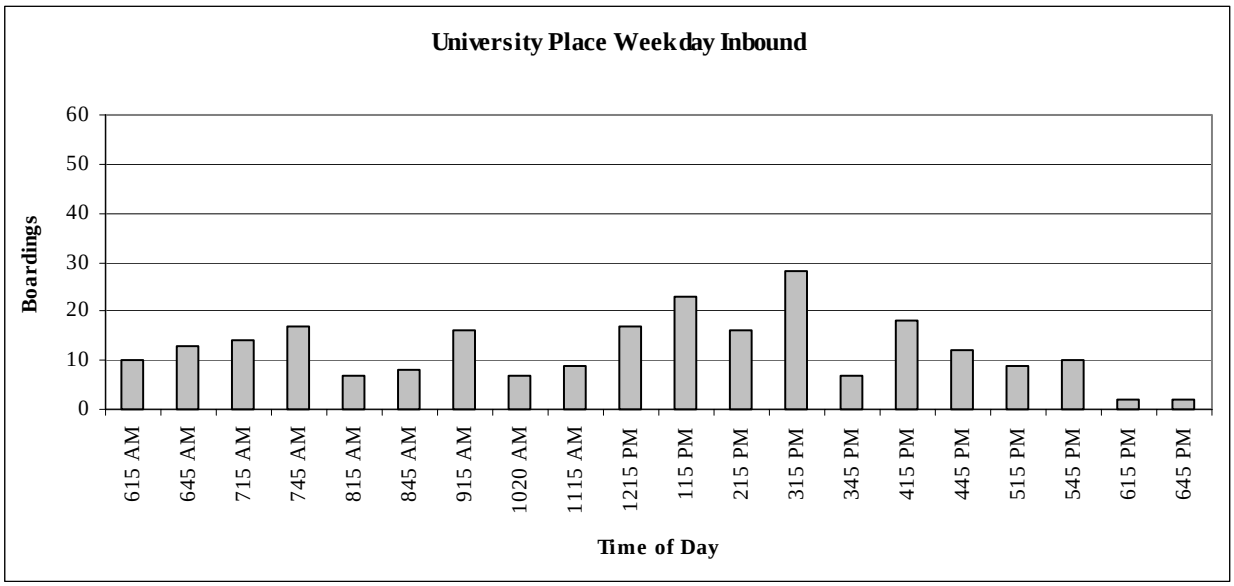
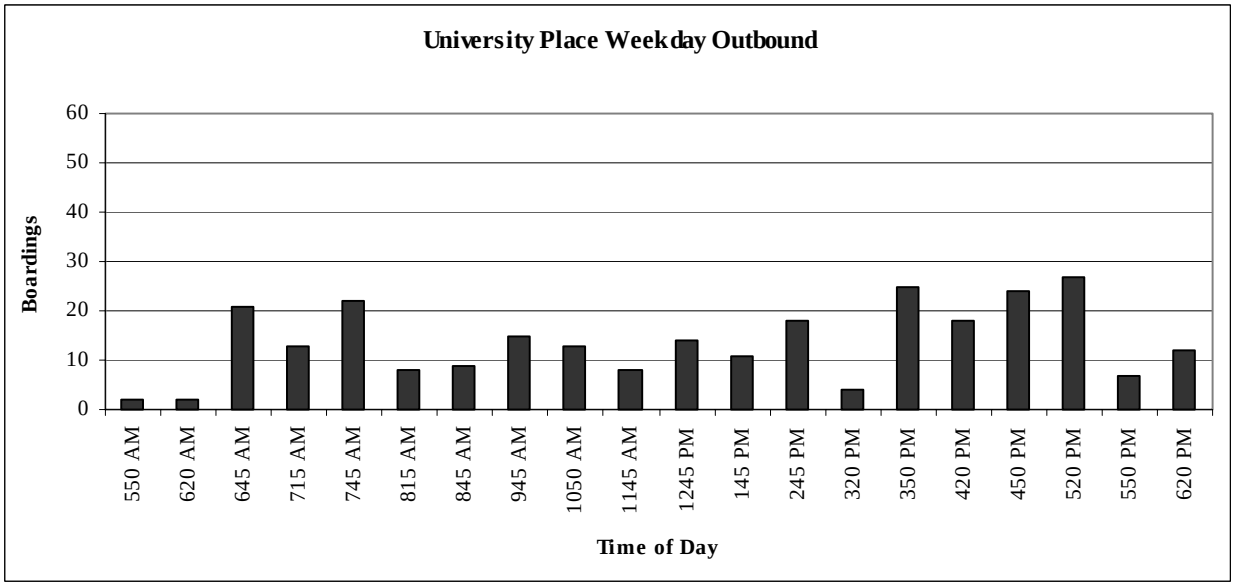


Figure 5-31 Route 4 Weekday Outbound Ridership by Time of Day



Figures 5-32 and 5-33 show the maximum number of people onboard during each run for route 4 on weekdays. Maximum loads occur during mid-day in the inbound direction. In the outbound direction, peak loads occur during the PM peak period.

