Appendix A

PUBLIC AND STAKEHOLDER INVOLVEMENT REPORT

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1. Introduction

This technical memorandum summarizes the Virginia Street Corridor Study (VSCS) community outreach and engagement activities conducted between March 2013 and January 2014. The VSCS public engagement activities focused on identifying, listening, connecting, analysing, educating and reviewing initial ideas to improve multimodal -pedestrian, bicycle, transit and automobile - transportation along Virginia Street from Mt. Rose Highway to North McCarran Boulevard.

During the study period, the project team conducted the following outreach and engagement activities:

- Partnerships with businesses and agencies to distribute and collect information
- Community survey
- Corridor walks
- Study briefings/presentations to elected officials and community organizations
- Stakeholder one-on-one meetings
- Two public workshops and one public meeting
- Four Technical Advisory Committees (TAC) meetings
- University of Nevada, Reno (UNR) student outreach
- Media events
- Special events

2. Outreach activity calendar

Table 1 provides an outline of the activities.

Table 1. Outreach and Activities

VSCS OUTREACH ACTIVITY CALENDAR			
DATE	**EVENT**	**Details**	**Materials Provided**
March 2013	Business and agency partnerships	RTC partnered with more than 50 businesses and agencies to distribute information regarding the study. These partners distributed information to their stakeholder databases to increase awareness and participation.	Meeting invites Project updates Survey links Study engagement posters
April 2013	Community survey	The team developed a brief survey to determine the types of improvements the community supported.	Electronic and hard copy English survey Electronic and hard copy Spanish survey
April to August 2013	Corridor walks	The team visited businesses in Midtown and UNR and invited them to attend meetings; take the survey and provide study comments.	Meeting invites Project updates Project survey
Ongoing	Study briefings/ presentations to elected officials and community	Reno City Council Regional Planning Commission RTC Board	

VSCS OUTREACH ACTIVITY CALENDAR			
DATE	**EVENT**	**Details**	**Materials Provided**
	organizations	RAD RTC Board, February 21, 2014 Reno City Council February 27, 2014	
April 1, 2013	UNR meeting	The team introduced the study and discussed the UNR master plan, possible RAPID routes and proposed RAPID stations.	Meeting invites Meeting agenda Sign-in sheet
April 2, 2013	TAC meeting	The team introduced the study and went over the investment plan framework, GIS decision tool, existing studies/reports, data collection and the stakeholder engagement approach.	Meeting invites Meeting agenda Presentation Sign-in sheet
June 18, 2013	TAC meeting	The team discussed their outreach and community input plans and included a draft community survey, coordination with stakeholders and workshops. RTC RAPID extensions to UNR draft concepts were also presented.	Meeting invites Meeting agenda RAPID routes display Draft community survey Sign-in sheet
July 11, 2013	City of Reno meeting	The team recapped the June 18th TAC meeting and thoughts. UNR RAPID route extension options were presented as well as an overview of the survey, Twitter and Facebook messages strategy, stakeholder and public engagement tactics and alternative scenarios.	Meeting invites Meeting agenda RAPID routes display
July 11, 2013	Midtown Mixer at The Creamery	The RTC attended the mixer to engage with the Midtown stakeholders and community and get them involved in future events.	
July 18, 2013	Midtown crosswalk instalment	The RTC installed a much needed crosswalk in front of Junkee Clothing Exchange in Midtown. The instalment received positive media and photo coverage.	
Aug. 6, 2013	UNR meeting	UNR provided updates on their planning. The team gave preliminary results of the survey and presented the RAPID options. Evans Street installation of bike lanes was confirmed.	Meeting invites Meeting agenda RAPID routes/stop location displays Pros/cons list of RAPID stop locations
Aug. 12, 2013	Midtown breakfast meeting	The team provided various display boards of the envisioning of Midtown for an open house. An overview and looping presentation were given. A workshop was conducted after where the team described the envisioned strategies. Attendees were able to voice their opinions and write their comments at each station in the workshop.	Meeting invites and announcements Presentation Display boards Sign-in sheet Comment cards
Sept. 10, 2013	Open house	The open house focused on the entire stretch of the corridor. The public was introduced to the auto, transit, pedestrian,	Meeting invites and announcements

VSCS OUTREACH ACTIVITY CALENDAR			
DATE	**EVENT**	**Details**	**Materials Provided**
		bicycle and parking realms that were presented in the Midtown breakfast meeting. The public was able to state their opinions and write their comments.	Presentation Display boards Fact sheet Sign-in sheet Comment cards
Sept. 24, 2013	City of Reno meeting	An overview of the September open house, UNR meeting and master plan and Midtown breakfast meeting was given. Proposed development at the southern end of the corridor was discussed.	Meeting invites Meeting agenda Data sheets Sign-in sheet
Oct. 8, 2013	TAC meeting	The team gave an update of the open house, UNR meeting and master plan, and the Midtown breakfast meeting results.	Meeting invites Meeting agenda Data sheets Midtown display boards Updated pros/cons list of RAPID stop locations Sign-in sheet
Nov. 13, 2013	Walkabout through Midtown	The RTC conducted a Midtown walkabout with stakeholders to show current issues and potential improvements.	
Dec. 17, 2013	TAC meeting	The team presented UNR RAPID routes and visualizations in accordance with the master plan. A short presentation was given of the "Bikes, Lights and Sidewalks" UNR student's research project. Updates of Midtown visualizations, the Meadowood Transfer Station and final report were also discussed.	Meeting invites Meeting agenda Presentation UNR research project presentation Sign-in sheet
Jan. 14, 2013	Public meeting	The meeting consisted of an open house at the beginning, a formal presentation given by the RTC, and a Q&A. The meeting ended with a Midtown business owner/resident giving a short photo presentation on sidewalk and street sizes through the area.	Meeting invites and announcements Display boards Presentation Sign-in sheet Comment cards

3. Public opinion survey

3.1. Overview of the survey

In June 2013 the project team developed a public opinion survey in both electronic and hard copy format. The survey targeted residents, business owners and commuters who travel through the Virginia Street Corridor regularly. The purpose of the survey was to receive input that would help the RTC and the City of Reno determine the types of improvements the community would like to see throughout the corridor and to increase participation at future planning events.

The project team created a poster to encourage survey participation that included a QR code to download the survey. The posters were placed in more than 50 businesses and partner agencies. Surveys were available in both English and Spanish. The RTC distributed and collected surveys on RAPID and Route 1 bus routes. The project team attended two farmers markets and visited businesses along the corridor to provide information on the study, upcoming events, and to distribute the survey. Surveys were also distributed to major employers throughout the corridor to distribute to their employees.

Survey results were compiled and presented to the project team, The City of Reno, UNR, and at the first public workshop. An electronic copy of the survey comments is provided in the attached CD.

3.2. Summary of comments

The results of the public opinion survey provided details that identify the most frequently visited areas of the corridor, the most popularly utilized modes of travel used to get to and from these locations, and the specific transportation improvements perceived to have the greatest potential positive impact on travel in this area.

When asked to identify the geographic section along the Virginia Street Corridor that represents the area of their primary interest, the top destination—as reported by survey participants—was Downtown, followed by Midtown and UNR. Other areas of lesser interest included, in order of numerical response, Mt. Rose, Meadowood Mall, South Meadows, Atlantis, South Virginia and Peppermill.

Participants were next prompted to report the ways in which they most frequently travel the Corridor. “Automobile” was selected as their chosen mode of transportation, followed by walking, taking the bus and biking, respectively.

Specific to the Downtown area, the top transportation needs, in order of importance, were reported as follows:

1. Extension of RAPID/RIDE bus service
2. Faster travel time for cars
3. Need for light rail transit
4. More bicycle lanes

Top needs for the Midtown area, as reported, included:

1. More bicycle lanes
2. Improved sidewalks
3. Extension of RAPID/RIDE bus service
4. Light rail transit

For UNR, the top transportation needs were reported to be:

1. More bicycle lanes
2. Improved sidewalks
3. Extension of RAPID/RIDE bus service
4. Light rail transit

In the area of the Meadowood Mall, desired transportation improvements included:

1. Extension of RAPID/RIDE bus service
2. More bicycle lanes
3. Improved sidewalks
4. Streetcar transit availability

With regard to the Atlantis/Convention area, top reported needs were:

1. Extension of RAPID/RIDE bus service
2. Faster travel times for cars

3. Light rail transit
4. More bicycle lanes

In the South Meadows/Damonte Ranch Parkway section, top needs included:

1. More bicycle lanes
2. Extension of RAPID/RIDE transit lanes
3. Improved sidewalks
4. Light rail transit

Needs in the Mt. Rose Highway/Summit areas were reported as follows:

1. Extension of RAPID/RIDE bus service
2. More parking
3. More bicycle lanes
4. Light rail transit

For South Virginia Street, top transportation needs included:

1. Sidewalk improvements
2. Extension of RAPID/RIDE bus service
3. More bicycle lanes
4. Faster travel times for cars

And finally, in the Peppermill Resort Area, top needs to improve area transportation were reported to be:

1. Sidewalk improvements
2. Extension of RAPID/RIDE bus service
3. Faster travel times for cars
4. Light rail transit/More bicycle lanes (tie)

4. Public workshop No.1

4.1. Overview of the public workshop

A public workshop was held on August 12, 2013 at the Terry Lee Wells Discovery Museum. The workshop was held in the morning to accommodate Midtown business owners. The purpose of the workshop was to: introduce the goal of the study to stakeholders, envision the future of Midtown, identify overall opportunities and constraints for Midtown, and update stakeholders on the next steps of the study.

Attendees participated in a group exercise where stations were created to receive community input. Topics included visioning, auto realm, bicycle realm, pedestrian realm, transit realm, parking realm and survey. Attendees rotated through each station and provided input on the topics. After attendees visited all stations, group facilitators reported out the discussions of the groups.

4.2. Summary of comments

Meeting participants worked together to create a vision for the Midtown area. The following ideas were generated during the discussions:

b. Vibrant economy, fun area to be in, with many new businesses created by young kids, and a desire for more street fairs
c. Seamless transportation connectivity between UNR and Midtown
d. Safe and accessible transportation and reduced pedestrian - vehicle conflict

e. Safe use of alternatives to cars: bicycle, pedestrian and public transportation. Low speed vehicular traffic, and bicycle and pedestrian friendly environment with wide sidewalks, separated bicycle lanes, shade and sidewalk furniture and bicycle amenities.
f. Positive image and high ridership for transit
g. Decorative sidewalks and street lighting
h. Renovated buildings, parking on abandoned lots, community gardens in abandoned blocks, and linear malls.
i. Not paid and well lit off-street parking accommodated on dedicated small lots.
j. Minimize construction impact on businesses

Participants also worked to create strategies for attaining the Midtown vision. Strategies focused on: autos, bicycles, pedestrians, transit, parking, and financing strategies. Below is a synopsis of the strategies:

- Auto strategies focused on reducing speed, changing movement, better lighting, and improved signage.
- Bicycle strategies were discussed to increase safety for cyclists by creating dedicated and protected bicycle lanes, providing convenient bicycle parking, reducing speed, and limiting turns only at corners. An additional strategy considered called for a ring around Midtown with “sharrows”.
- Pedestrian strategies focused on widening sidewalks to 10 feet, providing outdoor seating, more signage, ADA improvements, and safety improvements.
- Transit strategies included better connectivity between Midtown and UNR, and history-themed stations with lighting, seating, and wifi.
- Parking strategies discussed included providing additional parking on side streets, providing lighting, angling side street parking, potential parking garages, and creating a park and ride and a park and walk.
- Financing strategies focused on exploring public-private partnerships for improving parking, acquiring public parking lots, considering user fees for bicycle lanes and development fees.

An electronic copy of the complete summary of the strategies can be found in the enclosed CD.

5. Public workshop No.2

5.1. Overview of the public workshop

A second public workshop was held on September 10, 2013 at the Terry Lee Wells Discovery Museum. The workshop was held in the evening to accommodate participants who could not attend a morning meeting. The purpose of the workshop was to: introduce the goal of the study to public, introduce opportunities identified in the UNR and Midtown segments, identify overall corridor opportunities by topic area, gather data focused on the area south of Plumb, and introduce next steps of the study.

5.2. Summary of comments

Attendees participated in focused discussions on the following topics:

- Auto
- Transit (whole corridor, UNR plan, Meadowood transfer station)
- Pedestrians
- Bicycle (Master plan, focus on what’s missing, whole corridor)
- Parking (Midtown focus, show results)
- Location Specific (UNR, Downtown, Midtown, Plumb-Kietzke, Kietzke-Patriot, Patriot-Geiger/Mt Rose)

Following the discussions, participants took part in a dotmocracy voting of complete street components by area. A summary of the polling results is below.

- UNR – Provide transportation choices that decrease the cost of transportation.

- Downtown – Enhance economic competitiveness by increasing access to employment and expand business access to markets.
- Midtown – Expand business access to markets by maintaining the neighborhood values.
- Convention area – Provide transportation choices that decrease the cost of transportation.
- South Virginia – Provide transportation choices that decrease the cost of transportation.

An electronic copy of the results can be found in the enclosed CD.

6. Public Meeting No.3

6.1. Overview of the public workshop

A third public meeting was held on January 14, 2014 at the public Terry Lee Wells Discovery Museum. The purpose of the meeting was to: present the findings and results of the study, gather and address any last comments from the public; and introduce the next steps of the study.

6.2. Summary of comments

Participants attended an open house where the study results were on display. The RTC provided a presentation ofthe study results. A synopsis of the public comments and questions is below.

- Consider installing roundabouts in the congested areas of Virginia Street to slow traffic for pedestrian safety.
- Install temporary bike lanes on Center Street and Sierra Street for safe and easy commuting between UNR and Downtown and Midtown.
- Bulb-out sidewalks are dangerous for cyclists. Plumas Street is a problem area for this.
- On-street parking is not essential for businesses, the installation of more bike parking and larger sidewalks would benefit more.
- Will this project involve T-21 money? How is the project going to be funded?
- Would the RTC consider angled parking with medians instead of middle lanes?
- Current pedestrian issue exists with traffic turning left on Virginia Street; difficult to see people walking across the street; consider roundabouts.

A Midtown business owner and resident made a presentation of current issues on Virginia Street through Midtown. He compared current photos of the area with photos from 1965 to show the difference in sidewalk and street sizes.

An electronic copy of the meeting summary is provided enclosed in a CD.

One-on-one stakeholder interviews were conducted to support the team in collecting information and identifying major mobility meeds along the corridor. Additional meetings were conducted with major stakeholder, the City of Reno, and UNR.

Table 2 below provides a summary of these interviews.

Table 2. Stakeholder one-on-one interview summary

ONE-ON-ONE STAKEHOLDER COMMENTS

ISSUES SUMMARY

	MIDTOWN RESTAURANTS AND BARS	DEVELOPERS	GAMING	MIDTOWN MERCHANTS
PEDESTRIANS				• Disagreement regarding whether sidewalks should be fixed now, or whether this construction should be delayed • Please delay sidewalk construction on Virginia Street—businesses are too new and cannot handle disruptions during construction at this time • Concerned that there are no crosswalks near their stores (corrected in June 2013)
BICYCLES				• Need more bicycle racks
PARKING	• Would like to discourage used car lots in the corridor		• Would like to wait less during off-peak hours; move valet parking across Virginia Street	• Disagreement regarding whether there is more parking needed • Concerns about moving parking to residential areas because of safety concerns, especially for young kids
TRANSIT	• Need a better tie-in between UNR and the rest of the city • BRT should go up to UNR • Business owners should work together to offer discounts to students	• Would like better tie-in between UNR and the city • Wants a better bus system from UNR to Midtown to help in student housing and	• Better identification of bus discounts is needed • Establishment does not feel that most of their hotel guests want to use the bus	• Commented that very few come to their store by BRT even though the bus stop is very close to their store

	coming to Midtown by BRT with proof that they came on the bus • The bus needs to be rebranded as a “cool thing” to ride	lowering student parking costs		
SAFETY				• Concerns about moving parking to residential areas because of safety concerns, especially for young kids (duplicate from above) • Safety is very poor crossing Virginia Street, especially during special events • Need to slow down traffic on Virginia Street for safety
OTHER	• Need to put a limit on unused parcels on Virginia Street • Impact fees are too low and encourage improper business in the corridor • Would like to see more green development concepts • Reno needs to be more progressive like Portland or Denver			• Please delay construction along Virginia Street—construction work should be done in small sections at a time • Need better identification of Midtown (flags, signage, etc) • Wants better social media and print to highlight Midtown • Impact fees are too high and discourage redevelopment in Midtown

7. RTC Technical Advisory Committee (TAC) meetings

The Virginia Street Corridor Study team attended four RTC TAC meetings to provide briefings and project updates. The TAC is composed of 12 representatives from local, state, and federal agencies. The table below provides an overview of the meetings and the discussions.

Table 3. TAC Meetings

TECHNICAL ADVISORY COMMITTEE (TAC) MEETING SUMMARY			
TAC	**DATE**	**MEETING PURPOSE**	**ISSUES DISCUSSED**
Meeting #1	April 2, 2013	• Introduce the study and its goals • Explain how the team will use a GIS database throughout the study • Discuss how the team will use pre-existing information and research on the corridor • Discuss the importance of data collection throughout the life of the study • Provide an overview of the stakeholder engagement process being developed • Introduce the next steps of the study	• Short- and long-term project elements • NDOT Road Safety Audit • Bicycle and pedestrian counts • Traffic counts • Crash data
Meeting #2	June 18, 2013	• Create the vision of Virginia Street • Provide an update on outreach and community input efforts • Present RTC RAPID extension ideas • Introduce the next steps of the study	• Assets, concerns, and the future of Virginia Street
Meeting #3	October 8, 2013	• Provide an overview of the September 10 open house public meeting • Provide updates on the UNR Master Plan and potential RAPID stations • Provide an update on the Midtown breakfast meeting results and cross-sections • Introduce the next steps of the study	• South Virginia Street cross-section options • Preferred Midtown roadway options
Meeting #4	December 17, 2013	• Provide an update of the visualized and preferred UNR RAPID routes in accordance with the Master Plan • Present information found in the UNR grad student's research project • Report on bikes, lights and sidewalks • Show Midtown bike alternate routes with parking • Confirm the use of the Meadowood Transfer Station • Introduce the next steps of the study	• Approve the preferred UNR RAPID route • Approve alternative bicycle routes in Midtown • Approve Midtown Concept

8. Press Coverage

Press coverage was provided by the RTC. Several press articles were published and presentations ans interviews were conducted with RTC staff members. For more information on press coverage please contact the RTC's Public Information Officer.

Appendix A. Supporting Materials

A.1. Public opinion survey materials

A.2. Public workshop No.1

A.3. Public workshop No.2

A.4. Public meeting No.3

Appendix B

TRANSIT ANALYSIS

TRANSPORTATION CONSULTANTS, INC.

TRANSPORTATION PLANNING AND TRAFFIC ENGINEERING CONSULTANTS

2690 Lake Forest Road, Suite C
Post Office Box 5875
Tahoe City, California 96145
(530) 583-4053 FAX: (530) 583-5966
info@lsctahoe.com
www.lsctrans.com

TECHNICAL MEMORANDUM

To: Josh Thomson, Atkins

From: Gordon Shaw, PE, AICP, LSC Transportation Consultants, Inc.

Date: June 13, 2013

RE: Existing Transit Services Along the Virginia Street Corridor

INTRODUCTION

This memo presents a summary of existing transit services along the Virginia Street study corridor, including both Regional Transportation Commission (RTC) Ride fixed route services as well as University of Nevada Reno (UNR) campus shuttle service. This includes all services operating along Virginia Street between Damonte Parkway on the south and North McCarran Boulevard on the north, along with other routes in the UNR campus area.

RTC RIDE

The Ride public transit program serves the entire Reno/Sparks region. Three types of fixed route services are operated: RAPID bus service, the Sierra Spirit, and standard bus routes

RAPID Service

The RAPID program operates largely along South Virginia Street (with service along Center Street and Lake Street in the downtown area) between 4th Street Station on the north and Meadowood Mall on the south. It consists of two coordinated types of service:

- RAPID service is operated using articulated buses (approximately 60 feet in length). For much of the operating day, service is provided every 10 minutes. Enhanced bus stops are provided, many with high platforms (to provide convenient level entrance) and opportunities for pre-payment of fares. A total of 9 stops are served, on roughly ½ mile spacing.

- RAPID CONNECT service uses standard size (approximately 40 feet in length) buses to serve additional stops along the RAPID corridor. A total of 23 stops are served in the southbound direction, and 20 in the northbound direction. As of August 7th, this service will be renamed Route 1.

- The Sierra Spirit consists of a shuttle connecting the UNR campus (as far north as 17th / West Stadium Drive) with downtown Reno via Virginia Street. Service is provided every 15 minutes from 7:00 AM to 7:00 PM, 365 days a year and stops are generally provided every block. While currently free-fare, on August 7th a fare of 25 cents for general public and 10 cents for elderly/disabled/youth will be implemented.

- Route 7 (Stead) provides service every 30 minutes over a long service day (from roughly 5 AM to 2 PM). It serves the Virginia Street Corridor from 4th Street Station north beyond North McCarran Parkway.

- Route 17 (Lemmon Valley) provides hourly service until roughly 11 PM at night. North from 4th Street Station, it travels along Evans Street before turning right on Highland Avenue and exiting the study corridor.

- Route 57 (Damonte Ranch) provides hourly service during the AM and PM commute period (approximately 10 hours per day) south along Virginia Street from Meadowood Mall to Damonte Ranch Road. In August, it will be combined with the nearby Route 56 to provide consistent service throughout the day.

Table A presents a summary of all RTC fixed route service in the corridor. A review of this table indicates the following:

- Up to 235 transit round-trips are operated along the corridor over the course of a weekday. Just under half of these are RAPID or RAPID CONNECT runs.

- In total, 63,409 vehicle-hours and 948,376 vehicle-miles of transit service is operated over the course of a year.

- At peak times on weekdays, 17 buses are in operation in the corridor.

Ridership

A detailed review of ridership data for the routes in the study corridor was conducted, using data for a minimum of two-weeks of data (for periods when UNR is in session). Detailed tables for the individual routes are provided in Appendix A. Table B presents a summary of average weekday ridership by service. Note that for routes only partially within the study corridor, only boardings within the study corridor are reported. As shown, an average of 7,253 passengers board buses over the course of an average weekday. Of this, 5,618 or 77 percent consists of ridership on the RAPID program. Between RAPID and RAPID CONNECT, two-thirds of ridership is on the RAPID service and one-third on the RAPID CONNECT service.

Tables C and D present the average weekday ridership by stop and by route, for the southbound direction and northbound direction, respectively. These tables reflect the importance of 4th Street Station and Meadowood Mall as transfer points.

Hourly transit boardings in the corridor are shown in Table E and Figure A. Overall, ridership grows to a daily peak in the 3:00 PM hour, when a total of 765 passengers board buses in the corridor on an average weekday. It is worth noting the Route 7 (serving the UNR campus along Virginia Street) has a ridership profile more typical of a "commuter" route, with a peak in the 7:00 AM hour, and lower ridership in the midday period from 8:00 AM to 2:00 PM

As a particular focus of this study is means to improve transit service to the UNR campus, it is appropriate to review existing transit ridership in the immediate campus area. Table F presents a summary of the existing average weekday ridership in the area bounded by Virginia Street, North McCarran Parkway, Evans Avenue and I-80. As shown, a total average of 291.4 passenger boardings currently occur in the area. Of this total, 62 percent is on the Sierra Spirit, 38 percent on Route 7 (along Virginia Street) and only 2 percent is on Route 17 (along the southern portion of Evans Avenue). Busy stops include Virginia/Artemesia (with a total of 79.6 boardings and Virginia/College (total of 39.0).

Rider Trip Purpose

RTC commissioned a study (focusing on streetcar feasibility) that included onboard surveys of passengers on RAPID, RAPID CONNECT, and the Sierra Spirit services. This survey, conducted in March 2011, yielded 1,659 valid responses. As shown in Table G, excluding "home" as not a valid overall trip purpose, the most common trip purpose on RAPID and CONNECT service is for work, followed by shopping. However, on Sierra Spirit the most common trip purpose was to access UNR, with 41.4 percent of all ridership.

UNR CAMPUS SHUTTLE

UNR operates two shuttle services in the campus area:

- The **Main Campus Shuttle** operates over a figure-8 route, between 17th/West Stadium Way on the north and Gotchell Hall on the south. Key stops include the West Stadium Parking Complex, Student Union/ Knowledge Center, Student Services Building, and Lombardi Recreation Center. With service operating every 10 minutes or less, there is not a set schedule. During the fall and spring semesters, service is operated from 7:30 AM to 10 PM Monday through Thursday and 7:30 AM to 5:30 PM on Friday

- The **East Campus Shuttle** serves the east side campus via Evans Avenue, the northernmost portion of the campus, as well as University Village / Highlands residential areas. Service is provided every 15 minutes, from 7:30 AM to 5:30 PM on weekdays, during the fall and spring semesters. Key stops include Fleishmann Agriculture, the Medical School and Cain Hall. Boarding at The Highlands requires a transportation pass, as the service is partially funded by the complex management.

Campus staff has indicated that the shuttle routes will be redesigned to stay on the perimeter of campus.

TABLE A: Summary of Existing RTC Fixed Route Services in the Virginia Street Corridor

Route	Weekday	Saturday	Sunday/ Holiday	Weekday Headway	Round-Trips/Day			Veh-Hrs / Year	RT per year	Miles per Roundtrip	Miles per Year	Peak Buses in Service
					Weekday	Sat	Sun/Hol					
RAPID	6:01 AM - 9:20 PM	6:42 AM - 8:19 PM	6:42 AM - 8:19 PM	10 to 30 Min	79	64	64	27,215	27,215	9.5	258,543	6
CONNECT	24 Hrs/Day	24 Hrs/Day	24 Hrs/Day	30 to 60 Min	43	43	43	20,075	15,695	9.5	149,103	3
Subtotal: RAPID Program					*122*	*107*	*107*	*47,290*	*42,910*	*19*	815,290	*9*
Sierra Spirit	7:00 AM - 7:00 PM	7:00 AM - 7:00 PM	7:00 AM - 7:00 PM	15 Min	48	48	48	8,760	17,520	3.9	68,328	2
Route 7	4:45 AM - 1:48 AM	5:15 AM - 1:48 AM	5:15 AM - 1:48 AM	30 Min	35.5	34.5	20.5	4,013	12,052	1.8	21,693	3
Route 17	5:26 AM - 10:54 PM	6:26 AM - 8:55 AM	6:26 AM - 8:55 AM	Hourly	17.5	14.5	14.5	1,213	6,064	0.7	4,244	2
Route 57	5:54 AM - 9:53 AM and 2:24 PM - 8:53 PM	5:22 AM - 9:51 AM and 2:22 PM - 8:51 PM	5:22 AM - 9:53 AM and 2:22 PM - 6:53 PM	Hourly	12	12	10	2,133	4,266	9.1	38,821	1
TOTAL TRANSIT SERVICE IN CORRIDOR					**235**	**216**	**200**	**63,409**	**82,811**	**34.5**	**948,376**	**17**

TABLE B: Summary of Existing RTC Average Weekday Ridership in the Virginia Street Corridor

Route	Average Weekday Boardings			
	Southbound	Northbound	Total	Percent of Total
RAPID	1,858	1,905	3,764	52%
CONNECT	986	868	1,855	26%
Subtotal: RAPID Program	*2,845*	*2,774*	*5,618*	*77%*
Sierra Spirit	238	212	450	6%
Route 7	71	803	873	12%
Route 17	5	138	143	2%
Route 57	120	49	169	2%
TOTAL TRANSIT SERVICE IN CORRIDOR	3,278	3,975	7,253	100%

TABLE C: Average Weekday Boardings by Stop on Virginia Street Corridor - Southbound

Stop	Stop#	Route						Total
		Rapid	Connect	7	17	SS	57	
Highland/Evans	704	--	--	--	0.4	--	--	0.43
Evans/9th	705	--	--	--	1.3	--	--	1.29
Evans/7th	706	--	--	--	2.9	--	--	2.89
Lake/6th	128	--	--	--	0.2	--	--	0.21
Virginia/17th	403	--	--	8.6	--	--	--	8.6
Virginia/(Planetarium)	404	--	--	3.9	--	--	--	3.9
Virginia/15th	405	--	--	12	--	--	--	12
Virginia/College	406	--	--	8	--	19.9	--	27.9
Virginia/Artemesia (West)	1803	--	--	22.4	--	41.8	--	64.2
Virginia/10th	407	--	--	9.6	--	23.9	--	33.5
Virginia/8th (West)	1804	--	--	--	--	51.4	--	51.4
Virginia/6th (West)	1805	--	--	--	--	15.1	--	15.1
Virginia/5th (West)	1806	--	--	--	--	18.6	--	18.6
Virginia/4th (West)	1807	--	--	--	--	35.6	--	35.6
Virginia/Commercial	1808	--	--	--	--	21	--	21
Virginia/2st	1809	--	--	--	--	10.3	--	10.3
8th/Virginia	408	--	--	3.7	--	--	--	3.7
Sierra/Elm	*409*	--	--	*1.5*	--	--	--	*1.5*
RTC 4th Street Station	*1977*	*1325.8*	*636.4*	*0.9*	*0.1*	--	--	*1963.2*
Lake/2nd	*601*	--	*27.4*	--	--	--	--	*27.4*
Lake/Mill	*1753*	--	*59.9*	--	--	--	--	*59.9*
Virginia/California	1993	157.9	55.9	--	--	--	--	213.8
Virginia/La Rue	6	--	34.4	--	--	--	--	34.4
Virginia/Mary	7	50.4	19.4	--	--	--	--	69.8
Virginia/Mt. Rose	9	68.8	--	--	--	--	--	68.8
Virginia/Arroyo	8	--	7.3	--	--	--	--	7.3
Virginia/Walts Ln	1998	--	10.9	--	--	--	--	10.9
Virginia/Wells (Time Point)	10	--	38.4	--	--	--	--	38.4
Virginia/Orchard Plaza	12	44.3	3.2	--	--	--	--	47.5
Virginia/Carano	14	--	21.2	--	--	--	--	21.2
Virginia/Brinkby	15	107.6	25.2	--	--	--	--	132.8
Virginia/Gentry	488	--	11.9	--	--	--	--	11.9
Virginia/Moana	489	--	--	--	--	--	--	0
Virginia/Peckham (Fs) (Time Point)	490	85.7	18.9	--	--	--	--	104.6
Virginia/Kumle Ln (Redfield)	491	--	2.5	--	--	--	--	2.5
Virginia/Kietzke	1409	--	7.1	--	--	--	--	7.1
Virginia/(Best Buy)	1412	15.7	--	--	--	--	--	15.7
Virginia/Meadowood Mall Way	1994	--	2.4	--	--	--	--	2.4
Meadowood Mall Circle/Virginia	*1601*	--	*2.8*	--	--	--	--	*2.8*
Meadowood Mall (Time Point)	*30*	*2.2*	*1*	--	--	--	*104.4*	*107.6*
S. Virginia/Neil	1631	--	--	--	--	--	1.8	1.8
Virginia/Neil	495	--	--	--	--	--	1.2	1.2
S. Virginia/(Sierra Center)	1623	--	--	--	--	--	0.5	0.5
Virginia/Green Acres	496	--	--	--	--	--	1.4	1.4
S. Virginia/Huffaker Lane	1632	--	--	--	--	--	3.4	3.4
S. Virginia/Patriot	1633	--	--	--	--	--	3.3	3.3
S. Virginia/(Sierra Rv)	1634	--	--	--	--	--	--	0
S. Virginia/Holcomb Ranch	1864	--	--	--	--	--	0.6	0.6
S. Virginia/(Winco Entrance)	1697	--	--	--	--	--	1.5	1.5
S. Meadows Prkway/S. Virginia (Time Point)	1636	--	--	--	--	--	0.5	0.5
S. Meadows Prkway/Gateway	1637	--	--	--	--	--	1.8	1.8
S. Virginia/Damonte Ranch (Time Point)	1645	--	--	--	--	--	--	0
Total		1858.4	986.2	70.6	5.0	237.6	120.4	3278.2
Percent of Total		56.7%	30.1%	2.2%	0.2%	7.2%	3.7%	

Virginia Boardings Stop.xlsx

TABLE D: Average Weekday Boardings by Stop on Virginia Street Corridor - Northbound

Stop	Stop#	Route						Total
		Rapid	Connect	7	17	SS	57	
S. Virginia/Damonte Ranch (Time Point)	1645	--	--	--	--	--	19.2	19.2
S. Virginia/Auto Center	1853	--	--	--	--	--	2.6	2.6
S. Virginia/(Winco Entrance) (Time Point)	1646	--	--	--	--	--	12	12
S. Virginia/Patriot	1647	--	--	--	--	--	2.2	2.2
S. Virginia/Longley	1648	--	--	--	--	--	2.5	2.5
Virginia/(Butcher Boy)	1478	--	--	--	--	--	7.6	7.6
Virginia/Green Acres	503	--	--	--	--	--	0.4	0.4
S. Virginia/Sierra Center Pkwy	1622	--	--	--	--	--	1.4	1.4
Virginia/Neil	493	--	--	--	--	--	0.5	0.5
Meadowood Mall Circle/Virginia	*1601*	--	--	--	--	--	*0.2*	*0.2*
Meadowood Mall (Time Point)	*30*	*724.8*	*288.7*	--	--	--	*0.2*	*1013.7*
Virginia/Meadwood Cir	506	--	20.6	--	--	--	--	20.6
Virginia/Meadowood Mall Way	1411	--	22.5	--	--	--	--	22.5
Virginia/Meadowood Mall Way	1991	103.6	--	--	--	--	--	103.6
Virginia/Kietzke	99	--	38.4	--	--	--	--	38.4
Virginia/(Convention Ctr) (Time Point)	507	--	71.6	--	--	--	--	71.6
Virginia/Peckham (Time Point)	1950	365.9	--	--	--	--	--	365.9
Virginia/Moana	509	--	1.2	--	--	--	--	1.2
Virginia/Gentry	510	--	43	--	--	--	--	43
Virginia/(Peppermill)	45	346	122.3	--	--	--	--	468.3
Virginia/Grove (Heidi's)	46	--	8.2	--	--	--	--	8.2
Virginia/(Parklane) (Time Point)	1951	65.5	14.5	--	--	--	--	80
Virginia/Wells (Time Point)	48	--	78.8	--	--	--	--	78.8
Virginia/Holcomb	49	130.9	28.3	--	--	--	--	159.2
Virginia/Arroyo	50	--	10.2	--	--	--	--	10.2
Virginia/Vassar	51	--	6.9	--	--	--	--	6.9
Virginia/Center	52	--	13.7	--	--	--	--	13.7
Center/Burns	*1995*	*80.6*	--	--	--	--	--	*80.6*
Virginia/Taylor	53	--	16.8	--	--	--	--	16.8
Virginia/Thoma	1850	--	12.6	--	--	--	--	12.6
Virginia/California	55	--	31	--	--	--	--	31
Virginia/Liberty	56	--	4.9	--	--	--	--	4.9
Center/Liberty	*1996*	*86.2*	--	--	--	--	--	*86.2*
Center/Ryland (Library)	*57*	--	*8.7*	--	--	--	--	*8.7*
Center/State	*58*	--	*15.1*	--	--	--	--	*15.1*
Center/1st To 2nd (Cal-Neva Parki	*59*	--	*5.8*	--	--	--	--	*5.8*
RTC 4th Street Station	*1972*	*1.9*	*4.6*	*746.2*	*133.9*	--	--	*886.6*
Virginia/2nd (East) FS	1817	--	--	--	--	63.5	--	63.5
Virginia/Plaza	1795	--	--	--	--	29.9	--	29.9
Virginia/4th	1796	--	--	--	--	1.2	--	1.2
Virginia/5th	1797	--	--	--	--	49.6	--	49.6
Virginia/6th	1798	--	--	--	--	23.2	--	23.2
Virginia/7th	338	--	--	17.2	--	--	--	17.2
Virginia/9th	339	--	--	0	--	12.9	--	12.9
Virginia/Artemesia	340	--	--	8.1	--	7.3	--	15.4
Virginia/College	341	--	--	7.5	--	3.6	--	11.1
Virginia/15th	342	--	--	16.3	--	5.6	--	21.9
Virginia/(Planetarium)	343	--	--	2.5	--	10.6	--	13.1
Virginia/17th (East)	1800	--	--	4.9	--	4.6	--	9.5
Evans/7th	677	--	--	--	2.5	--	--	2.5
Evans/9th	678	--	--	--	1.2	--	--	1.2
Highland/Evans	1660	--	--	--	0.2	--	--	0.2
Total		1905.4	868.4	802.7	137.7857	212	48.8	3975.1
Percent of Total		47.9%	21.8%	20.2%	3.5%	5.3%	1.2%	

Figure A: Virginia Street Corridor Average Weekday Boarding by Route / Hour

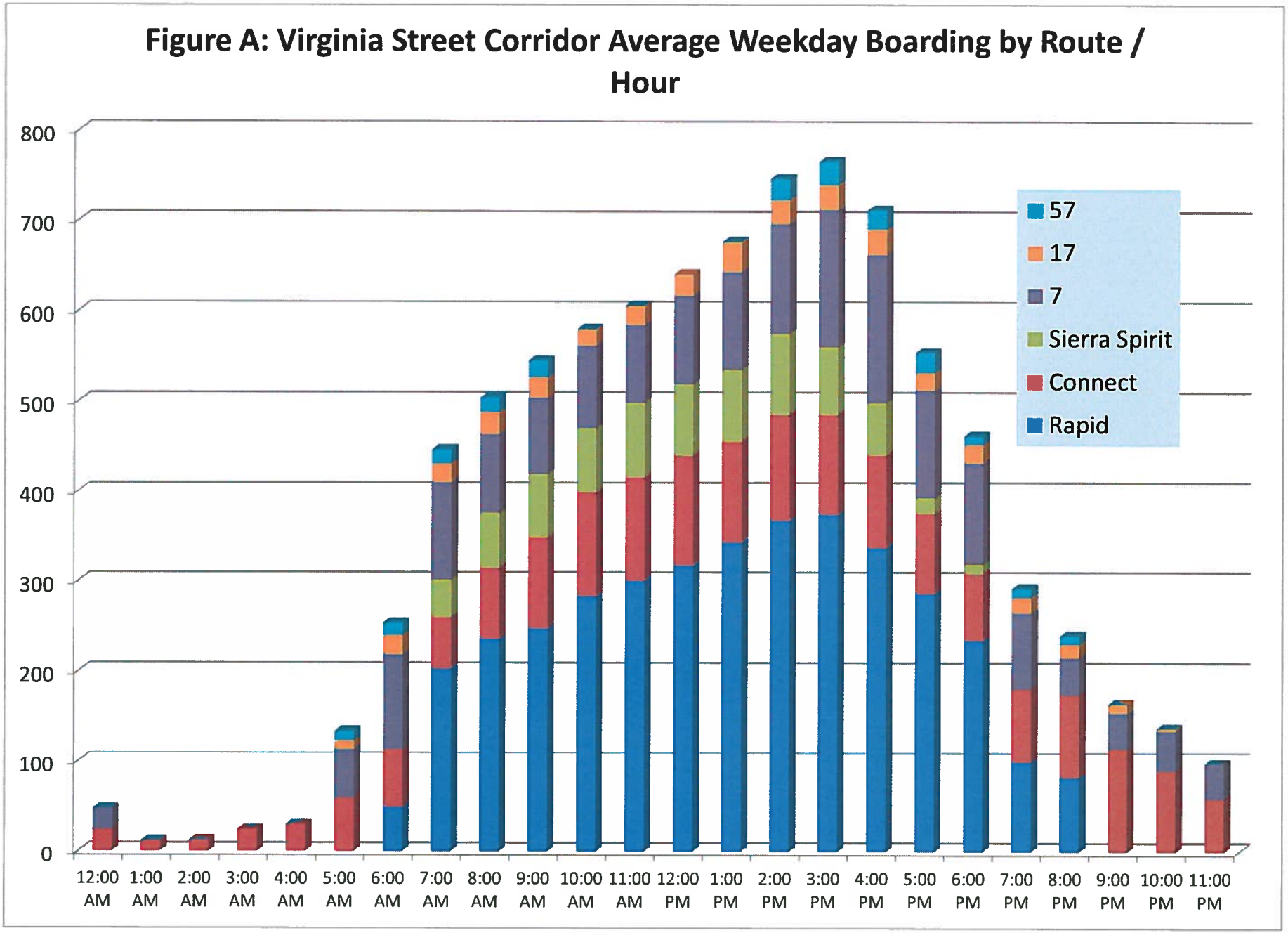


TABLE E: Average Weekday Boarding by Hour by Route -- Virginia Street Corridor

	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Total
Northbound																									
RAPID	--	--	--	--	--	--	10.9	118.4	113.1	108.5	125.5	136.4	154.9	174.0	179.5	200.9	176.9	145.2	129.2	76.1	55.9	--	--	--	1905.4
CONNECT	1.2	5.4	6.1	16.1	6.1	30.3	31.2	35.8	35.5	43.1	54.6	56.5	53.5	53.1	51.6	51.4	42.4	39.5	34.0	27.7	48.8	67.5	46.5	30.5	868.4
Sierra Spirit	--	--	--	--	--	--	--	28.8	41.1	43.9	37.8	41.1	32.1	39.1	36.1	29.1	19.5	5.8	3.5	--	--	--	--	--	357.9
7	19.2	14.5	--	--	11.2	15.1	78.9	61.6	44.8	36.1	49.4	44.4	54.6	61.2	69.9	96.2	99.3	77.5	82.7	60.8	23.2	30.6	36.1	35.4	1102.7
17	0.0	0.0	0.0	0.0	0.0	2.9	7.3	6.1	8.4	7.5	6.6	8.6	8.2	18.6	15.1	15.5	16.8	12.1	14.0	9.7	7.7	5.6	0.0	0.0	170.7
57	--	--	--	--	--	2.7	2.2	3.7	4.4	4.0	0.0	0.0	0.0	0.0	5.4	7.2	6.1	5.7	1.7	2.7	3.0	--	--	--	48.8
Subtotal	20.4	19.9	6.1	16.1	17.3	51.0	130.5	254.4	247.3	243.1	273.9	287.0	303.3	346.0	357.6	400.3	361.0	285.8	265.1	177.0	138.6	103.7	82.6	65.9	4453.9
Southbound																									
RAPID	--	--	--	--	--	--	37.8	84.1	122.3	138.4	157.3	163.8	162.1	168.8	187.5	172.9	160.0	140.7	104.5	23.3	26.4	8.5	--	--	1858.4
CONNECT	22.8	6.6	6.6	8.4	23.9	28.9	33.0	20.5	43.1	57.6	60.6	58.0	68.7	58.5	66.2	59.4	60.3	49.4	40.1	53.3	42.5	46.4	43.3	28.1	986.2
Sierra Spirit	--	--	--	--	--	--	--	13.7	20.6	27.3	34.4	42.4	47.0	41.6	53.8	46.2	39.2	11.7	7.4	--	--	--	--	--	385.3
7	4.3	--	--	--	--	38.6	26.3	46.7	42.5	48.4	41.2	41.0	43.5	46.0	51.0	55.5	64.1	41.8	29.7	23.2	18.3	9.1	8.0	3.7	682.9
17	0.0	0.0	0.0	0.0	0.0	6.5	14.0	14.8	15.9	15.1	12.0	12.8	15.4	15.2	12.0	11.8	11.2	7.6	6.3	7.3	6.8	4.5	2.8	0.0	191.9
57	--	--	--	--	--	8.4	11.9	11.9	11.9	15.0	0.0	0.0	0.0	0.0	18.2	19.0	15.4	16.6	8.0	7.5	6.8	--	--	--	150.6
Subtotal	27.1	6.6	6.6	8.4	23.9	82.4	123.0	191.7	256.3	301.8	305.5	318.0	336.7	330.1	388.7	364.8	350.2	267.8	196.0	114.6	100.8	68.5	54.1	31.8	4255.3
Total Both Directions																									
RAPID	--	--	--	--	--	--	48.7	202.5	235.4	246.9	282.8	300.2	317.0	342.8	367.0	373.8	336.9	285.9	233.7	99.4	82.3	--	--	--	3763.8
CONNECT	24.0	12.0	12.7	24.5	30.0	59.2	64.2	56.3	78.6	100.7	115.2	114.5	122.2	111.6	117.8	110.8	102.7	88.9	74.1	81.0	91.3	113.9	89.8	58.6	1854.6
Sierra Spirit	--	--	--	--	--	--	--	42.5	61.7	71.2	72.2	83.5	79.1	80.7	89.9	75.3	58.7	17.5	10.9	--	--	--	--	--	743.2
7	23.5	--	--	--	--	53.7	105.2	108.3	87.3	84.5	90.6	85.4	98.1	107.2	120.9	151.7	163.4	119.3	112.4	84.0	41.5	39.7	44.1	39.1	1785.6
17	0.0	--	--	--	--	9.4	21.4	20.9	24.3	22.6	18.5	21.4	23.6	33.9	27.0	27.3	28.0	19.8	20.3	16.9	14.5	10.1	2.8	0.0	362.6
57	--	--	--	--	--	11.1	14.1	15.6	16.3	19.0	0.0	0.0	0.0	0.0	23.6	26.2	21.5	22.3	9.7	10.2	9.8	--	--	--	199.4
TOTAL	47.5	12.0	12.7	24.5	30.0	133.4	253.6	446.1	503.6	544.9	579.3	605.0	640.0	676.2	746.2	765.1	711.2	553.7	461.1	291.5	239.4	163.7	136.7	97.7	8709.2

TABLE F: Average Daily RTC Passenger Boardings in UNR Area

Stops in Area Bounded by Virginia Street, McCarren Blvd North, Evans Avenue and I-80

Stop	Route 7	Route 17	Route Sierra Spirit	Total
Southbound	--	0.4	--	0.4
Highland/Evans	--	1.3	--	1.3
Evans/9th	--	2.9	--	2.9
Virginia/17th	8.6	--	--	8.6
Virginia/(Planetarium)	3.9	--	--	3.9
Virginia/15th	12.0	--	--	12.0
Virginia/College	8.0	--	19.9	27.9
Virginia/Artemesia (West)	22.4	--	41.8	64.2
Virginia/10th	9.6	--	23.9	33.5
Virginia/8th (West)	--	--	51.4	51.4
Northbound				
Virginia/9th	0.0	--	12.9	12.9
Virginia/Artemesia	8.1	--	7.3	15.4
Virginia/College	7.5	--	3.6	11.1
Virginia/15th	16.3	--	5.6	21.9
Virginia/(Planetarium)	2.5	--	10.6	13.1
Virginia/17th (East)	4.9	--	4.6	9.5
Evans/9th	--	1.2	--	1.2
Highland/Evans	--	0.2	--	0.2
TOTAL	103.8	6.0	181.6	291.4
Percent of Total	36%	2%	62%	100%

TABLE G: RTC Passenger Trip Purpose

Route / Trip Purpose	Origin#	Destination#	Origin%	Destination%	% Excluding "Home"
RAPID					
Home	524	276	59.7%	31.5%	
Work	135	205	15.4%	23.4%	35.6%
Univ. Nevada - Reno	31	33	3.5%	3.8%	6.7%
Other school	38	46	4.3%	5.2%	8.8%
Recreation	24	54	2.7%	6.2%	8.2%
Shopping	44	90	5.0%	10.3%	14.0%
Medical Visit	16	28	1.8%	3.2%	4.6%
Other	65	145	7.4%	16.5%	22.0%
CONNECT					
Home	288	154	58.4%	31.5%	
Work	83	119	16.8%	24.3%	37.4%
Univ. Nevada - Reno	7	2	1.4%	0.4%	1.7%
Other school	39	24	7.9%	4.9%	11.7%
Recreation	10	21	2.0%	4.3%	5.7%
Shopping	20	58	4.1%	11.9%	14.4%
Medical Visit	9	17	1.8%	3.5%	4.8%
Other	37	94	7.5%	19.2%	24.3%
Sierra Spirit					
Home	124	45	50.0%	18.2%	
Work	12	15	4.8%	6.1%	8.3%
Univ. Nevada - Reno	64	71	25.8%	28.7%	41.4%
Other school	5	9	2.0%	3.6%	4.3%
Recreation	17	28	6.9%	11.3%	13.8%
Shopping	11	26	4.4%	10.5%	11.3%
Medical Visit	2	8	0.8%	3.2%	3.1%
Other	13	45	5.2%	18.2%	17.8%

APPENDIX A

Detailed Route Ridership Data

RAPID Average Weekday Boarding by Stop and Hour

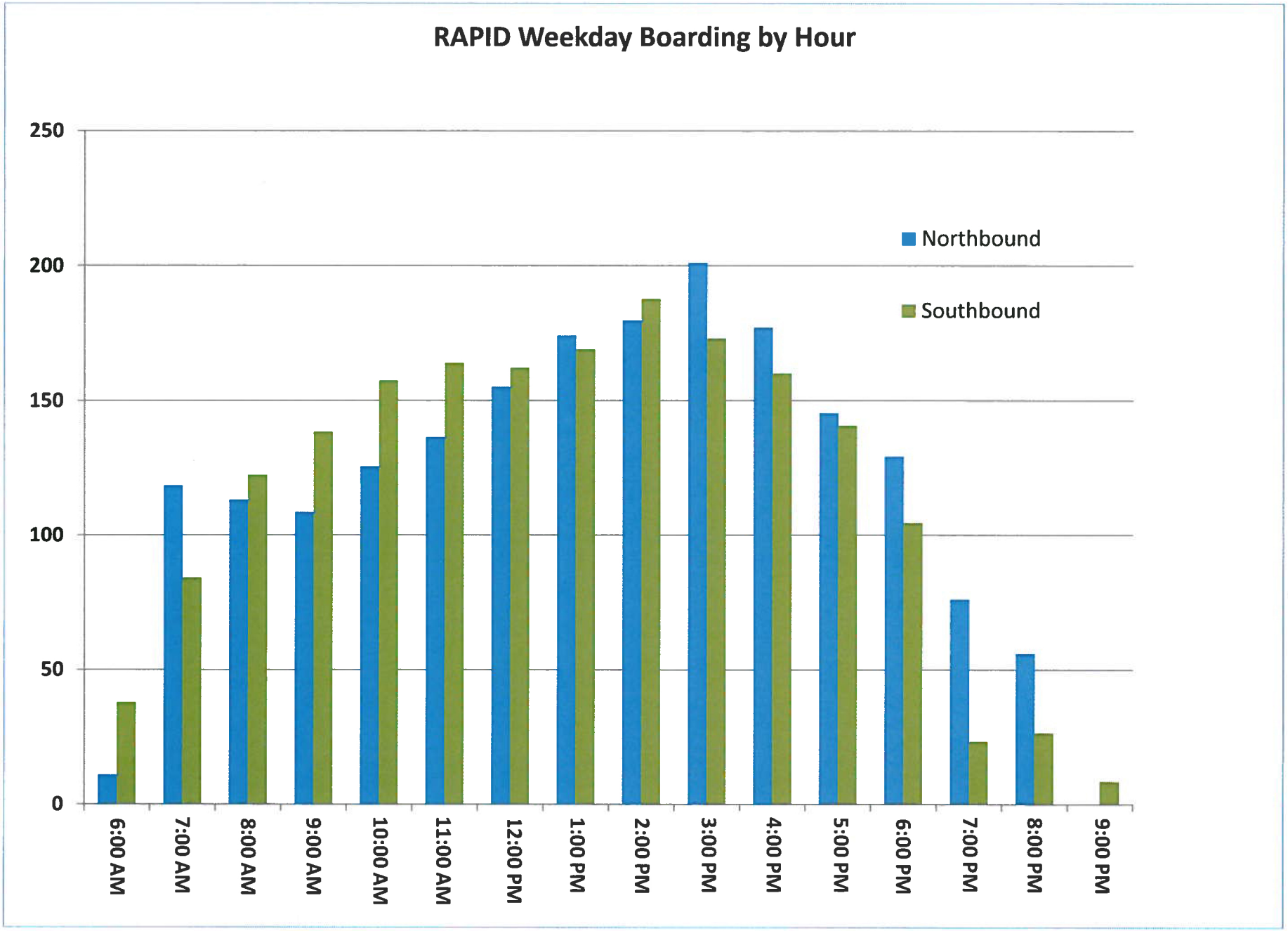
		Hour Beginning																			
		6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Total Daily	% of Directional Boardings
Northbound																					
001	30 MEADOWOOD MALL (Time Point)	1.2	44.8	40.4	36.7	38.2	51.1	60.5	62.4	63.5	81.0	73.0	60.0	56.5	31.4	24.1	--	--	--	724.8	38%
002	1991 Virginia/Meadowood Mall Way	0.0	3.0	1.3	5.0	5.6	6.6	9.9	10.3	10.5	11.1	7.6	12.4	10.4	6.4	3.5	--	--	--	103.6	5%
003	1950 Virginia/Peckham (Time Point)	1.2	17.0	17.7	17.3	22.6	24.5	30.5	36.5	42.2	40.4	36.4	26.8	25.6	14.8	12.4	--	--	--	365.9	19%
004	45 VIRGINIA/(PEPPERMILL)	1.9	26.9	24.9	20.9	25.5	24.1	26.0	30.5	28.9	34.7	31.8	26.6	18.2	15.2	9.9	--	--	--	346.0	18%
005	1951 Virginia/(Parklane) (Time Point)	1.7	4.1	6.4	5.9	4.9	3.0	2.5	5.8	7.2	4.2	6.7	4.5	4.8	1.9	1.9	--	--	--	65.5	3%
006	49 VIRGINIA/HOLCOMB	1.4	8.8	9.8	7.6	13.8	11.1	9.4	11.2	11.2	15.8	9.5	8.6	6.8	3.7	2.2	--	--	--	130.9	7%
007	1995 Center/Burns	3.0	8.9	6.6	7.3	9.1	6.2	7.2	7.8	7.8	4.0	3.8	2.5	3.3	1.6	1.5	--	--	--	80.6	4%
008	1996 Center/Liberty	0.5	4.9	6.0	7.8	5.8	9.8	8.9	9.5	8.2	9.7	8.1	3.8	2.3	0.5	0.4	--	--	--	86.2	5%
009	1972 Bay L 4SS (RAPID) (Time Point)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.6	0.0	--	--	--	1.9	0%
Total		11	118	113	109	126	136	155	174	180	201	177	145	129	76	56	--	--	--	1905.4	100%
Southbound																					
001	1972 Bay L 4SS (RAPID) (Time Point)	29.5	67.1	92.0	96.6	109.4	116.9	111.4	119.4	133.4	120.0	109.0	102.9	76.7	15.8	18.8	6.9	--	--	1325.8	71%
002	1993 Virginia/California	1.0	4.0	11.1	14.5	18.5	15.2	13.7	14.1	17.1	11.8	14.3	10.8	8.0	1.8	1.5	0.5	--	--	157.9	8%
003	7 VIRGINIA/MARY	2.2	2.8	4.0	3.5	4.4	4.4	3.4	3.6	4.6	3.9	4.9	4.0	3.4	0.7	0.4	0.2	--	--	50.4	3%
004	9 VIRGINIA/MT. ROSE	0.6	1.9	3.9	4.6	5.8	4.8	6.8	7.1	7.2	7.6	6.9	5.5	4.5	1.1	0.4	0.1	--	--	68.8	4%
005	1948 Virginia/Orchard Plaza (Time Point)	1.0	2.4	2.6	3.8	3.4	4.9	4.4	4.2	3.5	4.5	2.7	3.2	2.0	0.9	0.7	0.1	--	--	44.3	2%
006	15 VIRGINIA/BRINKBY	1.5	4.5	4.7	9.3	6.6	9.6	11.0	9.3	9.8	13.1	12.4	7.1	4.1	1.6	2.5	0.5	--	--	107.6	6%
007	1949 Virginia/Peckham (NS) (Time Point)	2.0	1.4	3.7	5.6	7.5	6.7	10.0	8.7	9.3	10.0	8.8	6.0	4.7	1.0	0.2	0.1	--	--	85.7	5%
008	1412 Virginia/(Best Buy)	0.0	0.0	0.3	0.5	1.7	1.3	1.4	2.4	2.6	2.0	1.0	0.9	0.7	0.4	0.5	0.0	--	--	15.7	1%
009	30 MEADOWOOD MALL (Time Point)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.0	1.4	0.1	--	--	2.2	0%
Total		37.8	84.1	122.3	138.4	157.3	163.8	162.1	168.8	187.5	172.9	160.0	140.7	104.5	23.3	26.4	8.5	--	--	1858.4	100%

Source: RTC ridership data for weeks of 10/1/12 and 10/8/12

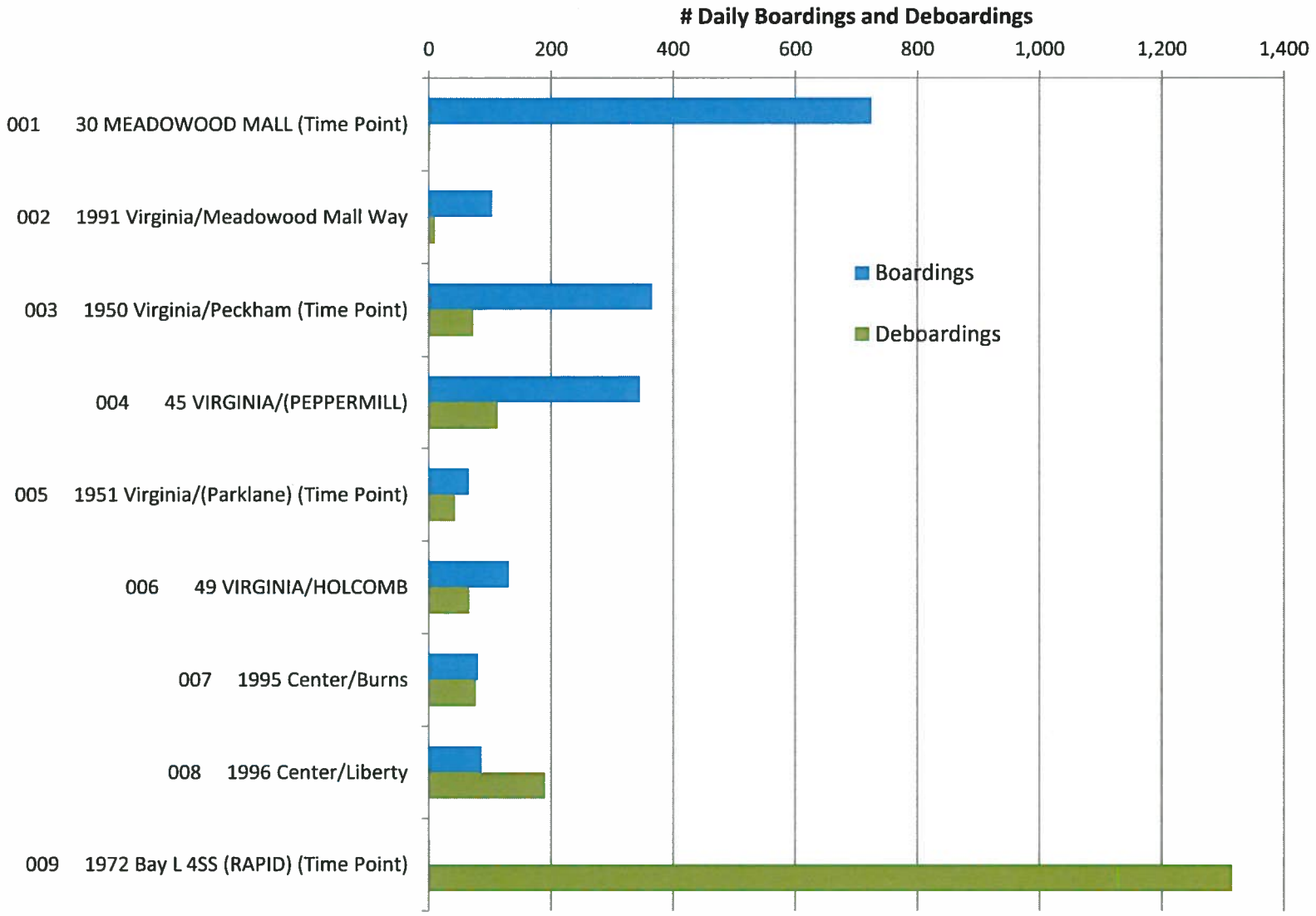
RAPID Average Weekday Alighting by Stop and Hour

		Hour Beginning																	
		6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	Total	% of Directional Alightings
Northbound																			
001	30 MEADOWOOD MALL (Time Point)	0.0	0.1	0.7	0.0	0.2	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	2.5	0%
002	1991 Virginia/Meadowood Mall Way	0.0	0.1	0.2	0.5	0.2	0.9	1.4	1.0	1.9	0.8	0.7	1.5	0.6	0.8	0.0	--	10.6	1%
003	1950 Virginia/Peckham (Time Point)	0.3	3.9	2.7	6.3	4.8	5.3	7.4	9.5	5.2	6.9	8.2	5.5	4.2	1.4	1.5	--	73.1	4%
004	45 VIRGINIA/(PEPPERMILL)	0.8	6.6	5.2	4.2	4.3	7.9	8.1	11.2	11.4	13.9	10.9	11.0	9.4	5.0	3.2	--	113.1	6%
005	1951 Virginia/(Parklane) (Time Point)	0.2	1.3	2.7	2.0	2.2	4.0	5.6	3.5	3.8	3.8	4.0	4.4	3.4	1.5	0.9	--	43.3	2%
006	49 VIRGINIA/HOLCOMB	0.0	3.5	3.7	5.8	5.2	4.4	4.8	5.3	9.1	6.3	5.9	5.2	2.8	3.1	1.2	--	66.3	4%
007	1995 Center/Burns	0.9	3.1	6.1	5.0	5.7	5.0	4.1	5.6	6.5	6.3	7.3	6.3	8.6	4.3	2.6	--	77.4	4%
008	1996 Center/Liberty	1.3	6.6	12.5	13.5	16.7	15.7	16.2	19.7	18.1	19.0	15.2	12.7	11.4	6.5	5.0	--	190.1	10%
009	1972 Bay L 4SS (RAPID) (Time Point)	15.7	89.9	79.2	73.5	92.7	90.1	102.5	117.7	122.1	143.5	127.5	94.0	82.8	47.5	36.2	--	1314.9	70%
Total		19.2	115.1	113.0	110.8	132.0	133.3	151.6	173.5	178.1	200.5	179.7	140.6	123.2	70.1	50.6	--	1891.3	100%
Southbound																			
001	1972 Bay L 4SS (RAPID) (Time Point)	0.7	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0%
002	1993 Virginia/California	0.3	2.4	6.7	12.2	8.7	10.1	10.3	11.8	10.8	9.6	8.5	7.1	7.6	0.4	1.0	0.4	107.9	6%
003	7 VIRGINIA/MARY	0.7	0.5	2.5	2.7	3.7	4.4	4.3	4.7	4.7	5.1	6.2	4.1	3.8	0.4	0.4	0.4	48.6	3%
004	9 VIRGINIA/MT. ROSE	1.3	3.7	9.4	7.2	9.7	8.3	8.9	9.1	8.3	8.5	10.8	9.1	6.7	0.4	0.7	0.3	102.4	6%
005	1948 Virginia/Orchard Plaza (Time Point)	1.6	2.0	4.6	5.1	6.8	5.7	3.7	7.0	6.4	6.6	7.3	7.0	7.0	1.2	1.1	0.2	73.3	4%
006	15 VIRGINIA/BRINKBY	6.8	26.1	14.7	16.3	22.0	23.3	20.8	20.8	24.9	24.3	23.1	22.5	16.6	4.8	3.9	1.6	272.5	15%
007	1949 Virginia/Peckham (NS) (Time Point)	5.6	14.6	20.2	24.5	26.9	31.5	29.4	32.7	29.2	26.3	23.4	21.1	12.0	3.9	3.2	1.8	306.3	17%
008	1412 Virginia/(Best Buy)	1.4	3.6	10.0	13.6	18.0	17.0	12.1	10.5	13.1	13.8	11.4	10.0	6.1	1.9	1.6	0.3	144.4	8%
009	30 MEADOWOOD MALL (Time Point)	21.3	37.3	47.1	48.7	57.2	55.3	57.2	62.7	77.3	68.6	61.9	51.0	37.9	9.8	10.8	1.5	705.6	40%
Total		39.7	92.8	115.2	130.3	153.0	155.6	146.7	159.3	174.7	162.8	152.6	131.9	97.7	22.8	22.7	6.5	1764.3	100%

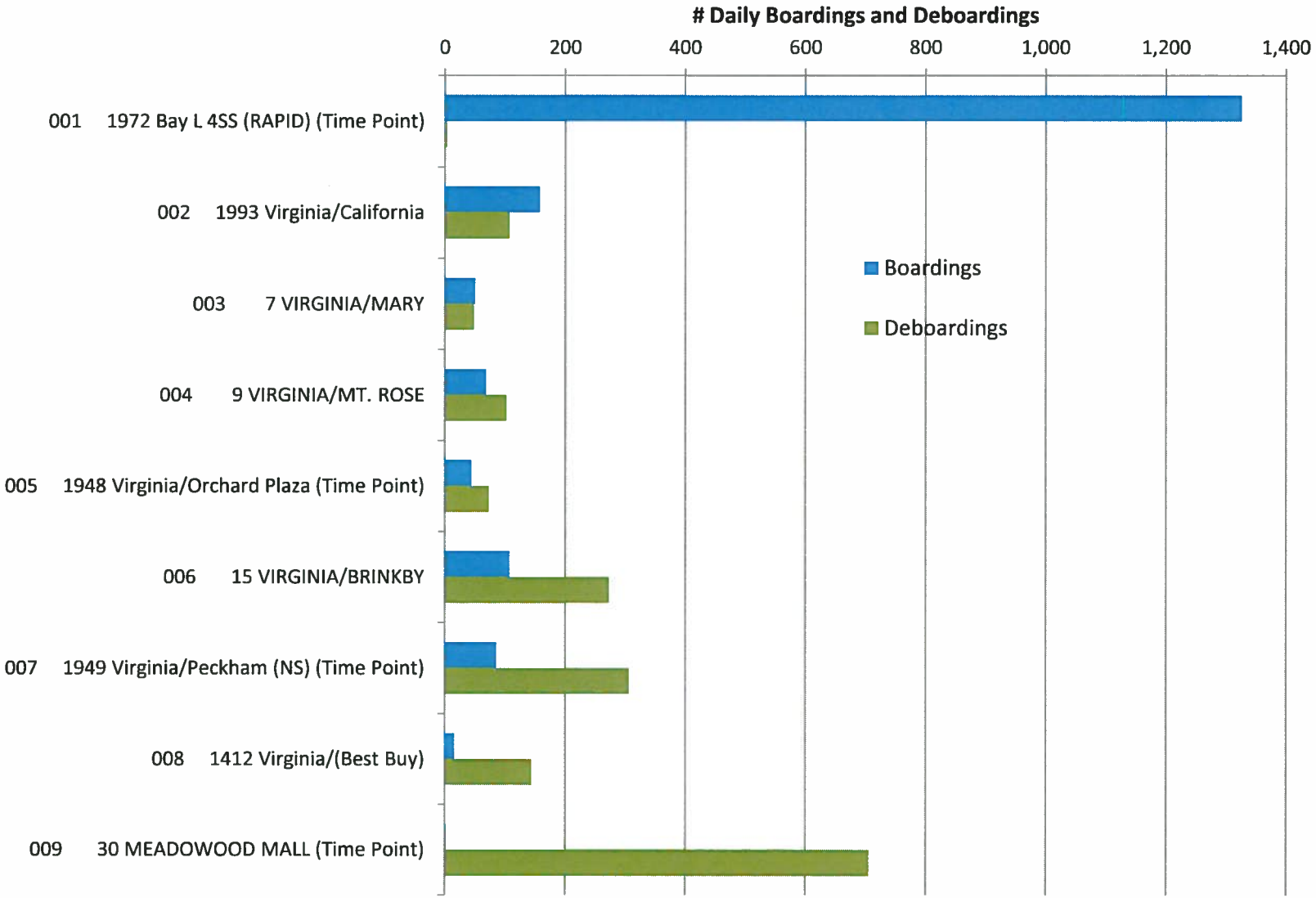
Source: RTC ridership data for weeks of 10/1/12 and 10/8/12

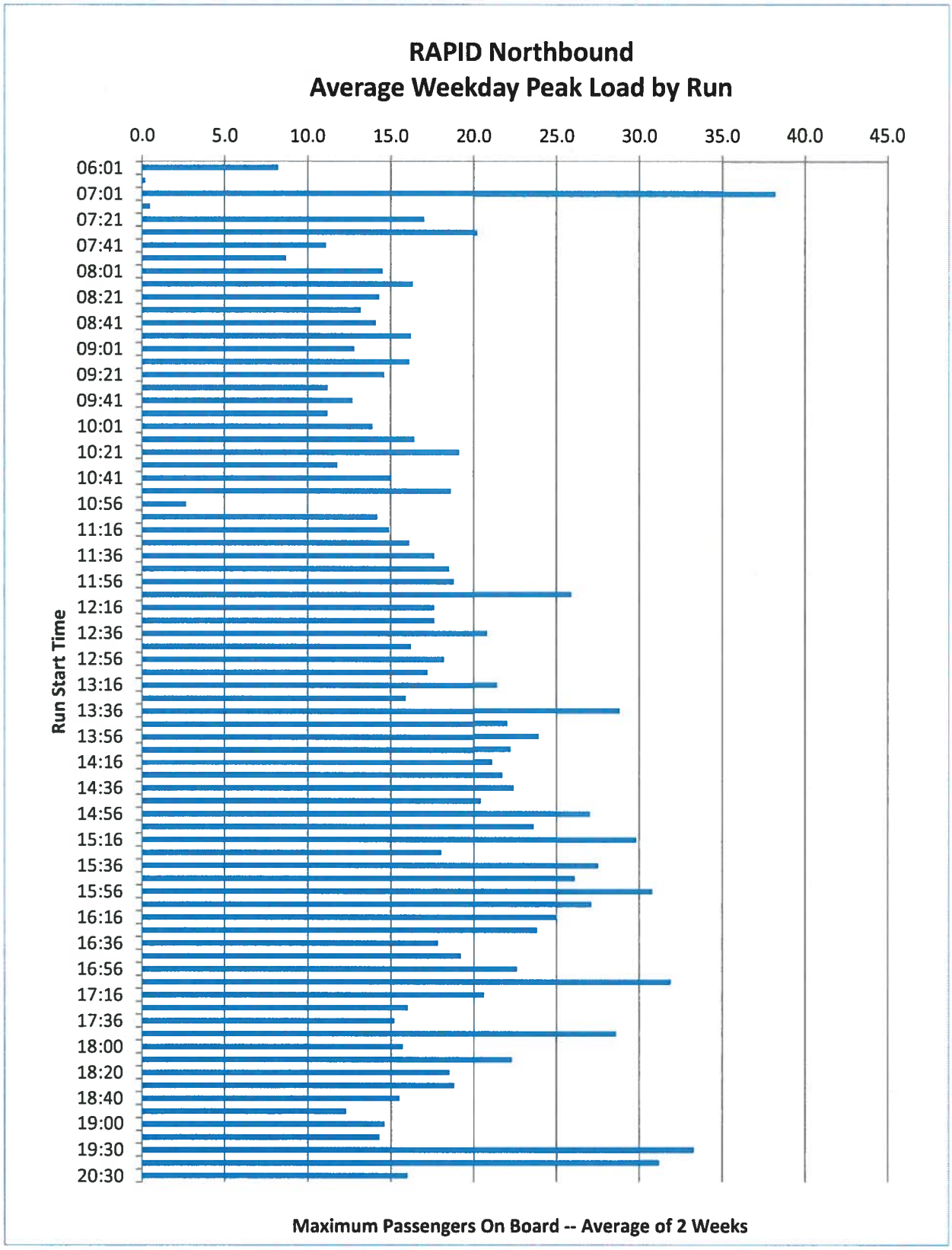

RAPID Weekday Boarding by Hour
250
200
150
100
50
0
Northbound
Southbound
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM

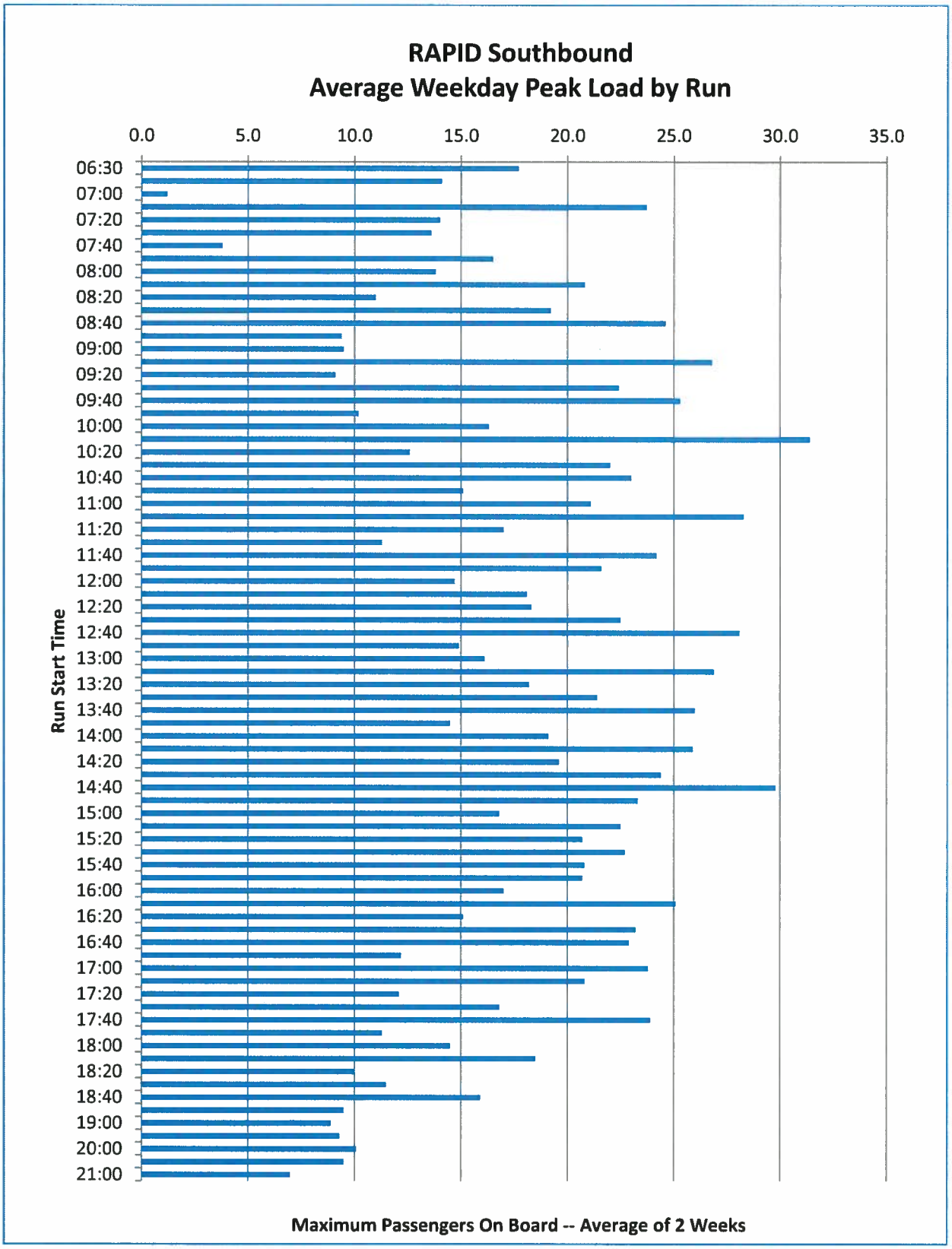
RAPID Average Weekday Passenger Activity by Stop -- Northbound



RAPID Average Weekday Passenger Activity by Stop -- Southbound




RAPID Northbound
Average Weekday Peak Load by Run
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
Run Start Time
06:01
07:01
07:21
07:41
08:01
08:21
08:41
09:01
09:21
09:41
10:01
10:21
10:41
10:56
11:16
11:36
11:56
12:16
12:36
12:56
13:16
13:36
13:56
14:16
14:36
14:56
15:16
15:36
15:56
16:16
16:36
16:56
17:16
17:36
18:00
18:20
18:40
19:00
19:30
20:30
Maximum Passengers On Board -- Average of 2 Weeks


RAPID Southbound
Average Weekday Peak Load by Run
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Run Start Time
06:30
07:00
07:20
07:40
08:00
08:20
08:40
09:00
09:20
09:40
10:00
10:20
10:40
11:00
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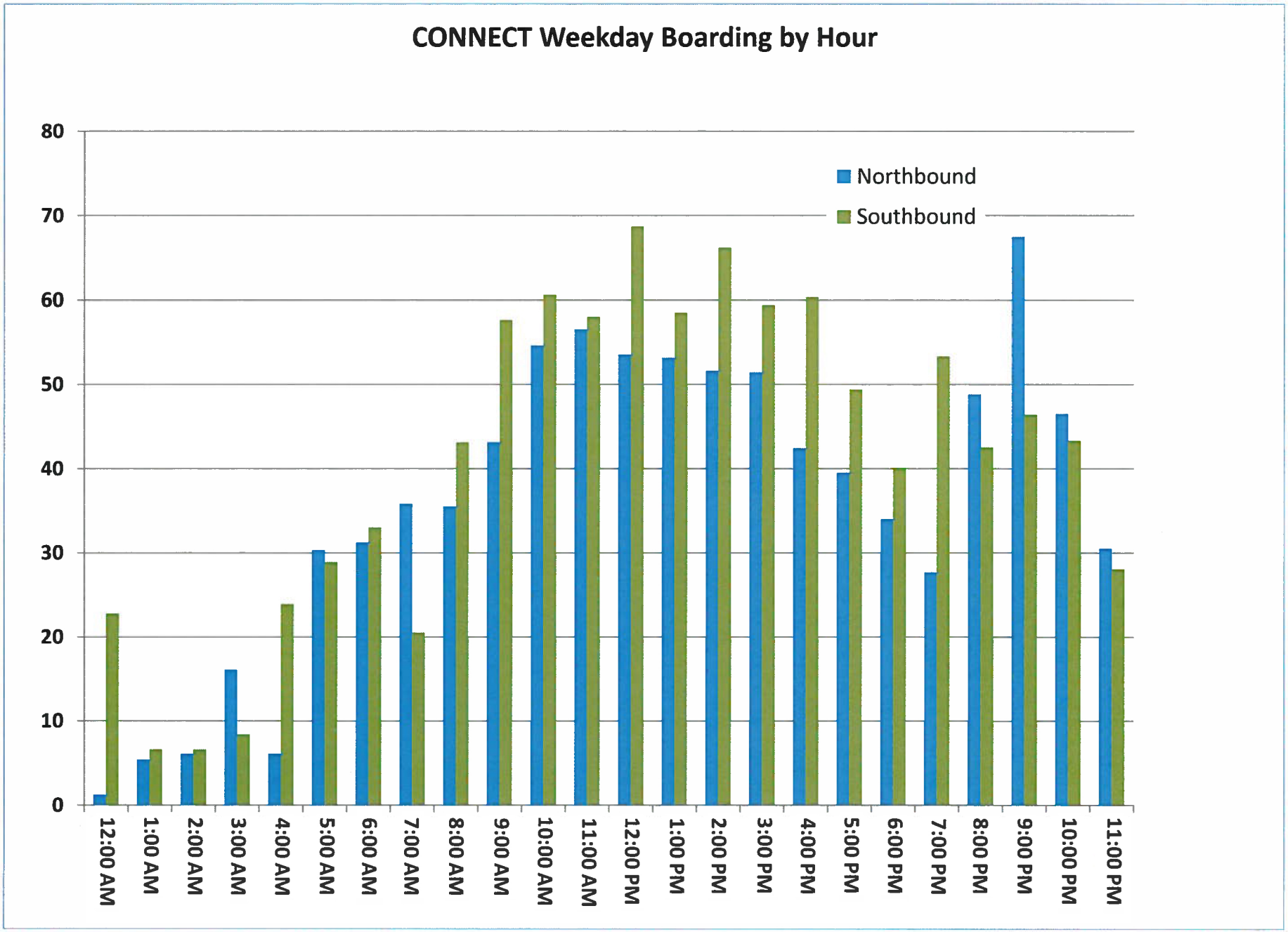
16:00
16:20
16:40
17:00
17:20
17:40
18:00
18:20
18:40
19:00
20:00
21:00
Maximum Passengers On Board -- Average of 2 Weeks