Figure 5-32: Route 4 Weekday Inbound Maximum Load by Time of Day

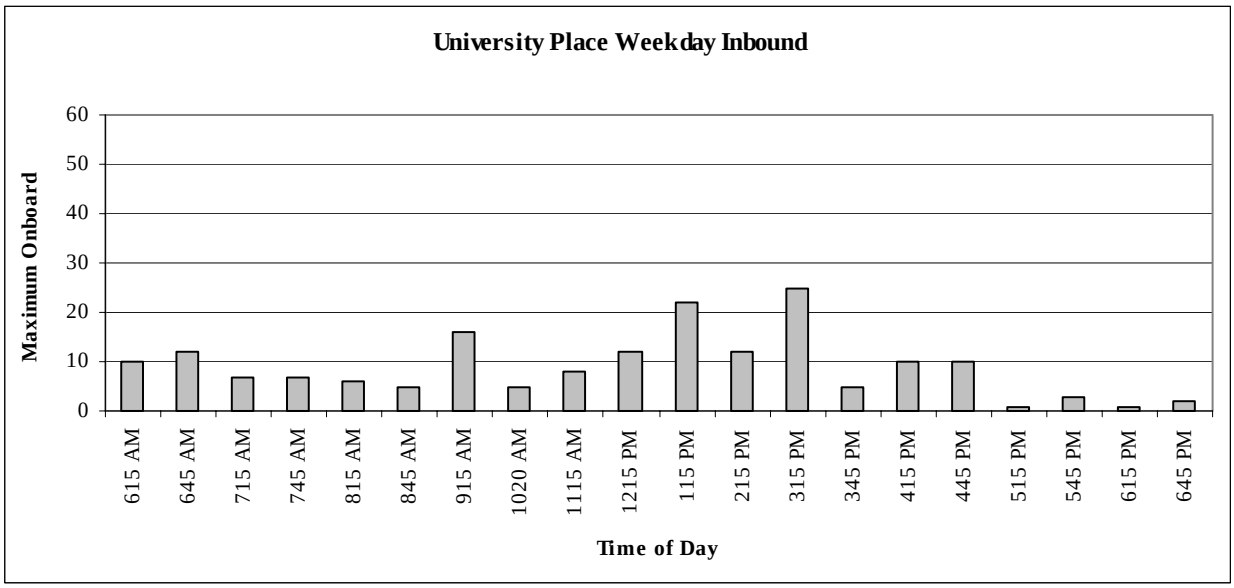


Figure 5-33: Route 4 Weekday Outbound Maximum Load by Time of Day

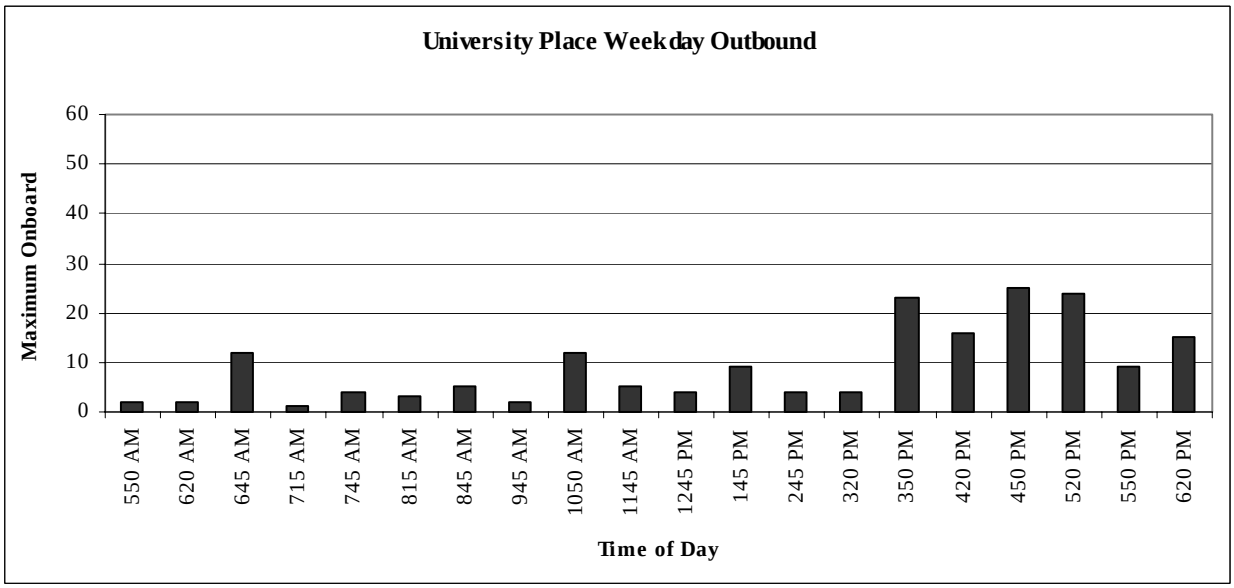
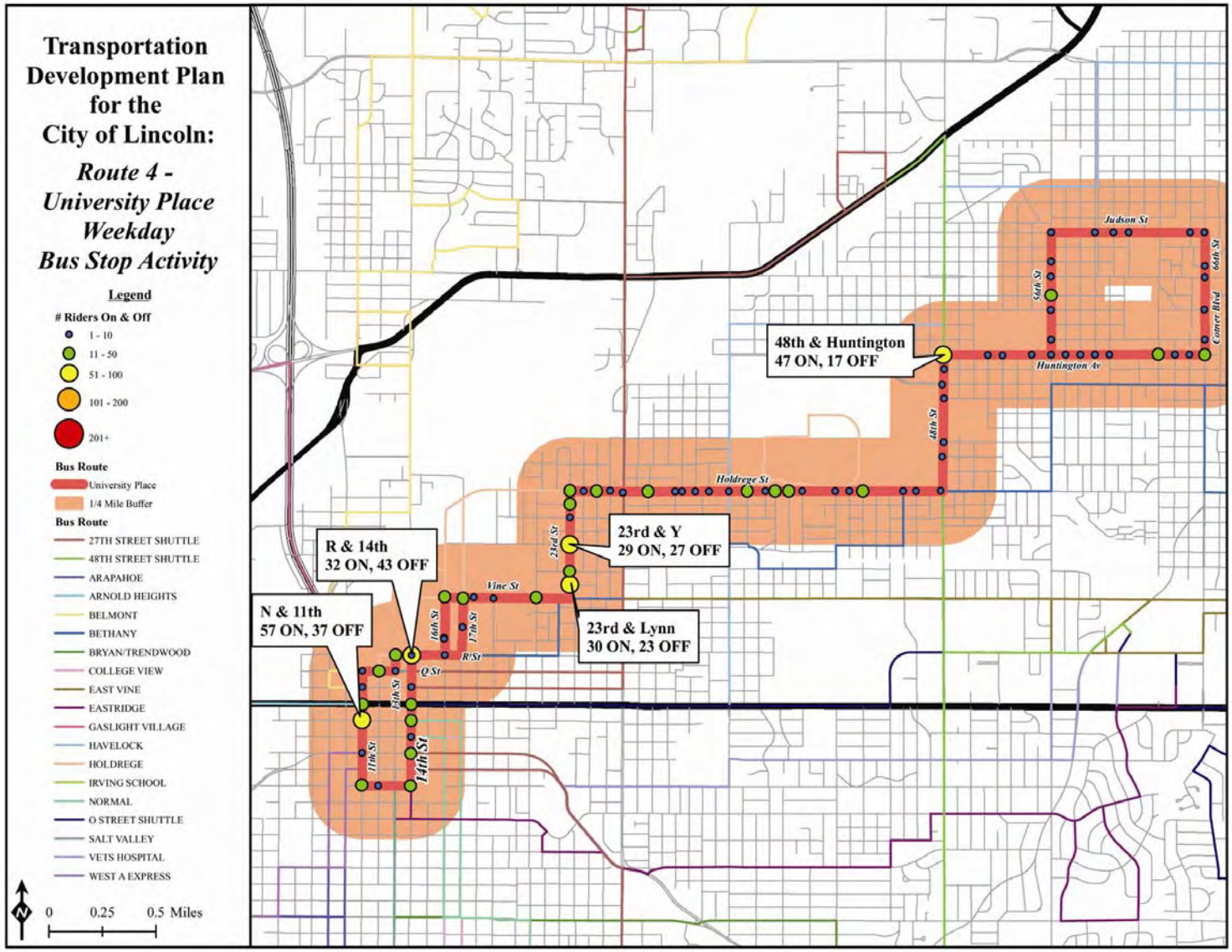


Figure 5-34 is a map weekday activity by bus stop for Route 4. This route is relatively active throughout its length in terms of boarding and alighting activity, especially along Holdrege Street. Five stop locations have 50 or more boardings per day: N & 11th, R & 14th, 23rd & Lynn, 23rd & Y, and 48th & Huntington near Nebraska Wesleyan University. Most stop locations east of the UNL East Campus area actually have much lower boarding and alighting numbers.