CONNECT Average Weekday Boarding by Stop and Hour

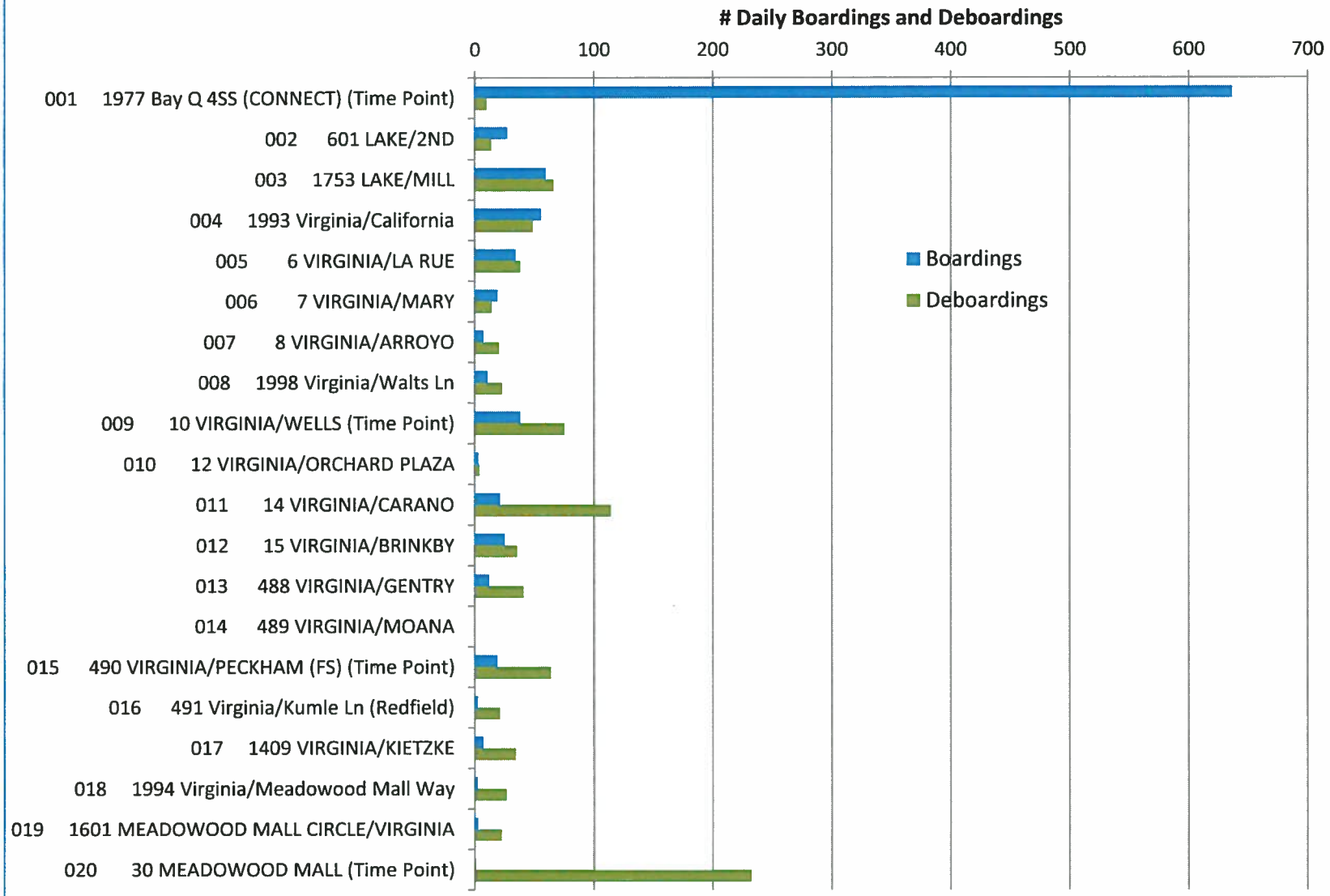
		Hour Beginning																								
		12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Total	Percent of Directional Boardings
Northbound																										
001	30 MEADOWOOD MALL (Time Point)	0	2.6	2.2	12.9	1.3	7	4.4	10.6	12.1	13.9	15	16.4	18.5	12.9	17.6	15.2	15.6	15.5	16.5	9.8	17	31.6	14.4	5.7	288.7	33.2%
002	506 VIRGINIA/MEADWOOD CIR	0	0.1	0	0	0	0.1	0.5	0.2	0.2	0.8	1.2	0.8	0.6	1.2	2.6	1.3	1.9	2.3	0.5	0.8	2.3	2.1	1.1	0	20.6	2.4%
003	1411 VIRGINIA/MEADOWOOD MALL WAY	0	0	0.1	0	0.1	0	0.1	0	0.4	1.1	3.1	0.6	1.1	1.4	1.2	0.5	1.8	2.4	0.7	1.7	0.6	4.5	1.1	0	22.5	2.6%
004	99 VIRGINIA/KIETZKE	0	0.1	0.1	0.1	0.1	1.5	0.5	2.1	1	0.7	3.2	4.1	3.6	3.3	2.8	3.4	2.2	2.6	1.9	0.7	2.3	1.2	0.6	0.3	38.4	4.4%
005	507 VIRGINIA/(CONVENTION CTR) (Time Point)	0.3	0.1	0.3	0.7	0.4	2.6	1.3	1.9	2	1.1	2.9	3.5	2	3.9	4.2	3	3.4	3.6	3.1	5.1	6.1	6.3	8.1	5.7	71.6	8.2%
006	509 VIRGINIA/MOANA	0	0.5	0	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0	0	0.1	0	0	0.1	0	0.2	1.2	0.1%
007	510 VIRGINIA/GENTRY	0	0.5	0.1	0.1	0.1	1.5	5.2	2.9	2.3	0.9	2.1	1.7	2.2	3.7	1.8	3.9	2.7	1.1	1.2	0.3	1.1	4.3	1.9	1.4	43	5.0%
008	45 VIRGINIA/(PEPPERMILL)	0.4	1	2.7	1.6	1.2	11.1	5.7	5	5.6	3.8	5.4	5.1	5	6.2	4.9	6.2	3.4	3.1	2.4	3.5	10.1	8.3	11.2	9.4	122.3	14.1%
009	46 VIRGINIA/GROVE (HEIDI'S)	0	0	0	0.1	0.8	1.2	0.5	0.3	0.2	0.2	0.6	0.8	0.4	0.1	0.4	0.7	0.1	0.5	0.1	0.2	0.2	0.3	0.4	0.1	8.2	0.9%
010	1951 Virginia/(Parklane)	0	0	0	0	0.5	0.6	2.7	1.2	0.3	1	0.4	1.1	0.4	1	0.4	0.5	0.6	0.6	0.4	0.7	0.5	0.5	0.7	0.4	14.5	1.7%
011	48 VIRGINIA/WELLS (Time Point)	0	0.2	0.2	0.3	0.4	0.8	3.3	1.9	2.2	6.6	8.2	8.3	7.1	7.2	6	6.3	3.4	3.5	3.8	2.2	2.8	1.8	0.9	1.4	78.8	9.1%
012	49 VIRGINIA/HOLCOMB	0.3	0	0.3	0	0	0.4	2	2.2	0.8	1.9	1.4	3.7	2.4	1.1	1.5	1.6	1.4	0.3	0.7	0.6	2.1	2.4	1.1	0.1	28.3	3.3%
013	50 VIRGINIA/ARROYO	0	0	0	0	0.1	0	0.4	0.5	0.3	0.6	0.5	1.2	0.6	1.3	0.6	1.2	0.2	0.6	0.2	0.3	0.5	0.7	0.4	0	10.2	1.2%
014	51 VIRGINIA/VASSAR	0	0	0	0	0	0	0	0	0.3	1.1	0.3	1.1	0.4	0.7	0.8	0.7	0.4	0	0	0.1	0	0.4	0.5	0.1	6.9	0.8%
015	52 VIRGINIA/CENTER	0.2	0.1	0	0.2	0.5	1.4	0.7	0.2	0.3	0.3	0.5	0.1	0.6	4	0.6	0.3	0.3	0.3	0.1	0.4	0.3	0.6	1.2	0.5	13.7	1.6%
016	53 VIRGINIA/TAYLOR	0	0	0	0.1	0.6	0.9	1.8	0.3	2	1.7	1.3	1.1	0.6	0.8	0.5	2	0.8	0.2	0.2	0.3	0.1	0.6	0.7	0.2	16.8	1.9%
017	1850 VIRGINIA/THOMA	0	0	0	0	0	0	0.4	0.7	1.1	2	1.6	1.3	2.3	0.4	0.6	0.2	0.5	0.1	0.5	0.1	0.1	0.3	0.2	0.2	12.6	1.5%
018	55 VIRGINIA/CALIFORNIA	0	0.1	0	0	0	0.7	0.7	3.4	2.3	2.8	3.3	2.4	3.4	1.7	2.1	2	1.1	1.6	0.9	0.5	1	0.5	0.5	0	31	3.6%
019	56 VIRGINIA/LIBERTY	0	0	0	0	0	0.2	0.2	0	0.2	0	0.1	0	0.2	0.3	0	0.4	0.9	0.3	0.1	0.3	0.7	0.4	0.6	0	4.9	0.6%
020	57 CENTER/RYLAND (Library)	0	0	0	0	0	0.1	0.1	0.2	0.6	0.8	0.9	0.9	0.6	1.3	1.2	0.6	0.7	0.4	0	0.1	0.2	0	0	0	8.7	1.0%
021	58 CENTER/STATE	0	0.1	0.1	0	0	0.2	0.1	1.5	1.2	1.8	1.6	1.8	0.8	0.6	1.3	1.1	0.8	0.4	0.3	0	0.4	0.2	0.6	0.2	15.1	1.7%
022	59 CENTER/1ST TO 2ND (CAL-NEVA PARKI	0	0	0	0	0	0	0.6	0.7	0.1	0	1	0.5	0.5	0	0.4	0.3	0.2	0.1	0.3	0	0.4	0.4	0.3	0	5.8	0.7%
023	1977 Bay Q 4SS (CONNECT) (Time Point)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.6	4.6	0.5%
Total		1.2	5.4	6.1	16.1	6.1	30.3	31.2	35.8	35.5	43.1	54.6	56.5	53.5	53.1	51.6	51.4	42.4	39.5	34	27.7	48.8	67.5	46.5	30.5	868.4	100.0%
Southbound																										
001	1977 Bay Q 4SS (CONNECT) (Time Point)	16.8	5.4	5	5.7	15.7	20	26.6	15.3	30.4	35.5	36	35.4	43.7	34.8	40	35	37.8	27.3	22.1	34.4	30.9	27.6	33.9	21.1	636.4	64.5%
002	601 LAKE/2ND	0.7	0.1	0.1	0	0	0.6	0.5	0.3	0.4	1	0.6	1.5	2	2.3	1.5	2.3	1.6	2.4	2.1	2.6	1.1	0.6	0.6	2.5	27.4	2.8%
003	1753 LAKE/MILL	0.6	0.1	0.3	0.1	1.6	1.3	1	0.7	3.4	4.5	5.4	4.2	4.2	2.5	4	3.2	3.5	4.9	3.3	2.1	1.8	4.4	2	0.8	59.9	6.1%
004	1993 Virginia/California	0.3	0.7	0.1	1.7	0.8	1.7	1.5	1.1	2	5.5	3.9	3.6	5.2	4.6	3.7	2.9	3.1	2.2	2.1	3.7	1.5	2.6	1.3	0.1	55.9	5.7%
005	6 VIRGINIA/LA RUE	0.2	0	0.7	0	0.5	0.4	0.8	0.7	2.2	2.2	3.2	1.9	2.5	1.8	3	4.5	1.8	2.3	1.6	1.2	0.7	2.1	0.1	0	34.4	3.5%
006	7 VIRGINIA/MARY	0.2	0	0	0	0.8	1.5	0.2	0.2	1.3	1.1	0.8	0.6	1.5	1.8	0.9	1.3	0.9	0.5	1.4	0.9	0.6	1.2	0.4	1.3	19.4	2.0%
007	8 VIRGINIA/ARROYO	0.1	0	0	0	0	0.2	0.3	0	0.4	0.6	0.8	0.7	0.8	0.1	0.6	0.3	0.7	0.1	1	0.3	0.2	0	0.1	0	7.3	0.7%
008	1998 Virginia/Walts Ln	0	0	0	0	0	0.2	0	0.1	0	0.6	0.5	1.2	0.3	0.9	1.6	1.2	0.5	0.7	0.9	0.8	0.7	0.4	0.3	0	10.9	1.1%
009	10 VIRGINIA/WELLS (Time Point)	0	0	0	0	0.6	0.6	0.3	0.4	1	1.4	2.1	2.5	2.1	3.2	5.1	3.2	4.9	4.3	2.1	2.3	0.5	0.7	1	0.1	38.4	3.9%
010	12 VIRGINIA/ORCHARD PLAZA	0	0	0	0	0.4	0.4	0	0	0	0	0.2	0.1	0	0.3	0.4	0	0.3	0	0.1	0	0.1	0.6	0.3	0	3.2	0.3%
011	14 VIRGINIA/CARANO	0.9	0.2	0.2	0.7	0.8	0.8	0.4	0.1	0.6	1.5	2	2	1.5	1.5	1.4	2.3	1.3	0.4	0.9	0.7	0.1	0.3	0.2	0.4	21.2	2.1%
012	15 VIRGINIA/BRINKBY	0.6	0	0.1	0	0.2	0.7	1.3	0.7	0.9	1.3	2.5	1.4	2	0.9	0.9	1.1	2.1	1.5	0.7	1.4	2.4	1.3	0.8	0.4	25.2	2.6%
013	488 VIRGINIA/GENTRY	0	0	0.1	0	2.4	0.2	0.1	0.6	0	0.8	0.5	1.2	0	0.3	0.6	0.9	0.2	0.5	0.7	0.7	0.5	1.2	0.3	0.1	11.9	1.2%
014	489 VIRGINIA/MOANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
015	490 VIRGINIA/PECKHAM (FS) (Time Point)	1.3	0	0	0.1	0.1	0.3	0	0.1	0.5	1.1	1.6	0.9	1.6	2	1.7	0.5	0.6	0.9	0.1	1.3	0.7	1.8	0.8	0.9	18.9	1.9%
016	491 Virginia/Kumle Ln (Redfield)	0.2	0	0	0	0	0	0	0.1	0	0.1	0	0.1	0.3	0.3	0.1	0	0.1	0.3	0	0	0	0.5	0.4	0	2.5	0.3%
017	1409 VIRGINIA/KIETZKE	0	0.1	0	0.1	0	0	0	0.1	0	0.4	0.3	0.4	0.7	0.9	0.5	0.4	0.6	0.5	0.5	0.7	0.4	0.3	0	0.2	7.1	0.7%
018	1994 Virginia/Meadowood Mall Way	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0.2	0.2	0.1	0.3	0.3	0	0.3	0.2	0.4	0	2.4	0.2%
019	1601 MEADOWOOD MALL CIRCLE/VIRGINIA	0	0	0	0	0	0	0	0	0	0	0.1	0.3	0.2	0.2	0	0.1	0.2	0.3	0	0.2	0	0.6	0.4	0.2	2.8	0.3%
020	30 MEADOWOOD MALL (Time Point)	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	1	0.1%
Total		22.8	6.6	6.6	8.4	23.9	28.9	33	20.5	43.1	57.6	60.6	58	68.7	58.5	66.2	59.4	60.3	49.4	40.1	53.3	42.5	46.4	43.3	28.1	986.2	100.0%

CONNECT Average Weekday Alightings by Stop and Hour

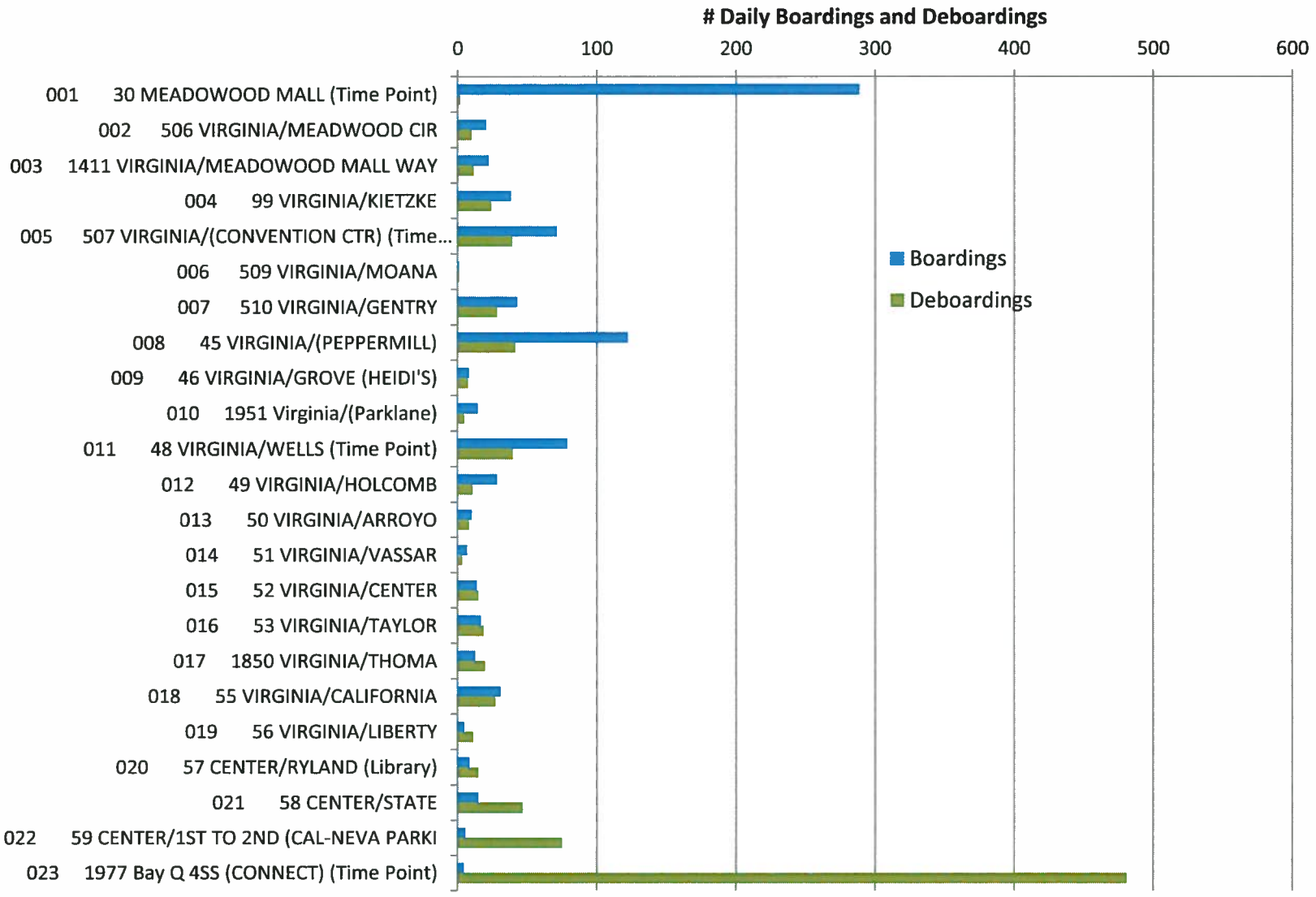
		Hour Beginning																								
		12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Total	Percent of Directional Alightings
Northbound																										
001	30 MEADOWOOD MALL (Time Point)	0	1.1	0	0	0	0	0	0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.2%
002	506 VIRGINIA/MEADWOOD CIR	0	0	0	0.3	0	0	0	0	0.1	0.6	1	1.4	0.3	1.5	1	0.7	1.2	0.9	0.1	0	0.4	0.3	0.1	0.4	10.3	1.1%
003	1411 VIRGINIA/MEADOWOOD MALL WAY	0	0	0	0.1	0	0	0.1	0	0.3	0.3	0.4	2.1	0.5	1	1.2	0.6	1.5	2.1	1	0.1	0.3	0.1	0	0	11.7	1.2%
004	99 VIRGINIA/KIETZKE	0	0.1	0	0	0	0	0.1	0.2	1	0.8	2.4	1.6	2.3	2.5	3.3	2.8	1.9	2	0.8	0	0.9	0.8	0.4	0.3	24.2	2.6%
005	507 VIRGINIA/(CONVENTION CTR) (Time Point)	0	0	0	0.2	0	0.1	1.1	0.9	1.4	0.5	3.7	4.3	1.9	3.4	6.1	2.2	1.5	2.9	1.8	3.5	0.8	1.4	0.8	0.9	39.4	4.2%
006	509 VIRGINIA/MOANA	0	0	0	0.3	0	0	0.3	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.5	0	1.3	0.1%
007	510 VIRGINIA/GENTRY	0	0	0.1	0	0	0.1	0	1.3	0.9	1.1	1.1	1.4	1.9	2.1	1.4	2.3	2.8	2.4	3.9	0.9	1.1	2.2	1.1	0.4	28.5	3.0%
008	45 VIRGINIA/(PEPPERMILL)	0.1	1.2	0.2	1.5	0	2.7	1.2	1.7	0.8	0.7	2	2.1	1.8	2.3	1.9	1.8	3.3	2.3	1.3	0.7	2.6	2.9	5	1.6	41.7	4.4%
009	46 VIRGINIA/GROVE (HEIDI'S)	0	0	0.1	0	0	0.1	0.3	0	0.2	0.1	0.3	0.1	0.2	0.7	0.3	0.6	0.2	0.8	0.5	1.4	0.3	0.8	0.3	0.2	7.5	0.8%
010	1951 Virginia/(Parklane)	0	0.1	0	0	0	0	0.2	0	0.1	0.1	0.9	0.3	0.4	0.4	0.1	0.1	0.5	0.2	0.3	0.1	0.1	0.2	0.6	0.1	4.8	0.5%
011	48 VIRGINIA/WELLS (Time Point)	0	0	0	0.2	0	0.1	0.1	0.7	1.7	1.8	2.7	2.1	2.5	2.3	3.5	3.6	4.9	2.8	1.5	1.9	3.3	1.4	0.6	2	39.7	4.2%
012	49 VIRGINIA/HOLCOMB	0.2	0.1	0.1	0.5	0	0.5	0.1	0.2	0.2	0.3	0	0.4	0.7	0.3	0.2	0.6	0.8	1	0.6	0	0.6	1.4	1.3	0.7	10.8	1.1%
013	50 VIRGINIA/ARROYO	0	0	0.1	0.1	0	0	0.3	0.2	0	0.7	0.4	0.6	0.4	0.3	0.4	0.6	0.4	0.2	0	0.3	0.2	1.1	0.7	1.1	8.1	0.9%
014	51 VIRGINIA/VASSAR	0	0	0	0	0	0	0	0.2	0	0.5	0.3	0.4	0.4	0.2	0.5	0.1	0.3	0	0.1	0.1	0	0.2	0	0	3.3	0.3%
015	52 VIRGINIA/CENTER	0	0.3	0	0	0	0.1	0.8	0	0.2	0.1	0.6	0.5	0.3	5.5	0.3	0.5	0.4	0.6	0.2	0.3	0.4	1.8	1.7	0.4	15	1.6%
016	53 VIRGINIA/TAYLOR	0	0	0	0.1	0	0	0.5	0.7	0.6	1.3	1.2	1.2	1.5	1.3	0.7	1.8	1.7	0.6	0.7	0.5	1	1.8	0.8	0.7	18.7	2.0%
017	1850 VIRGINIA/THOMA	0.1	0.1	0.1	0.1	0	0.6	0	0.4	0.6	1.3	1.7	1.1	2.2	1.6	1.5	1.4	2	0.7	1.2	1.1	1.2	0.6	0.2	0.1	19.9	2.1%
018	55 VIRGINIA/CALIFORNIA	0	0.6	0.1	1	0	0.6	0.3	1.5	1	1.3	2.1	2	1.6	1.8	1.8	1.6	1.5	1.4	0.8	1.1	1.4	2.2	0.8	0.8	27.3	2.9%
019	56 VIRGINIA/LIBERTY	0	0	0	0.1	0	0.1	0.7	0.2	1.1	0.8	0.5	1.2	0.4	1	0.4	1.2	0.8	0.1	0.1	0.3	0.5	0.5	0.7	0.7	11.4	1.2%
020	57 CENTER/RYLAND (Library)	0	0	0.1	0	0	0.1	0	0.1	0.2	1.8	2.3	1.8	1.3	0.9	0.9	0.9	1	0.8	0.7	0.5	0.7	0.3	0.3	0.2	14.9	1.6%
021	58 CENTER/STATE	0.1	0.4	0.2	0.3	0	1.5	0.3	2.3	2.3	2.1	2.8	3.8	3.4	3.5	4.2	3.9	2.8	2.6	1.7	1.4	2.5	1.7	1.5	1.5	46.8	5.0%
022	59 CENTER/1ST TO 2ND (CAL-NEVA PARKI	0.4	0.7	1.7	4.1	0.6	1.4	2.2	4.1	5.9	5.4	4.4	4.4	4.8	3.5	3.2	5.1	2.5	2.3	2.7	1.8	3.6	3	4.6	2.7	75.1	8.0%
023	1977 Bay Q 4SS (CONNECT) (Time Point)	1.3	3.3	3.2	1.3	5.7	24.8	26.1	22.5	19.2	19.7	25.1	28.6	25.9	26	29.5	32	22.2	16.7	14.7	11.9	26.8	35.1	34.7	24.6	480.9	51.0%
Total		2.2	8	6	10.2	6.3	32.8	34.7	38.1	37.9	41.3	55.9	61.4	54.7	62.1	62.4	64.4	54.2	43.4	34.8	27.9	48.7	59.8	56.7	39.4	943.3	100.0%
Southbound																										
001	1977 Bay Q 4SS (CONNECT) (Time Point)	0	1.7	0	0.2	0.6	0	0	0	7.3	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	9.9	1.1%
002	601 LAKE/2ND	0	0	0	0	0	0	0	0.2	0.5	0.1	0.5	0.9	0.5	1.2	1.2	1.3	1	0.1	2.2	0.8	0.3	0.7	0	2.3	13.8	1.5%
003	1753 LAKE/MILL	0.8	0.1	0.1	0	0.1	0.2	0.5	1.8	4.3	5	6.4	6.4	7.2	5.9	5.7	6	4.9	3.1	3.9	1.6	0.6	1.3	0.3	0	66.2	7.3%
004	1993 Virginia/California	0.1	0.8	0	0	0	1.3	0.6	0.4	2.4	2.2	3.3	4.5	4.6	2.8	5.1	3.9	3.6	2.1	2.3	2.8	1.6	2.7	1.5	0.4	49	5.4%
005	6 VIRGINIA/LA RUE	0.3	0.1	0.1	0	0	0	0.5	0.1	0.9	1.8	2.2	2.5	2.4	2.8	3.7	3.7	4.3	2.7	2.9	2.8	1.3	1.4	1.3	0.5	38.3	4.2%
006	7 VIRGINIA/MARY	0.1	0	0.1	0	0.1	0.1	0	0.1	0.8	0.5	1.1	0.6	0.8	1.3	0.9	0.9	0.9	0.8	0.9	1.4	1	0.9	0.7	0.4	14.4	1.6%
007	8 VIRGINIA/ARROYO	0.4	0.1	0	0.3	0.3	0.1	0.4	0.6	1.1	1.6	1.1	0.8	2.4	0.8	0.7	2.2	1.3	1.5	1.2	1.1	0.6	0.3	0.8	0.8	20.5	2.3%
008	1998 Virginia/Walts Ln	0.4	0.1	0.2	0.1	0.9	1.4	1.1	0.5	1	0.8	1.3	0.4	1.2	1.4	1.4	0.8	1.1	2.5	1.5	1.3	1.8	1.2	0.6	0.1	23.1	2.5%
009	10 VIRGINIA/WELLS (Time Point)	1.1	0.3	0.1	0	0.1	0	0.8	2.3	4.7	5.6	4.9	4.8	6.1	7.4	5.9	5.4	5.4	4.8	4.3	3.1	2.2	2.8	1.5	1.7	75.3	8.3%
010	12 VIRGINIA/ORCHARD PLAZA	0	0	0	0.5	0	0	0.4	0.1	0	0.6	0.5	0.5	0.1	0.3	0.2	0	0.1	0.2	0.3	0.3	0	0	0	0	4.1	0.5%
011	14 VIRGINIA/CARANO	3.3	1.3	0.8	1	2.4	3.2	9.4	3.2	4.2	5.7	5.1	8.2	5	6.2	5	4.9	4.8	5.6	3.1	6.6	4.5	8.2	6.8	5.6	114.1	12.6%
012	15 VIRGINIA/BRINKBY	1.9	0.2	0.6	0	0.2	1.9	0.9	0.9	1.2	1	1.5	2.5	1.8	1.3	1.6	2.5	1.7	1.8	1.1	1.5	0.8	2.4	2.2	4	35.5	3.9%
013	488 VIRGINIA/GENTRY	1.4	0.2	0.8	0	1.5	0.5	1.8	1	2.2	2.2	0.6	2.2	1.7	2.1	2.8	2.4	2.9	2.7	2.6	1.8	2.7	1.9	1.7	1.3	41	4.5%
014	489 VIRGINIA/MOANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
015	490 VIRGINIA/PECKHAM (FS) (Time Point)	0.9	0.8	0.5	0.7	0.4	2	2.4	1.3	1.5	4.4	4.6	4.7	4.5	5.1	3.7	3.5	3.6	1.3	1.9	2.9	3.4	6	2.2	1.7	64	7.1%
016	491 Virginia/Kumle Ln (Redfield)	0.1	0.3	0.2	0	0	1.2	0.4	1	1.2	2	1.6	1.1	1.1	1.8	0.6	0.5	1.6	1.3	0.6	2.6	0.4	0.6	0.6	0.2	21	2.3%
017	1409 VIRGINIA/KIETZKE	0.3	0	1	0	0.3	0.2	1.1	0.1	1.6	3.4	3.7	2.2	2.9	3	2.7	1.5	1.9	1.7	2.5	1.5	0.8	1	0.3	0.6	34.3	3.8%
018	1994 Virginia/Meadowood Mall Way	0	0	0	0.4	0.2	0.7	0.1	0.4	1.6	1.7	1.7	1.2	2.3	2.2	1.5	1.7	3.4	2.1	1.3	1.3	1.3	0.8	0.9	0	26.8	3.0%
019	1601 MEADOWOOD MALL CIRCLE/VIRGINIA	0.7	0.1	0	0.2	0	0.9	0.3	0.4	0.7	2.1	1.2	1.6	1	2.1	0.9	0.9	1.7	1.4	0.2	1.8	0.7	1.4	1.3	1.1	22.7	2.5%
020	30 MEADOWOOD MALL (Time Point)	6.7	1.2	0.5	3	17.3	15	11.5	4.5	10.3	13.1	13	10.5	14.1	13.7	16.4	13.6	11	11.2	8.5	11.7	7.6	7.4	6	4.6	232.4	25.6%
Total		18.5	7.3	5	6.4	24.4	28.7	32.2	18.9	47.5	53.8	54.3	55.6	59.7	61.4	60	55.7	55.2	46.9	41.3	46.9	31.7	41	28.7	25.3	906.4	100.0%

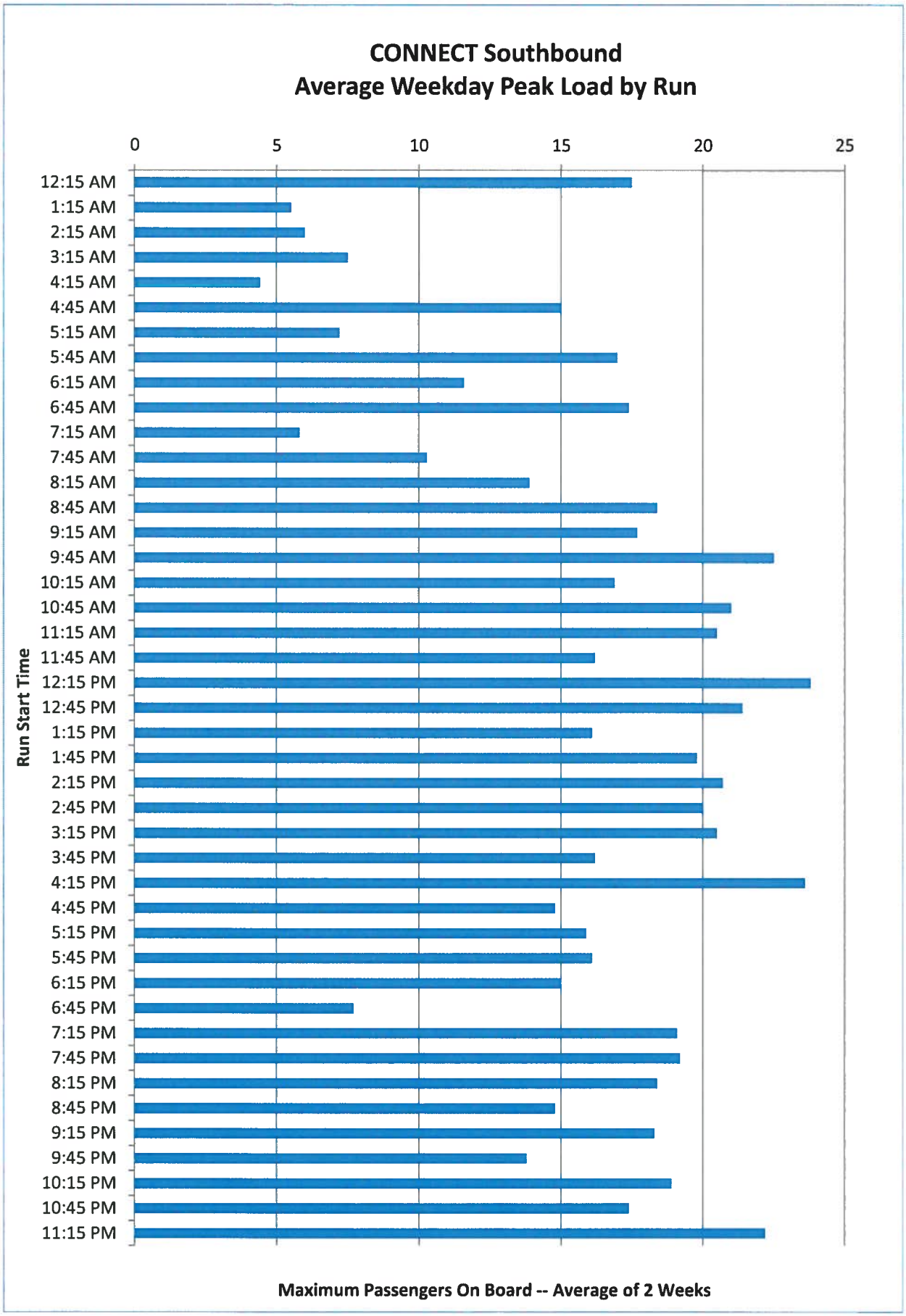

CONNECT Weekday Boarding by Hour
Northbound
Southbound
80
70
60
50
40
30
20
10
0
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM

CONNECT Average Weekday Passenger Activity by Stop -- Southbound



CONNECT Average Weekday Passenger Activity by Stop -- Northbound




CONNECT Southbound
Average Weekday Peak Load by Run
0
5
10
15
20
25
12:15 AM
1:15 AM
2:15 AM
3:15 AM
4:15 AM
4:45 AM
5:15 AM
5:45 AM
6:15 AM
6:45 AM
7:15 AM
7:45 AM
8:15 AM
8:45 AM
9:15 AM
9:45 AM
10:15 AM
10:45 AM
11:15 AM
11:45 AM
12:15 PM
12:45 PM
1:15 PM
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2:15 PM
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6:45 PM
7:15 PM
7:45 PM
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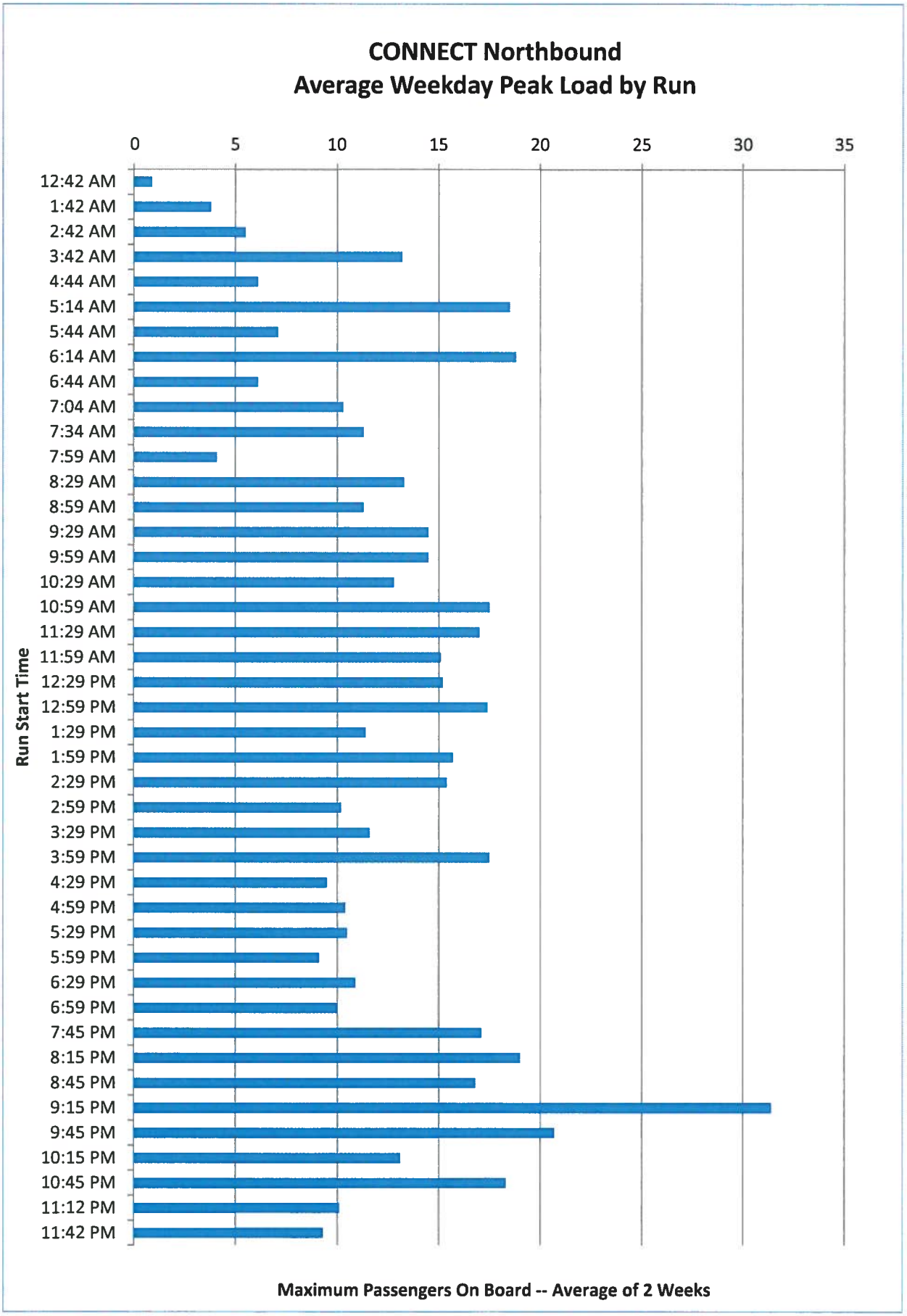
10:45 PM
11:15 PM
Run Start Time
Maximum Passengers On Board -- Average of 2 Weeks


CONNECT Northbound
Average Weekday Peak Load by Run
0
5
10
15
20
25
30
35
12:42 AM
1:42 AM
2:42 AM
3:42 AM
4:44 AM
5:14 AM
5:44 AM
6:14 AM
6:44 AM
7:04 AM
7:34 AM
7:59 AM
8:29 AM
8:59 AM
9:29 AM
9:59 AM
10:29 AM
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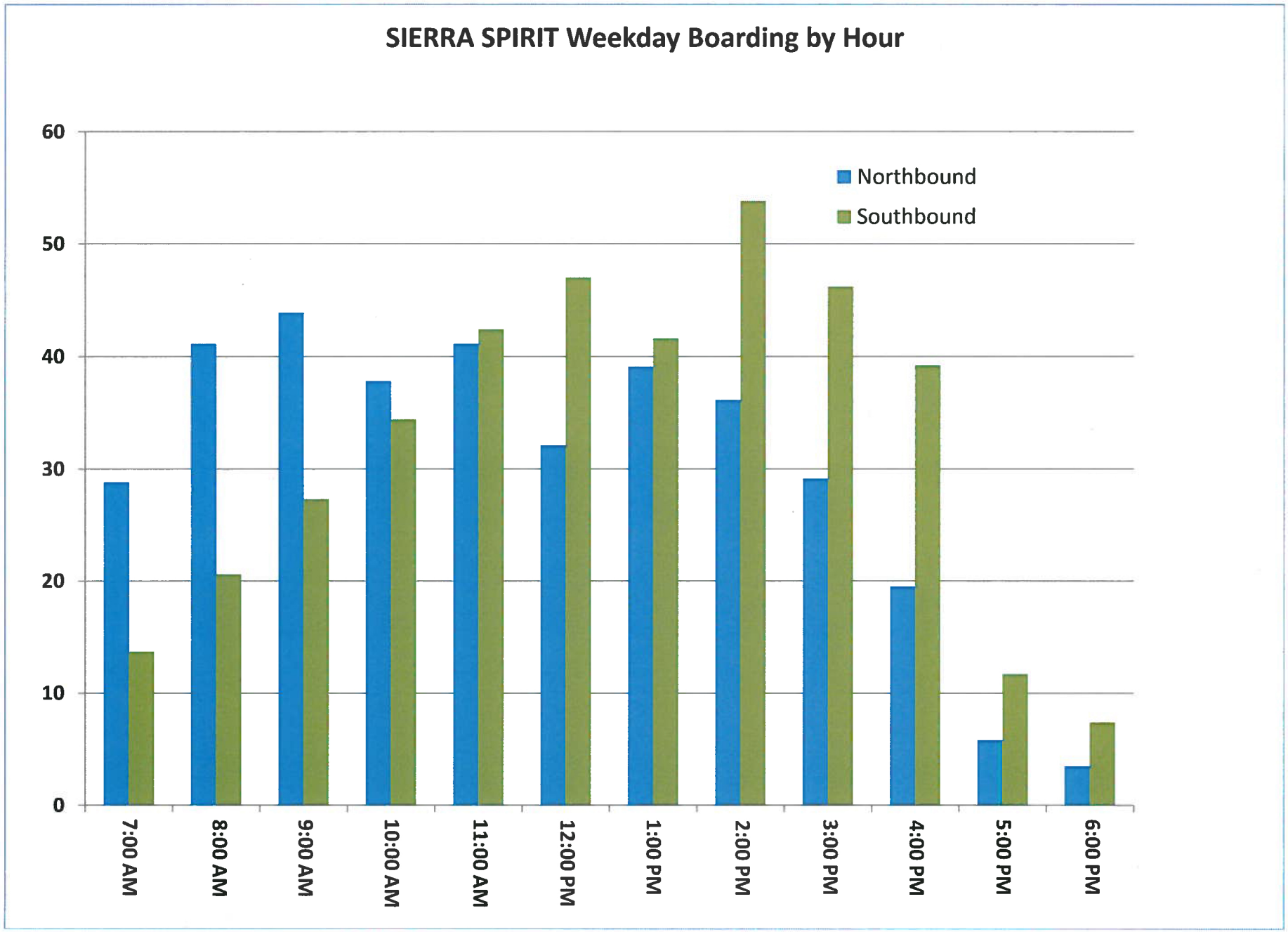
12:59 PM
1:29 PM
1:59 PM
2:29 PM
2:59 PM
3:29 PM
3:59 PM
4:29 PM
4:59 PM
5:29 PM
5:59 PM
6:29 PM
6:59 PM
7:45 PM
8:15 PM
8:45 PM
9:15 PM
9:45 PM
10:15 PM
10:45 PM
11:12 PM
11:42 PM
Run Start Time
Maximum Passengers On Board -- Average of 2 Weeks

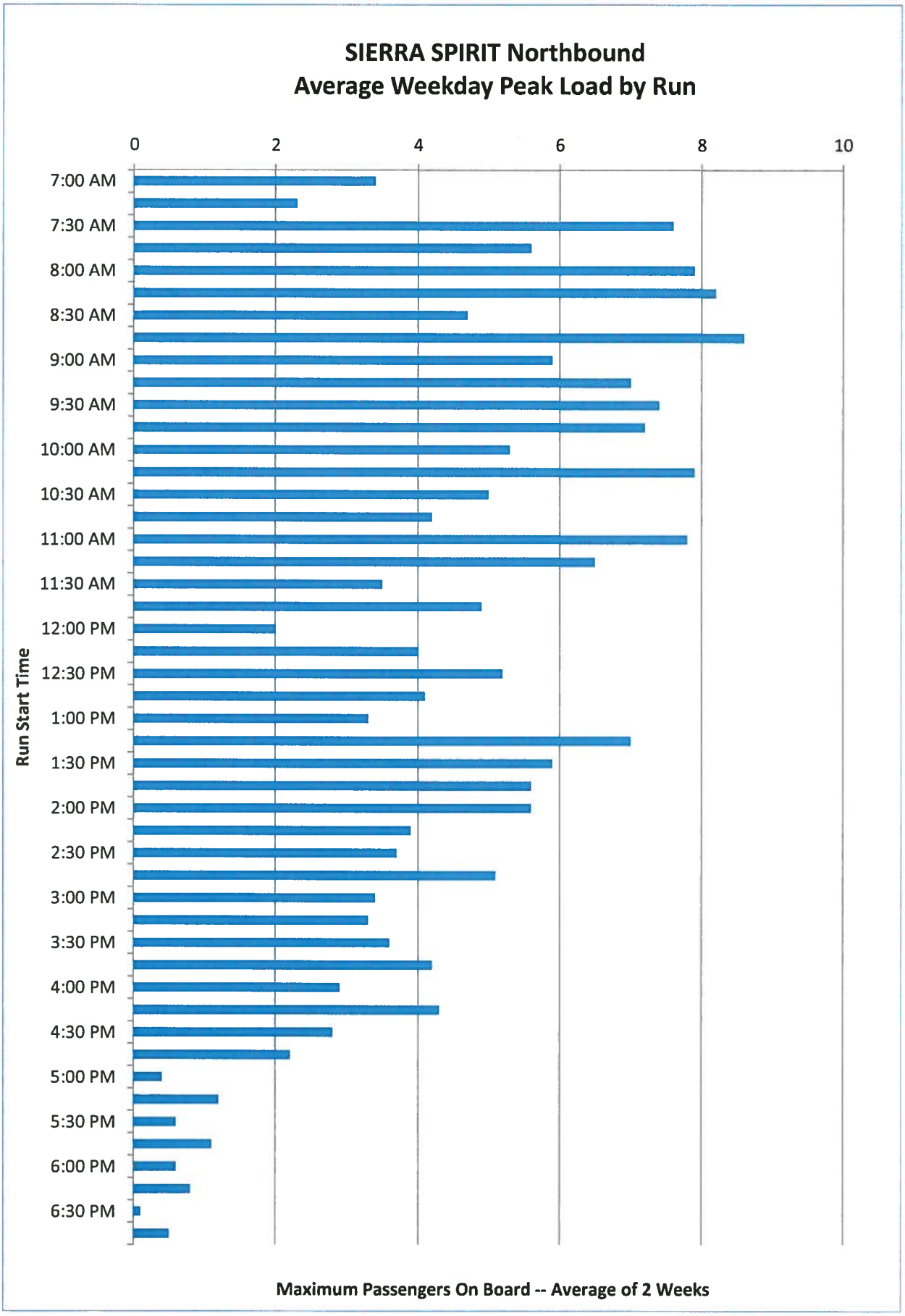
SIERRA SPIRIT Average Weekday Boarding by Stop and Hour

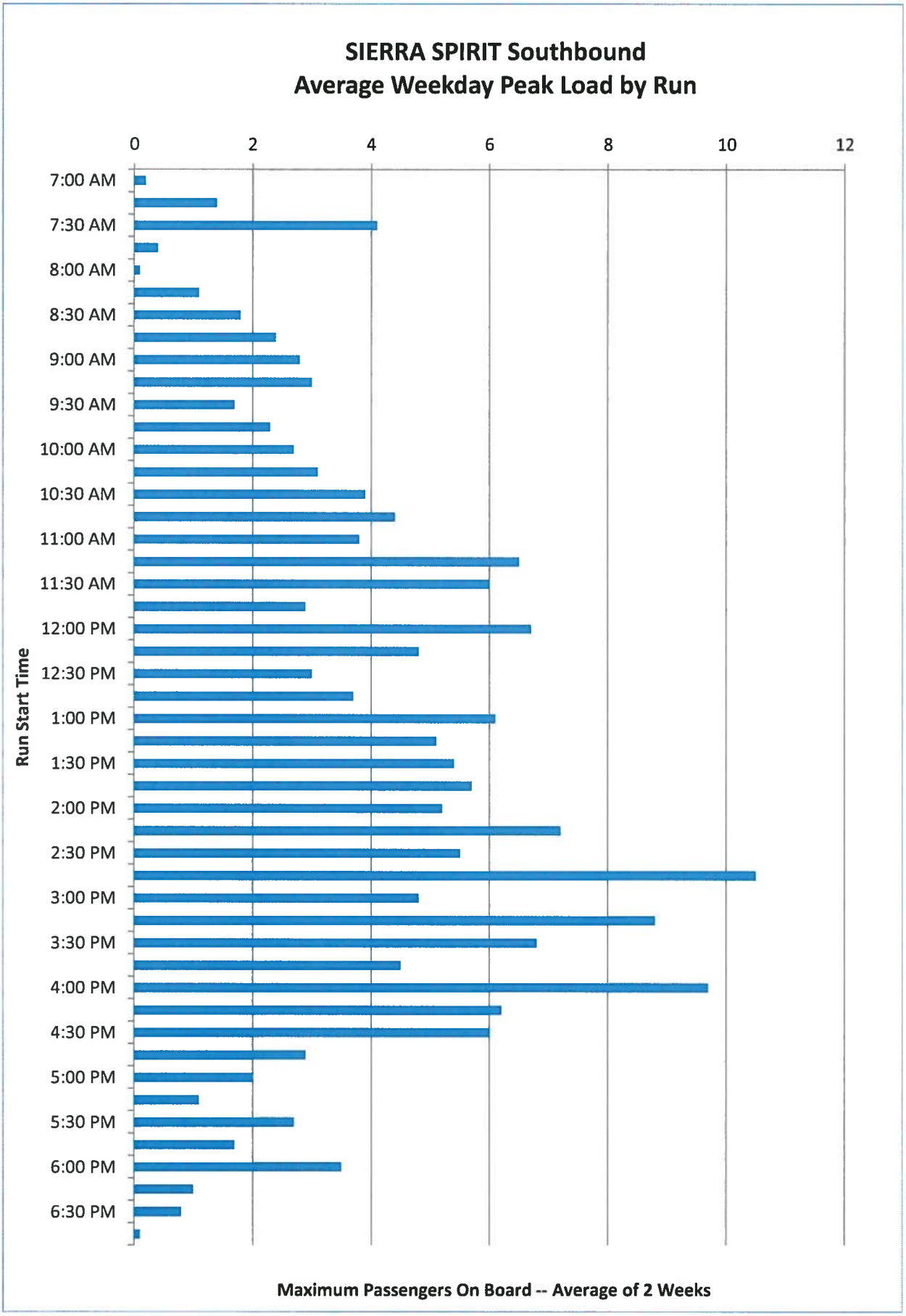
		7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	Daily Total	Percent of Directional Boardings
Northbound															
001	1491 ARLINGTON/2ND (Time Point)	6.1	13.4	10.7	9.5	10.1	6.9	11.5	8	5.1	4.7	1.4	1	88.4	24.7%
002	1934 2nd/Sierra	2.9	5.1	5.4	3.7	2.1	1.4	2.1	1	1.8	1	0	0.2	26.7	7.5%
003	1817 Virginia/2nd (East) FS	3.8	4.8	8.1	7.3	8.9	6	5	7.6	5.3	5	1.1	0.6	63.5	17.7%
004	1795 Virginia/Plaza	2.1	2	2	3.2	4.9	3.9	4.8	4.1	1.6	0.8	0.5	0	29.9	8.4%
005	1796 Virginia/4th	0.5	0	0	0.5	0	0	0	0	0.2	0	0	0	1.2	0.3%
006	1797 Virginia/5th	5.2	5.6	5.7	3.9	6.5	4.2	4.4	4.2	5.4	3	1.3	0.2	49.6	13.9%
007	1798 Virginia/6th	2	4.3	3	2	1.1	2.9	2.2	1.4	2.6	1.7	0	0	23.2	6.5%
008	1799 Virginia/8th	3.2	3.3	3.8	4.1	3.7	3.1	2.7	2.5	2.7	0.9	0.4	0.4	30.8	8.6%
009	339 VIRGINIA/9TH	1.8	1.1	2.6	1.3	1	0.6	1	0.9	1.1	0.9	0.3	0.3	12.9	3.6%
010	340 VIRGINIA/ARTEMESIA	0	0.3	0.7	0.4	1.2	1.1	1.5	0.9	0.7	0	0.5	0	7.3	2.0%
011	341 VIRGINIA/COLLEGE	0.4	0	0.3	0.1	0.4	0.2	0.2	0.9	0.6	0.1	0	0.4	3.6	1.0%
012	342 VIRGINIA/15TH	0	0.5	0.6	0.4	0.5	0.6	1.1	0.6	0.3	0.8	0.1	0.1	5.6	1.6%
013	343 VIRGINIA/(PLANETARIUM)	0.6	0.3	0.5	0.9	0.5	0.8	1.9	3.5	1	0.3	0.2	0.1	10.6	3.0%
014	1800 Virginia/17th (East)	0.2	0.4	0.5	0.5	0.2	0.4	0.7	0.5	0.7	0.3	0	0.2	4.6	1.3%
015	1801 W Stadium/17th (Time Point)	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total		28.8	41.1	43.9	37.8	41.1	32.1	39.1	36.1	29.1	19.5	5.8	3.5	357.9	100.0%
Southbound															
001	1801 W Stadium/17th (Time Point)	0.7	0.6	1.9	1.4	2.4	1	1.6	1.7	3.4	1.8	0.6	0.4	17.5	4.5%
002	1802 W Stadium/(Mackay Stadium)	0.1	0	0	0.1	0	0.2	0	0	0.4	0.6	0.1	0	1.5	0.4%
003	1862 15th/W. Stadium	3.7	4.1	6.1	7.9	11.3	8	12.6	16.8	14.4	15.4	6.4	4.6	111.3	28.9%
004	406 VIRGINIA/COLLEGE	0	0.6	2.2	1.8	2.5	2.1	2.3	3.9	2.5	2	0	0	19.9	5.2%
005	1803 Virginia/Artemesia (West)	0.1	0.5	1.5	2.7	3.9	5.1	6	6.8	7.1	5.7	1.7	0.7	41.8	10.8%
006	407 VIRGINIA/10TH	3.4	2	2.3	1.9	1.8	2.2	2.6	2.6	1.5	2.4	0.7	0.5	23.9	6.2%
007	1804 Virginia/8th (West)	2.8	4.6	4.1	6.5	5.8	5.7	4.7	6.3	5.2	4.6	0.5	0.6	51.4	13.3%
008	1805 Virginia/6th (West)	0.2	2.1	1.3	1.2	1.8	2.6	1.5	2.7	1.2	0.4	0.1	0	15.1	3.9%
009	1806 Virginia/5th (West)	0.8	0.6	1.3	1.6	2.1	3	3.1	1.9	1.9	1.5	0.7	0.1	18.6	4.8%
010	1807 Virginia/4th (West)	0.6	2.1	2.9	3.3	4.9	9.1	2.4	4.6	3.2	1.9	0.5	0.1	35.6	9.2%
011	1808 Virginia/Commercial	0.5	1.2	1.5	3.2	3.5	3.8	1.8	2.1	2	0.8	0.2	0.4	21	5.5%
012	1809 Virginia/2st	0.7	0.6	0.9	1.3	0.9	0.8	1.1	1.8	1.5	0.7	0	0	10.3	2.7%
013	1810 1st/Sierra	0.1	1.6	1.3	1.5	1.5	3.4	1.9	2.6	1.8	1.4	0.2	0	17.3	4.5%
014	1811 1st/West	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0.0%
015	1491 ARLINGTON/2ND (Time Point)	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total		13.7	20.6	27.3	34.4	42.4	47	41.6	53.8	46.2	39.2	11.7	7.4	385.3	100.0%

SIERRA SPIRIT Average Weekday Alighting by Stop and Hour

		7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	Daily Total	Percent of Directional Alightings
Northbound															
001	1491 ARLINGTON/2ND (Time Point)	1.1	0	0	0	0	0	0	0	0	0	0	0	1.1	0.3%
002	1934 2nd/Sierra	0.6	0.6	0.8	1.4	0.6	0.4	1	0.3	0.2	0.5	0.2	0	6.6	2.0%
003	1817 Virginia/2nd (East) FS	0.9	1.2	1.4	0.9	2	1.9	0.9	1.8	1.4	0.4	0.3	0.2	13.3	4.0%
004	1795 Virginia/Plaza	2.7	1.6	1.6	2.3	4.8	4.2	4.3	2.5	1.6	2.6	0.6	0.9	29.7	9.0%
005	1796 Virginia/4th	0	0	0	0	0	0	0.3	0.1	0	0	0	0	0.4	0.1%
006	1797 Virginia/5th	1.1	2	3.3	2.3	3.8	3.4	0.8	2.4	2.9	0.8	0.4	0.5	23.7	7.2%
007	1798 Virginia/6th	0.5	1.1	0.9	0.8	0.9	1.7	1	2.4	3.2	0.7	0	0	13.2	4.0%
008	1799 Virginia/8th	2.2	3.7	4.7	8.6	6.3	3.6	6.7	4.8	5.7	4	1.1	0.2	51.6	15.6%
009	339 VIRGINIA/9TH	0.7	3.5	3.8	2.8	3.7	2.6	1.6	3.6	3.3	1.3	0.9	0	27.8	8.4%
010	340 VIRGINIA/ARTEMESIA	4.2	5.9	4.5	5.2	2.3	2.4	2.8	3.9	2.9	2.6	0.4	0.1	37.2	11.2%
011	341 VIRGINIA/COLLEGE	3	7.5	5.7	2.5	4.4	2.4	1	2.3	2.5	0.9	0.6	0.1	32.9	9.9%
012	342 VIRGINIA/15TH	5.1	6.9	3.5	3.3	4.4	3.7	4.2	3.4	3.8	2.1	0.6	0.4	41.4	12.5%
013	343 VIRGINIA/(PLANETARIUM)	0.1	0.3	0.6	1.7	1.6	2	4.6	1.7	1	0.7	0.5	0.3	15.1	4.6%
014	1800 Virginia/17th (East)	0.7	1.8	1.4	1.1	1.9	1.3	2.1	1.2	2.1	1.5	0.7	1.4	17.2	5.2%
015	1801 W Stadium/17th (Time Point)	1.9	2.7	4.8	2.3	1	1.7	2.3	1	0.6	0.8	0.6	0.2	19.9	6.0%
Total		24.8	38.8	37	35.2	37.7	31.3	33.6	31.4	31.2	18.9	6.9	4.3	331.1	100.0%
Southbound															
001	1801 W Stadium/17th (Time Point)	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0.0%
002	1802 W Stadium/(Mackay Stadium)	0	0.3	0	0.6	0.8	0.8	0.7	0.9	0.7	0.3	0.1	0	5.2	1.2%
003	1862 15th/W. Stadium	5.3	7.8	7	5.5	4.6	2.4	2.7	3.8	4.5	2.4	0.7	0.3	47	11.0%
004	406 VIRGINIA/COLLEGE	0	0	0.1	0	0	0	0.6	0.3	0.4	0.4	0	0	1.8	0.4%
005	1803 Virginia/Artemesia (West)	0.5	0.2	0.8	0.5	1.1	0.5	0.6	1.9	1.1	0.9	0.9	0.4	9.4	2.2%
006	407 VIRGINIA/10TH	0	0.2	0.4	0.2	0	1	1	1	1.1	3	1.5	1.9	11.3	2.6%
007	1804 Virginia/8th (West)	0.2	0.3	0.9	1.4	2.5	2.4	2.2	3.3	2.1	0.8	0.4	0.4	16.9	3.9%
008	1805 Virginia/6th (West)	0.2	0.4	0.4	1.9	2.2	3.5	2.3	2.3	2.8	3	1	0.1	20.1	4.7%
009	1806 Virginia/5th (West)	1.9	1.7	2.1	2.7	3.7	4.4	3.8	4.5	5.1	4.1	1.1	0.3	35.4	8.2%
010	1807 Virginia/4th (West)	1.9	3.6	5.2	5.1	8.9	9.4	8.5	13.9	13.2	9.5	1.4	1.2	81.8	19.1%
011	1808 Virginia/Commercial	0.7	1.1	3	3.7	3.6	5.4	4.7	2.4	1.3	1.8	0.3	0.1	28.1	6.5%
012	1809 Virginia/2st	2.8	4.1	4.7	5.2	5.2	4.6	4.8	4.8	3.1	2.7	1.8	0	43.8	10.2%
013	1810 1st/Sierra	1.1	2.8	3.3	4.6	4.5	6.1	6.5	9.5	6.8	5.3	2	1.2	53.7	12.5%
014	1811 1st/West	0	0	0.2	0.1	0	0	0	0.4	0.1	0	0	0	0.8	0.2%
015	1491 ARLINGTON/2ND (Time Point)	1.9	2	4.6	7	9	8.7	10.2	11.9	7.5	7.4	1.9	1.7	73.8	17.2%
Total		16.5	24.5	32.7	38.5	46.1	49.3	48.6	60.9	49.8	41.6	13.1	7.6	429.2	100.0%

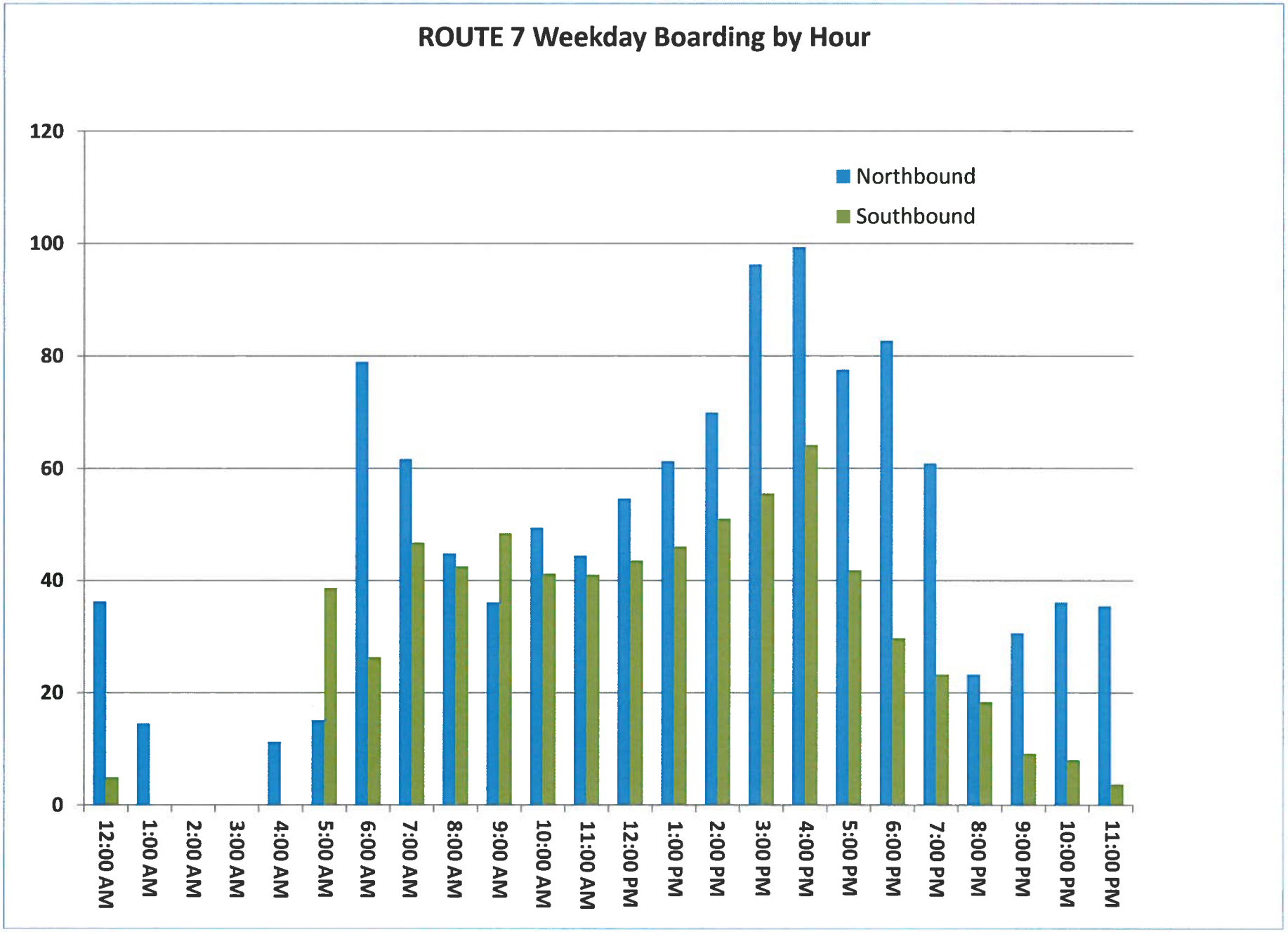

SIERRA SPIRIT Weekday Boarding by Hour
60
50
40
30
20
10
0
Northbound
Southbound
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM


SIERRA SPIRIT Northbound
Average Weekday Peak Load by Run
0
2
4
6
8
10
7:00 AM
7:30 AM
8:00 AM
8:30 AM
9:00 AM
9:30 AM
10:00 AM
10:30 AM
11:00 AM
11:30 AM
12:00 PM
12:30 PM
1:00 PM
1:30 PM
2:00 PM
2:30 PM
3:00 PM
3:30 PM
4:00 PM
4:30 PM
5:00 PM
5:30 PM
6:00 PM
6:30 PM
Run Start Time
Maximum Passengers On Board -- Average of 2 Weeks

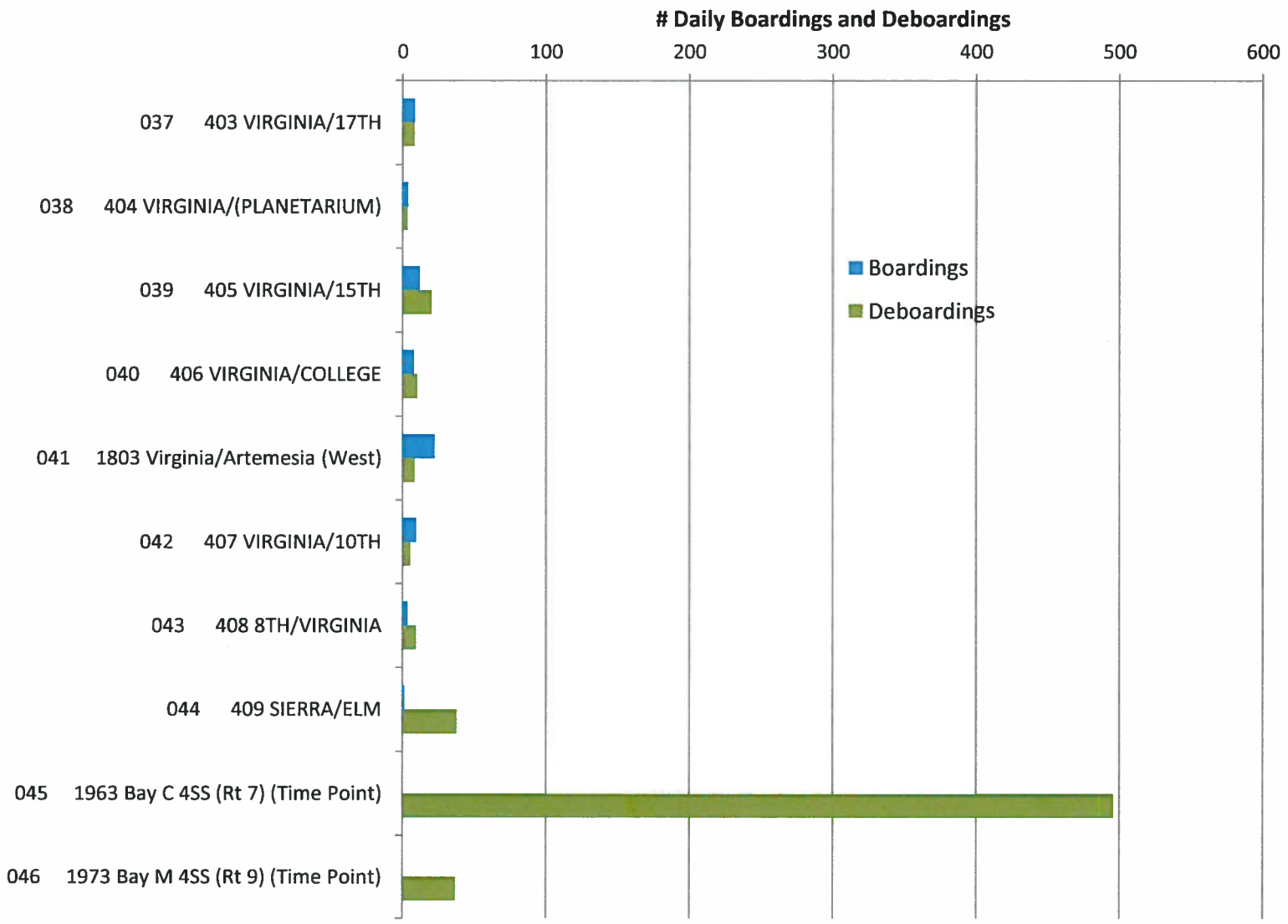

SIERRA SPIRIT Southbound
Average Weekday Peak Load by Run
0
2
4
6
8
10
12
7:00 AM
7:30 AM
8:00 AM
8:30 AM
9:00 AM
9:30 AM
10:00 AM
10:30 AM
11:00 AM
11:30 AM
12:00 PM
12:30 PM
1:00 PM
1:30 PM
2:00 PM
2:30 PM
3:00 PM
3:30 PM
4:00 PM
4:30 PM
5:00 PM
5:30 PM
6:00 PM
6:30 PM
Run Start Time
Maximum Passengers On Board -- Average of 2 Weeks

ROUTE 7 Average Weekday Boarding by Stop and Hour

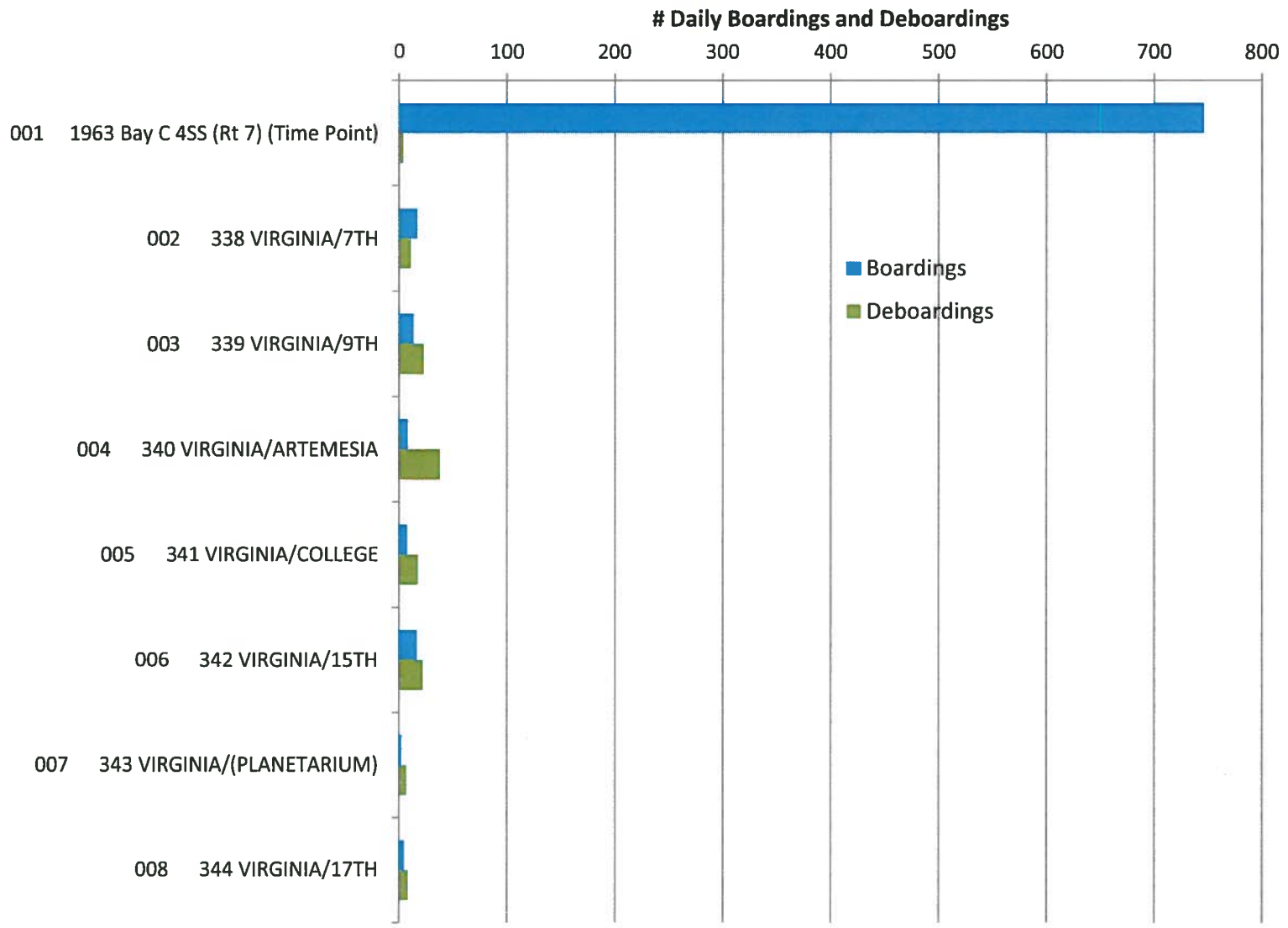
		Hour Beginning																								
		12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Total	Percent of Directional Boardings
Northbound																										
001	1963 Bay C 4SS (Rt 7) (Time Point)	16.3	11.7	0	0	8	12.1	61.9	51.1	37.1	25.1	37.5	30.3	35.2	39.2	44.4	49.7	55.7	47.5	42.1	41.4	16.5	23.7	31.2	28.5	746.2	67.7%
002	338 VIRGINIA/7TH	0.2	0.2	0	0	0	0.4	0.4	1	0.4	0.6	0.6	0.4	1.4	1.1	1.3	2.1	1.4	2.6	0.9	0.6	0.2	0.9	0.1	0.4	17.2	1.6%
003	339 VIRGINIA/9TH	0	0.2	0	0	1.7	0.2	1.9	0.6	0.2	0.3	0	0.3	0.7	0.5	0.2	0.6	3.2	0.3	1	0.1	0.3	0.4	0.5	0.4	13.6	1.2%
004	340 VIRGINIA/ARTEMESIA	0.1	0.3	0	0	0	0	0.8	0.2	0	0	0.3	0.1	0.2	0.5	0.9	2.4	0.4	0.5	0.4	0.2	0.4	0.2	0.1	0.1	8.1	0.7%
005	341 VIRGINIA/COLLEGE	0.1	0.1	0	0	0	0	0	0	0	0	0.6	0.1	0.7	0.2	1.9	1.1	0.5	0.8	0.5	0.2	0	0.1	0.3	0.3	7.5	0.7%
006	342 VIRGINIA/15TH	0	0	0	0	0	0.2	0.5	0.1	0.1	0.2	0.2	0.9	0.8	0.9	0.5	1.8	1.1	1.9	2.1	2.2	0.5	0.2	0.3	1.8	16.3	1.5%
007	343 VIRGINIA/(PLANETARIUM)	0	0	0	0	0	0.1	0.2	0	0	0.4	0.3	0	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.3	0	0	0.1	0	2.5	0.2%
008	344 VIRGINIA/17TH	0.3	0	0	0	0.4	0.1	0	0.1	0	0.3	0.5	0.6	0.4	0	0.3	0.4	0.1	0.3	0.2	0.5	0	0.1	0.3	0	4.9	0.4%
Total -- In Study Area		17	12.5	0	0	10.1	13.1	65.7	53.1	37.8	26.9	40	32.7	39.5	42.5	49.6	58.2	62.5	54.4	47.3	45.5	17.9	25.6	32.9	31.5	816.3	74.0%
Total -- Entire Route		36.2	14.5	0	0	11.2	15.1	78.9	61.6	44.8	36.1	49.4	44.4	54.6	61.2	69.9	96.2	99.3	77.5	82.7	60.8	23.2	30.6	36.1	35.4	1102.7	100.0%
Southbound																										
037	403 VIRGINIA/17TH	0	0	0	0	0	0	0	0.9	0.1	1	0.3	1.1	0.2	0.5	0.3	0.8	1.8	0.3	0.7	0.1	0.1	0	0.4	0	8.6	1.3%
038	404 VIRGINIA/(PLANETARIUM)	0	0	0	0	0	1.3	0.1	0.5	0	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.3	0.3	0.5	0	0	0	0	0	3.9	0.6%
039	405 VIRGINIA/15TH	0.2	0	0	0	0	1	0	0.2	0	0.5	0.6	1.2	1.4	0.8	1.7	1.4	0.4	0.9	1	0.2	0.1	0	0	0.4	12	1.8%
040	406 VIRGINIA/COLLEGE	0	0	0	0	0	0	0	0.3	0.2	0.3	0.6	0.7	1.4	0.3	0.9	0.7	1.3	0.1	0.5	0.3	0.3	0	0.1	0	8	1.2%
041	1803 Virginia/Artemesia (West)	0	0	0	0	0	0.4	0.4	0.7	0.6	0.4	1	2.7	1.8	2.5	2.5	3.6	2.3	0.7	2.5	0.1	0.2	0	0	0	22.4	3.3%
042	407 VIRGINIA/10TH	0	0	0	0	0	0.8	0.6	0.6	1	0.8	0.3	0.7	0.4	1.9	0.6	0.2	0.1	0.6	0.2	0.3	0.3	0.1	0.1	0	9.6	1.4%
043	408 8TH/VIRGINIA	0	0	0	0	0	0.1	0.2	0.3	0.4	0.2	0	0	0.5	0.4	0.5	0.4	0.3	0	0.1	0.3	0	0	0	0	3.7	0.5%
044	409 SIERRA/ELM	0	0	0	0	0	0.1	0	0	0.4	0.1	0.1	0	0	0.3	0	0.1	0.1	0.1	0	0.1	0.1	0	0	0	1.5	0.2%
045	1963 Bay C 4SS (Rt 7) (Time Point)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0.5	0.1%
046	1973 Bay M 4SS (Rt 9) (Time Point)	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.1%
Total -- In Study Area		0.6	0	0	0	0	3.7	1.3	3.5	2.7	3.4	3	6.5	5.9	6.8	6.6	7.4	6.6	3	5.5	1.4	1.6	0.1	0.6	0.4	70.6	10.3%
Total -- Entire Route		4.9	0	0	0	0	38.6	26.3	46.7	42.5	48.4	41.2	41	43.5	46	51	55.5	64.1	41.8	29.7	23.2	18.3	9.1	8	3.7	682.9	100.0%

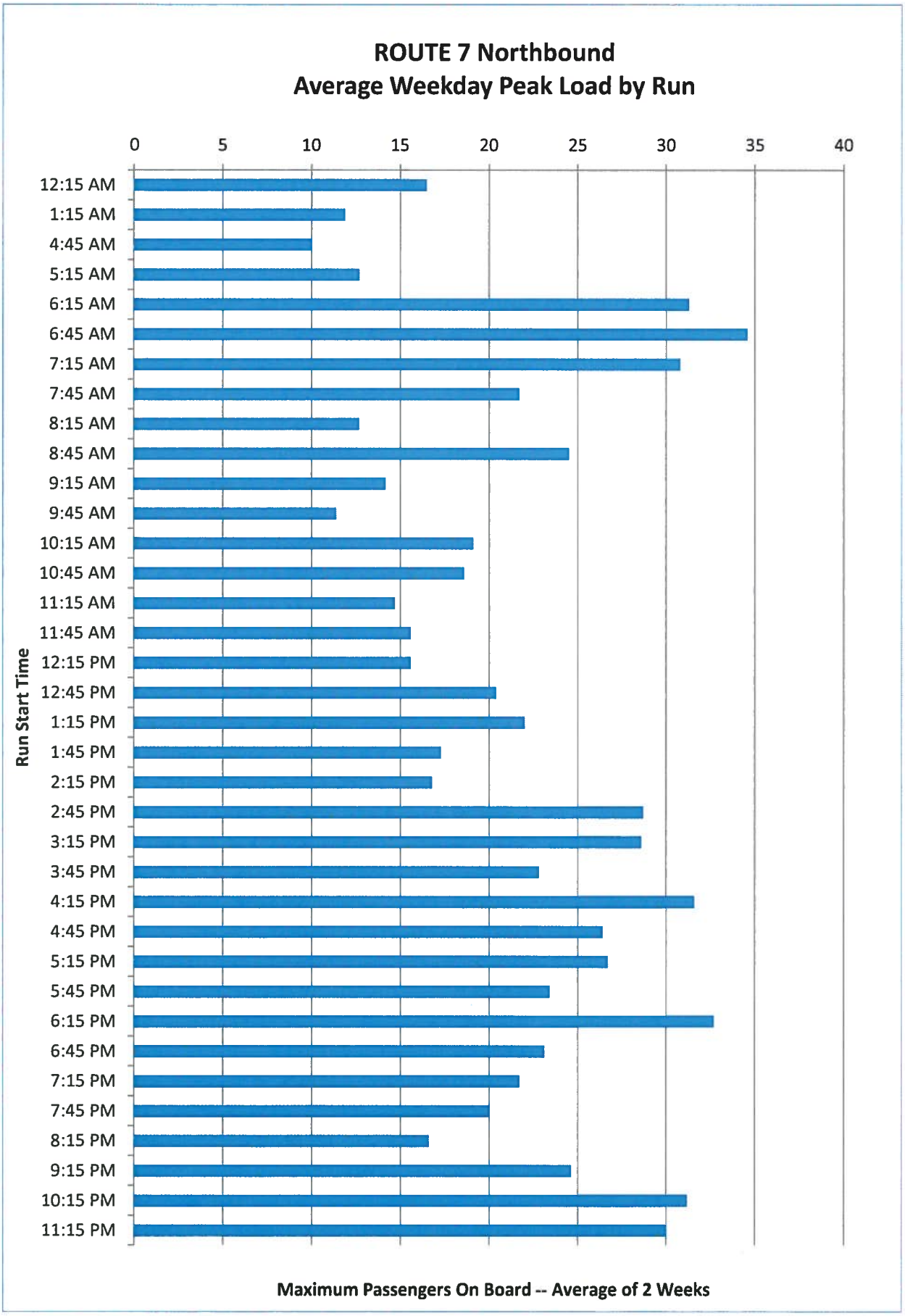

ROUTE 7 Weekday Boarding by Hour
120
100
80
60
40
20
0
Northbound
Southbound
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM

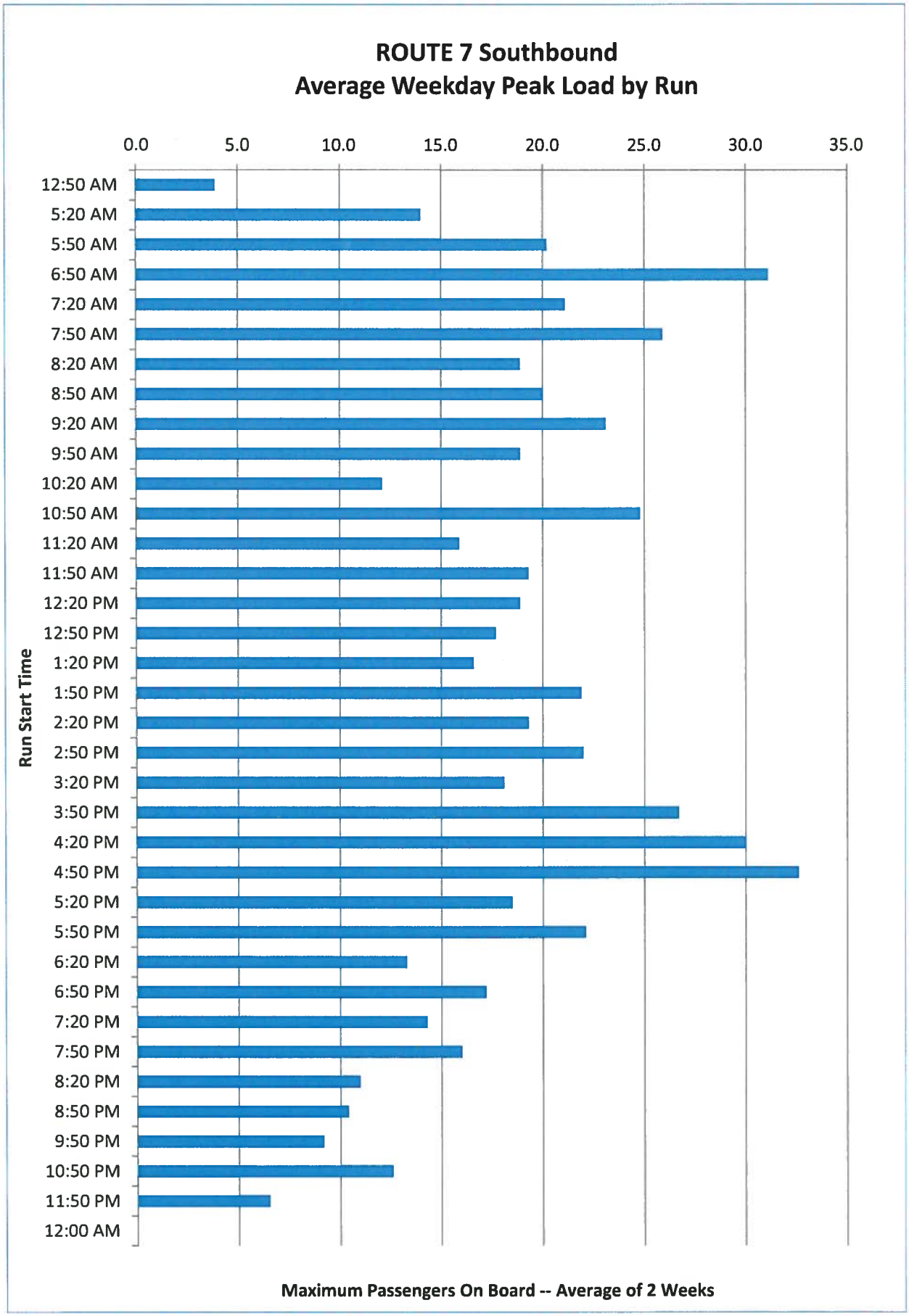
ROUTE 7 Average Weekday Passenger Activity by Stop -- Southbound