Figure 5-34: Route 4 Weekday Bus Stop Activity



Route 5 Bryan Trendwood

Route 5 is ranked 12th out of 20 regular routes in terms of service and cost effectiveness. Route 5 provides service between downtown Lincoln and eastern portions of the city. This route serves Madonna Rehabilitation Hospital, Bryan LGH East, and the Folsom Children's Zoo. A reason that this route is ranked so poorly is that it does not serve many generators that are close by and served by other routes. Table 5-25 provides performance statistics for Route 5.

Table 5-25: Route 5 Weekday Performance Indicators

Route 5 Bryan Trendwood	
Factor/Indicator	**Weekday**
Ridership	292
Revenue Hours	21
Revenue Miles	298
Operating Speed (MPH)	14.1
Operating Cost	$1,306.31
Farebox Revenue	$178.12
Passengers per Mile	0.98
Passenger per Hour	13.85
Cost per Mile	$4.39
Cost per Passenger	$4.47
Farebox Recovery	14%
Cumulative Rank Score	25
Rank	12

Figures 5-35 and 5-36 show ridership by time of day for Route 5. In the inbound direction, boardings show both an AM and PM peak with lower middays.. In the outbound direction, boardings fairly consistent throughout the day with a midday peak and a few trips during the AM and PM peak showing higher boarding activity.

Figure 5-35: Route 5 Weekday Inbound Ridership by Time of Day

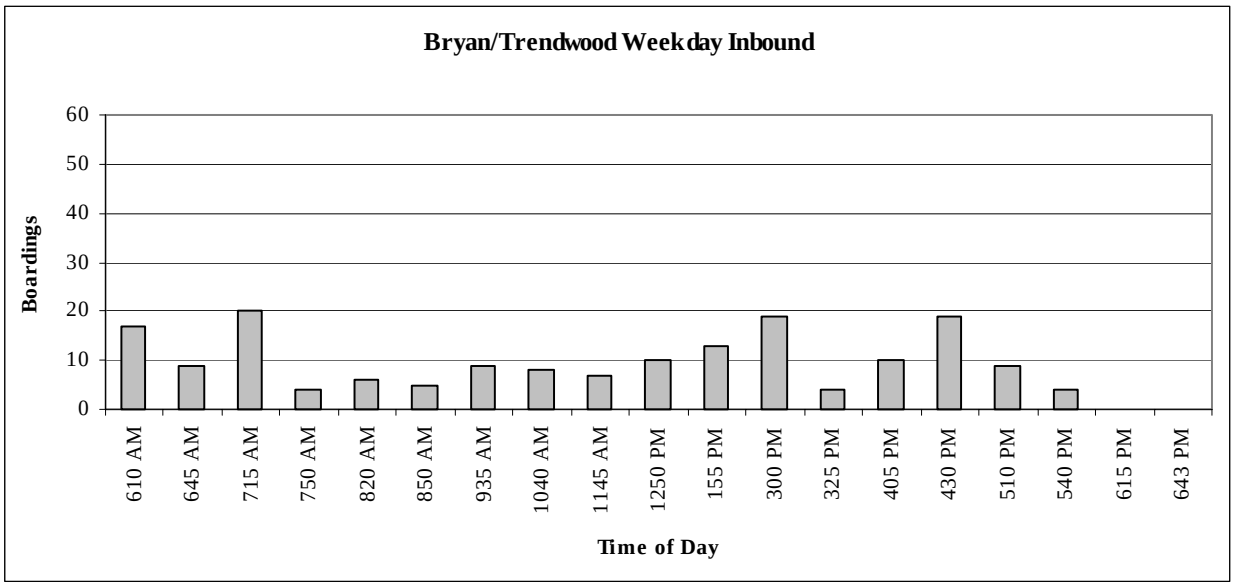
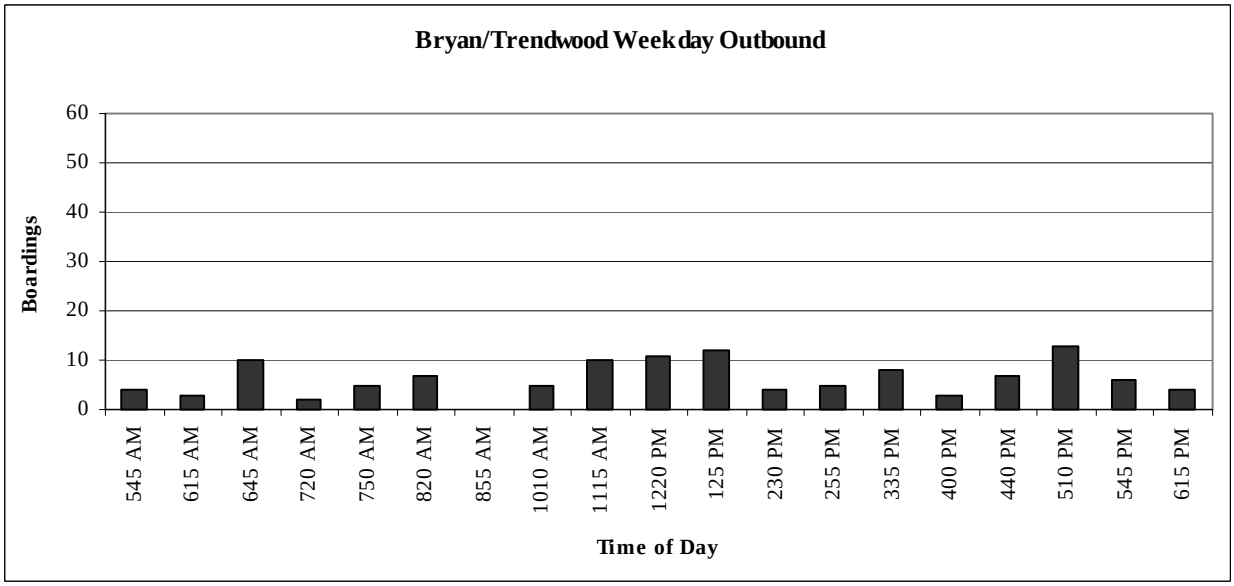


Figure 5-36 Route 5 Weekday Outbound Ridership by Time of Day



Figures 5-37 and 5-38 show the maximum loads by run for Route 5 in the inbound and outbound directions. As with the ridership trend, the greatest number of people onboard occurs during the peak commuting periods in the inbound direction and at midday and PM peak in the outbound direction. The maximum load carried on any trip is 22 passengers, which is far below the 44 people that the bus has capacity for.

Figure 5-37: Route 5 Weekday Inbound Maximum Load by Time of Day

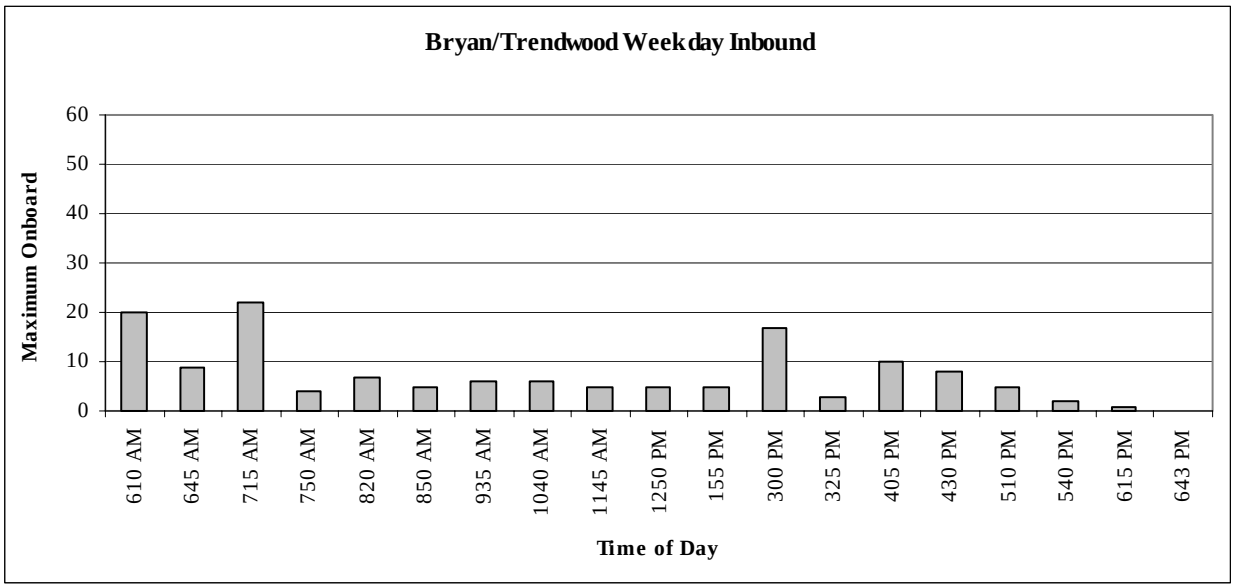


Figure 5-38: Route 5 Weekday Outbound Maximum Load by Time of Day

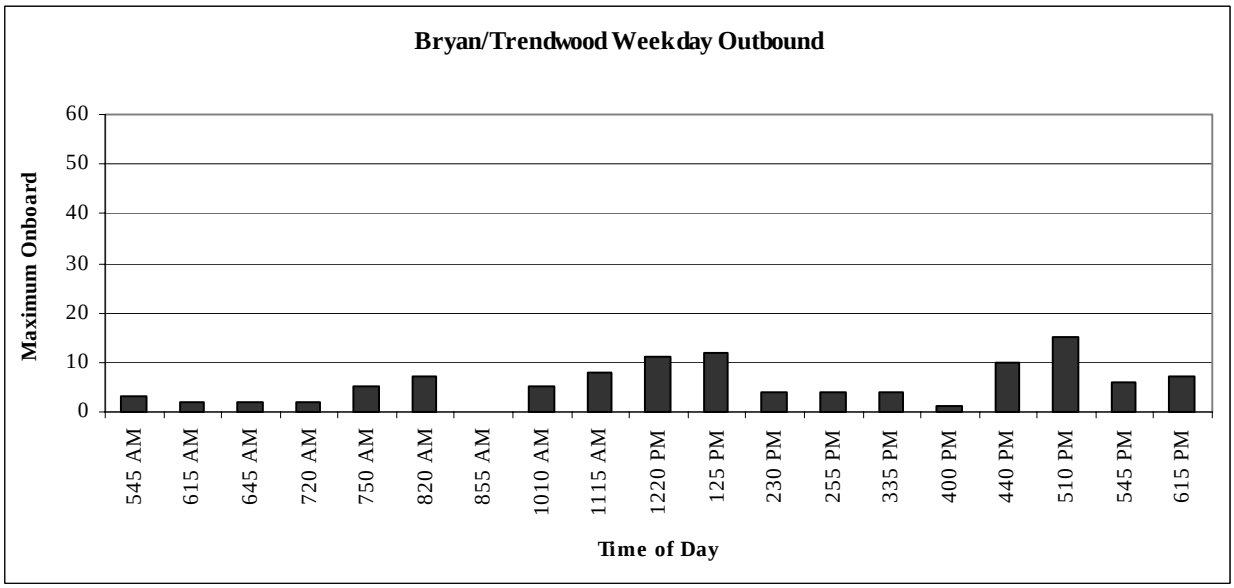
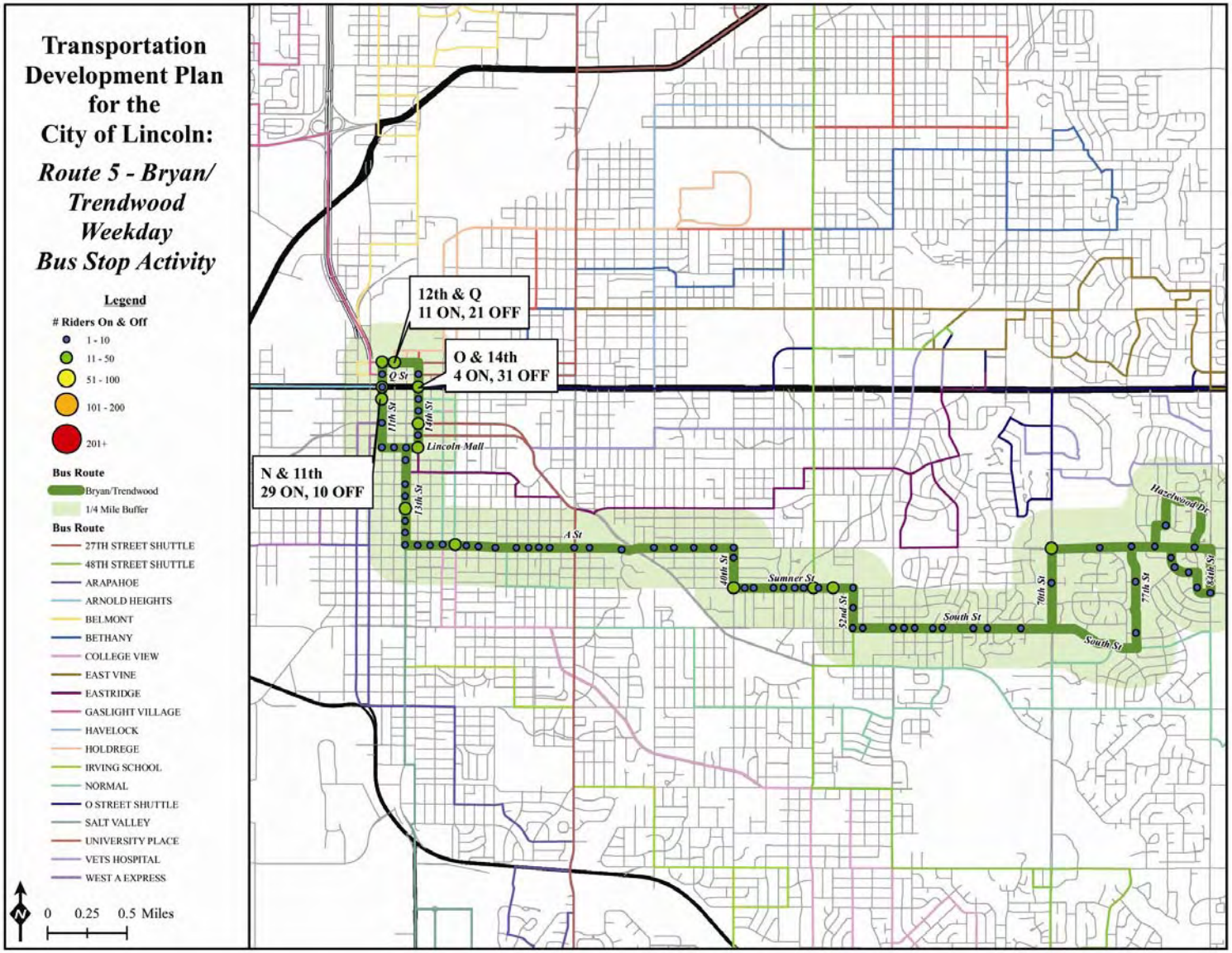