ROUTE 7 Average Weekday Passenger Activity by Stop -- Northbound

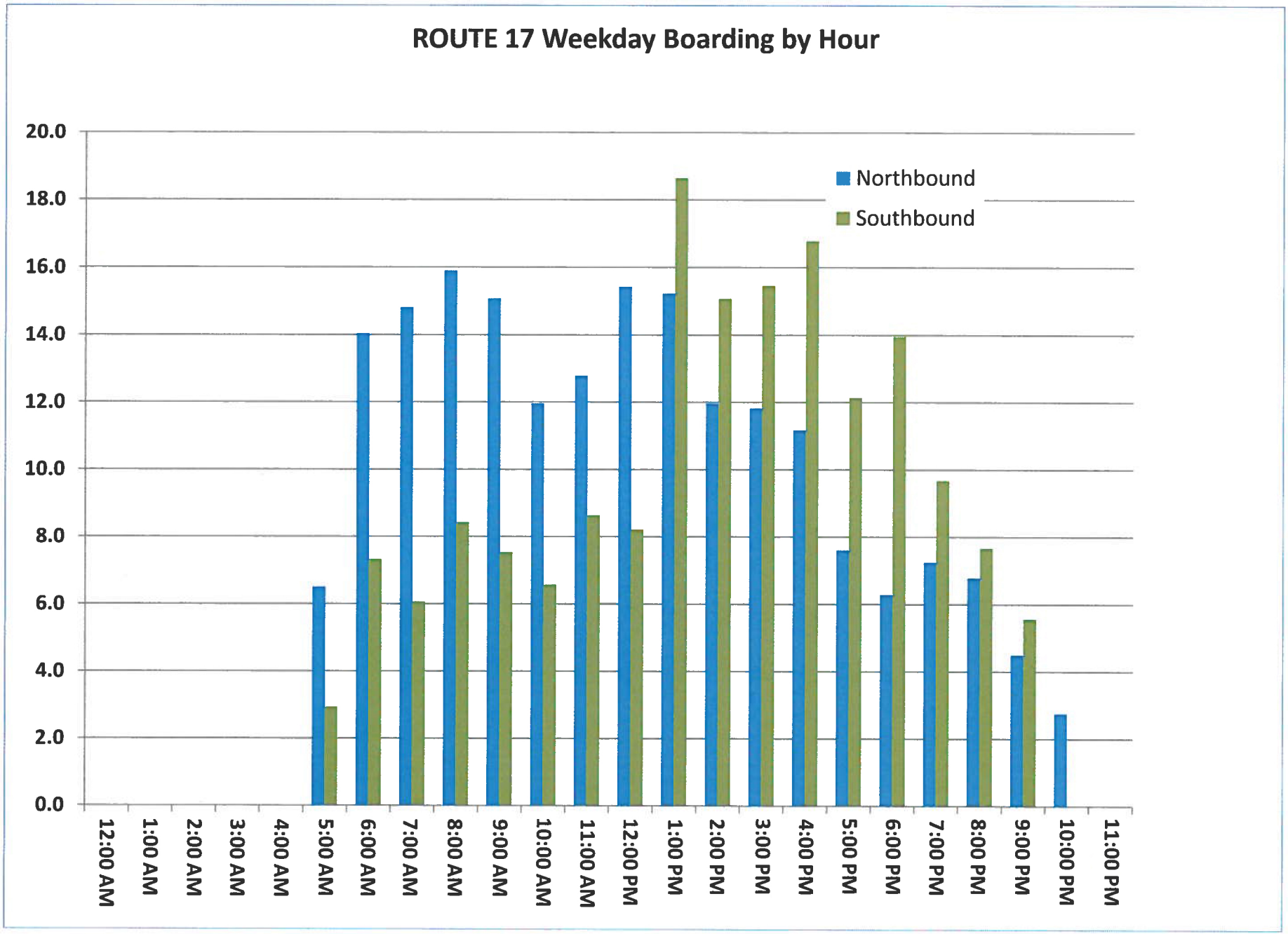



ROUTE 7 Northbound
Average Weekday Peak Load by Run
0
5
10
15
20
25
30
35
40
12:15 AM
1:15 AM
4:45 AM
5:15 AM
6:15 AM
6:45 AM
7:15 AM
7:45 AM
8:15 AM
8:45 AM
9:15 AM
9:45 AM
10:15 AM
10:45 AM
11:15 AM
11:45 AM
12:15 PM
12:45 PM
1:15 PM
1:45 PM
2:15 PM
2:45 PM
3:15 PM
3:45 PM
4:15 PM
4:45 PM
5:15 PM
5:45 PM
6:15 PM
6:45 PM
7:15 PM
7:45 PM
8:15 PM
9:15 PM
10:15 PM
11:15 PM
Run Start Time
Maximum Passengers On Board -- Average of 2 Weeks

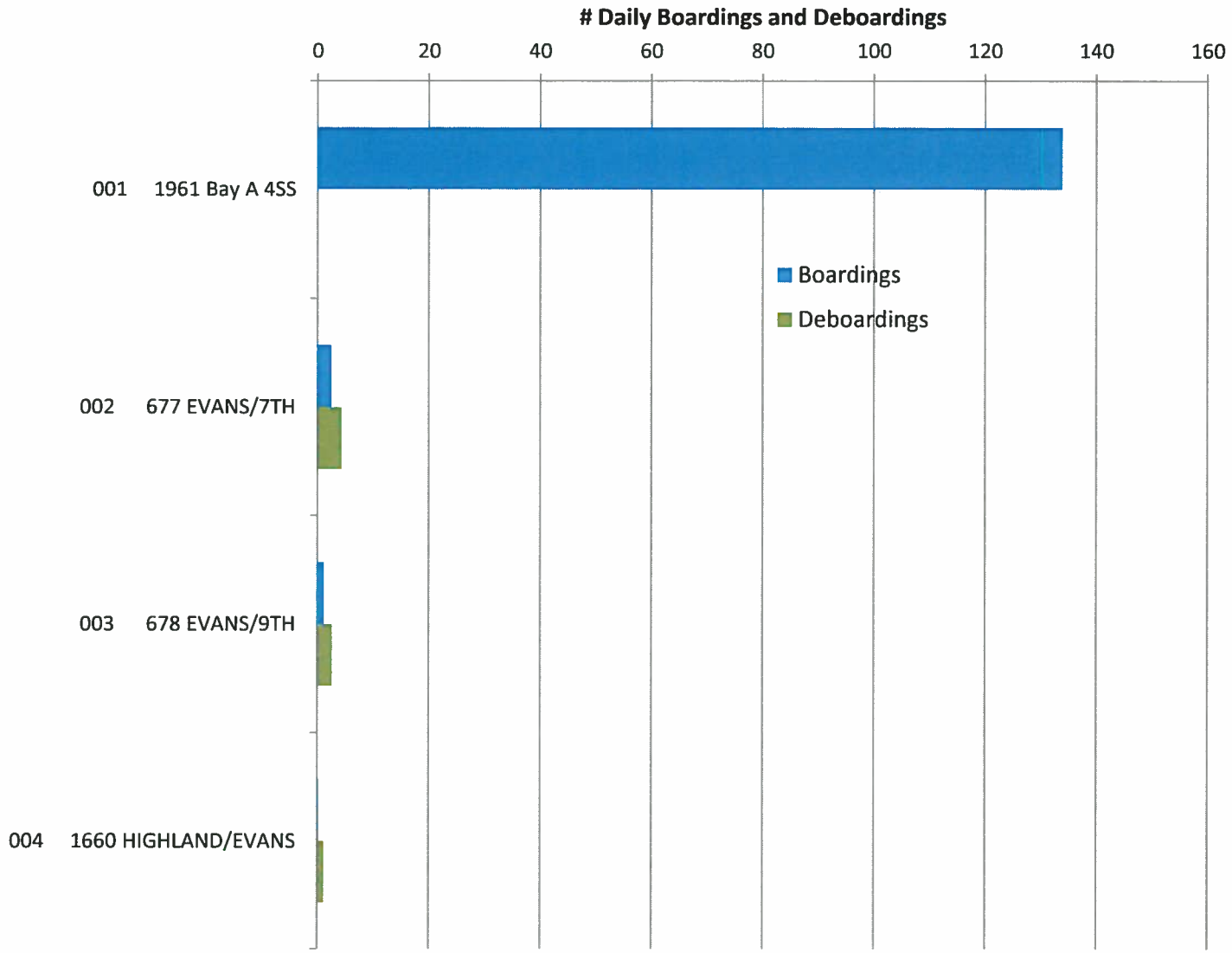

ROUTE 7 Southbound
Average Weekday Peak Load by Run
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Run Start Time
12:50 AM
5:20 AM
5:50 AM
6:50 AM
7:20 AM
7:50 AM
8:20 AM
8:50 AM
9:20 AM
9:50 AM
10:20 AM
10:50 AM
11:20 AM
11:50 AM
12:20 PM
12:50 PM
1:20 PM
1:50 PM
2:20 PM
2:50 PM
3:20 PM
3:50 PM
4:20 PM
4:50 PM
5:20 PM
5:50 PM
6:20 PM
6:50 PM
7:20 PM
7:50 PM
8:20 PM
8:50 PM
9:50 PM
10:50 PM
11:50 PM
12:00 AM
Maximum Passengers On Board -- Average of 2 Weeks

ROUTE 17 Average Weekday Boarding by Stop and Hour

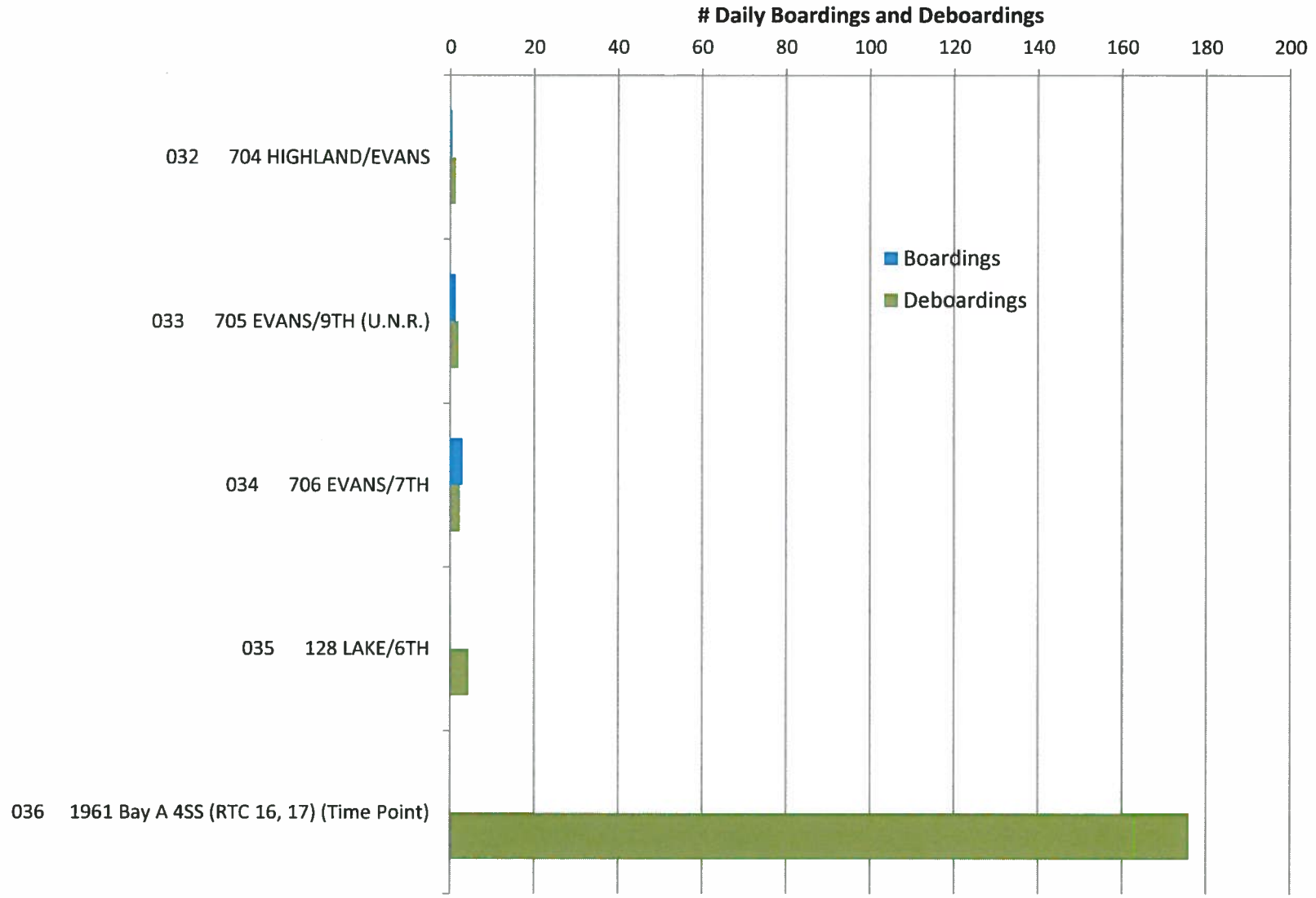
		Hour Beginning																								
		12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Total	Percent of Directional Boardings
Southbound																										
032	704 HIGHLAND/EVANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0%
033	705 EVANS/9TH (U.N.R.)	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.2	0.1	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	1.3	1%
034	706 EVANS/7TH	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.5	0.5	0.1	0.1	0.4	0.3	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	2%
035	128 LAKE/6TH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0%
036	1961 Bay A 4SS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0%
Total in Study Area		0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.6	0.5	0.2	0.1	0.6	0.5	0.5	0.7	0.3	0.1	0.0	0.1	0.1	0.0	0.1	0.0	5.0	3%
Total		0.0	0.0	0.0	0.0	0.0	6.5	14.0	14.8	15.9	15.1	12.0	12.8	15.4	15.2	12.0	11.8	11.2	7.6	6.3	7.3	6.8	4.5	2.8	0.0	191.9	
Northbound																										
001	1961 Bay A 4SS	0.0	0.0	0.0	0.0	0.0	2.0	6.5	5.1	6.1	5.0	4.9	6.4	5.9	12.5	11.5	12.2	14.4	10.0	11.8	8.5	6.5	4.8	0.0	0.0	133.9	78%
002	677 EVANS/7TH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.1	0.1	0.3	0.2	0.3	0.1	0.2	0.5	0.1	0.0	0.1	0.0	0.0	2.5	1%
003	678 EVANS/9TH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.2	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0	1.2	1%
004	1660 HIGHLAND/EVANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0%
Total in Study Area		0.0	0.0	0.0	0.0	0.0	2.0	6.6	5.1	6.2	5.2	5.0	6.5	6.1	13.0	11.6	12.7	14.8	10.3	12.4	8.6	6.6	4.9	0.0	0.0	137.8	81%
TOTAL		0.0	0.0	0.0	0.0	0.0	2.9	7.3	6.1	8.4	7.5	6.6	8.6	8.2	18.6	15.1	15.5	16.8	12.1	14.0	9.7	7.7	5.6	0.0	0.0	170.7	


ROUTE 17 Weekday Boarding by Hour
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Northbound
Southbound
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM

ROUTE 17 Average Weekday Passenger Activity by Stop -- Northbound

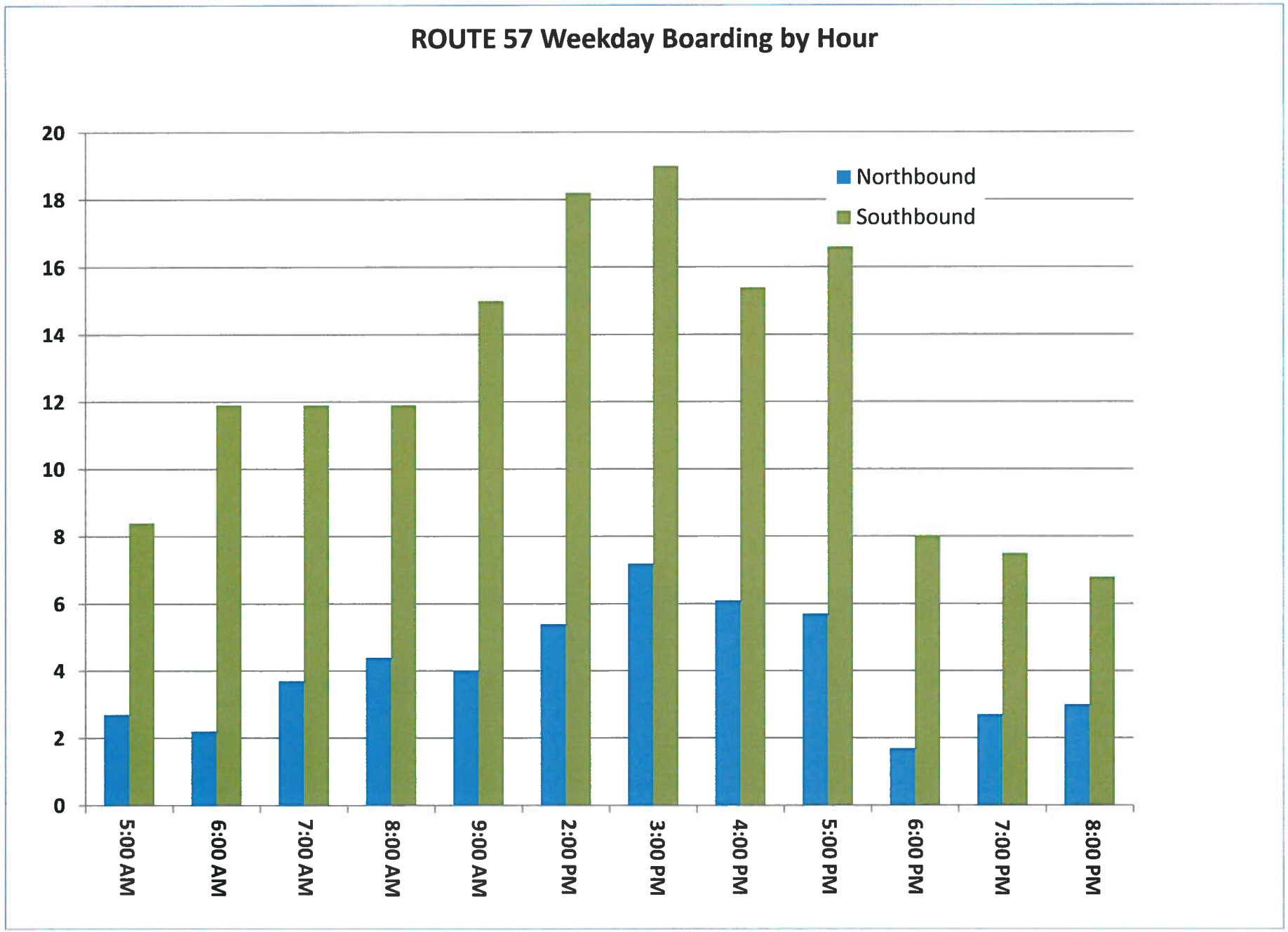


ROUTE 17 Average Weekday Passenger Activity by Stop -- Southbound

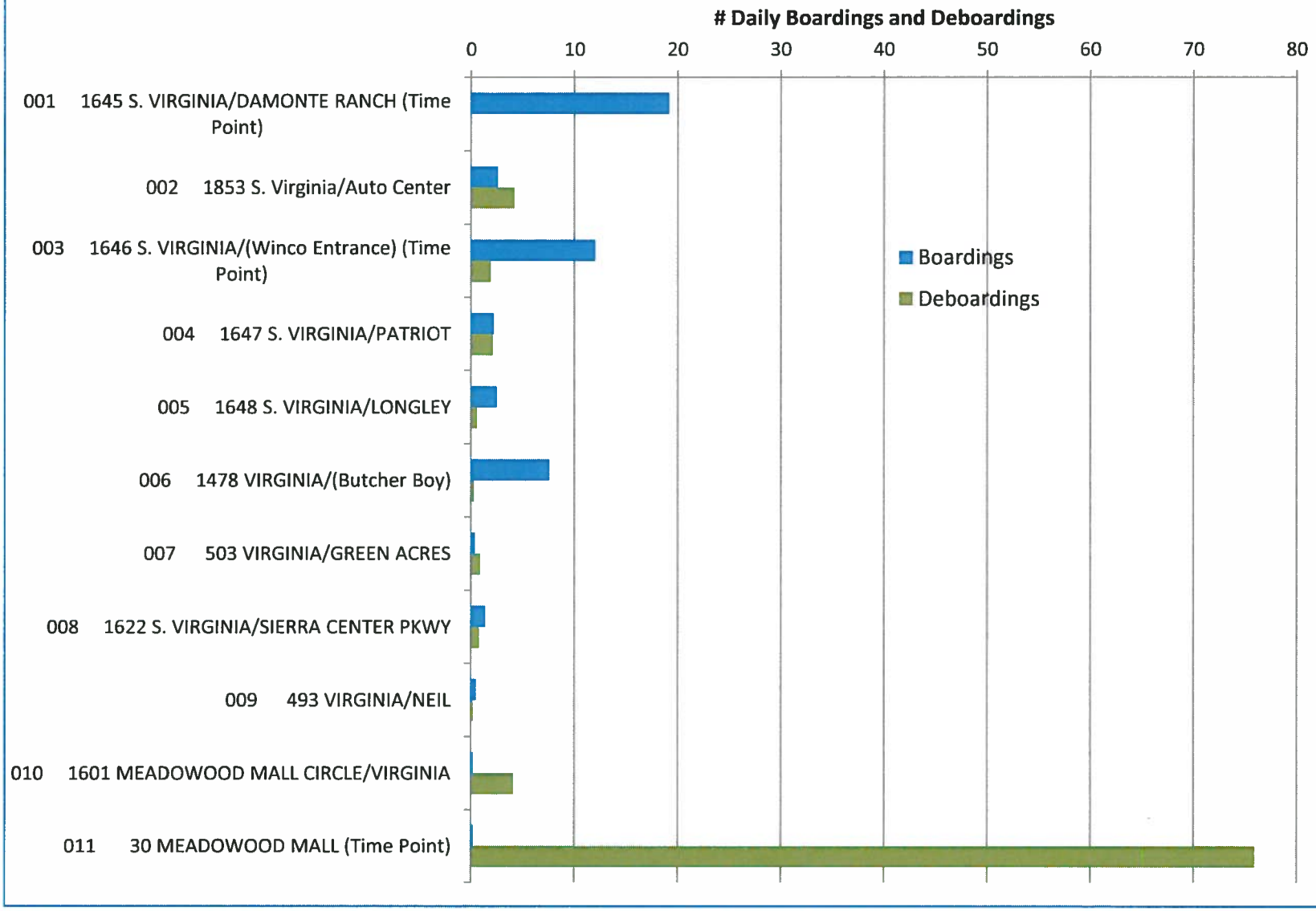


ROUTE 57 Average Weekday Alightings by Stop and Hour

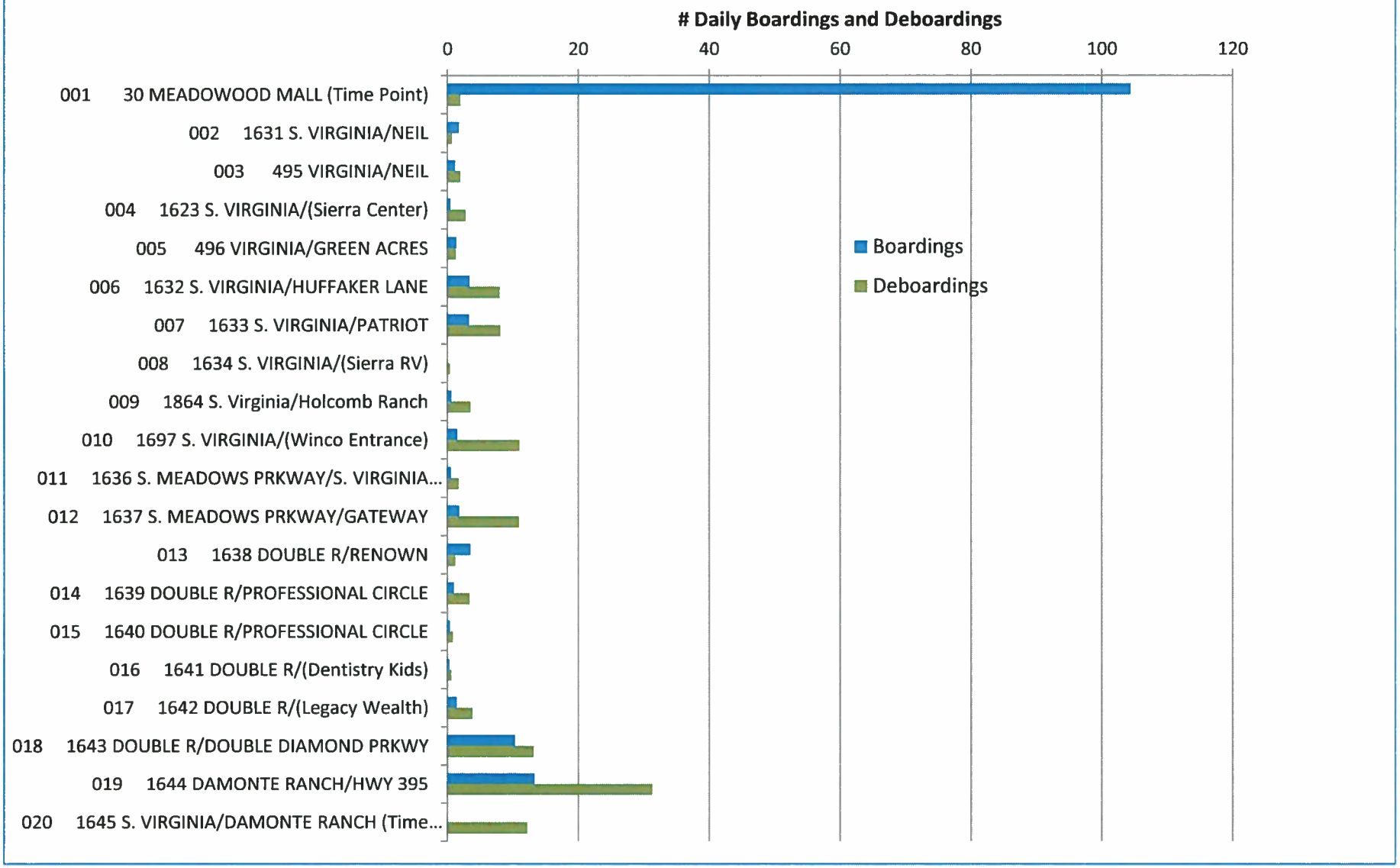
		5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	Daily Total	Percent of Directional Alightings
Northbound															
001	1645 S. VIRGINIA/DAMONTE RANCH (Time Point)	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
002	1853 S. Virginia/Auto Center	0	0.8	1.4	0.1	0.1	0.5	0.4	0.5	0.3	0.1	0	0	4.2	4.6%
003	1646 S. VIRGINIA/(Winco Entrance) (Time Point)	0	0	0.1	0	0.6	0.7	0.4	0	0.1	0	0	0	1.9	2.1%
004	1647 S. VIRGINIA/PATRIOT	0.1	0	0.1	0.1	0.1	0.5	0.6	0.3	0	0.3	0	0	2.1	2.3%
005	1648 S. VIRGINIA/LONGLEY	0	0	0	0	0.1	0.3	0.1	0.1	0	0	0	0	0.6	0.7%
006	1478 VIRGINIA/(Butcher Boy)	0	0	0.2	0	0	0	0.1	0	0	0	0	0	0.3	0.3%
007	503 VIRGINIA/GREEN ACRES	0	0	0	0	0	0	0.1	0.2	0.1	0.2	0	0.3	0.9	1.0%
008	1622 S. VIRGINIA/SIERRA CENTER PKWY	0	0.6	0.2	0	0	0	0	0	0	0	0	0	0.8	0.9%
009	493 VIRGINIA/NEIL	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0.2	0.2%
010	1601 MEADOWOOD MALL CIRCLE/VIRGINIA	0	0.1	0	0	0.1	0.5	0.3	0.9	1.2	0.3	0.3	0.4	4.1	4.5%
011	30 MEADOWOOD MALL (Time Point)	2.9	8.4	6	5.4	4.8	9	9.5	8.3	7.7	4.2	5.9	3.8	75.9	83.4%
Total		3	9.9	8	5.6	5.8	11.5	11.5	10.3	9.5	5.1	6.3	4.5	91	100.0%
Southbound															
001	30 MEADOWOOD MALL (Time Point)	0.1	0.6	0	0	0	1.3	0	0	0	0	0	0	2	1.7%
002	1631 S. VIRGINIA/NEIL	0	0	0	0	0.3	0.2	0.2	0	0	0	0	0	0.7	0.6%
003	495 VIRGINIA/NEIL	0	0	0.7	0	0.2	0.2	0.3	0	0.3	0.2	0.1	0	2	1.7%
004	1623 S. VIRGINIA/(Sierra Center)	0	0	0.1	0	0.8	0.4	0.6	0.6	0	0.3	0	0	2.8	2.4%
005	496 VIRGINIA/GREEN ACRES	0	0	0	0	0.2	0.3	0.5	0.2	0	0	0.1	0	1.3	1.1%
006	1632 S. VIRGINIA/HUFFAKER LANE	0	0	0.2	0.3	0.1	0.4	2.8	2	0.3	0.9	1	0	8	6.7%
007	1633 S. VIRGINIA/PATRIOT	0	0.1	0.3	0.6	1	0.9	0.7	0.6	2.3	0.5	0.6	0.5	8.1	6.8%
008	1634 S. VIRGINIA/(Sierra RV)	0	0	0.2	0.2	0	0	0	0	0	0	0	0	0.4	0.3%
009	1864 S. Virginia/Holcomb Ranch	0	0	0.2	0.9	0.7	0.4	0.1	0.7	0.3	0.2	0	0	3.5	2.9%
010	1697 S. VIRGINIA/(Winco Entrance)	1	0	1.6	1.4	1.2	1.7	1.4	1	0.6	0.8	0.1	0.2	11	9.3%
011	1636 S. MEADOWS PRKWAY/S. VIRGINIA (Time P	0	0	0	0.1	0	0.3	0.7	0.1	0.3	0	0.1	0.1	1.7	1.4%
012	1637 S. MEADOWS PRKWAY/GATEWAY	0.7	0.4	0.1	0.8	2.7	1.2	0.5	0.2	2.2	0.9	0.4	0.8	10.9	9.2%
013	1638 DOUBLE R/RENOWN	0.1	0	0.1	0.3	0.1	0	0.2	0.3	0	0	0	0.1	1.2	1.0%
014	1639 DOUBLE R/PROFESSIONAL CIRCLE	0	0	0.9	0	0	0.2	0.6	0.6	0.8	0.3	0	0	3.4	2.9%
015	1640 DOUBLE R/PROFESSIONAL CIRCLE	0	0	0	0	0.2	0	0.5	0	0.1	0	0	0	0.8	0.7%
016	1641 DOUBLE R/(Dentistry Kids)	0	0	0	0.2	0	0.1	0.3	0	0	0	0	0	0.6	0.5%
017	1642 DOUBLE R/(Legacy Wealth)	1.1	0.3	0.1	0.2	1.4	0	0	0.3	0.2	0.2	0	0	3.8	3.2%
018	1643 DOUBLE R/DOUBLE DIAMOND PRKWY	0.9	0.1	3.7	2.2	1.3	0.3	0.6	1.5	1.6	0.5	0.4	0.1	13.2	11.1%
019	1644 DAMONTE RANCH/HWY 395	2.3	1.8	4.7	2.9	3.6	2.9	3.5	2.7	3.1	1	1	1.8	31.3	26.3%
020	1645 S. VIRGINIA/DAMONTE RANCH (Time Point)	0.5	1.8	0.8	1.1	2.6	1.5	1.3	1	0.3	0.3	0.3	0.7	12.2	10.3%
Total		6.7	5.1	13.7	11.2	16.4	12.3	14.8	11.8	12.4	6.1	4.1	4.3	118.9	100.0%


ROUTE 57 Weekday Boarding by Hour
20
18
16
14
12
10
8
6
4
2
0
Northbound
Southbound
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM

Route 57 Average Weekday Passenger Activity by Stop -- Northbound



Route 57 Average Weekday Passenger Activity by Stop -- Southbound



TRANSPORTATION PLANNING AND
TRAFFIC ENGINEERING CONSULTANTS

2690 Lake Forest Road, Suite C
Post Office Box 5875
Tahoe City, California 96145
(530) 583-4053 FAX: (530) 583-5966
info@lsctahoe.com
www.lsctrans.com

TECHNICAL MEMORANDUM

To: Josh Thomson, Atkins

From: Gordon Shaw, PE, AICP, LSC Transportation Consultants, Inc.

Date: May 31, 2013

RE: Review of RAPID Routing and Station Locations on UNR Campus

INTRODUCTION

This memo presents an initial discussion of potential routing and station locations regarding extension of the RTC RAPID bus service to the University of Nevada Reno (UNR) campus. Note that this discussion is not based on detailed evaluation or site designs. Rather, it is intended as the basis of an initial discussion of options, and to determine whether the consulting team is "on the right track".

ROUTING/SERVICE OPTIONS

The existing RAPID service extends from Meadowood Mall in south Reno along the Virginia Street Corridor to the 4th Street Station, located on the south side of 4th Street between Lake Street and Evans Avenue on the east side of downtown Reno, approximately 0.5 miles south of the UNR campus. This existing route is 4.75 miles in length and serves 9 stops in each direction, resulting in an average stop spacing of roughly 0.6 miles. Articulated buses are used to provide service every 10 minutes over the bulk of the day. (In addition, RAPID CONNECT standard buses serve intermediate stops every 30 minutes.) The proposed project is intended to extend this high-quality transit service northward to serve the campus.

The UNR campus (excluding more remote areas such as the agricultural research facility) is approximately 1 mile in the north-south direction, and a quarter-mile in the east-west direction. Given this area, there are two general routing options: along Virginia Street, and along Evans Avenue. In addition, the north-south extent and standard BRT station spacing guidelines indicates that either route would optimally serve two stops in the campus area.

Virginia Street Route Option

Under this option, RAPID buses would exit the 4th Street Station, head west on 4th Street and then north on Virginia Street. While the overall length would depend on the location of the northernmost stop, at its greatest extent (with a northernmost stop on 17th Street), this route would be 1.8 miles in length (3.6 miles round-trip).

Advantages

- Serves the greater potential ridership. In particular, this option would place stops within convenient walking access distance of the residential areas (much of it high density) west of Virginia Street.

- Provides a higher profile for transit services.

Disadvantages

- This option is longer, and would have a longer running time due to the additional route length, the additional traffic signals (a total of 10 northbound and 11 southbound) and traffic congestion. This additional travel time would translate into additional buses and bus operating costs to provide a specific service headway.

Evans Avenue Route Option

This route would use Evans Avenue, which is immediately east of the 4th Street Station, and head north to a turnaround location on the east side of the UNR campus. Depending on the location of this turnaround loop, the maximum length would be 1.1 miles one-way (2.2 round-trip).

Advantages

- Provides substantially shorter operating time and cost. With a round trip that is 1.4 miles shorter and only one traffic signal to negotiate in each direction, this route could have a substantially shorter running time.

Disadvantages

- Would generate lower potential ridership. Not convenient to UNR uses on west side of N. Virginia Street, and UPRR limits walking access from the east.

- Would not be as compatible with adjacent land uses. The residential blocks between 6th Street and I-80 are particularly incompatible with high-frequency transit service.

- Given the lower level of pedestrian and traffic activity along Evans Avenue, security of passengers waiting at stops would be a greater issue.

Evans/Virginia Route Option

It may also be worth considering a combination of these two routes, by which the Evans Avenue Route is served as far north as 9th Street, and then the route shift west on 9th Street to serve stops along North Virginia Street. This would combine the lower running time along Evans south of 9th Street with the greater ridership potential along Virginia Street adjacent to the UNR campus. Modifications of the Evans/9th intersection (southwest corner) and Virginia/9th intersection (northeast corner) would be needed to provide an adequate travel path for buses.

Extension of UNR Shuttle Service South to RTC 4th Street Station

Rather than extension of RAPID service northward from the 4th Street Station to the UNR campus, another option would be for UNR campus shuttle service to be extended southward to

the 4th Street Station. The most straightforward strategy would be for campus shuttle service to be extended from the current southern terminus at Evans/9th southward along Evans Avenue to the 4th Street station at the corner of 4th/Evans. RTC would then designate a stop at the 4th Street Station of the campus shuttle. It would also be appropriate to evaluate the potential for changes in traffic controls at the Evans/6th Street intersection, if the current Stop signs on the Evans Avenue approaches results in excessive delays to shuttle buses. Depending on the ultimate configuration of the shuttle route, this would also probably require modifications to the Evans/9th and Virginia/9th intersections.

RTC Service Options

The current RAPID service plan between 4th Street Station and Meadowood Mall consists of two services: 60-foot articulated RAPID buses making limited (a total of 9 in each direction)stops at high-amenity bus stops, and standard 40-foot CONNECT buses serving more closely-spaced stops. One option would be to extend both RAPID and CONNECT service to the UNR campus. This would provide the proven ridership benefits of high-amenity transit service to the UNR campus, as well as "one seat" service as far as Meadowood Mall.

Another option would be to only extend CONNECT service. This would have the advantage of expanding connecting service between the campus and the key transit hub at 4th Street Station, every 30 minutes.

RAPID STOP LOCATION OPTIONS

It would be physically possible (at least at the majority of stops) to simply use existing RTC stops along Virginia Street for RAPID service (and use existing streets at the north end of campus to turn the bus around). However, this would have a number of drawbacks:

- The larger articulated buses would eliminate some existing onstreet parking, and may block crosswalks.

- More frequent service (six RAPID buses plus 2 CONNECT buses per hour) would result in additional traffic delays at stops such as Virginia/Artemesia where buses block the curb lane (even if the 4 Sierra Spirit buses per hour are eliminated).

- The existing stops do not provide shelter, expanded waiting areas, and other amenities that are part of the RAPID concept.

Optimally, enhanced stops would be provided, as discussed below. All stop locations have been conceptually designed to accommodate both an articulated RAPID bus, as well as a standard RAPID CONNECT bus.

Virginia Street Route Station Location Options

<u>Manzanita Lake Stop</u>

This stop would use the area currently the site of a small parking area just southwest of Manzanita Hall, on the east side of N. Virginia Street opposite 10th Street. Northbound buses would simply serve a bus bay (out of the travel lanes) on the east side of North Virginia Street, just south of the 10th Street signal. Southbound buses would cross North Virginia Street roughly 50 feet north of 10th Street, and enter a bus-only bay on the east side of the street. The passenger waiting area would be in a raised island between the two bus bays. A new traffic

signal would be needed approximately 100 feet south of 10th Street to provide egress for southbound buses, actuated by southbound bus movements or pedestrians.

Advantages

- Convenient to many of the UNR facilities in the southern portion of the campus. Also serves other land uses to the west and south.

- New traffic signal would also provide a protected pedestrian crossing of North Virginia Street.

Disadvantages

- Southbound left-turning buses and the new signal would negatively impact traffic flow on North Virginia.

Median Stop on Virginia North of 10th

This stop would consist of a raised island approximately 120 feet in length along the centerline of North Virginia Street on the north side of 10th Street, with bus bays in the "opposite" direction of traffic flow (in order to allow standard doors on the right side of the buses to serve the median island). Northbound buses would enter the existing northbound left turn lane at N. Virginia / 10th Street, and wait for a left-turn indication at a new signal to proceed to the west side of the island. Leaving the stop, northbound buses would negotiate through a painted median area to regain the northbound through lane (aided by breaks in northbound traffic generated by the 10th Street signal). Southbound buses would use this painted median area to shift to the east side of the island. A special actuated signal phase would provide southbound buses the ability to exit the stop and regain the southbound through lane without any conflicting traffic movements. Passengers would use the existing crosswalk on the north side of 10th Street to access the center median island.

This alternative would require North Virginia Street to be reduced to one through traffic lane in each direction. The conceptual site plan assumes that a three-lane cross section (with a center two-way left turn lane) would be provided.

Advantages

- Convenient to many of the UNR facilities in the southern portion of the campus. Also serves other land uses to the west and south.

- The new North Virginia / 10 Street provides protected pedestrian crossing.

Disadvantages

- Results in substantial impacts on existing traffic conditions (though this may be compatible with broader efforts to improve the pedestrian and urban design quality of North Virginia).

- Assuming no change in existing curb locations, provides only approximately 3 feet of pavement (including gutter pan) for bicyclists adjacent to the site.

- Not as attractive a location for passengers to wait for the bus.

15th St / Lawlor Stop

While there are various options that could use elements of the parking areas and landscaping areas along East 15th Street, one option that minimizes parking loss as well as transit running time would be to provide a bus turnaround loop on the north side of 15th (southeast of Lawlor Events Center). By turning off of 15th Street (rather than W. Stadium Way), the potential for conflicts with southbound traffic queues on W. Stadium Way is avoided. Buses would turn east off of North Virginia Street and turn left from the existing eastbound left turn lane, turn around, and serve a stop facing westbound. If selected, this could be the northern terminus of the RAPID line. This area could potentially be designed with pavers and a lack of full curbs to "share" the space between buses and pedestrians. The site could also potentially include a UNR Shuttle stop.

Advantages

- Very convenient to several key UNR activity centers, including Lawlor Events Center, Mackay Stadium, Joe Crowley Student Union, Mathewson IGT Knowledge Center, and the Lombardi Recreation Center.

- Would allow a Virginia Street Route to approximately 1 mile shorter on each round-trip.

Disadvantages

- Would eliminate approximately 7 existing parallel parking spaces on the north side of 10 Street.

- Would require modifications to existing plaza/landscaping areas.

- At peak times, bus movements may be delayed by traffic congestion.

Virginia Street Lawlor Stop

Another option for a northern terminus stop on Virginia Street would be to provide a bus stop on the east side of Virginia Street north of 15th Street, accompanied by a roundabout on Virginia Street at the West Stadium Parking Complex access drive (to provide a means for the buses to turn around).

Advantages

- Convenient to several key UNR activity centers, including Lawlor Events Center, Mackay Stadium, Joe Crowley Student Union, Mathewson IGT Knowledge Center, and the Lombardi Recreation Center.

- Would allow a Virginia Street Route to approximately 1 mile shorter on each round-trip.

- Roundabout would allow westbound-to-southbound left turn movements out of the parking structure onto Virginia Street.

- Less conflict between buses, pedestrians and traffic than along 15th Street.

Disadvantages

- Roundabout would require land purchase on the west side, as well as substantial capital costs.

17th / W. Stadium Way Stop

A final option for a northern terminus on the Virginia Street corridor would be located along the south side of 17th Street, west of West Stadium Way. It would be relatively simple and inexpensive, as future development in the North Campus area may require its relocation. Northbound buses would turn right onto 17th Street, serve the stop, and then make a counterclockwise loop via West Stadium Way, Anelli Lane, and Comstock Drive to re-enter Virginia Street at the Virginia Street /Sierra Street signal.

Advantages

- Convenient to Mackay Stadium and the Health Science Center.
- Could serve additional development in the North Campus area.
- Relatively low construction cost

Disadvantages

- Located in a relatively low-ridership-potential area of campus.
- Adds roughly 3 minutes to RAPID running time.
- Would eliminate 16 existing parking spaces.

Evans Avenue Route Station Location Options

9th/Evans Stop

The southern portion of campus could potentially be served by transit stops in the area currently a small parking lot on the south side of Fleishmann Agriculture Building (just northeast of the Evans/9th intersection). This lot currently provides 13 parking spaces in an inefficient design, as well as a turnaround and stop for the southern end of the East Campus Shuttle route. The southbound RAPID bus stop would be along the west side of Evans, just south of the Record Street intersection in a new bus bay outside of the travel lane. The northbound RAPID bus stop (as well as a potential campus shuttle stop) would be in the existing parking lot, accessed by a new one-lane northbound bus-only driveway that forms the fourth leg of the Evans/9th intersection. After serving this northbound stop, buses would exit by turning left onto Evans Avenue at the Record Street intersection.

Advantages

- Relatively low traffic impact
- Modest construction cost, in an area already disturbed.
- Provides some excess space that could be available for other uses such as tour bus loading.

Disadvantages

- Located in a relatively low-ridership-potential area of campus.
- Would eliminate 13 existing parking spaces in the lot northeast of Evans/Record.

Physics Building Loop Stop

This option would consist of a loop constructed just east of the Leifson Physics Building and south of Cain Hall. Buses would turn left off of Evans Avenue just past the facilities warehouse building, and then enter a loop to make a right-hand U turn before entering the stop. The passenger waiting area would be within the loop. If selected, this would be the northernmost stop on this route.