Figure 5-39 is a map of weekday activity by bus stop for Route 5. With the exception of a stop at 70th Street and A Street near a shopping center and a number of hospitals, boarding and alighting activity is weak east of 52nd Street. The largest number of boardings occurs in the downtown loop, especially at the stops located at 12th & Q, O & 14th and N & 11th. The stops near Bryan LGH East also have significant volume. However, no stops have activity greater than 50 boardings and alightings per day on Route 5.

Figure 5-39: Route 5 Weekday Bus Stop Activity



Route 6 Arapahoe

Route ranks 17th out of 20 regular routes. Route 6 provides service between Downtown Lincoln and southern neighborhoods in Lincoln. This route serves Bishop Heights Shopping Center, Irving Middle School, Park Middle School, and Star City Shores. A possible reason this route ranks 16th is because it serves neighborhood areas that generate little ridership, as well as paralleling other routes through neighborhoods that do generate transit passengers. This route also does not serve key generators that are located a short distance from the route. Table 5-26 provides performance statistics for Route 6.

Table 5-26: Route 6 Weekday Performance Indicators

Route 6 Arapahoe	
Factor/Indicator	**Weekday**
Ridership	243
Revenue Hours	21
Revenue Miles	267
Operating Speed (MPH)	12.5
Operating Cost	$1,326.14
Farebox Revenue	$148.23
Passengers per Mile	0.91
Passenger per Hour	11.35
Cost per Mile	$4.96
Cost per Passenger	$5.46
Farebox Recovery	11%
Cumulative Rank Score	32
Rank	17

Figures 5-40 and 5-41 chart ridership by time of day for Route 6. Ridership is low throughout the day. In the inbound direction, boardings are greatest during the AM peak. In the outbound direction, boardings are greatest during school dismissal times. Boardings per run reach a maximum of about 10 passengers.

Figure 5-40: Route 6 Weekday Inbound Ridership by Time of Day

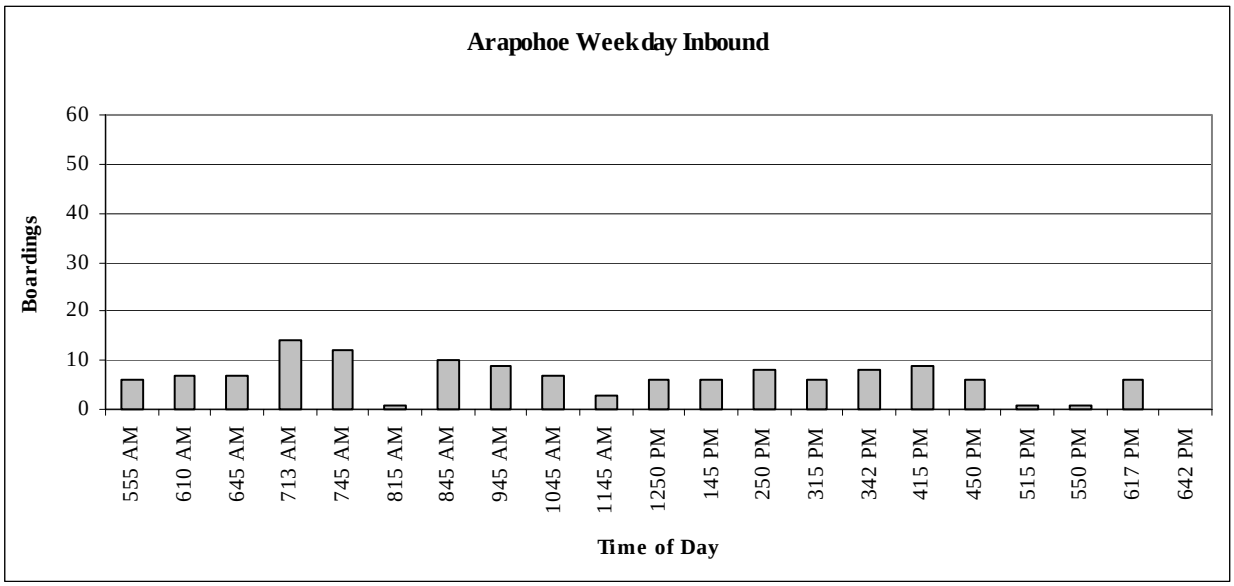
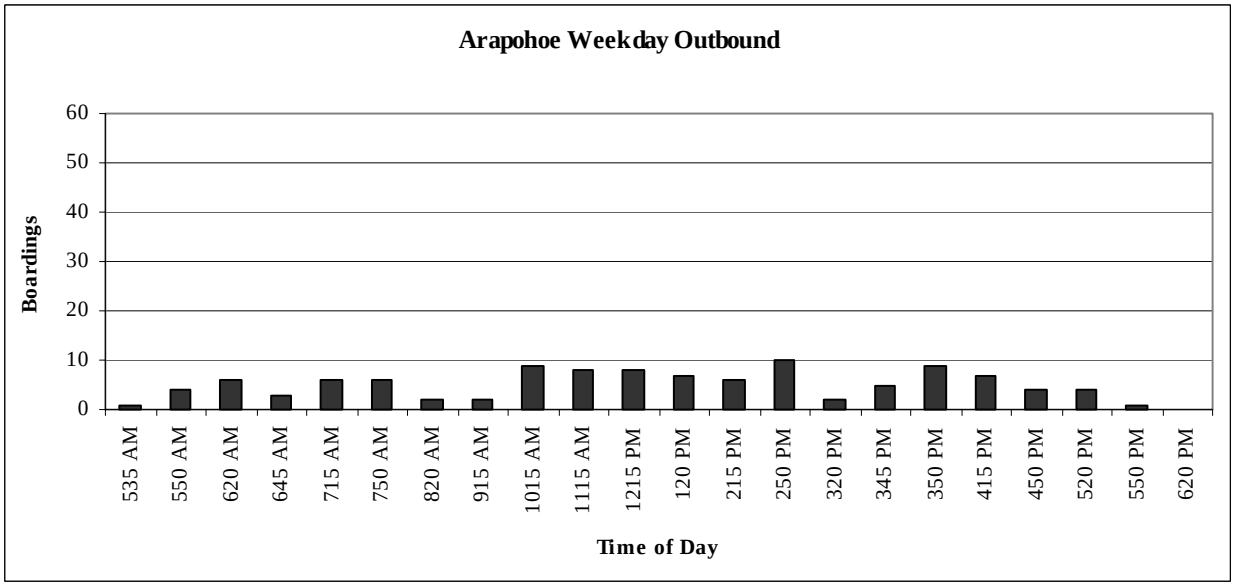


Figure 5-41: Route 6 Weekday Outbound Ridership by Time of Day



Figures 5-42 and 5-43 show maximum load per run for Route 6. In the inbound direction, loads are highest at during the same time periods that boardings are highest, the AM peak. In the outbound direction, the peak load occurs around midday and school dismissal times. The maximum load never reaches the 44 passenger capacity of the bus.