Advantages

- Convenient to the center of campus
- Relatively low traffic impact

Disadvantages

- Located in a relatively low-ridership-potential area of campus.
- Would eliminate approximately 26 existing parking spaces (including the parallel spaces along the access roadway).
- Overall route would be slightly (240 yards) shorter than with the National Judicial College stop discussed below.

National Judicial College Loop Stop

This option would consist of a loop on the west side of Evans Avenue just north of the National Judicial College, in a portion of the existing parking lot. Northbound buses would make a left turn off of Evans Avenue and serve a stop before making a right-hand U-turn back onto Evans Avenue southbound. The passenger waiting area would be within the loop.

Advantages

- Convenient to Mathewson – IGT Knowledge Center and Joe Crowley Student Union, and reasonable convenient to Lawlor Events Center and Mackay Stadium.
- Relatively low traffic impact.

Disadvantages

- Located in a relatively low-ridership-potential area of campus.
- Would eliminate a net of 19 existing parking spaces.

Evans/Virginia Route Station Location Option

9th / Center Stops

The only additional potential stop not discussed above on the Evans/Virginia Route would be a pair of "far side" stops on 9th Street after Center Street. In the westbound direction, a full new bus bay would be constructed by moving back the existing curb along the north side of 9th Street west of Center Street. In the eastbound direction, only roughly 4 feet of widening would be required on the south side of 9th Street east of Center Street, as there is currently an on-street parking lane in this area. If provided, a stop would not be provided in the vicinity of Virginia / 10th Street.

Advantages

- Convenient to the Quad, Manzanita Bowl and adjacent activity centers.
- Relatively inexpensive to construct.
- Relatively low traffic impact.

Disadvantages

- Less convenient to campus uses west of Virginia Street
- Would eliminate 6 existing on-street parking spaces.
- Would impact existing landscaping, and could be perceived as reducing the attractiveness of the Center Street entrance to campus.

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2690 Lake Forest Road, Suite C
Post Office Box 5875
Tahoe City, California 96145
(530) 583-4053 FAX: (530) 583-5966
info@lsctahoe.com
www.lsctrans.com

TECHNICAL MEMORANDUM

To: Emily Kubovchik, PE, PTOE, Atkins

From: Gordon Shaw, PE, AICP, LSC Transportation Consultants, Inc.

Date: December 6, 2013

RE: Ridership Impacts of Extension of RAPID BRT Service to the University of Nevada, Reno Campus

INTRODUCTION

This memo presents the findings of an analysis of the potential ridership increases that would accompany extension of the RTC RIDE's RAPID transit service to serve the University of Nevada, Reno (UNR) campus. The RAPID service is a Bus Rapid Transit (BRT) service that operates in mixed traffic along the Virginia Street corridor, using a combination of high-amenity buses, high-amenity bus stops (many with high platforms for easy boardings), high frequency (typically every 10 minutes) and unique branding. It currently operates a 4.6-mile-long route from Meadowood Mall on the south to the 4th Street Transit Station in downtown Reno; the extension would add 1.3 miles on the north end of the route to serve the UNR campus.

There are a variety of accepted methods for evaluating ridership impacts of enhancing existing transit services to provide BRT, including the traditional four-step demand methodology, logit models, and elasticity analysis. Of these, the most straightforward method (and the one for which adequate data is available) is elasticity analysis. Drawn from the field of microeconomics, an elasticity analysis considers the change in the demand for a good or service in comparison with the change in the "cost" of the good or service. In the field of transit demand analysis, the "cost" of obtaining the service may be one or more of a range of factors that impact the attractiveness of choosing to use a transit service, including fare, service frequency, travel time, and the inconvenience of transfers. Based upon the observed change in ridership that has accompanied changes in these factors in the past, the transit planning profession has identified a series of elasticity factors that may be applied to estimate the changes to existing transit ridership figures that can be expected once the transit improvements have been implemented.

EXISTING UNR RIDERSHIP IN THE BRT CORRIDOR

As presented in greater detail in LSC's memorandum summarizing existing services, dated June 13, 2013, the UNR campus is currently served by the following public transit services:

- RIDE Route 7 provides generally half-hourly service to the west side of the campus, as part of a longer route connecting the 4th Street Station on the south with the Stead area on the north.

- RIDE Route 17 provides generally half-hourly service to the southeast portion of the campus, on the way between the 4th Street Station and the Lemmon Valley area to the north.

- The Sierra Spirit provides service every 15 minutes between UNR and downtown Reno, at a low ($0.25 general public / $0.10 elderly/disabled) fare.

Existing average daily transit ridership in the UNR area on these routes is shown in Table A. These figures encompass all activity to and from the south which would potentially benefit from the BRT extension, excluding passengers (such as those boarding at UNR to travel north on Routes 7 and 17) that would not be served by the BRT extension. As indicated, daily ridership totals 705 passenger-trips, of which 70 percent are on the Sierra Spirit and 30 percent are on the two RIDE fixed routes.

To accurately conduct an elasticity analysis for ridership in the potential expanded BRT corridor, it is also necessary to evaluate the proportion of the total existing UNR ridership that has origins/destinations in the Downtown area (between I-80 and the Truckee River) versus the Midtown area (between the Truckee River and Plumb Lane) versus the South Virginia area (south of Plumb Lane). Fortunately, RTC commissioned a study (focusing on streetcar feasibility) that included onboard surveys of passengers on existing transit services. This data (totaling 1,206 valid responses) was analyzed to identify the travel pattern for existing passengers boarding/alighting in the UNR area. As shown in Table B, this data indicates that, excluding travel within the UNR area (that would not be well served by BRT), 81 percent of passengers with one trip end in the UNR area travel to/from downtown, 4, percent travel to/from Midtown, 11 percent travel to/from South Virginia, and 5 percent travel to/from other locations (requiring a transfer in downtown).

ELASTICITY ANALYSIS

As presented in Table C, the elasticity analysis was conducted in the following steps:

1. The ridership totals shown in Table A were factored by the origin/destination proportions shown in Table B to yield the daily transit ridership by existing "market" (fixed route vs. Sierra Spirit, and by non-UNR trip end).

2. The proposed RAPID expansion conceptual plans were reviewed to identify those transit service quality factors that would be impacted: service frequency, in-vehicle travel time, the need to transfer, the passenger fare, the bus stop amenities, advanced information technologies, a simplified route plan that is easy for passengers to understand, the unique branding of the RAPID BRT system, and the unique, high-amenity vehicles.

3. For each of the impacted factors, the existing value and value with RAPID extension was determined. Per standard transit ridership elasticity procedures, the impact of transfers (for travel beyond downtown) was reflected in the change in effective in-vehicle travel time. Specifically, the schedules were reviewed to identify average required transfer time (noting that the Sierra Spirit runs every 15 minutes but not on a fixed schedule while RAPID runs every 10 minutes, resulting in an average wait of 5 minutes in the southbound direction ant 7.5 minutes in the northbound direction). In addition, a 10

minute in-vehicle travel time "penalty" was included for current transfers, which is a standard value reflecting the inconvenience and uncertainty associated with transfers. Also, note that the current $0.25 general public / $0.10 elderly/disabled fare on the Sierra Spirit service (which would be replaced by RAPID extension to UNR) is assumed to continue, and to be applied to all passengers traveling within the UNR/Downtown area[1].

4. Elasticity values were then identified from a review of existing research documents, most notably the Transit Cooperative Research Program's (TCRP's) *Report 118: Bus Rapid Transit Practitioner's Guide* and the TCRP's *Report 95: Traveler Response to Transportation System Changes – Transit Scheduling and Frequency*. Note that a negative elasticity value reflects a service factor that varies inversely with ridership. For example, a reduction in service headway results in an increase in ridership.

5. Applying the elasticity value to the ratio of the future service quality factor to the existing service quality factor yielded a ridership factor, for both the existing fixed route passengers as well as the existing Sierra Spirit passengers. This factor reflects the percent change in ridership that is associated with the change in service quality factor. For example, a factor of 1.14 for the impact of reduced service headways on existing Sierra Spirit riders indicates that, considering solely the service headway factor, the RAPID expansion would yield a 14 percent increase in ridership.

6. Several other factors are also included, reflecting the unique attributes of BRT, specifically the high-amenity stops and vehicles, the easily-understood routing plan, the application of Intelligent Transportation Systems (ITS) technologies such as real-time traveler information, as well as the effect of the unique branding of RAPID service. These values were assumed to equal two-thirds of the maximum values identified in the TCRP *Report 118*. Note that, as the *Report 118* recommends, no additional factor reflecting synergy between these various improvements as the sum of these "other factors" does not reach a recommended minimum level (largely due to the fact that RAPID runs in mixed traffic rather than in a dedicated right-of-way).

7. The various factors are then multiplied together to yield an overall factor for each of the various existing travel "markets".

8. Multiplying the existing ridership in each "market" by the appropriate overall factor and adding the fixed route and Sierra Spirit figures yields the estimated ridership with RAPID extension.

As shown in Table C, future ridership with RAPID extension is forecast to be 1,530 one-way passenger-trips per day. This is equal to an increase of 825 passenger-trips per day, or 117 percent increase over current ridership. The largest segment of this ridership increase (622 passenger-trips) is for persons traveling between UNR and downtown (including transfers to other routes out of the Virginia Street Corridor). However, on a proportion basis, the greatest relative increase (155 percent) would occur between UNR and Midtown.

The ratio of annual to daily ridership on the fixed routes and Sierra Spirit were multiplied by the daily ridership impacts to yield the estimated annual ridership impact. Overall, the RAPID extension would increase transit ridership by an estimate 281,000 one-way passenger-trips per year.

---

[1] Similar to the Utah Transit Authority's free fare zone in downtown Salt Lake City.

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TABLE A: Average Daily RTC Passenger Activity in UNR Area Bound To/From South

Stops in Area Bounded by Virginia Street, McCarren Blvd North, Evans Avenue and I-80

Stop	Route 7	Route 17	Route Sierra Spirit	Total
Southbound Boardings	--	0.4	--	0.4
Highland/Evans	--	1.3	--	1.3
Evans/9th	--	2.9	--	2.9
Virginia/17th	8.6	--	17.5	26.1
Virginia/(Planetarium)	3.9	--	1.5	5.4
Virginia/15th	12.0	--	111.3	123.3
Virginia/College	8.0	--	19.9	27.9
Virginia/Artemesia (West)	22.4	--	41.8	64.2
Virginia/10th	9.6	--	23.9	33.5
Virginia/8th (West)	--	--	51.4	51.4
Northbound Alightings				
Virginia/7th	11.4	--	51.6	63.0
Virginia/9th	23.8	--	27.8	51.6
Virginia/Artemesia	41.4	--	37.2	78.6
Virginia/College	18.6	--	32.9	51.5
Virginia/15th	24	--	41.4	65.4
Virginia/(Planetarium)	9	--	15.1	24.1
Virginia/17th (East)	9.2	--	17.2	26.4
002 677 EVANS/7TH	--	4.3	--	4.3
003 678 EVANS/9TH	--	2.6	--	2.6
004 1660 HIGHLAND/EVAN	--	1.1	--	1.1
TOTAL	201.9	12.7	490.5	705.1
Percent of Total	29%	2%	70%	100%

Excludes passengers traveling to/from north on Rts 7 and 17 as well as passengers traveling within University area that would not be served by BRT.

TABLE B: Existing Origin/Destination Zonal Patterns Along Virginia Street Corridor

		University Area	Downtown	Midtown	South Virginia	Other	Total
All Routes	University Area	5	49	2	9	5	70
	Downtown	41	89	37	292	5	464
	Midtown	2	29	19	59		109
	South Virginia	3	283	49	216	2	553
	Other	0	4	1	5	0	10
	Total	51	454	108	581	12	1206
Sierra Spirit	University Area	5	47	0	0	0	52
	Downtown	41	0	0	0	0	41
	Midtown	0	0	0	0	0	0
	South Virginia	0	0	0	0	0	0
	Other	0	0	0	0	0	0
	Total	46	47	0	0	0	93
Rts 7 & 17	University Area	0	2	2	9	5	18
	Downtown	0	89	37	292	5	423
	Midtown	2	29	19	59	0	109
	South Virginia	3	283	49	216	2	553
	Other	0	4	1	5	0	10
	Total	5	407	108	581	12	1113

Summary: Ridership To/From University Area		
Downtown	90	81%
Midtown	4	4%
South Virginia	12	11%
Other	5	5%
Total	111	100%

Downtown	88	95%
Midtown	0	0%
South Virginia	0	0%
Other	5	5%
Total	93	100%

Downtown	2	9%
Midtown	4	17%
South Virginia	12	52%
Other	5	22%
Total	23	100%

Source: Onboard Surveys conducted as part of Streetcar Study in 2011.

TABLE C: Elasticity Analysis of RAPID Extension to UNR

Assuming Low Fare UNR/Downtown Zone

Between	UNR	UNR	UNR	
And	Downtown / Transfers	Midtown	South Virginia	Total
Existing Daily Ridership on BRT Corridor To/From UNR Area (1-Way Passenger-Trips)				
Rts 7 & 17	65	37	112	215
Sierra Spirit	491	0	0	491
Total	556	37	112	705
Service Quality Factors				
Service Headways (Minutes Between Departures)				
Existing:Rts 7 & 17	30	30	30	
Existing: Sierra Spirit	15	15	15	
With BRT Extension	10	10	10	
Elasticity Value	-0.32	-0.32	-0.32	
Ridership Factor: Rts 7 & 17	1.42	1.42	1.42	
Ridership Factor: Sierra Spirit	1.14	1.14	1.14	
In-Vehicle Travel Time (Minutes)				
Existing:Rts 7 & 17 (1)	8	24	40	
Existing: Sierra Spirit (1)	8	31	47	
With BRT Extension	6	12	28	
Elasticity Value	-0.3	-0.3	-0.3	
Ridership Factor: Rts 7 & 17	1.09	1.23	1.11	
Ridership Factor: Sierra Spirit	1.09	1.33	1.17	
Base Fare				
Existing:Rts 7 & 17	$2.00	$2.00	$2.00	
Existing: Sierra Spirit	$0.25	$2.00	$2.00	
With BRT Extension	$0.25	$2.00	$2.00	
Elasticity Value	-0.33	-0.33	-0.33	
Ridership Factor: Rts 7 & 17	1.99	1.00	1.00	
Ridership Factor: Sierra Spirit	1.00	1.00	1.00	
Other Factors				
Stop Amenities	1.1	1.1	1.1	
Unique Branding	1.07	1.07	1.07	
Service Pattern	1.1	1.1	1.1	
ITS Applications	1.07	1.07	1.07	
Vehicles	1.05	1.05	1.05	
TOTAL FACTOR				
Applied to Existing Rts 7 & 17 Riders	4.48	2.55	2.30	
Applied to Existing Sierra Spirit Riders	1.81	2.20	1.93	
Daily Ridership				
Total	1,178	95	258	1,530
Change In Daily Ridership				
Total	622	58	146	825
Percent Change	*112%*	*155%*	*130%*	*117%*
Annual Ridership				
Total				281,000

Note 1: Includes 10-minute travel time penalty to reflect current need to transfer, as well as an average of 2 minutes of transfer time between 7/17 and RAPID and 7 minutes between Sierra Spirit and RAPID.
Note: Excludes ridership generated by special events, such as UNR sporting events or concerts

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2690 Lake Forest Road, Suite C
Post Office Box 5875
Tahoe City, California 96145
(530) 583-4053 FAX: (530) 583-5966
info@lsctahoe.com
www.lsctrans.com

TECHNICAL MEMORANDUM

To: Emily Kubovchik, Atkins

From: Gordon Shaw, PE, AICP, LSC Transportation Consultants, Inc.

Date: January 27, 2014

RE: Transit's Role in Providing Mobility to Higher Education in the Truckee Meadows

INTRODUCTION

There has been substantial recent discussion on how to build on Reno/Sparks' role as a "University Town", as an economic development tool and to improve the vitality of the region. Strong transit connections to colleges and universities are a key element of many other successful college communities, building from the low auto availability of students and the benefits that transit can bring to busy activity centers such as a university campus.

This memo provides a discussion of how RTC services and programs could potentially strengthen connections between the region's various university and college campuses, as well as to Reno's downtown and Midtown areas. This review focuses on the following higher education facilities:

- The University of Nevada, Reno (UNR) Main Campus just north of downtown Reno
- The Truckee Meadows Community College (TMCC) Dandini (Main) Campus in north Reno
- The Redfield Campus (with both UNR and TMCC functions) on Mount Rose Highway just west of US 395
- The TMCC Meadowood Center, just east of Meadowood Mall in south-central Reno
- The TMCC Redfield Performing Arts Center on Keystone Avenue just south of I-80 in west Reno
- The TMCC IGT Applied Technology Center off of Rock Boulevard in east Reno

This memo first presents a summary of existing transit services connecting the various campuses. Next, current student levels and class schedules are reviewed to assess potential

travel needs. Finally, potential strategies to enhance transit services and utilization are reviewed.

TRANSIT SERVICES TO SOUTH RENO, UNR, AND TMCC

RTC Ride routes serving each of the individual campuses as follows:

- UNR Main Campus – Routes 7 and 17, and SIERRA SPIRIT
- TMCC Dandini (Main) Campus – Route 15
- TMCC Meadowood Center – RAPID, and Routes 1, 9, 12, 54, and 56
- TMCC Redfield Performing Arts Center – Route 3
- TMCC IGT Applied Technology Center – Route 14
- Redfield Campus – No Service

Figure A presents a map of these facilities, prepared by TMCC. Route details are included below, and show information for Monday through Friday service only.

RAPID, Reno's BRT service, currently connects downtown Reno with the Meadowood Mall area, providing service close to the TMCC campus. This service provides high frequency rapid transit bus service between Meadowood Mall and downtown Reno. As discussed in other sections of the report, this service is planned for expansion to the UNR campus in the near future. Currently, the bus operates between 6:01 AM and 9:20 PM, with buses departing every 10 minutes during peak hours and 30 minutes in the evening.

Route 2/2S operates between the hours of 4:30 AM and 1:48 AM, serving the UNR campus with mostly 30 minute headways (60 minutes in the evening, 15 minutes in the morning and afternoon peak periods). It serves a stop on the eastern edge of the campus, not within a convenient walk of the academic buildings.

Route 7 also serves UNR and provides service every 30 minutes (60 minutes in the evening) between 4:45 AM and 1:41 AM.

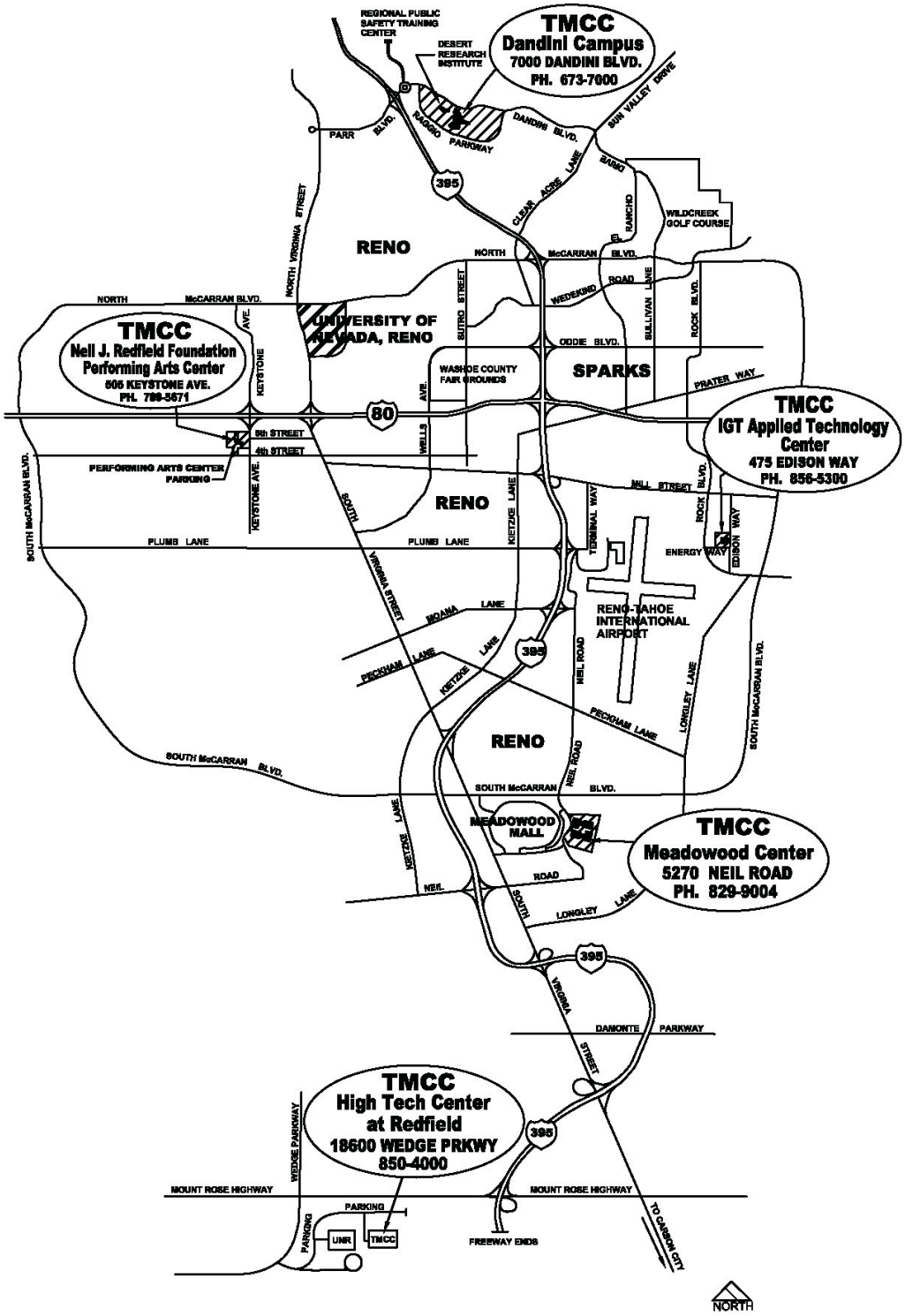
Route 9 connects downtown Reno with the Meadowood Mall, serving the TMCC campus in that area. Service is between 5:00 AM and 1:24 AM every 30 minutes during the day and 60 minutes in the evening.

Route 12 also serves the TMCC campus at the Meadowood Mall area, connecting it to downtown. The route operates between 4:06 AM and 1:09 AM with service every 30 minutes (60 minutes in the evening).

Route 15 directly serves the TMCC campus in northern Reno, originating from the downtown 4TH STREET STATION. Service is between 5:45 AM and 11:35 PM, with buses departing every hour.

Route 17 provides service between downtown Reno and the UNR campus (and continues north to Lemmon Valley) between 5:26 AM and 10:54 PM every hour.

Figure A
TMCC and UNR Facility Locations



TRUCKEE MEADOWS COMMUNITY COLLEGE
RENO VICINITY MAP

TMCC CAMPUS PLANS \ VICMAP 8-12

Source: TMCC

Route 54 also serves the TMCC campus near Meadowood Mall, with service beginning in downtown Reno. The route operates between 5:30 AM and 7:23 PM every hour.

Route 56 connects southern Reno with Meadowood Mall, providing service to the nearby TMCC campus. Service is offered every 30 minutes (60 minutes in the evening) between 5:24 AM and 10:41 PM.

SIERRA SPIRIT provides service connecting the UNR campus with downtown every 15 minutes, from 7:00 AM to 7:00 PM seven days a week. Extended hours of operation serve Wolf Pack games. A low fare ($0.25 for general public and $0.10 for elderly/disabled) is charged.

The way in which these individual routes serve trips between specific college and university centers (as well as to Downtown and Midtown) are summarized in Table A. For each trip origin and destination, this table indicates the routes required, the hours of the day ("service span") that service is available on weekdays, the frequency of service, and the total travel time between boarding the bus and reaching the destination. A review of this table indicates the following:

- With the exception of service to the Redfield Campus, the current RTC services do provide transit connections between the various higher education campuses as well as to Downtown and Midtown. These services are available both during the day and well into the evening (late enough to accommodate evening classes).

- Service frequency is high along the Virginia Street corridor between UNR and Meadowood Mall, thanks to the combination of RAPID and SIERRA SPIRIT services. It bears noting, however, that after 7 PM (when SIERRA SPIRIT service ends) frequency to the UNR campus drops to two times per hour.

- Service frequencies for other connections are modest, with either half-hourly or hourly service.

- Other than service to Downtown, all key trips currently require a transfer at 4TH STREET STATION. The need to transfer substantially reduces the convenience of a transit trip, particularly among "discretionary" riders with the option to use a private vehicle.

- Some of the trip travel times are long (approaching an hour). These longer travel times generally reflect long waits for transfers (particularly for departures on Routes 3 and 14).

REVIEW OF EXISTING CAMPUS ACTIVITY

University of Nevada, Reno

UNR has a current (Fall 2013) enrollment of 18,392 individual students. Of this, 83 percent are undergraduate students and 17 percent are graduate students. In recent years, enrollment has been increasing by 1 to 3 percent. Current projections estimate a 2023 enrollment of approximately 21,400.

TABLE A: Existing Key College RTC Ride Transit Connections

"+: Indicates Need to Transfer

Between ↓	And →	UNR Main Campus	TMCC Dandini (Main) Campus
Downtown	Routes	7, 17, SIERRA SPIRIT	15
	Service Span	5AM -- 1 AM	6 AM -- 11 PM
	Service Frequency	Up to 6X per Hour	2X per Hour
	Travel Time	10 Minutes	29 Minutes
Midtown	Routes	7 or 17 + RAPID or 1	15 + RAPID or 1
	Service Span	5AM -- 1 AM	6 AM -- 11 PM
	Service Frequency	2X per Hour	2X per Hour
	Travel Time	22 Minutes	39 Minutes
TMCC Dandini (Main Campus)	Routes	7 or 17 + 15	--
	Service Span	6 AM -- 11 PM	
	Service Frequency	2X per Hour	
	Travel Time	30 Minutes	
Redfield Campus	Routes	No Service	No Service
	Service Span		
	Service Frequency		
	Travel Time		
TMCC Meadowood Center	Routes	7 or 17 + RAPID or 1	15 + RAPID or 1
	Service Span	5AM -- 1 AM	6 AM -- 11 PM
	Service Frequency	2X per Hour	2X per Hour
	Travel Time	37 Minutes	52 Minutes
TMCC Redfield Performing Art Center	Routes	7 or 17 +3	15 + 3
	Service Span	5 AM -- 10 PM	6 AM -- 10 PM
	Service Frequency	1X per Hour	1X per Hour
	Travel Time	39 Minutes	52 Minutes
TMCC Applied Technology Center	Routes	7 or 17 + 14	15 + 14
	Service Span	5 AM -- Midnight	6 AM -- Midnight
	Service Frequency	2X per Hour	2X per Hour
	Travel Time	53 Minutes	57 Minutes

RTC Bus Book, August 11, 2013 Edition

The vast majority of UNR classes are held at the main campus. A review of the current Fall 2013 schedule indicates there is only one class being offered at the Redfield Campus through UNR, which occurs on Tuesdays from 4:00 PM to 6:45 PM. The semester-long course lasted from August 26 through December 10, 2013. According to the spring 2014 schedule, there are no classes set to be held at the Redfield Campus.

UNR also offers Extended Studies courses in a joint effort with the Redfield Campus. These courses are generally technology-based, as there is a “high tech” center on site. Other courses, such as Human Resources or Supervisory centered topics, change locations depending on

availability of space at both UNR and Redfield. As such, there is no approximation of how many total Extended Studies courses are typically offered at the Redfield site. Classes are posted by month on the Extended Studies website. For the month of November 2013, there were 11 courses (out of a total of 171) that were held at the Redfield Campus. Eight of these courses were one-day only courses, while three were a two-day course and one was a three-day course series. In total, there were 23 different days that classes were held. Some of these courses have also been scheduled for future dates in 2014.

Table B presents a summary of the Extended Studies course offerings for current and planned dates. As shown, courses are not held every day of the month (it should be noted that more classes could be added for 2014 dates at a later time, and there could be classes held throughout 2013 that are not shown). The majority, 60.9 percent, are held on Tuesdays, followed by Thursday with 26.1 percent. Only a few are held on Wednesday (8.7 percent) or Friday (4.3 percent). Regarding time, 69.6 percent are held from 8:30 AM to 3:30 PM on their respective days, while 17.4 percent are held from 9:00 AM to 4:00 PM. Only one course, a three-day offering, was held during the evening from 6:00 PM to 9:00 PM. Given the short-term nature of these courses and that they are generally attended by members of the general public (rather than full-time UNR students), the potential transit demand associated with these courses is probably low.

TABLE B: UNR Extended Studies Course Schedule as of November 2013

Day of Week	Time	# of Courses
Tuesday	8:30am - 3:30pm	12
	9:00am - 4:00 pm	1
	6:00pm - 9:00pm	1
Wednesday	9:00am - 4:00 pm	1
	6:00pm - 9:00pm	1
Thursday	8:30am - 3:30pm	4
	9:00am - 4:00 pm	1
	6:00pm - 9:00pm	1
Friday	9:00am - 4:00 pm	1
% Courses held on Tuesday		*60.9%*
% Courses held on Wednesday		*8.7%*
% Courses held on Thursday		*26.1%*
% Courses held on Friday		*4.3%*
% Courses held at 8:30 am		*69.6%*
% Courses held at 9:00 am		*17.4%*
% Courses held at 6:00 pm		*13.0%*

Source: UNR Extended Studies website

In addition to these one-day to three-day courses, there are some semester-long programs that are held through the Extended Studies program at the Redfield Campus. The Paralegal

Program courses exclusively take place at the Redfield Campus, and occur during the regular UNR semester timeframe. For the current semester, the courses are held on Saturdays and Sundays (individual students attend on both days) between September and December, from 9:00 AM to 5:00 PM. While this program would not generate transit demand from students also attending or living on the UNR campus, it would generate a modest level of demand for residents of the region accessing the Redfield campus.

Tahoe Meadows Community College

The *Truckee Meadows Community College Educational Master Plan* identifies a total enrollment of 2,174 full-time equivalent students (2008-09 figures). As many students take a small number of credits at one time, the total number of individuals attending college classes over the course of a year is approximately 13,000. The 2012 *TMCC Strategic Plan* calls for increasing the number of graduates each year from 988 in 2012 to 1356 in 2015.

By campus, the total number of individual students enrolled in at least one class at each campus is as follows:

Dandini (Main Campus)	8,275 (74%)
IGT Applied Technology Center	727 (6%)
Meadowood	1,348 (12%)
Performing Arts Center	160 (1%)
Redfield	748 (7%)

There is a substantial need for students to travel between campuses. Overall, 30 percent of students are enrolled in courses at more than one campus. As might be expected, this figure is highest for the smaller campuses: 72 percent of those enrolled at the Performing Arts Center also have classes elsewhere, along with 59 percent enrolled at Redfield and 65 percent at Meadowood. On the other end, only 19 percent of those enrolled at the Dandini Campus and 50 percent enrolled at IGT Applied Technology Center are also taking classes elsewhere.

Along with UNR, the TMCC also holds a limited number of courses at the Redfield Campus. The courses that are held at Redfield are all in the evening hours. In fall 2013, one course was offered on Wednesdays from 6:00 PM to 9:50 PM from August 28th to December 11th, 2013. The spring 2014 course catalog shows two semester-long courses and two short-term courses being held at Redfield:

- Wednesday from 5:00 PM to 6:45 PM, January 29th to May 14th
- Thursday from 6:00 PM to 9:50 PM, January 30th to May 15th
- Friday from 5:30 PM to 10:00 PM, January 10th and January 17th
- Saturday and Sunday from 9:00 AM to 6:00 PM, January 11th, 12th, 18th and 19th

This information suggests that courses at Redfield through TMCC are designed for students who attend after work, as all are held in the evening or on weekends.

In addition to the Redfield Campus, the TMCC holds courses at a location near the Meadowood Mall, at 5270 Neil Road. This location is adjacent to a RTC stop (served by Routes 6, 9, and 54), and is also roughly a quarter-mile walk from the Meadowood Transfer Point, which is also served by RAPID, Routes 1, 12, 56, and Intercity. According to the fall 2013 schedule, there are 48 different courses being held at this location. Of the 48 courses, three are one-day only courses, three are two-day courses, and one is a four-day series.

Table C shows a distribution of classes offered by time of day (not broken up by actual day). The "peak" times where students are on-site is between 9:00 AM and 12:30 PM (17 classes) and between 5:30 PM and 10:00 PM (18 classes). These are exclusive of the multi-day non-semester courses. Classes during these time periods are offered generally between Monday and Thursday. In total, 83 individual class sessions are held between Monday and Saturday. Looking at the total classes, the majority are offered on a Wednesday (30 percent) or Monday (28.9 percent). These are followed by Tuesday (18.1 percent) and Thursday (12.0 percent). Only 6.0 percent of classes are offered on Saturday and 4.8 percent on Friday, all of which are non-semester multi-day courses.

EXISTING STUDENT HOUSING RELATIVE TO TRANSIT ROUTES

RTC Planning staff has collected information on UNR student housing locations. As shown in Figure B, this data was plotted along with a quarter-mile band around existing RTC routes (excluding the INTERCITY route, due to the limited stops). Reviewing Figure B, key areas of student housing not currently served consist of the following:

- Areas of Sparks north of Baring Boulevard, particularly the neighborhoods off of Vista Boulevard.
- Southwest Reno, within McCarran Boulevard, west of Plumas Street and south of West Plumb Lane, including the concentration of multifamily housing along Skyline Boulevard.
- The neighborhood south of Rancho San Raphael Park, west of North Sierra Street and north of Kings Row

A similar map comparing TMCC student housing location with the existing fixed route convenient walking area is shown in Figure C. Reflecting that many TMCC students presumably live in their family home, this graphic reflects a more dispersed housing pattern than for UNR students. Key areas not currently served by fixed route RIDE services consist of the following:

- The Somersett area in far northwestern Reno
- Areas of Sparks north of Baring Boulevard, particularly the neighborhoods off of Vista Boulevard and Los Altos Parkway
- Portions of Stead not served by Route 7
- The Hidden Valley area east of the airport
- The neighborhoods in far southeast Reno at the base of Geiger Grade (SR 341)

Table D presents the results of a GIS evaluation of student housing locations relative to existing Ride fixed routes (excluding the Intercity Route). Of all students, 39 percent of UNR students were found to live within a quarter-miles of a route[1], and 38 percent of TMCC students.

[1] This may be an underestimate. The housing location data is known to the Traffic Analysis Zone (TAZ) level. The GIS analysis calculates the number of housing units within the quarter-mile distance of the route, assuming the units are evenly distributed over the TAZ. However, larger streets are often used to form the boundaries of the TAZs, and both transit routes and higher density housing tends to cluster near the larger streets. The number of housing units within the quarter-mile distance from a route therefore may well be higher than shown.

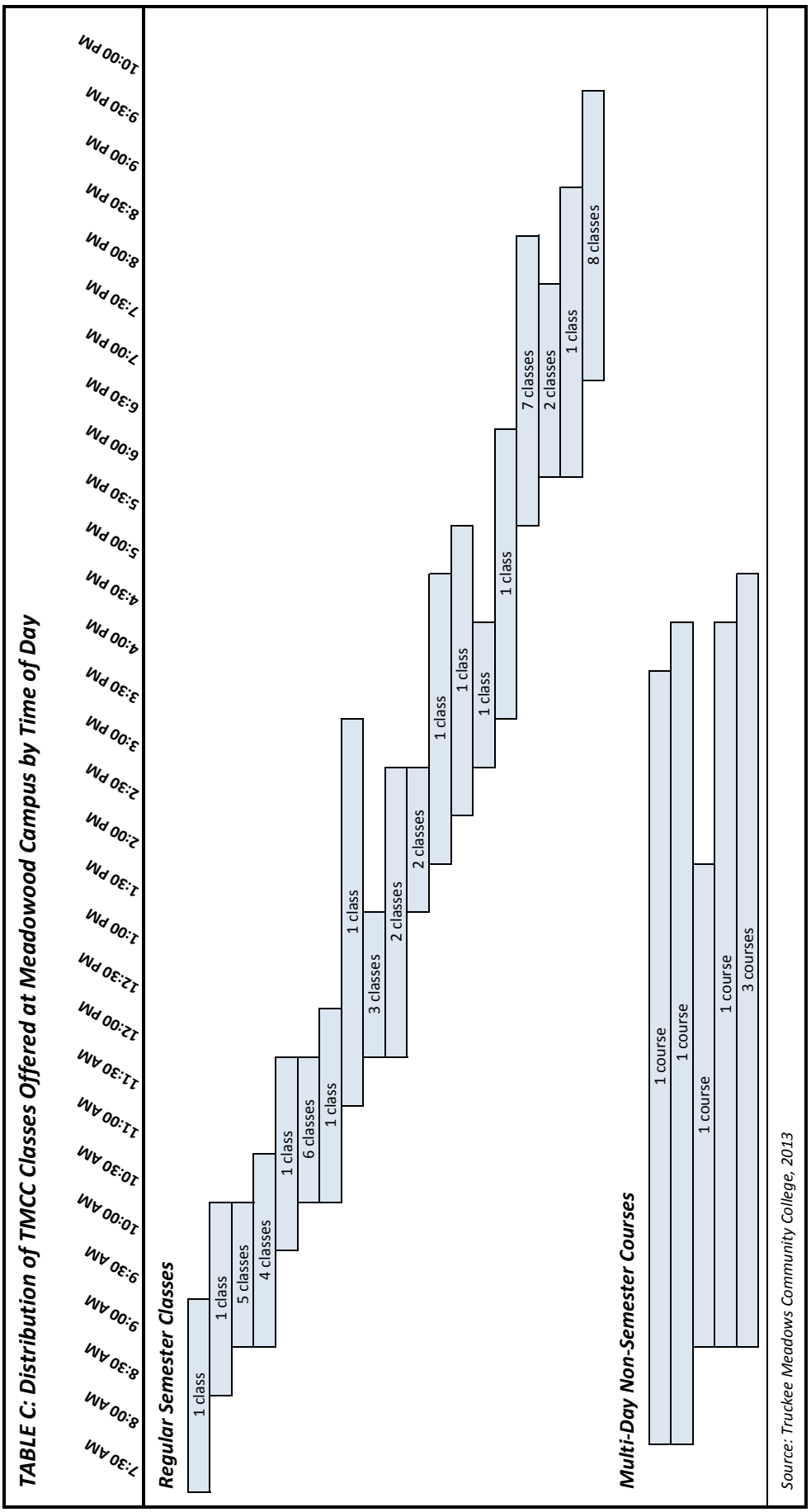


TABLE C: Distribution of TMCC Classes Offered at Meadowood Campus by Time of Day
7:30 AM
8:00 AM
8:30 AM
9:00 AM
9:30 AM
10:00 AM
10:30 AM
11:00 AM
11:30 AM
12:00 PM
12:30 PM
1:00 PM
1:30 PM
2:00 PM
2:30 PM
3:00 PM
3:30 PM
4:00 PM
4:30 PM
5:00 PM
5:30 PM
6:00 PM
6:30 PM
7:00 PM
7:30 PM
8:00 PM
8:30 PM
9:00 PM
9:30 PM
10:00 PM
Regular Semester Classes
1 class
1 class
5 classes
4 classes
1 class
6 classes
1 class
1 class
3 classes
2 classes
2 classes
1 class
1 class
1 class
7 classes
2 classes
1 class
8 classes
Multi-Day Non-Semester Courses
1 course
1 course
1 course
1 course
3 courses
Source: Truckee Meadows Community College, 2013

Figure B:
UNR STUDENTS WITHIN A 1/4 MILE OF TRANSIT ROUTES

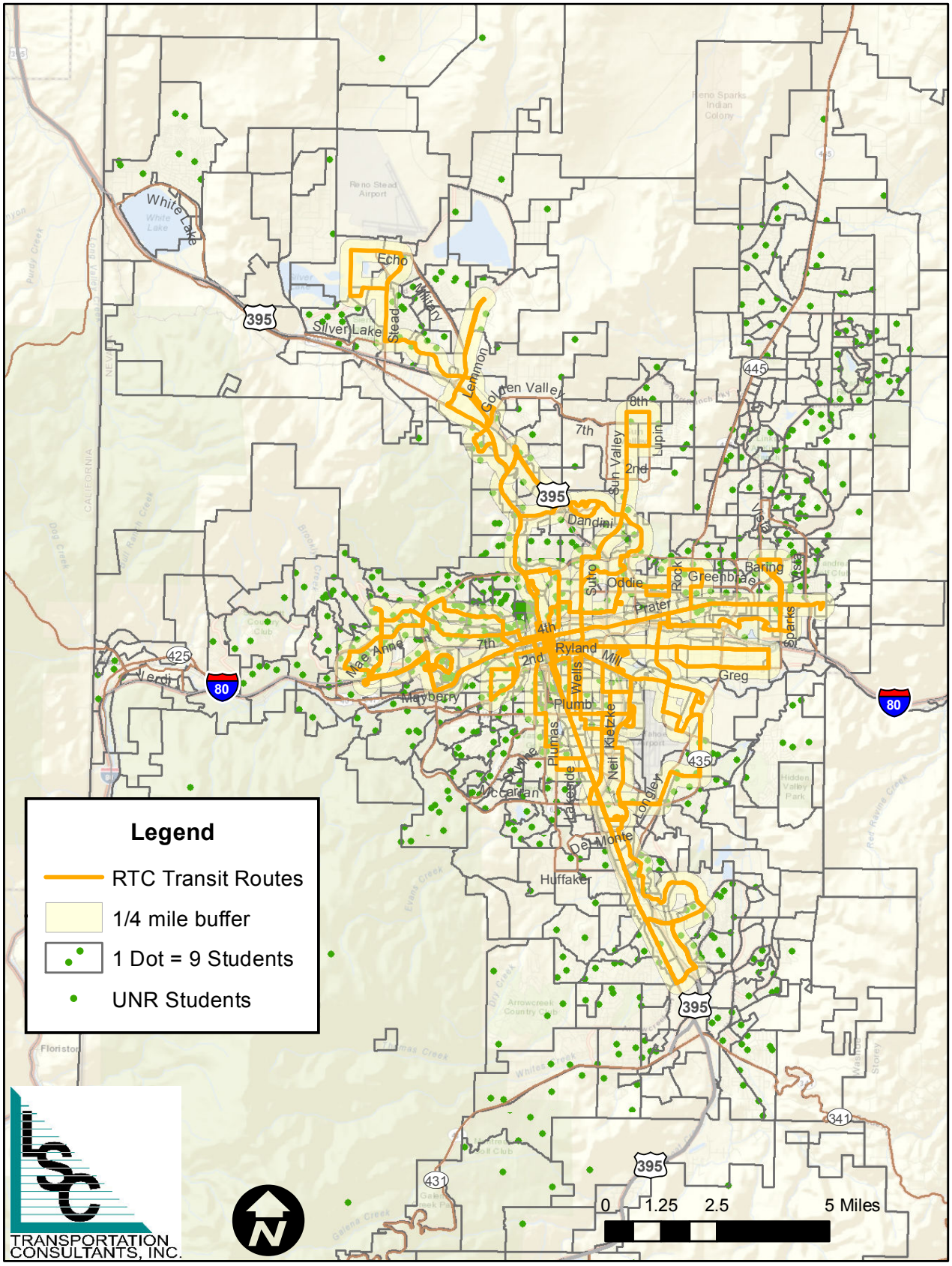


Figure C:
TMCC STUDENTS WITHIN A 1/4 MILE OF TRANSIT ROUTES

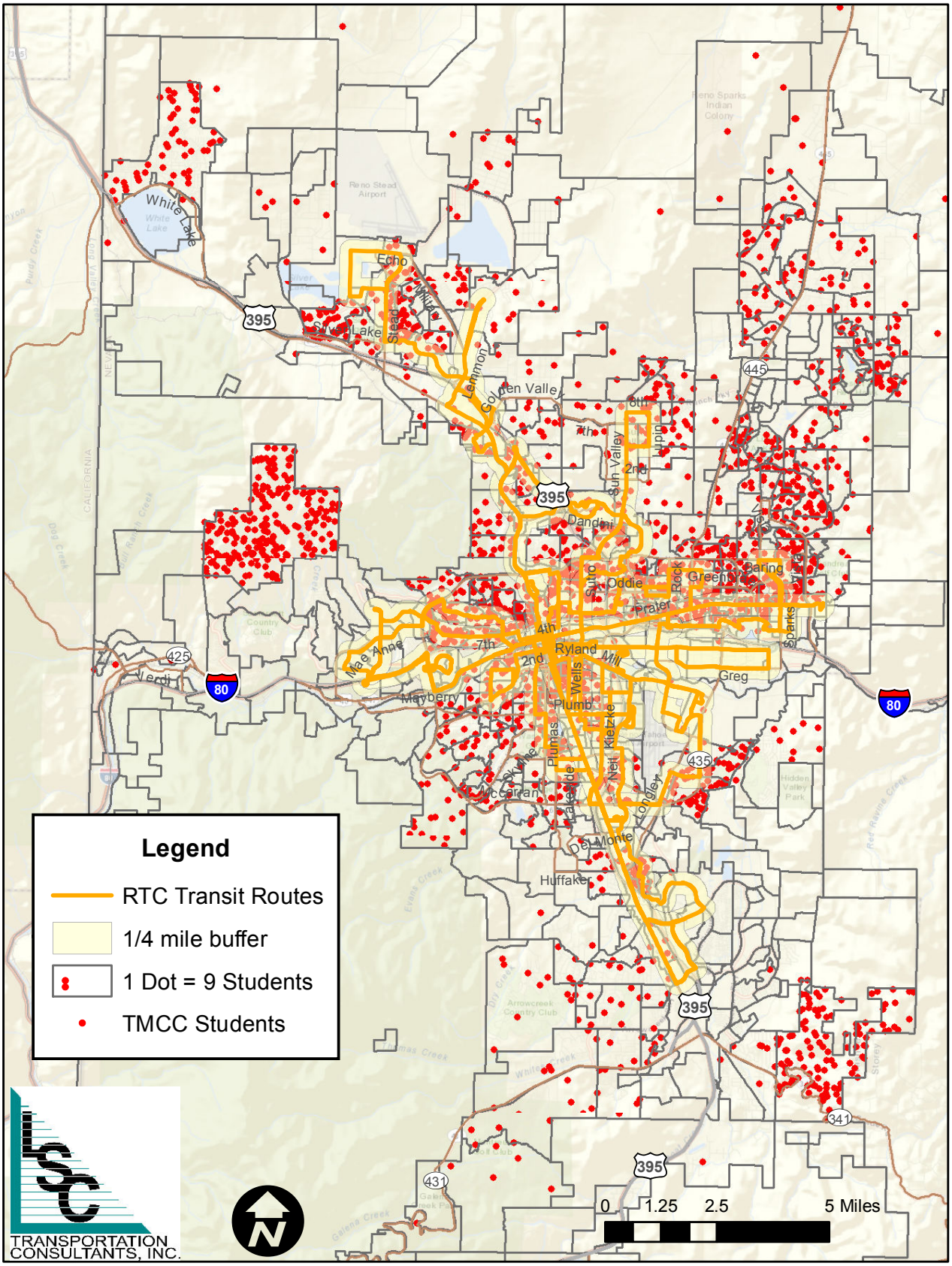


TABLE D: Higher Education Student Housing Served by Existing RIDE Fixed Routes

Institution	Total Number of Students	# Students in Living Within 1/4 Mile of a Fixed Route	
		Number	Percentage
UNR	7594	2972	39%
TMCC	22580	8536	38%
TOTAL	30174	11508	38%

Note: As housing is only located by traffic analysis zone (and the GIS software assumes random distribution with each zone), these figures underestimate the housing within 1/4 mile of the route, for those zones only partially within 1/4 mile.
Source: RTC Planning

TRANSIT SERVICE IMPROVEMENTS DISCUSSION

Extension of RAPID Service to Better Serve Higher Education

Previous tasks of this study have detailed the implementation steps and benefits associated with northward extension of RAPID from the current terminus at the 4TH STREET STATION in downtown Reno to the UNR campus. This discussion need not be repeated here, though it is worth underscoring that that the 2004 *UNR Master Plan* indicates that providing of BRT service to the UNR campus would reduce overall parking demand by 7 percent. If this figure is still pertinent, this equates to approximately 600 parking spaces that could be avoided through the extension of BRT.