Figure 5-42: Route 6 Weekday Inbound Maximum Load by Time of Day

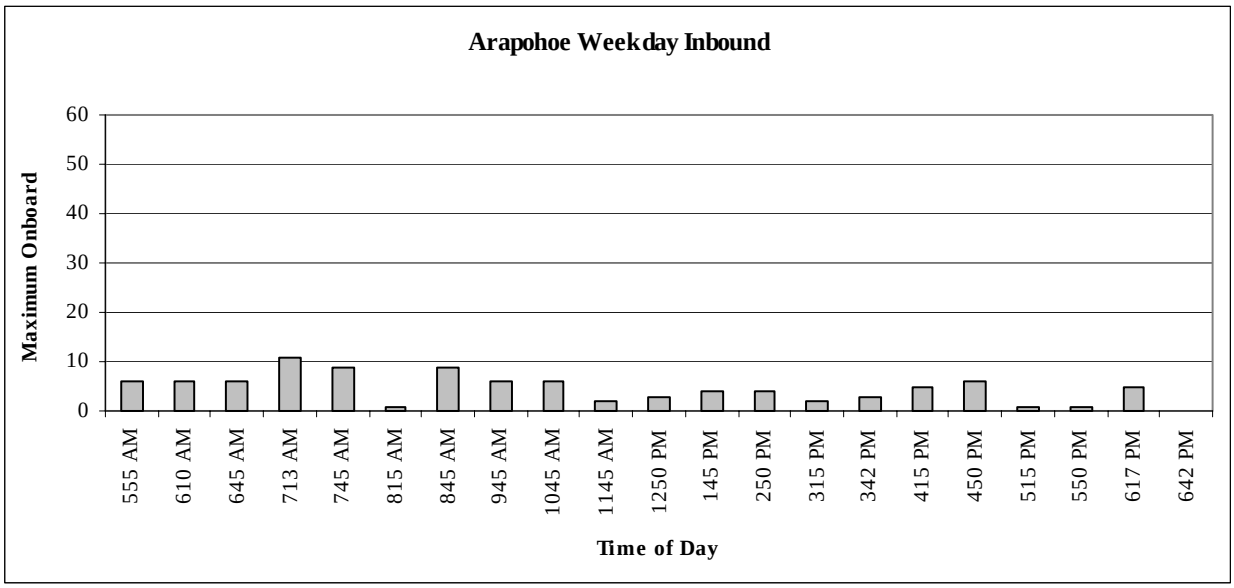


Figure 5-43: Route 6 Weekday Outbound Maximum Load by Time of Day

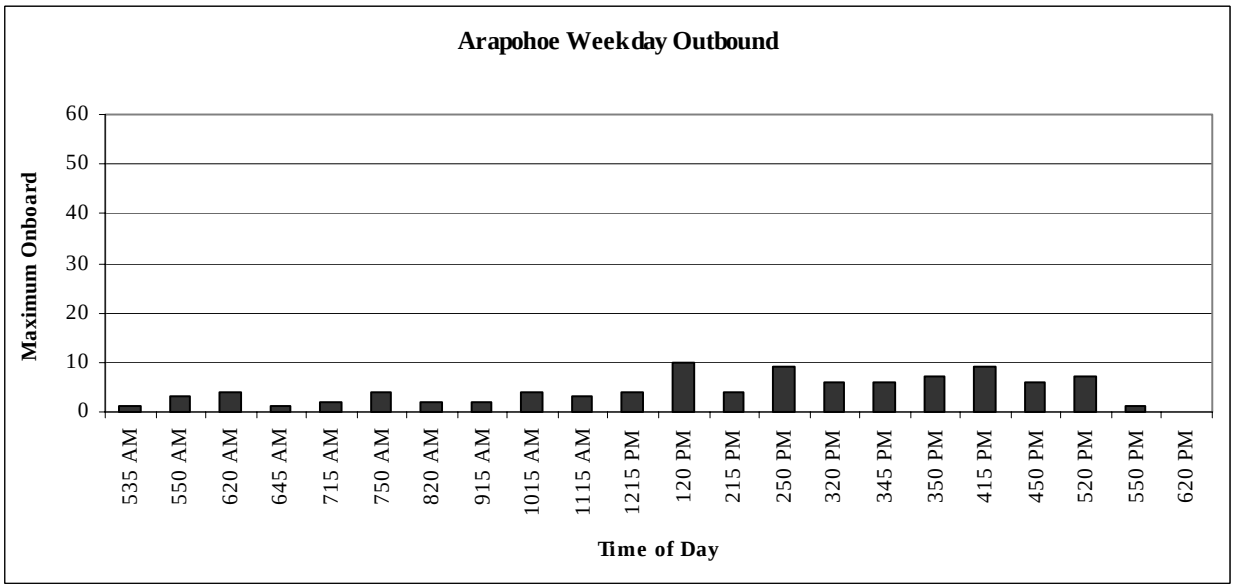
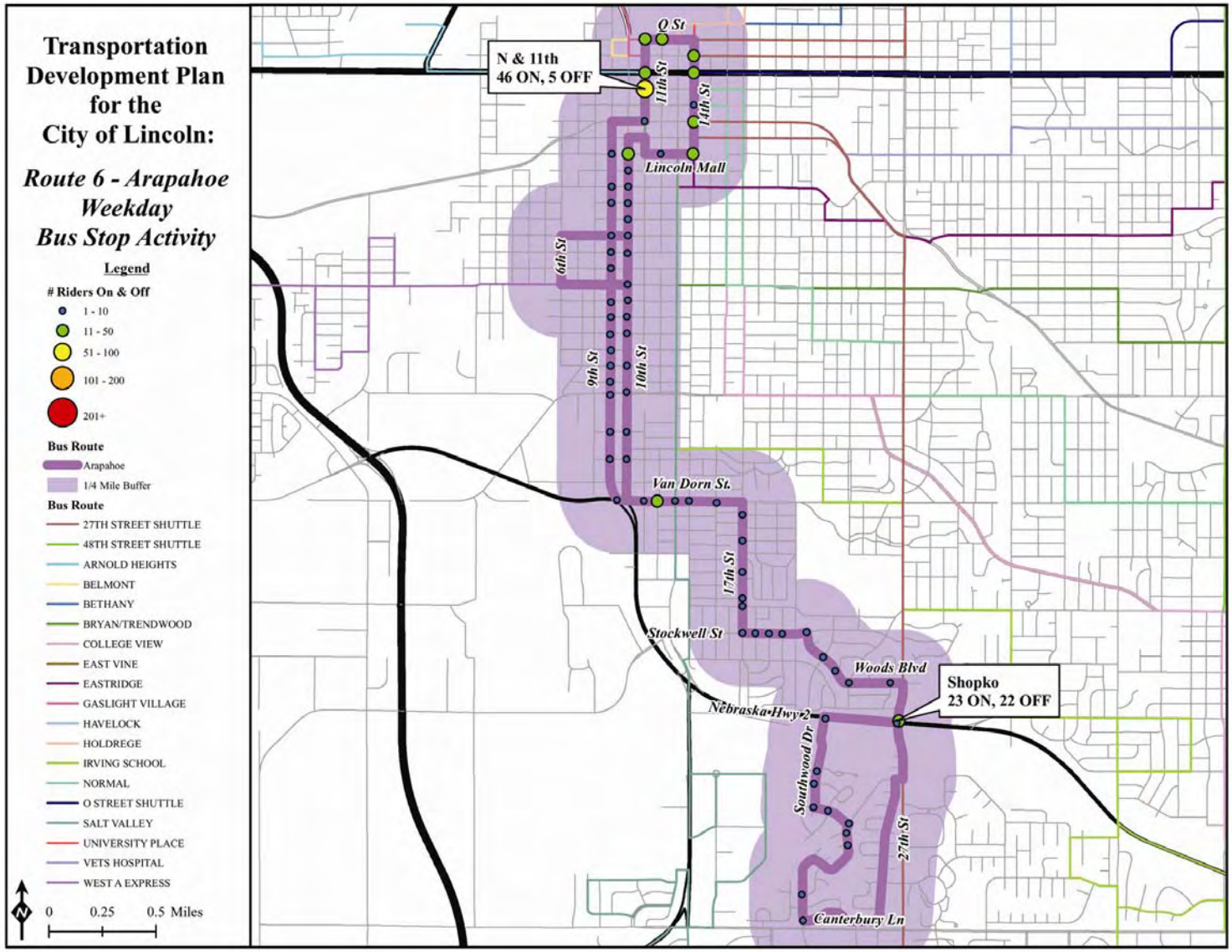