Regarding southward extension of BRT service to the Redfield Campus, as discussed in LSC's memorandum dated October 11, 2013 regarding *Meadowood Mall Transit Site Alternatives Analysis and South Virginia Transit Services*, the RAPID service currently terminates at the Meadowood Mall Transfer Station, and extending service to the southern end of the city would not be cost-effective due to overall lack in demand relative to BRT standards.

Establishment of New Routes to Serve Higher Education

Any discussion of establishing new transit routes must carefully consider the cost implications. A reasonable operating span of service that can accommodate the bulk of college/university transit needs and is consistent with other services would be 5:45 AM to 11:15 PM on weekdays, and 6:45 AM to 6:45 PM on Saturdays. Hourly service over this span equates to 5,075 in-service vehicle-hours per year. At RTC RIDE's current marginal operating cost of $69.60 per vehicle-hour, each new route would incur a cost of approximately $353,000 per year.

New Route to Serve Redfield Campus

The limited course offerings at the Redfield Campus (and the fact that many are of short duration or geared toward working professionals) indicate that overall demand for transit service to this campus would be low. The greatest potential ridership would be generated by the paralegal course, though to serve classes provided on Saturdays and Sundays would add an additional $35,000 to the annual operating costs. Ridership generated solely by the UNR and

TMCC functions at this campus would be far below that which would warrant establishment of an additional fixed route. However, ridership generated by other existing trip generators along South Virginia Street south of the current extent of service at Damonte Ranch Parkway (including The Summit Mall and Tamarack Junction) coupled with future development could warrant a route serving the entire corridor. This route, originating at Meadowood Mall, would allow passengers to transfer directly to other routes serving the majority of the Reno/Sparks area, including RAPID service to the UNR campus.

New Route Connecting UNR Campus and TMCC Dandini Campus

A new route could be operated using one bus on a half-hourly schedule connecting the two main campuses. The distance between the UNR Student Union and the TMCC RIDE transit stop is 4.0 miles, and can be run in approximately 10 minutes. This would provide a shorter travel time than the current available service (Routes 7 or 17, transferring to Route 15 at 4TH STREET STATION) which requires 30 minutes to complete a one-way trip. However, the available information indicates that the number of individual students taking classes at both campuses is small. The substantial costs associated with an additional route (even if the days of service were limited to periods when classes are in session at both campuses) would result in a cost-inefficient service.

New Routes to Serve Student Housing Areas

The housing location information discussed above can be used to evaluate the potential transit ridership generated by new ridership designed to extend service to new areas with relatively high number of students. Three potential areas were considered, as areas of relatively high number of currently un-served units:

- The northwest university area, west of Sierra Boulevard and south of Rancho San Raphael Park

- The southwest Reno area south of Plumb Lane and west of Plumas Street

- The central area of Sparks, focusing on the neighborhoods along Los Altos Parkway and Vista Boulevard south of Vista Del Rancho Parkway

Each of these areas could be provided with hourly transit service connecting to key transit centers, using a single bus.

As shown in Table E, the number of students housed in the areas that would be served by these new routes outside of the existing service area was calculated, using a GIS analysis. Next, it was necessary to identify an appropriate “transit mode split” (the proportion of travel that would be captured by transit service). The Transportation Cooperative Research Program’s *Synthesis 78: Transit Systems in College and University Communities (2008)* provides examples of existing modes splits for student travel to other campuses. Both the University of California at Davis and the University of Texas at Austin report a transit mode split of 15 percent. However, both of these campuses benefit from relatively compact areas of student residential housing, as well as very frequent transit service levels. On the other hand, Montana State University in Bozeman indicates a transit mode split of 1 percent. Furthermore, given that TMCC students have a higher likelihood of easy access to a car, easier parking conditions, and a less consistent schedule of classes, a lower mode split can be expected for TMCC students than for UNR. Given the location of these outlying un-served areas, the limited level of service frequency

assumed for this analysis, and the fact that parking is more readily available than at the peer UC and UT campuses, a mode split of 5 percent for UNR and 3 percent for TMCC is appropriate for these potential new services.

Multiplying the number of students served by these mode split figures and assuming 154 days of classes per year and one round-trip per student per class day yields the estimates of student transit demand shown in Table E. As indicated, this ranges from 9,300 passenger-trips in the northwest University area to 13,800 in the North-Central Sparks area. Dividing these ridership figures by the annual vehicle service-hours, students would generate between 1.6 and 2.4 passenger-trips per vehicle-hour of service. Dividing the annual marginal operating costs by the number of trips, the cost per student passenger-trip would range between $26 and $38. These figures are far from meeting the RTC minimum performance standards, and thus indicate that these services would not be warranted, considering only student demand.

Of course, many other types of passengers would make use of these new routes, if provided. The evaluation of total demand is outside the scope of this discussion. However, student demand should be included if and when new routes are considered.

TABLE E: Potential Transit Demand Generated by Students Housed in 3 Key Areas Not Currently Served by RIDE Fixed Routes

	Northwest University Area	Southwest Reno	North- Central Sparks
Number of Students Housed Outside Existing Service Area			
UNR	386	244	348
TMCC	371.5	688	904
Estimated Mode Split			
UNR 5%			
TMCC 3%			
Annual 1-Way Transit Trips			
UNR	5,900	3,800	5,400
TMCC	3,400	6,400	8,400
Total	9,300	10,200	13,800
Vehicle Service Hours per Year	5,840	5,840	5,840
Student Trips/VSH	1.6	1.7	2.4
Annual Marginal Operating Cost	$353,000	$353,000	$353,000
Cost per Student Trip	$38	$35	$26

Note 1: At 154 class days per year.

PEER COLLEGE TRANSIT PASS DISCUSSION

Besides provision of new services, another possible strategy to enhance university/college ridership is to develop a “universal” systemwide transit pass. There are many transit pass programs across the country associated with universities, colleges and community colleges that offer “free” transit fare for students, in exchange for funding generated through student fees. These programs are joint efforts between the local transit agency and school, and have been found to be very effective in spurring transit ridership in many communities. To institute these

programs, students vote on a measure for an increase to their fees, in turn gaining unlimited access on local transit systems. The goal of these programs is to increase the incentive for students to ride transit rather than driving, with the community gaining the benefits of fewer vehicles on the road and a greater ridership base in the transit system. Three different pass programs are discussed below.

RTC has already taken a step in this direction by offering reduced fares for UNR and TMCC students. The UNR "Wolf Pass" and TMCC Bus Pass programs provide students the opportunity to purchase a 6-month pass for $115 valid on all local RTC RIDE services (the Wolf Pass program also provides the option for a $150 pass also good on the INTERCITY route). If used for one round-trip every weekday over the six-month period, this yields an average fare per ride of $0.44, compared to the $2.00 base fare or $1.60 10-ride pass fare.

San Jose/Cupertino, California -- Eco Pass

The Eco Pass program is available in many areas of the country, for both student and employee transit passes. The information provided in this section includes De Anza College and San Jose State University, both located in the San Jose/Silicon Valley area of California, both of which have partnered with the Valley Transportation Authority (VTA). The VTA provides urban transit service in Santa Clara County, which includes San Jose, Mountain View and Palo Alto. The bus system includes numerous community, regular, express and limited stop bus routes, as well as light rail. Connections to the Caltrain and BART rail systems are available.

De Anza College is a community college in Cupertino, California that takes part in the Eco Pass program with VTA. Part-time students pay $4 per quarter for their pass, while full-time students pay $5 per quarter. These fees are included in the overall registration fees. At San Jose State University in San Jose, CA, students obtain their Eco Pass through an $84.50 Student Association fee required each semester. At both schools, a sticker is placed on their student ID cards. When students want to ride the bus, they must show their Eco Pass sticker to the driver. The Eco Pass allows students to ride all of VTA's buses and light rail routes within Silicon Valley, free of charge. Caltrain and BART are not part of this pass program, nor is access to the VTA's Highway 17 route that travels to Santa Cruz. Students can use their pass on all designated routes, seven days per week.

Denver/Boulder, Colorado -- RTD CollegePass

Denver RTD offers a similar program to Eco Pass with their CollegePass program. Students of participating colleges and universities in the greater Denver / Boulder area are able to use their student ID cards to ride RTD transit for free. Two of these schools include University of Denver and University of Colorado at Boulder. The pass allows students to use RTD's Local, Limited, Express, Regional, Light Rail and SkyRide (to Denver International Airport) routes, seven days per week.

At the University of Denver, students that are registered for 12 or more credits can obtain a RTD CollegePass through the $112 per quarter ($40 in summer quarter) Undergraduate Activity fee as part of registration. Students at the University of Colorado at Boulder pay a mandatory fee of $85 per semester to obtain a CollegePass. Students taking advantage of this program receive a photo ID CollegePass smart card that they show when they board the buses.

Seattle/Tacoma -- UPass

The UPass program is operated through the University of Washington, and includes the Seattle, Tacoma and Bothell campuses. Unlike the previous two pass examples, the UPass allows for student's to access multiple transit systems, including:

- King County Metro (Seattle area)
- Community Transit (Snohomish County, including Everett, Bothell and Edmonds)
- Everett Transit (Everett)
- Pierce Transit (Pierce County/Tacoma area)
- Kitsap Transit (Kitsap County/Bremerton area)
- Sound Transit (Central Puget Sound area, including Everett, Seattle, Lakewood, Tacoma and SeaTac)

Within the Sound Transit program, UPass holders can ride the buses, light rail and Sounder commuter trains. Students attending the main University of Washington campus in Seattle also have access to King County's water taxis, Seattle Streetcar and NightRide systems, as well as reduced rates for ZipCar.

Fees vary by campus, but all are part of mandatory registration fees. At the main University of Washington, students pay $76 per quarter, while students at the Tacoma campus pay $45 per quarter and students at the Bothell campus bay $91 per quarter. Like the CollegePass, a smart chip is included in the student ID card.

CONCLUSIONS

Based upon the information discussed above, LSC has the following conclusions:

- The most effective single strategy to improve overall transit service to support the "university city" concept is the extension of the RAPID program northward from the 4TH STREET STATION to the UNR campus.

- The potential ridership demand for students traveling between campuses is modest at best. Establishing new transit services solely to improve connections between the campuses would not be cost-effective.

- Provision of service to the Redfield Campus could be an effective element of extension of Ride fixed route service southwards to serve The Summit Mall (and other nearby transit trip generators).

- Establishment of new routes serving student housing areas currently beyond a convenient walk from a transit stop would not be productive or cost-effective, considering only student demand. However, there are areas around the Truckee Meadows with concentrations of un-served student housing, where student demand should be considered in evaluating the overall potential for new routes.

- A universal pass providing fare-free transit for UNR and/or TMCC students warrants detailed investigation and discussions between RTC and the two campus

administrations. Specific levels of student fees (or some other source) needed to offset current student fare revenues would need to be identified based on current levels of student ridership. This strategy has a good potential to enhance the convenience of public transit services to students, aid in travel between the campuses, while also helping to address parking and other issues at the two key campuses.

References

Transportation Research Board, 2008, *TCRP Synthesis 78: Transit Systems in College and University Communities*

Transportation Research Board, 2001, *TCRP Synthesis 39: Transportation on College and University Campuses*

Daggett and Gutkowski, 2002, *University Transportation Survey – Transportation in University Communities*

TRANSPORTATION PLANNING AND
TRAFFIC ENGINEERING CONSULTANTS

2690 Lake Forest Road, Suite C
Post Office Box 5875
Tahoe City, California 96145
(530) 583-4053 FAX: (530) 583-5966
info@lsctahoe.com
www.lsctrans.com

TECHNICAL MEMORANDUM

To: Josh Thomson, Atkins

From: Gordon Shaw, PE, AICP, LSC Transportation Consultants, Inc.

Date: October 11, 2013

RE: Meadowood Mall Transfer Site Alternatives Analysis and South Virginia Transit Services

INTRODUCTION

This memo focuses on RTC RIDE fixed route transit service options for the southern portion of the Virginia Street Corridor. First an evaluation of potential alternatives to the existing Meadowood Mall Transfer Site is presented. This is followed by a discussion of service plan alternatives for the portion of the Corridor south of the Mall. Finally, recommendations for inclusion in the overall Corridor Plan are presented.

This information is intended to inform a discussion regarding potential changes in the transit station and routing in the southern portion of Reno, particularly in consideration of possible southward extension of the RAPID program. As such, it does not include detailed engineering or costs.

MEADOWOOD TRANSFER SITE EVALUATION

The existing use levels are first reviewed, with respect to the routes, runs and passenger loads served. Future changes in the program are then discussed. Next, the existing transfer site is assessed, with regards to its current limitations and operational/financial impacts. A series of alternative sites are then identified, and the advantages/disadvantages of each are discussed.

Existing Routes and Bus Activity

With the route and schedule modifications implemented on August 11, 2013, the Meadowood Mall Transfer Site is served by the following routes:

- **RAPID** service is provided along the Virginia Street corridor from Meadowood Mall on the south to the 4th Street Station in downtown Reno on the north. Service is operated from 6:01 AM to 9:20 PM on weekdays, with 10-minute headway service provided from 7:01 AM to 7:10 PM. Service on Saturdays, Sundays and holidays operates from 6:42 AM to 8:49 PM, with 12-minute headway service provided from 7:06 AM to 7:05 PM. RAPID

- **Route 1** serves the same route as RAPID, but serves additional stops. Service is provided throughout the day, seven days a week, with 30-minute frequency provided over the bulk of the day and hourly service in the early morning hours.

- **Route 9 (**Kietzke) also connects Meadowood Mall on the south with the downtown 4th Street Station on the north, but uses the Lake Street, Mill Street and Kietzke Lane corridors. Service to Meadowood starts at 5:28 AM, and ends at 1:24 AM, with runs operating every 30 minutes from 6:30 AM through 7:30 PM and hourly in other periods. Frequency on weekends and holidays is consistently hourly.

- **Route 12 (**Terminal/Neil) similarly connects Meadowood Mall with 4th Street Station, but travels north on Neil Road and Terminal Way before traveling west on 2nd Street. Meadowood is served from 4:06 AM to 1:09 PM, generally on half-hourly frequency.

- **Route 56** (South Meadows/Damonte Ranch) extends southward from Meadowood Mall to Damonte Ranch Parkway. On weekdays, half-hourly service is provided from 5:24 AM to 8:47 PM as well as from 3:24 PM to 5:17 PM. Hourly service is provided during the middle of the day, as well as from 5:17 PM until 10:41 PM. Hourly service is also provided on weekends/holidays, with slightly shorter operating hours.

- **RTC Intercity** service consists of three runs per day in the AM and PM commute periods, connecting downtown Reno with downtown Carson City. Morning service consists of southbound departures from Meadowood occur at 6:00 AM, 6:30 AM and 7:00 AM and northbound arrivals at 7:35 AM, 8:05 AM and 8:35 AM. In the afternoon, buses depart southbound at 3:19 PM, 4:19 PM, and 5:51 PM, with northbound arrivals at 4:59 PM, 5:59 PM and 7:21 PM.

A summary of existing services is shown in Table A, while Figure A presents the existing route map in the area. In addition to the total daily arrivals, this table shows the buses scheduled to be on-site, by route, over the course of the 5:00 PM – 6:00 PM hour. As indicated, in total, buses arrive (and depart) from the center a total of 240 times per weekday, 172 times per Saturday, and 167 times per Sunday. In the weekday peak hour, there are a total of 16 buses arriving and departing. Up to four buses are on-site at any one time (per the schedule), with up to two articulated buses and two standard coaches. Delays along the route, as well as trade-outs of buses for operational reasons, can result in as much as seven buses on-site at one time.

Existing Passenger Activity

Table B presents a summary of average weekday ridership for the various routes serving the Meadowood Mall, by hour. Data for the individual routes is provided in Appendix A. In addition, Figure B presents the boardings by hour, both for the Meadowood Mall transfer station as well as for the area as a whole.

As shown, on an average weekday 1,863 passengers board buses in the Meadowood Mall area (defined by S. McCarran Boulevard, Neil Road and US 395. Of these, 1,613 board at the Meadowood Mall transfer site, equal to 87 percent of all passenger activity in the area. The busiest hour of total boardings is the 2:00 PM hour, when 142 passengers board at Meadowood Mall and 166 passengers board in the area as a whole.

TABLE A: Summary of Existing Bus Activity at Meadowood Mall

Route	RAPID	1	9	12	54	56	Intercity	Total Transit Buses Onsite		
Weekday Peak Headway (Minutes)	10	30	60	30	60	30	6X Daily	Artic	Standard	Total
Peak Hr Activity										
5:00 PM			Arr		Dep			1	3	4
5:01 PM							Dep NB	1	2	3
5:02 PM								1	1	2
5:03 PM								1	1	2
5:04 PM								1	1	2
5:05 PM			Dep					1	1	2
5:06 PM	Dep	Arr						2	0	2
5:07 PM						Arr		1	1	2
5:08 PM								1	1	2
5:09 PM								1	1	2
5:10 PM								1	1	2
5:11 PM								1	1	2
5:12 PM								1	1	2
5:13 PM								1	1	2
5:14 PM								1	1	2
5:15 PM				Arr				1	2	3
5:16 PM	Arr	Dep						2	2	4
5:17 PM		Arr				Dep		1	3	4
5:18 PM								1	2	3
5:19 PM								1	2	3
5:20 PM								1	2	3
5:21 PM				Dep				1	2	3
5:22 PM								1	1	2
5:23 PM								1	1	2
5:24 PM								1	1	2
5:25 PM								1	1	2
5:26 PM	Dep	Arr						2	1	3
5:27 PM								1	1	2
5:28 PM								1	1	2
5:29 PM		Dep						1	1	2
5:30 PM			Arr					1	1	2
5:31 PM								1	1	2
5:32 PM								1	1	2
5:33 PM								1	1	2
5:34 PM								1	1	2
5:35 PM			Dep					1	1	2
5:36 PM	Arr							2	0	2
5:37 PM								2	0	2
5:38 PM		Dep						2	0	2
5:39 PM								1	0	1
5:40 PM								1	0	1
5:41 PM							Arr SB	1	1	2
5:42 PM								1	1	2
5:43 PM							Dep SB	1	1	2
5:44 PM								1	0	1
5:45 PM				Arr				1	1	2
5:46 PM		Arr						2	1	3
5:47 PM								2	2	4
5:48 PM		Dep						2	2	4
5:49 PM								1	2	3
5:50 PM	Dep							1	2	3
5:51 PM				Dep				0	2	2
5:52 PM	Arr							1	1	2
5:53 PM								1	1	2
5:54 PM								1	1	2
5:55 PM								1	1	2
5:56 PM								1	1	2
5:57 PM					Arr			1	2	3
5:58 PM								1	2	3
5:59 PM		Dep					Arr NB	1	3	4

TOTAL DAILY BUS ARRIVALS

Weekday	91	43	30	29	19	22	6	91	149	240
Saturday	61	43	21	20	12	15	0	61	111	172
Sunday	61	43	19	21	11	12	0	61	106	167

Figure A
Existing RTC Ride Routes Serving Meadowood Mall

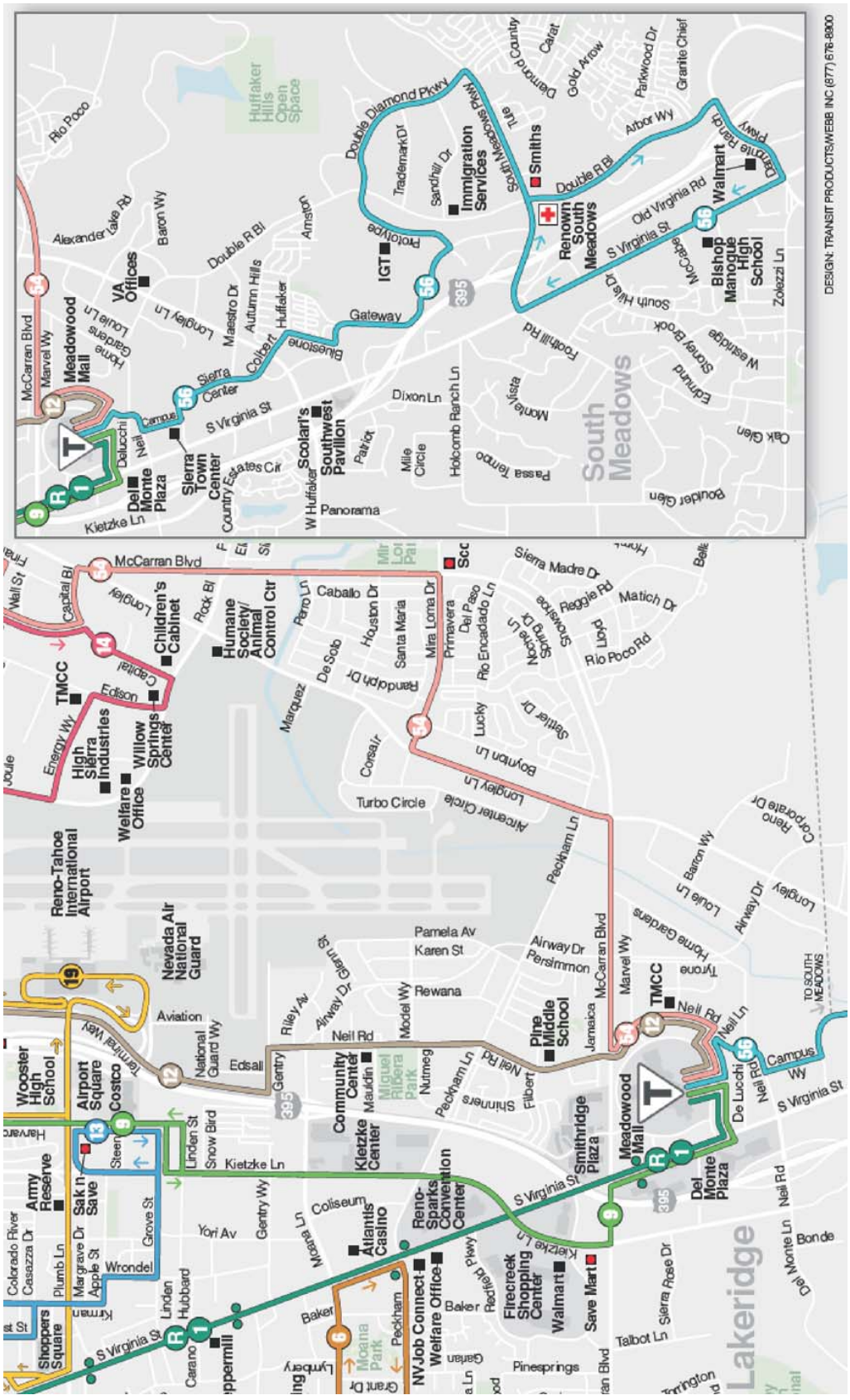
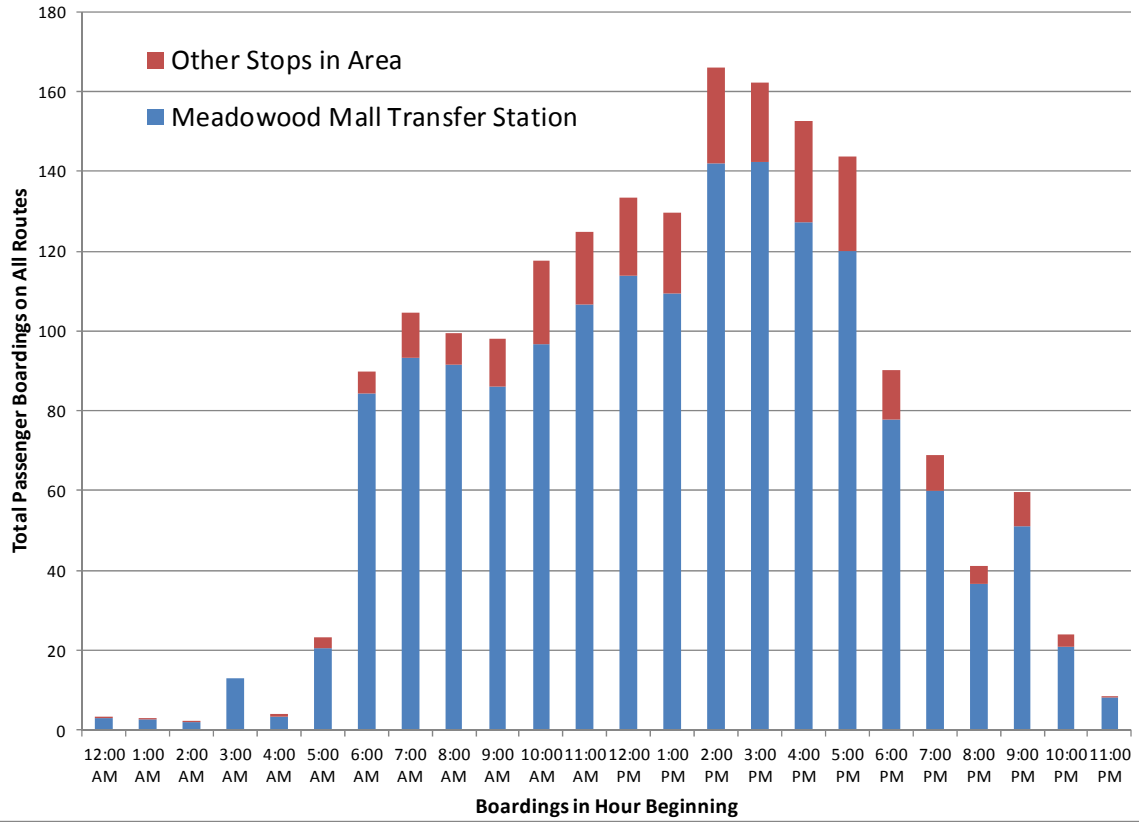


TABLE B: Average Weekday Boarding by Stop and Hour in Meadowood Mall Area

Stop Number / Name		Hour Beginning: 12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Average Daily Total
008	1412 VIRGINIA/(BEST BUY)	0	0	0	0	0	0	0	0.3	0.5	1.7	1.3	1.4	2.4	2.6	2	1	0.9	0.7	0.4	0.5	0	0	0	0	15.7
018	1994 VIRGINIA/MEADOWOOD MALL WAY	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0.2	0.2	0.1	0.3	0.3	0	0.3	0.2	0.4	0	2.4
003	1411 VIRGINIA/MEADOWOOD MALL WAY	0	0	0.1	0	0.1	0	0.1	0	0.4	1.1	3.1	0.6	1.1	1.4	1.2	0.5	1.8	2.4	0.7	1.7	0.6	4.5	1.1	0	22.5
002	1991 VIRGINIA/MEADOWOOD MALL WAY	0	0	0	0	0	0	3	1.3	5	5.6	6.6	9.9	10.3	10.5	11.1	7.6	12.4	10.4	6.4	3.5	0	0	0	0	103.6
002	506 VIRGINIA/MEADWOOD CIR	0	0.1	0	0	0	0.1	0.5	0.2	0.2	0.8	1.2	0.8	0.6	1.2	2.6	1.3	1.9	2.3	0.5	0.8	2.3	2.1	1.1	0	20.6
010	1601 MEADOWOOD MALL CIRCLE/VIRGINIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0.2
019	1601 MEADOWOOD MALL CIRCLE/VIRGINIA	0	0	0	0	0	0	0	0	0	0	0.1	0.3	0.2	0.2	0	0.1	0.2	0.3	0	0.2	0	0.6	0.4	0.2	2.8
029	303 MCCARRAN/MEADOWOOD MALL WY	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0.3
006	305 McCARRAN/SMITHRIDGE	0	0	0	0	0.7	0	0.1	0.8	0.4	0.4	0.6	1.5	0.7	1.3	0.7	1	1.3	1.3	1.3	0.6	0	0.1	0	0	12.8
023	26 NEIL/McCARRAN	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0.1	0.2	0	0	0	0	0	0	0	0	0	0	0.5
024	27 NEIL/MARVEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0.2
003	32 NEIL/MEADOWOOD LN	0.1	0	0	0	0	0.5	0	0.2	0.2	0.1	5.9	1.5	2.7	1.2	2.4	2.4	1	0.8	0.7	0.4	0.3	0	0	0	20.4
002	31 NEIL LN/NEIL RD	0.1	0	0	0	0	2.1	1.3	7	0.8	1.3	1.5	1.9	1.3	1	2.4	2.4	3.6	2.1	0.4	0.1	0.1	0.7	0.3	0	30.4
001	30 MEADOWOOD MALL (Time Point)	3	2.6	2.2	12.9	3.4	20.4	84.5	93.3	91.5	85.9	96.7	106.7	113.8	109.3	142.1	142.2	127.2	120.1	77.8	60	36.8	51.1	20.8	8.3	1,612.6
021	505 NEIL/DELUCCHI	0	0	0	0	0	0	0.4	0.2	0	0	0.1	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0.9
004	1650 CAMPUS WAY/(Sierra Pacific)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0.2
020	1659 CAMPUS WAY/NEIL ROAD	0	0	0	0	0	0	0	0	0.3	0.2	0.2	0	0	0.3	0	0.4	0.1	0.2	0.1	0	0.2	0	0	0	2.0
005	1651 SIERRA CENTER/CAMPUS WAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0.2
019	1658 SIERRA CENTER/(Intuit Entrance)	0	0	0	0	0	0	0	0	0.1	0.2	0.2	0	0	0	0.2	0	0.2	0.6	0.1	0.3	0	0	0	0	1.9
006	1652 SIERRA CENTER/(Sierra Town Center)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
018	1657 SIERRA CENTER/MAESTRO	0	0	0	0	0	0	0	0.7	0	0.1	0	0.1	0	0.1	0	2	1.3	1.7	1.4	0.7	0.4	0.1	0	0	8.6
008	1654 SIERRA CENTER/PATRIOT	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0.2
002	1631 S. VIRGINIA/NEIL	0	0	0	0	0	0.1	0	0.2	0	0.2	0	0	0	0	0.7	0.1	0.1	0.2	0	0.1	0.1	0	0	0	1.8
009	493 VIRGINIA/NEIL	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0.5
004	1623 S. VIRGINIA/(Sierra Center)	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0.1	0.1	0	0	0.1	0	0	0	0	0	0.5
008	1622 S. VIRGINIA/SIERRA CENTER PKWY	0	0	0	0	0	0	0	0.2	0.1	0.2	0	0	0	0	0	0.4	0.2	0.2	0	0	0.1	0	0	0	1.4
Total Area		3.3	2.7	2.3	12.9	4.2	23.2	89.9	104.5	99.6	98.1	117.7	124.9	133.3	129.6	165.9	162.2	152.7	143.7	90.2	68.9	41.3	59.5	24.1	8.5	1,863.2

Source: RTC ridership data for weeks of 10/1/12 and 10/8/12

FIGURE B: Average Weekday Transit Boardings in Meadowood Mall Area



Ridership by route (as they existed prior to the August 2013 realignment) is shown in Table C. Fully 45 percent of total daily ridership boarded the RAPID service, followed by 18 percent on Route 1 (Connect).

Much of the ridership activity at the transfer center is associated with passengers making transfers, rather than those beginning or ending their transit trip in the Mall area. Specific data regarding the proportion of transfers vs. non-transfer passengers boarding at this location is not available. However, based on informal surveys and driver input, a majority of boardings consist of transfers but a substantial proportion (on the order of 30 to 40 percent) consists of "originating" passengers. Applying this rough percentage to the observed boarding data, the Meadowood Mall remains by far the greatest transit trip generator in the vicinity.

Review of Existing Facility

The existing transfer site is located adjacent to the south entrance to Meadowood Mall, spanning the distance from the drive aisle immediately outside the Mall and Meadowood Mall Circle. It consists of bus-only lanes on both sides of a raised island approximately 285 feet in length and 15 feet in width. It provides space for up to 10 buses to board passengers at one time along straight curbs, so long as the space between buses is relatively tight (precluding some buses to depart when other buses are nearby). A total of three standard shelters are provided, along with six benches and a modest amount of street trees to provide shade. Signs indicate where specific routes stop along the curb, though the presence of adjacent buses often requires arriving drivers to stop in other nearby areas. The only public restrooms are a substantial walk within the Mall, and are not available when the Mall is closed (9 PM to 10 AM).

TABLE C: Average Weekday Boarding by Stop and Hour at Meadowood Mall Transfer Site

	Hour Beginning																								Average Daily Total	
Route	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	#	%
RAPID	--	--	--	--	--	--	1.2	44.8	40.4	36.7	38.2	51.1	60.5	62.4	63.5	81	73	60	56.5	31.4	24.1	--	--	--	724.8	45%
Route 1	0	2.6	2.2	12.9	1.3	7	4.4	10.6	12.1	13.9	15	16.4	18.5	12.9	17.6	15.2	15.6	15.5	16.5	9.8	17	31.6	14.4	5.7	288.7	18%
Route 6	--	--	--	--	0.4	1.6	3.7	5.1	8	4.3	3.1	6.2	4.6	5.4	3.4	8.4	9.3	6.5	5.6	3.8	3	5.4	0	0	87.8	5%
Route 9	3	--	--	--	1.7	2	5.2	11.2	7.4	6.5	12.2	10.4	12.7	13.5	11.3	18.5	16.4	15.3	6.8	8.3	8.3	9.6	6.4	2.6	189.3	12%
Route 54	--	--	--	--	--	--	3.3	5.8	4.8	3	4.1	3.2	3.9	4.7	6	4.4	4.7	6	5.1	4	--	--	--	--	63.0	4%
Route 56	--	--	--	--	--	2.6	17.2	10.1	13.3	7.6	11.2	10	11.7	9.3	12.2	9.1	11.1	9.6	6.4	5	3.7	4.5	0	--	154.6	10%
Route 57	--	--	--	--	--	6	5.9	10.1	9.3	12.4	--	--	--	--	10.6	13.6	10.1	10.8	6	5	4.8	--	--	--	104.6	6%
Total Area	3	2.6	2.2	12.9	3.4	19.2	40.9	97.7	95.3	84.4	83.8	97.3	111.9	108.2	124.6	150.2	140.2	123.7	102.9	67.3	60.9	51.1	20.8	8.3	1,612.8	

Source: RTC ridership data for weeks of 10/1/12 and 10/8/12. Data for routes prior to August 2013 route realignment.

Impact of Existing Facility Location on Route Running Time

The location of the existing facility increases route running time for services along Virginia Street. To quantify this, LSC staff observed the times that buses turned on and off of South Virginia Street at Meadowood Mall Circle (passed the crosswalk on the east side of the intersection) as well as the times that buses arrived and departed the transfer station, over the course of a busy PM peak period. The results of these counts are shown in Table D. As shown, travel times were collected for a total of 24 buses operating in one or both directions (as well as other buses at the center). On average, the travel time off of Virginia Street was 1 minute 25 seconds in the eastbound direction (to the station) and 1 minute 44 second in the westbound direction (from the station). In total, and assuming that 30 seconds of drive time would be required to access a location directly on Virginia Street (excluding signal time, which was not included in the observations), the location of the existing station adds approximately 2 minutes 40 seconds to routes running along Virginia Street.

The LSC staffer at the station was also tasked with recording how many of the buses using the station were moved while at the station (excluding the arrival and departure trip), such as to shift position on the platform to make room for later arrivals. Of the 30 buses observed to use the station over the observation period, 16 (or 53 percent) made an additional movement. This reflects a minor but persistent inconvenience to staff and passengers that could be avoided through a station design that provides adequate bus berths sufficient to accommodate all buses at peak times.

Summary of Existing Facility Conditions

The following are positive factors related to the current transfer center site:

- Perhaps most importantly, the location provides a high level of transit service conveniently located next to the greatest transit trip generator in the vicinity. The transfer center yields the best overall level of transit service of any location south of downtown, with direct service to much of Reno south of I-80.

- Good access avoids significant delays to bus movements into and out of the site.

- It provides the opportunity for a modest level of park-and-ride parking, which is currently used on a consistent basis for the Intercity service. It is worth noting that extension of RAPID service north to the UNR campus could result in additional park-and-ride benefit associated with sporting and concert events at UNR.

However, there are some negative considerations as well, beyond the running time impacts discussed above:

- Passenger amenities are minimal. At peak times, there can be 60 to 80 passengers waiting to board buses, exceeding the capacity of the bus shelters.

- Limited bus capacity necessitates additional bus movements, and precludes specific routes from always serving specific assigned locations.

- Lack of convenient restroom facilities when the Mall is open, or any restroom facilities for the 13 hours per day when the Mall is closed bus transit service is in operation.