Figure 5-44 shows activity by bus stop for Route 6. Activity is low throughout the route except on the loop over to 6th Street and in the terminal loop. Activity is greatest in the downtown loop, especially at N & 11th. Shopko on 27th Street also attracts a lot of activity.

Figure 5-44: Route 6 Weekday Bus Stop Activity



Route 7 Belmont

Route 7 ranks fourth out of 20 regular routes. This route operates between downtown Lincoln and the northern part of the city. It serves the State Fairgrounds, Memorial Stadium, The University of Nebraska's City Campus, North Star High School, and Goodrich Middle School. A reason this route ranks so well is that it serves many generators in the northern part of Lincoln, and operates through areas where people are likely to use transit. Table 5-27 provides performance statistics for Route 7.

Table 5-27: Route 7 Weekday Performance Indicators

Route 7 Belmont	
Factor/Indicator	**Weekday**
Ridership	312
Revenue Hours	17
Revenue Miles	230
Operating Speed (MPH)	13.9
Operating Cost	$1,022.01
Farebox Revenue	$190.32
Passengers per Mile	1.36
Passenger per Hour	18.91
Cost per Mile	$4.45
Cost per Passenger	$3.28
Farebox Recovery	19%
Cumulative Rank Score	9
Rank	4

Figures 5-45 and 5-46 show ridership by time of day for Route 7 in the inbound and outbound directions. In the inbound direction, the highest number of boardings occurs during the AM peak period trips. In the outbound direction, the most boardings occur also in the AM peak period. In both directions, there are spikes in ridership during the afternoon peak periods, however, they are more pronounced in the outbound direction.

Figure 5-45: Route 7 Weekday Inbound Ridership by Time of Day

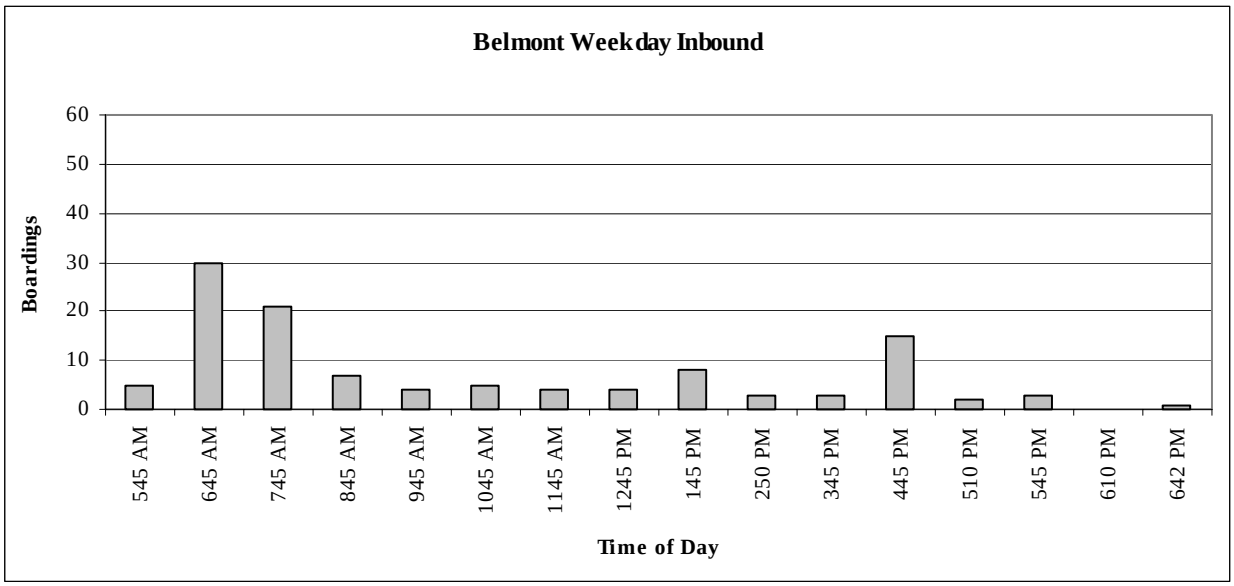
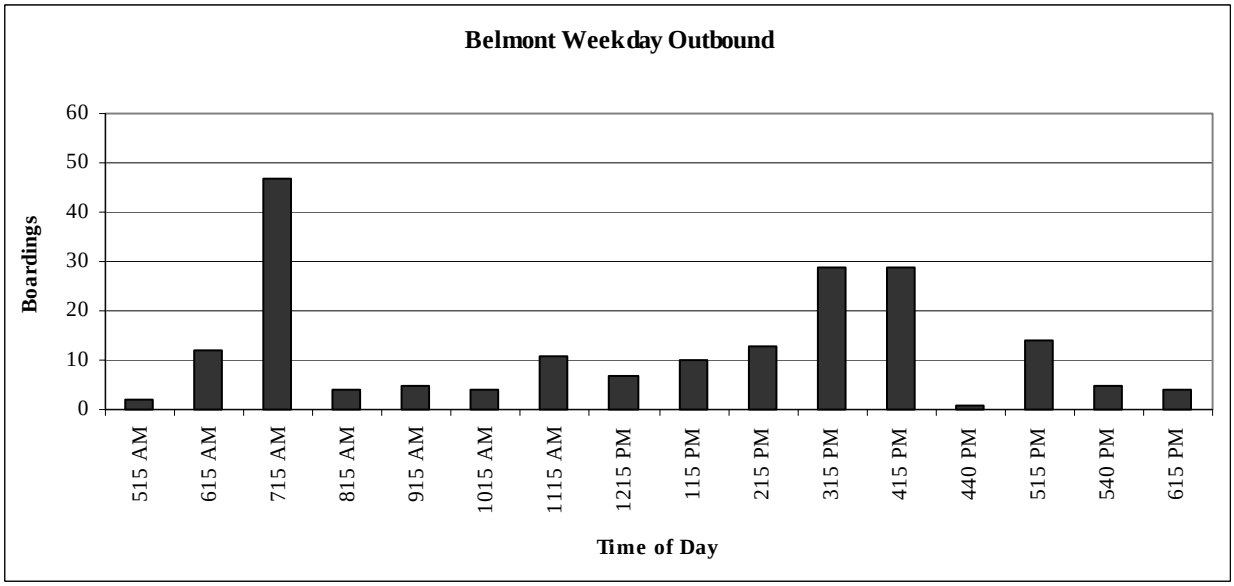


Figure 5-46: Route 7 Weekday Outbound Ridership by Time of Day



Figures 5-47 and 5-48 show the maximum number of people onboard during each run for each direction on Route 7. The largest load occurs in the inbound direction at AM peak, with a lower load spike in the PM peak. In the outbound direction, the highest loads during the PM peak with lower loads during other parts of the day.

Figure 5-47: Route 7 Weekday Inbound Maximum Load by Time of Day

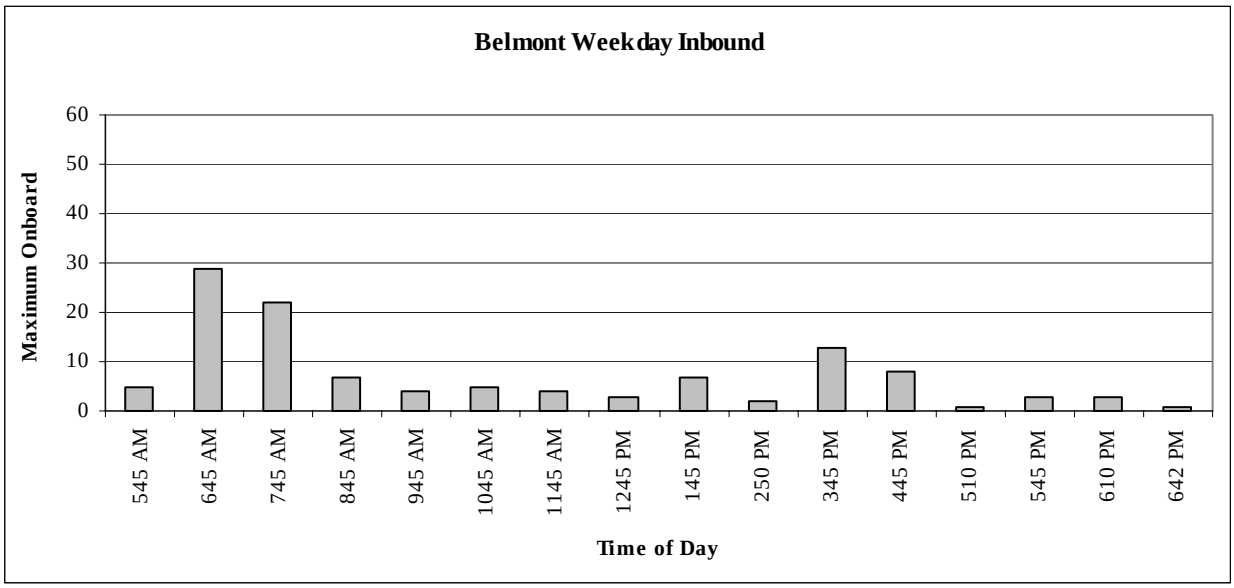


Figure 5-48: Route 7 Weekday Outbound Maximum Load by Time of Day

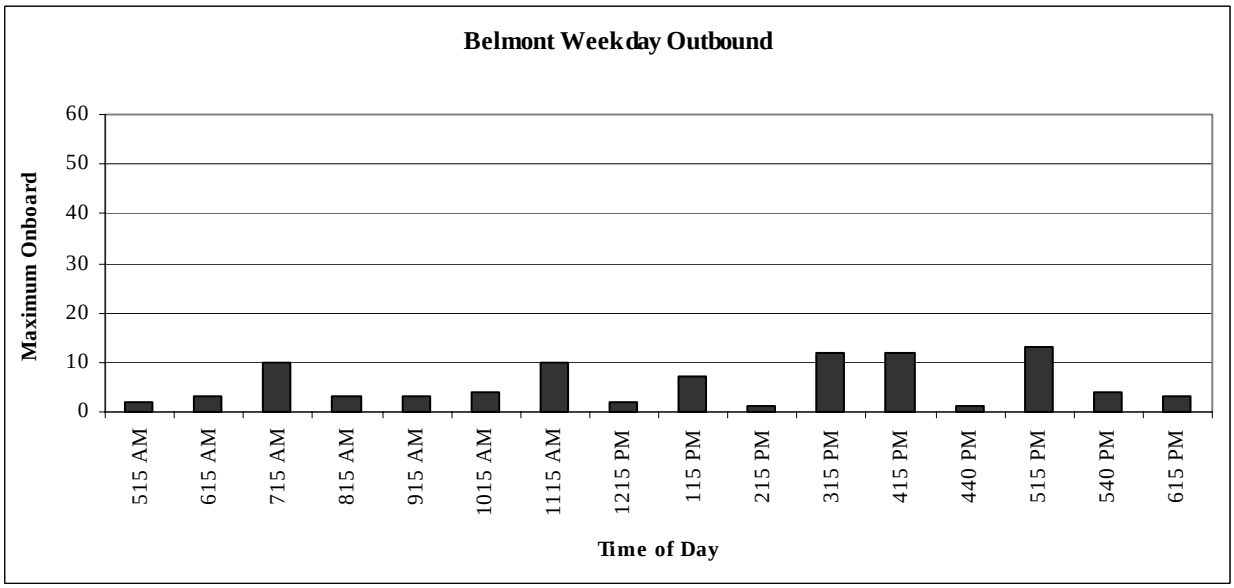


Figure 5-49 is a map of activity by bus stop for Route 7. There is a good amount of boarding and alighting activity throughout the route, except along 33rd Street in the terminal loop. Activity is highest in the downtown loop and at 33rd Street and Ridge Park near Northstar High School. Other stops with high ridership are located in downtown, near UNL, near Goodrich Middle School, and a senior housing complex non 23rd Street.