TABLE D: Meadowood Transit Operational Times and Travel Time

Virginia Street/Meadowood Mall Circle and Meadowood Transfer Center Locations 5-Sep-13

Route	Bus#	Time Eastbound on Meadowood Circle Just East of Virginia	Arrive At Center	Depart Center	Time Westbound on Meadowood Circle Just East of Virginia	Eastbound Drive Time	Time at Center	Westbound Drive Time	Moved While At Center?
R	606	4:02:22 PM		4:16:27 PM	4:18:21 PM			0:01:54	Y
9	507	4:10:38 PM	4:12:43 PM	4:16:16 PM	4:17:50 PM	0:02:05	0:03:33	0:01:34	N
R	613	4:10:44 PM	4:11:42 PM	4:26:35 PM	4:28:15 PM	0:00:58	0:14:53	0:01:40	y
1	534	4:12:50 PM	4:14:25 PM	4:29:47 PM	4:32:45 PM	0:01:35	0:15:22	0:02:58	y
56	477		4:17:29 PM	4:24:19 PM			0:06:50		N
RTC	492	4:22:53 PM	4:25:31 PM	4:27:51 PM	4:28:08 PM	0:02:38	0:02:20	0:00:17	N
R	608	4:23:00 PM	4:24:10 PM	4:38:30 PM	4:40:08 PM	0:01:10	0:14:20	0:01:38	Y
R	612	4:32:45 PM	4:33:44 PM	4:46:32 PM	4:48:19 PM	0:00:59	0:12:48	0:01:47	Y
R	501	4:34:42 PM	4:36:45 PM	4:38:11 PM	4:38:58 PM	0:02:03	0:01:26	0:00:47	Y
1	531	4:41:00 PM	4:42:20 PM	4:59:36 PM	5:01:46 PM	0:01:20	0:17:16	0:02:10	Y
R	611	4:42:40 PM	4:43:40 PM	4:56:34 PM	4:59:08 PM	0:01:00	0:12:54	0:02:34	y
56	514		4:47:40 PM	4:54:53 PM			0:07:13		N
R	610	4:50:49 PM	4:51:44 PM	5:06:29 PM	5:08:13 PM	0:00:55	0:14:45	0:01:44	Y
12 Spcl	486	4:52:43 PM	4:54:36 PM	4:58:20 PM		0:01:53	0:03:44		N
9	509	5:00:18 PM	5:02:23 PM	5:05:20 PM	5:06:23 PM	0:02:05	0:02:57	0:01:03	N
R	607	5:00:24 PM	5:01:20 PM	5:16:05 PM		0:00:56	0:14:45		Y
R	606	5:10:43 PM	5:11:50 PM	5:27:20 PM	5:28:52 PM	0:01:07	0:15:30	0:01:32	Y
1	535	5:12:51 PM	5:14:19 PM	5:29:20 PM	5:32:32 PM	0:01:28	0:15:01	0:03:12	Y
395	493		5:08:46 PM	5:10:07 PM	5:10:46 PM		0:01:21	0:00:39	N
R	613	5:24:36 PM	5:25:24 PM	5:36:13 PM	5:38:03 PM	0:00:48	0:10:49	0:01:50	Y
GAR	477		5:16:39 PM	5:17:19 PM	5:18:14 PM		0:00:40	0:00:55	N
12	478		5:17:10 PM	5:22:02 PM			0:04:52		N
9	497	5:31:53 PM	5:34:31 PM	5:36:13 PM	5:37:51 PM	0:02:38	0:01:42	0:01:38	N
R	608	5:37:03 PM	5:38:04 PM	5:51:08 PM	5:53:08 PM	0:01:01	0:13:04	0:02:00	Y
1	534	5:40:29 PM	5:41:40 PM	5:59:18 PM	6:01:58 PM	0:01:11	0:17:38	0:02:40	Y
12	500		5:43:21 PM	5:52:45 PM			0:09:24		Y
GAR	512		5:44:01 PM	5:45:00 PM			0:00:59		N
395	493	5:48:32 PM	5:50:07 PM	5:51:30 PM		0:01:35	0:01:23		N
56	514		5:52:02 PM	5:54:11 PM			0:02:09		N
R	611	5:52:23 PM	5:53:11 PM	6:00:25 PM		0:00:48	0:07:14		N
				Average Drive Time		**0:01:25**		**0:01:44**	

- As largely a concrete island area, the site has minimal landscaping and limited attractiveness.

Potential Program – Future Routes and Capacity Requirements

As discussed below, there is a long-term potential for one additional bus route serving the southern portion of the RTC RIDE service area. An optimal facility program would provide dedicated bus bays as follows:

RAPID	2 Articulated Bus Bays
Route 1	1 Standard Bus Bay
Route 9	1 Standard Bus Bay
Route 12	1 Standard Bus Bay
Route 54	1 Standard Bus Bay
Route 56	1 Standard Bus Bay
Intercity Route	1 Standard Bus Bay
New Route	1 Standard Bus Bay
TOTAL	7 Standard Bus Bays + 2 Articulated Bus Bays

In addition, a minimum of one bus parking space (and preferably two) should be available for buses waiting to trade-out for operational reasons. At a minimum, nine bays allowing passenger loading/unloading plus one additional non-loading bay should be provided.

Given existing ridership and the potential for additional ridership in the future, up to 120 passengers will be on-site at peak times. Assuming that 25 percent transfer directly to waiting buses, up to 90 waiting passengers should be accommodated.

POTENTIAL NEW SITE ALTERNATIVES

Factors to consider in assessing alternative sites include the following:

- Consistency with the RAPID program. This limits sites to parcels directly along South Virginia Street.
- Impact on transit route running times and operating costs.
- Potential availability. Parcels with substantial existing development were not considered.
- Adequate site ingress and egress.
- Sufficient size to accommodate at least the minimum program regarding number of buses.
- Adjacency to transit trip generators within walking distance.
- Adequacy of access by pedestrians and bicyclists
- Compatibility with adjacent land uses.

Considering these factors, a total of four alternative sites were identified, as shown in Figure C. A summary of these sites is presented in Table E.

Figure C:
Alternative Transfer Station Sites on South Virginia Street

TABLE E: Summary of Transfer Site Alternatives

Address	6050 and 6100 S. Virginia	6250 S. Virginia	6870 S. Virginia	Longley / S. Virginia
Acreage	1.20	1.36	0.97	11.00
Existing Zoning	Commercial	Commercial, Miscellaneous Vacant	Commercial	Commercial
Additional RAPID Miles on S. Virginia	0.06	0.17	0.53	1.02
Additional Signals on RAPID Route	0	0	2	3
Capacity -- Number of Bus Bays	12	15	9	More Than Adequate
Impact on 1-Way Route Running Time (Minutes per Round-Trip)				
RAPID	-3	-2.5	2	5
1	6.5	7.0	10.5	15.0
9	-3	-2.5	-2.5	2.0
12	5	5.5	7	10
54	5	5.5	9.0	-2
56	3.5	4	0 (Note 1)	0 (Note 1)
Intercity	1	1	0	0
Transit Ridership Potential of Nearby Land Uses	Moderate (Del Monte Plaza)	Moderate (Del Monte Plaza)	Moderate (Sierra Town Center, The Commons)	Moderate
Transit Ridership Potential of Additional Land Uses Served	None	None	Moderate (S. Kietzke, Summit Sierra)	Moderate (S. Kietzke, Summit Sierra, Sierra Town Center)
Pedestrian Access	Adequate	Adequate	Adequate	Adequate
Bicycle Access	Adequate	Adequate	Adequate	Adequate
Park-and-Ride Capacity	0	0	0	More Than Adequate
Compatibility With Adjacent Land Uses	Moderate -- Multifamiily residential to the east	High	High	High
Access	Good -- Requires shortening existing northbound left turn pocket	Good	Good -- Requires shortening existing northbound left turn pocket	Good

Note 1: Assuming extension to Summit Sierra Mall

6050 and 6100 S. Virginia Site

APN 025-290-20 and APN 025-290-22

These two parcels are currently largely vacant (excluding a billboard). They are located along the east side of Virginia Street, with a Jiffylube separating the northernmost parcel from Meadowood Mall Circle. This northern parcel currently has an "Available" real estate sign posted. Other nearby land uses consist of an apartment complex to the east, Metropawn pawn shop to the south, and the Del Monte Plaza (including Whole Foods, Macy's Furniture Gallery, Sierra Trading Post) to the west across South Virginia Street.

Together, the parcels provide a street frontage of approximately 264 feet and are 176 feet deep. In addition, the southern parcel includes a strip along the back side of the parcels to the south, providing a 20' wide "alley" for the 286 feet south to Delucchi Lane.

Access could be provided by two access points, consisting of one access point at either end of the street frontage along South Virginia Street. As discussed below, it is feasible to design the bus routes to avoid left turns out of the site onto South Virginia Street, limiting necessary movement to right in, right out, and left in. To assess whether the driveway intersection on South Virginia Street would provide adequate Level Of Service (LOS) for transit vehicles, LSC conducted a Synchro analysis that applied Highway Capacity Manual methodology to estimated traffic volumes at this intersection (based on counts at the S. Virginia Street/Meadowood Mall Circle intersection, and expected transit movements). This analysis assumed a southbound left turn lane, with no traffic signal. As shown in the computer output presented in Appendix B, in the PM peak-hour southbound left turning buses would experience LOS B with 13 seconds of average delay, while westbound right turning buses would experience LOS C with 15 seconds of average delay. Based upon these results indicating only minimal delay, a traffic signal at this access point is not necessary (so long as buses are routed to avoid westbound left turning movements). This would require shortening the existing 240-foot-long northbound left turn pocket from South Virginia into the Del Monte Plaza by approximately 90 feet, in order to create a short southbound left turn pocket into the transfer center.

Another option would be to provide a drive lane providing northbound access from Delucchi Lane. This would allow buses on Delucchi Lane to enter the site without first turning onto S. Virginia Street. However, it would only get limited use.

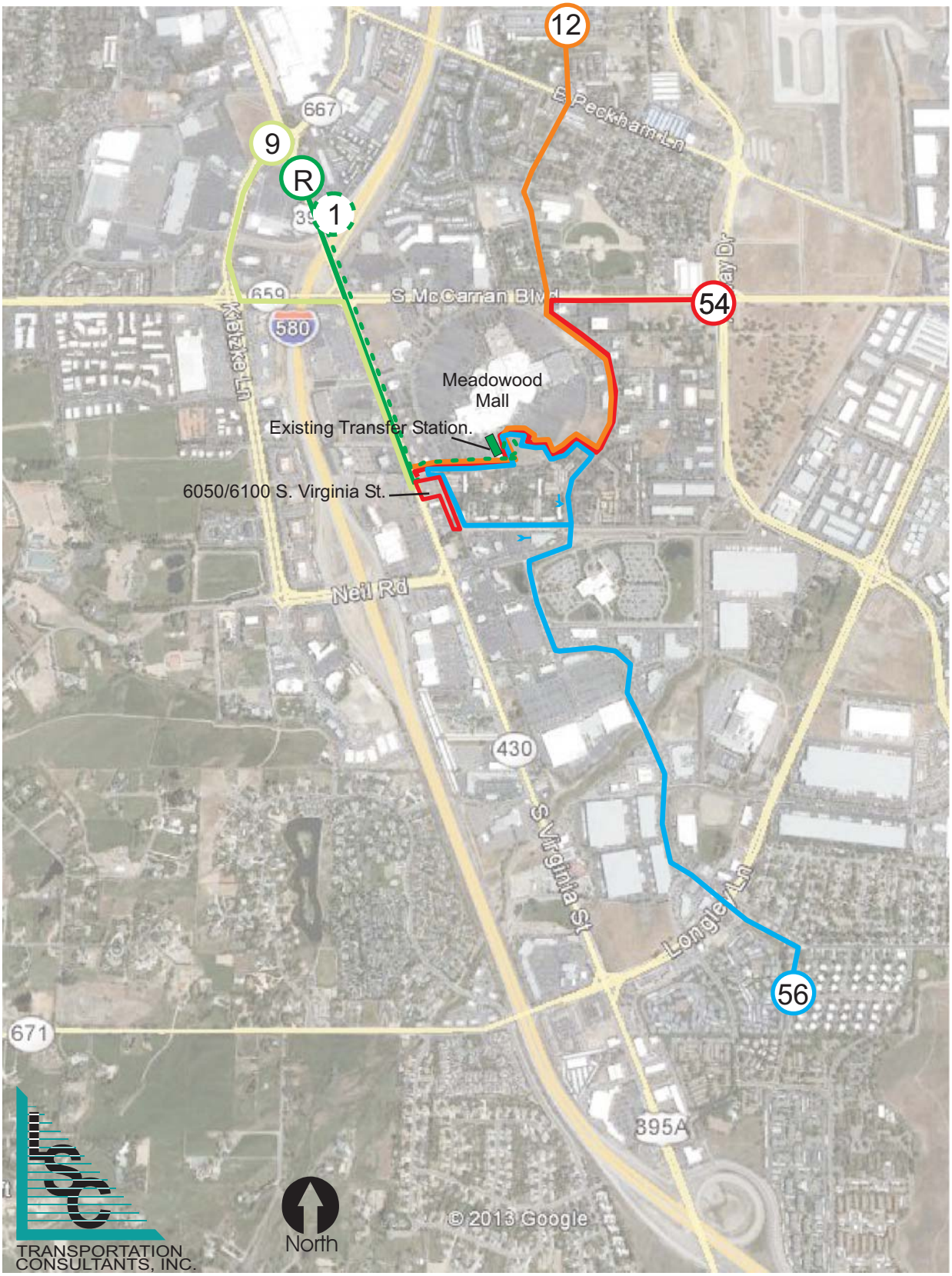
This site could accommodate approximately 12 buses at loading positions at any one time, configured in 4 rows of 3 bus bays each. Several buses not actively loading/unloading could also be on site, along with RTC Supervisor and other operational small vehicles.

A conceptual route plan incorporating this site is shown in Figure D. Existing routes would be realigned as follows (described in the inbound direction):

- **Rapid** would remain on Virginia Street southward to the new transfer point. This would reduce overall route running time by approximately 3 minutes.

- **Route 1** would serve a Meadowood Mall stop (assumed to remain at or near the existing transfer point), and then return to South Virginia Street to make a left turn movement into the new transfer station. Based on the observed bus travel times, serving both stops in both directions would add approximately 6 minutes 30 seconds to the overall route round-trip running time. The service plan for this route consists of three buses (over the

Figure D
RTC Ride Routes - 6050/6100 S. Virginia Transfer Station Site



majority of the 24-hour operating day) operating 90-minute cycles to yield 30-minute headway service. As the current schedule includes 25 minutes of total layover time at the ends of the route, it should be possible to accommodate this additional running time (at least in one direction).

- **Route 9** would remain on Virginia Street to the new transfer point, reducing running time by approximately 3 minutes.

- **Route 12** would serve Meadowood Mall, and then continue westward on Meadowood Mall Circle before making left turns onto S. Virginia Street and into the transfer point. This would add approximately 4.5 to 5 minutes of running time. There is currently 7 minutes of layover time scheduled at Meadowood Mall. In addition, there is 8 minutes of layover at 4th Street Station between the end of Route 12 and the interlined start of Route 9. As Route 9 running time would be reduced, there may be adequate overall running time to accommodate the extension of Route 12 with minor changes to the schedule.

- **Route 54** would also extend beyond the current terminus at Meadowood Mall to the new transfer point, similar to Route 12, adding 4.5 to 5 minutes of running time. As the current route schedule includes only a total of 8 minutes of layover time, it would probably be necessary to make modifications to the route to reduce route running time elsewhere in order to serve a new transfer point. Another option would be to only serve the existing Meadowood Mall stop in the north/eastbound direction (by operating a one-way clockwise loop consisting of Neil Road, Delucchi Lane, S. Virginia Street and Meadowood Mall Circle), which would reduce running time.

- **Route 56** would use the current route as far north as Neil Road/Delucchi Lane, and then turn left on Delucchi Lane, turn right into the transfer center drive on Delucchi Lane, serve the transfer center, and make right turns onto South Virginia followed by Meadowood Mall Circle, serve a Meadowood Mall stop and then proceed southbound on Neil Road. This would add approximately 3.5 minutes to overall route running time, which probably can be accommodated within the existing schedule's 10 minutes of layover time.

- **Intercity** service would need to serve a stop at the relocated transfer point as well as at Meadowood Mall, as the Mall serves as a park-and-ride facility for this route and as the new site would not have room to accommodate park-and-ride activity. As the site is along the current route and only would need to be service in one (northbound) direction, this would add roughly a minute to the overall running time and can probably be accommodated in the existing schedule.

Four of the existing six routes would still have direct service to the Mall. Between Routes 1, 12, 54 and 56, a total of seven buses per hour would travel between the relocated transfer point and Meadowood Mall, with six buses per hour in the reverse direction. This would partially (though not wholly) offset the loss of convenience to transit riders bound to and from the Mall on RAPID and Route 9.

Under any of these relocation alternatives, it would be desirable to maintain a Meadowood Mall stop near the south entrance door (such as along the curb of the interior circulation roadway just to the east of this entrance, or at the northern end of the existing bus plaza). As no more than three buses would be on-site at any one time, the area required to accommodate RIDE buses would be reduced. This would allow an opportunity to expand parking.

Advantages

- Reduces running time on Route 1.
- Reduces space requirements at Meadowood Mall.

Disadvantages

- Reduces service to Meadowood Mall, requiring passengers on RAPID and Route 9 to transfer to other routes or walk from S. Virginia Street.
- As there is not adequate land for park-and-ride parking, it would either require an additional stop on the Intercity route, or would not be served (Intercity stop would remain at Meadowood Mall).
- The costs and staff time associated with planning, designing, constructing and maintaining a new site.
- Probably requires revisions to Route 54.
- Adds a stop (and increased in-vehicle travel time) to the Intercity Route.
- Adjacent to multifamily residential to the east, which may be a sensitive receptor of transit center noise.

<u>6250 S. Virginia Site</u>

APN 25-300-28 and APN 25-300-29

The primary parcel has 265' of frontage on S. Virginia Street, and is 158 feet deep, while the second parcel to the east is 54' in width and 331' in length, providing access to Delucchi Lane and yielding a total width of 212 feet.

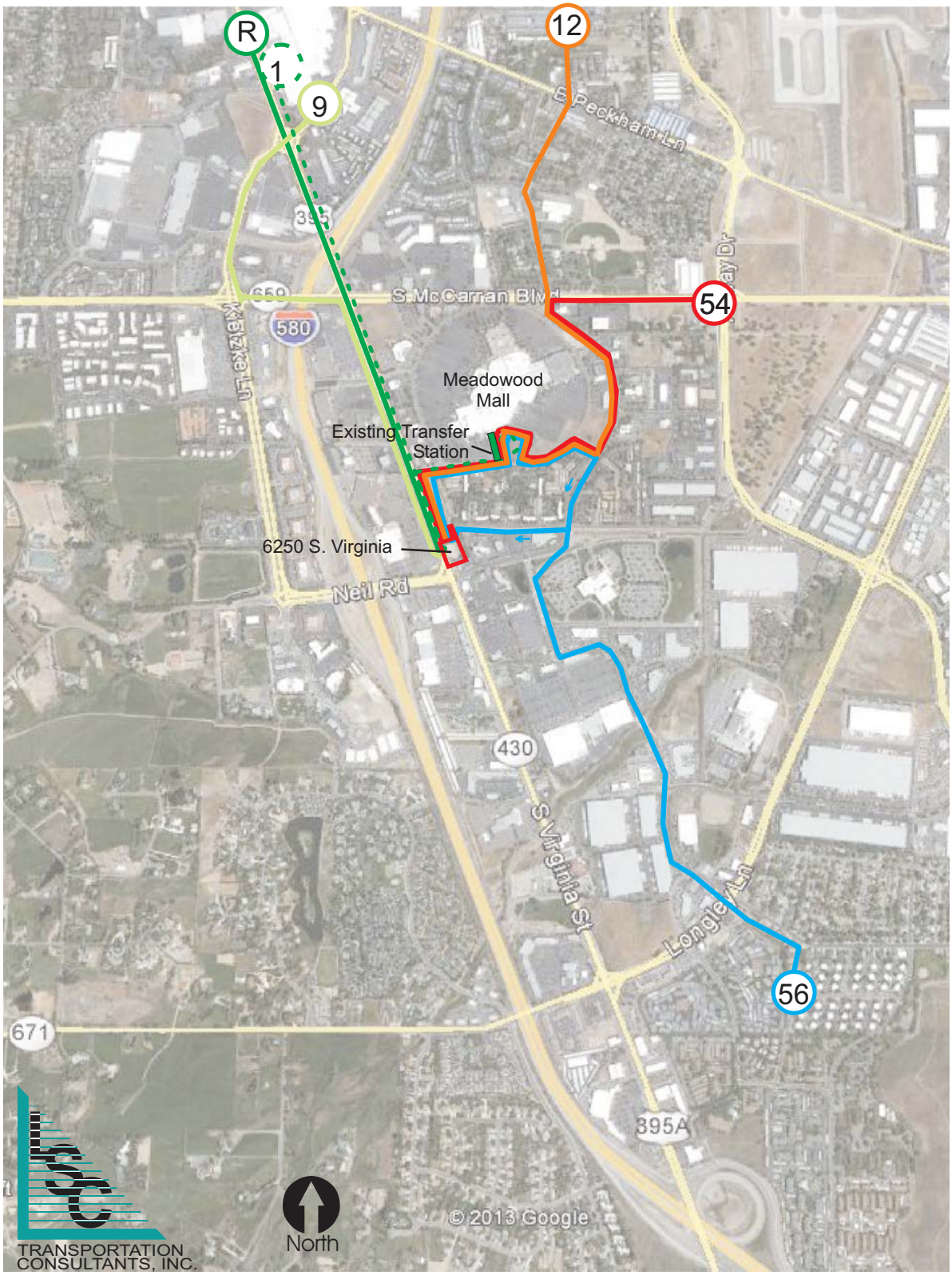
Adjacent land uses consist of Sierra View Animal Hospital to the north, Mutual of Omaha Bank to the east, Joes Diner to the south, and the Del Monte Plaza to the west.

Access to this site could be provided via a two-way access onto Delucchi Lane and one access point on South Virginia Street. As discussed above regarding the previous site, adequate southbound left-turn movements into the site can be made without provision of a traffic signal, and it is feasible to reconfigure the routes to avoid westbound left-turn egress movements. At peak times, southbound queues on Virginia forming back from the Neil Street signal could delay left turn movements into the site until the Neil Street signal releases the southbound queue to allow buses to enter the left-turn pocket.

This site would provide capacity for approximately 15 bus bays, along with support vehicles and up to 2 buses at non-loading locations.

Figure E presents a conceptual route plan incorporating this alternative site. Existing routes would be realigned as follows (described in the inbound direction):

Figure E
RTC Ride Routes - 6250 S. Virginia Transfer Station Site



- **Rapid** would remain on Virginia Street southward to the new transfer point. This would reduce overall route running time by approximately 2.5 minutes.

- **Route 1** would serve a Meadowood Mall stop and then return to South Virginia Street to make a left turn movement into the new transfer station. This would add approximately 7 minutes to the overall route round-trip running time. As the current schedule includes 25 minutes of total layover time per bus cycle at the ends of the route, it should be possible to accommodate this additional running time.

- **Route 9** would remain on Virginia Street to the new transfer point, reducing running time by approximately 2.5 minutes.

- **Route 12** would serve Meadowood Mall, and then continue westward on Meadowood Mall Circle before making left turns onto S. Virginia Street and into the transfer point. This would add approximately 5.5 minutes of running time. There is currently 7 minutes of layover time scheduled at Meadowood Mall. In addition, there is 8 minutes of layover at 4th Street Station between the end of Route 12 and the interlined start of Route 9. As Route 9 running time would be reduced, there is probably adequate overall running time to accommodate the extension of Route 12 with minor changes to the schedule.

- **Route 54** would also extend beyond the current terminus at Meadowood Mall to the new transfer point, similar to Route 12, adding approximately 5.5 minutes of running time. As the current route schedule includes only a total of 8 minutes of layover time, it would be necessary to make modifications to the route to reduce route running time elsewhere in order to serve a new transfer point. Another option would be to only serve the existing Meadowood Mall stop in the north/eastbound direction (by operating one-way loop consisting of Neil Road, Delucchi Lane, S. Virginia Street and Meadowood Mall Circle), which would reduce running time. However, it would probably still be necessary to modify other portions of the route to provide adequate running and layover time.

- **Route 56** would use the current route as far north as Neil Road/Delucchi Lane, and then turn left on Delucchi Lane, turn left into the transfer center drive on Delucchi Lane, serve the transfer center, and make right turns onto South Virginia followed by Meadowood Mall Circle, serve a Meadowood Mall stop and then proceed southbound on Neil Road. This would add approximately 4 minutes to overall route running time. With 10 minutes of layover time in the existing schedule, this would probably require modifications elsewhere along the route to be able to consistently maintain an hourly schedule.

- **Intercity** service would need to serve a stop at the relocated transfer point as well as at Meadowood Mall. This would add roughly a minute to the overall running time and can probably be accommodated in the existing schedule.

Four of the existing six routes would still have direct service to the Mall. Between Routes 1, 12, 54 and 56, a total of seven buses per hour would travel between the relocated transfer point and Meadowood Mall, with six buses per hour in the reverse direction. This would partially (though not wholly) offset the loss of convenience to transit riders bound to and from the Mall on RAPID and Route 9.

Advantages

- Reduces running time on Route 1.
- Reduces space requirements at Meadowood Mall.

Disadvantages

- Reduces service to Meadowood Mall, requiring passengers on RAPID and Route 9 to transfer to other routes or walk from S. Virginia Street.
- As there is not adequate land for park-and-ride parking, it would either require an additional stop on the Intercity route, or would not be served (Intercity stop would remain at Meadowood Mall).
- The costs and staff time associated with planning, designing, constructing and maintaining a new site.
- Probably requires revisions to Route 54 and Route 56.
- Adds a stop (and increased in-vehicle travel time) to the Intercity Route.

<u>6870 S. Virginia Site</u>

APN 025-320-04

This site is along the east side of S. Virginia Street adjacent to the Sierra Town Center. It has 292 feet of linear frontage on S. Virginia Street, and is approximately 146 deep.

Adjacent land uses consist of a restaurant to the north, the parking lot for the Sierra Town Center (including a Target store) to the east, and a motel to the south. Across Virginia Street to the west lays “The Commons” mixed-use center (including lodging, retail, restaurant and office uses) and a miniature golf course.

Access could be provided by a single access point near the center of the site, aligning with a major access point for The Commons on the west side of Virginia Street, providing left-in / right-in / right-out access. This new access point would be approximately 440 feet south of the existing signal at Sierra Center Parkway, and 980 feet north of the signal at Green Acres Drive. As discussed above, and considering that the Green Acres Drive signal to the south provides gaps in the northbound traffic stream, it would not be necessary to provide a signal at this location to provide adequate LOS for buses. Providing a southbound left turn lane adequate to accommodate up to two buses at a time would require shortening the existing northbound left turn lane from South Virginia Street onto Sierra Center Parkway by approximately 150 feet, yielding a turn lane of roughly 180 feet in length.

Another access option would be to negotiate an agreement with the owners of Sierra Town Center for bus access between the east side of the parcel and the intersection of Sierra Center Parkway and Campus Way. There is an existing internal roadway (without adjacent parking spaces) that could provide a convenient connection across the site to the northern end of the parcel, requiring the elimination of only 4 existing parking spaces. This would allow Routes 56

and 12 to access the transfer station without the need to enter and exit South Virginia Street, saving approximately 1 minute in round-trip running time.

This site could accommodate approximately 9 bus bays (3 rows of 3 bays each), along with up to four bus positions not loading.

Figure F presents a conceptual route plan serving this new site. Existing routes would be realigned as follows (described in the inbound direction):

- **Rapid** would remain on Virginia Street southward to the new transfer point. This would extend the route by roughly 0.5 miles. Considering both the additional travel time on S. Virginia Street and the elimination of travel time to Meadowood Mall, the overall impact would be to increase round-trip route running time by approximately 2 minutes. As the existing RAPID schedule includes a total of 16 minutes of layover time per round-trip, this additional time can probably be accommodated without operating additional buses.

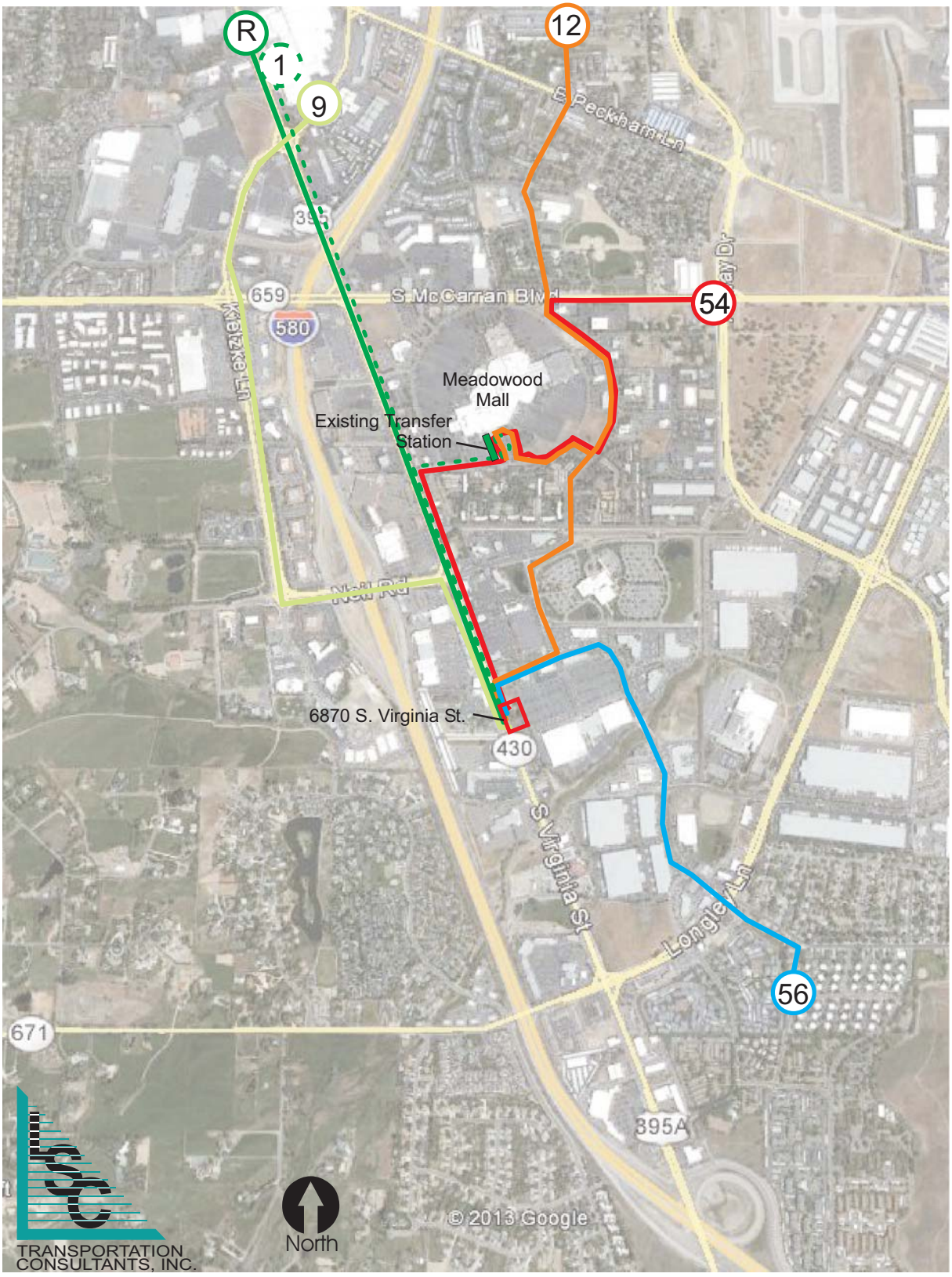
- **Route 1** would serve a Meadowood Mall stop and then return to South Virginia Street to make a left turn movement into the new transfer station. This would add approximately 10.5 minutes to the overall route round-trip running time. Considering the existing 25 minutes of total layover time at the ends of the route, it may be possible to provide adequate time for layovers and to address variation in travel times, depending on variability in travel times. If not, operating a fourth bus on 120-minute cycles would be necessary, possibly in peak times only.

- **Route 9** could shift from serving South Virginia Street between McCarran Boulevard and Neil Road to serving Kietzke Lane, traveling east on Neil Road before turning south on S. Virginia to the new transfer point. This has the benefit of providing new RIDE service to the extensive office, medical, educational and lodging developments along this section of Kietzke Lane, as well as within walking distance of the developments along Kietzke Lane south of Neil Road. Overall, route running time would be reduced by approximately 2.5 minutes.

- **Route 12** would serve Meadowood Mall, and then return to Neil Road to travel south to the new site via Campus Way, Sierra Town Center Way and S. Virginia Street (unless an agreement to allow bus access via the Sierra Town Center internal streets allows direct access to the east side of the new site, in which travel on S. Virginia Street could be avoided). This would continue the existing 30-minute-headway service along this corridor, replacing the reduction in Route 56 service discussed below. Approximately 7 minutes of running time would be added per round-trip. Considering the existing 15 minutes of total available layover time and that running time on Route 9 (which is interlined with Route 12) would be reduced, there is probably adequate overall running time to accommodate the extension of Route 12 with minor changes to the schedule.

- **Route 54** would extend beyond the current terminus at Meadowood Mall to the new transfer point, adding approximately 9 minutes of running time. As the current route schedule includes only a total of 8 minutes of layover time, modifications would be necessary to the route to reduce route running time elsewhere in order to serve a new transfer point. As an example, elimination to service on Mira Loma Drive (remaining on Longley Lane between Mira Loma Drive and Capital Boulevard) could be an option, though one with negative ridership impacts.

Figure F
RTC Ride Routes - 6870 S. Virginia Transfer Station Site



- **Route 56** would use the current route as far north as Sierra Center Drive, and then turn left on Sierra Center Drive and S. Virginia Street, serve the transfer center, and make right turns onto South Virginia followed by Sierra Center Drive (unless a direct access through the Sierra Town Center internal roadways were to be available). This would reduce overall running time by roughly 5 minutes. This is approximately the time that would be needed to serve Summit Sierra shopping center, from the existing southerly end of Route 56 at S. Virginia Street/Damonte Ranch Parkway. This running time assumes the construction of a transit stop (with the ability to turn the bus around) near the eastern end of the mall on Summit Sierra Boulevard, and that the existing S. Virginia Street / Summit Sierra Boulevard intersection is modified from its existing right-in/right-out configuration to at least accommodate a left-out movement from Summit Sierra Boulevard onto S. Virginia Street northbound.

- **Intercity** service would be limited to a stop at the new transfer station, assuming that an arrangement can be reached with the Sierra Town Center to provide adjacent park-and-ride spaces. Overall running time would be comparable to current times.

Three of the existing six routes would still have direct service to the Mall. Between Routes 1, 12, and 54, a total of five buses per hour would travel between the relocated transfer point and Meadowood Mall in each direction. Both Route 9 and Route 56 passengers would need to transfer to access the Mall.

Advantages

- Expands service available to commercial uses along South Virginia between Sierra Town Center and Meadowood Mall, as well as along Kietzke Lane between McCarran Boulevard and Neil Lane.

- Allows Route 56 to be extended south to Summit Sierra Mall (assuming modifications to allow left-turn-out access onto S. Virginia Street).

- Reduces space requirements at Meadowood Mall.

Disadvantages

- Reduces service to Meadowood Mall, requiring passengers on RAPID, Route 9 and Route 56 to transfer to other routes or walk from S. Virginia Street.

- Provision of park-and-ride parking at this site would require an agreement with the Sierra Town Center owner.

- The costs and staff time associated with planning, designing, constructing and maintaining a new site.

- Probably requires operation of additional bus on Route 1, at least during periods of traffic delays.

- Requires revisions to Route 54, reducing service elsewhere.

- Barring agreements with adjacent land owners, all routes must access via Virginia Street.

Longley / S. Virginia Site

APN 025-491-10

This is a large undeveloped parcel on the northeast corner of South Virginia Street and Longley Lane. As shown in Figure B, it excludes a small pad on the northwest corner of Longley Lane and East Patriot Boulevard. Adjacent land uses consist of light industrial to the north, offices to the east (across East Patriot Boulevard), small commercial properties to the south (across Longley Lane), and the Longley West Plaza shopping center to the west (across South Virginia Street). Extending up to approximately 710 feet in the north-south dimension and 840 feet in the east-west dimension, it encompasses a total of roughly 10.3 acres.

As this is far more than the land necessary for transit operations use, the parcel could also accommodate additional uses. This may include potential transit oriented development, taking advantage of the high quality of transit service that would be provided by the transfer center. It also could potentially accommodate park-and-ride parking, which would provide residents of the South Meadows area with a convenient location to leave their car and utilize the RAPID program (as well as the other routes).

With existing signals at S. Virginia/Longley Lane and Longley Lane/East Patriot Boulevard, access could potentially be provided without the need for additional signals, depending on the site design as well as the traffic generation associated with other land uses on the parcel. There is more than adequate frontage for access to be provided on the west, south and east sides of the parcel (though access on Longley Lane would probably be limited to right-in/right-out only, due to the presence of existing turn lanes).

The conceptual route plan serving this new site is shown in Figure G. Existing routes would be realigned as follows (described in the inbound direction):

- **RAPID** would remain on Virginia Street southward to the new transfer point, extending the existing route by roughly 1.0 miles. The overall impact would be to increase round-trip route running time by approximately 5 minutes. As the existing RAPID schedule includes a total of 16 minutes of layover time per round-trip, this additional time can probably be accommodated by adjusting the schedule, without operating additional buses. An additional RAPID stop would be warranted in the vicinity of Neil Road or Meadowood Mall Way.

- **Route 1** would serve a Meadowood Mall stop and then return to South Virginia Street to make a left turn movement into the new transfer station. This would add approximately 15 minutes to the overall route round-trip running time. Considering the existing 25 minutes of total layover time at the ends of the route, operating a fourth bus on 120-minute cycles would probably be necessary. Assuming that this service plan would be needed 10 hours per day, this would increase total operating costs on the order of $250,000 per year.

- **Route 9** could shift to serve Kietzke Lane between McCarran Boulevard and Neil Road to serving Kietzke Lane, traveling east on Neil Road before turning south on S. Virginia to the new transfer point, and thereby expanding the fixed route service area. Overall, route round-trip running time would be increased by approximately 2 minutes, which can be accommodated within the existing available 15 minutes of layover time.

Figure G
RTC Ride Routes - S. Virginia/Longley Transfer Station Site

- **Route 12** would serve Meadowood Mall, and then return to Neil Road to travel south to the new site via Campus Way, Sierra Town Center Way, Colbert Way and E. Patriot Boulevard. This would continue the existing 30-minute-headway service along this corridor, replacing the reduction in Route 56 service discussed below. This would add approximately 10 minutes of running time per round-trip. This route is currently interlined with Routes 7 and 9, which are operated by a total of 8 buses over an overall 4-hour-long cycle to provide half-hourly service. As a whole, each bus and driver currently have 44 minutes of layover time each four-hour cycle, which could allow these routes to be operated in the available total time. However, detailed evaluation of variation in travel time would be needed to identify if all transfer times can be maintained.

- **Route 54** would not serve Meadowood Mall, but rather would remain on Longley Lane to a right turn into the new transfer point, slightly reducing overall running time.

- **Route 56** would use the current route as far north as E. Patriot Boulevard, then turn left into the new transit center. This would reduce overall running time by roughly 8 minutes, which would be more than adequate time to extend the route southward from the existing southerly at S. Virginia Street/Damonte Ranch Parkway to Summit Sierra shopping center. This extension could also serve Tamarack Junction Casino and the adjacent RV and mobile home parks. This assumes that a transit stop is constructed (with the ability to turn the bus around) near the eastern end of the Mall on Summit Sierra Boulevard, and that the existing S. Virginia Street / Summit Sierra Boulevard intersection is modified from its existing right-in/right-out configuration to at least accommodate a left-out movement from Summit Sierra Boulevard onto S. Virginia Street northbound.

- **Intercity** service would be limited to a stop at the new transfer station, as park-and-ride spaces could be provided at this site. Overall running time would be comparable to current times.

With this site and routing scenario, direct service to Meadowood Mall would be limited to Routes 1 and 12, providing four runs per hour connecting the relocated transfer point with the Mall. While RAPID could serve a stop within a long (1,000 foot) walking distance, overall transit service access to the Mall would be significantly reduced from the current level.

Advantages

- Expands service available to commercial uses along South Virginia between Sierra Town Center and Meadowood Mall, as well as along Kietzke Lane between McCarran Boulevard and Neil Lane.

- Allows Route 56 to be extended south to Summit Sierra Mall (assuming modifications to allow left-turn-out access onto S. Virginia Street). Provides opportunity for future service on South Virginia Street to Summit Sierra Mall and Redfield Campus.

- Reduces space requirements at Meadowood Mall.

- Great flexibility with regards to access and site design.

- Provides opportunity for joint development adjacent to transit center.

Disadvantages

- Substantially reduces service to Meadowood Mall, limiting direct service to Routes 1 and 12.

- The costs and staff time associated with planning, designing, constructing and maintaining a new site.

- Requires operation of additional bus on Route 1, at least during periods of traffic delays, adding on the order of $250,000 per year in operating costs.

- Requires revisions to Route 54, reducing service elsewhere, along with revisions to the Route 7/9/12 interlined schedule.

- Relatively costly.

- Necessitates a larger strategy for use of land not needed for transit operations.

DISCUSSION OF ROUTE ALTERNATIVES SOUTH OF MEADOWOOD MALL

As presented above, the current fixed route plan provides only a single route (Route 56) along the Virginia Street Corridor south of Meadowood Mall. This service plan has several shortcomings:

- At present, the fixed route system provides one route (Route 56) serving all areas south of Meadowood Mall. Convenient (within a quarter-mile walk distance) transit service is not available to the commercial properties along the west side of South Virginia Street between Delucchi Lane and Foothill Road (including The Commons, Southwest Pavilion, and Longley West Plaza).

- No service is provided on South Virginia Street south of Damonte Ranch Parkway, such as to Tamarack Junction Casino, Pioneer Hill Mobile Home Estates, or the extensive Summit Sierra Center.

- Service is limited to only hourly frequency for much of the day.

- The circuitous route results in long in-vehicle travel times, such as a 27 minute travel time for the 3.7-mile trip from the Wal-mart on Damonte Ranch Parkway and Meadowood Mall.

On the other hand, recent experience indicates that limited ridership potential of transit service along that portion of S. Virginia Street between Meadowood Mall Circle and Damonte Ranch Parkway. Specifically, prior to August 11, 2013, Route 57 provided hourly service along South Virginia Street 11 hours per day, with two-way service operated between Meadowood Mall and South Meadows Parkway along with a one-way clockwise loop consisting of South Meadows Parkway, Double R Boulevard, Damonte Ranch Parkway and S. Virginia Street. As shown in Table F, ridership on the S. Virginia Street portion of the route averaged only 62 passenger boardings per day (or 5.6 boardings per hour).

In light of the relatively low ridership and service productivity under the previous route plan (in which two routes served this southern area), operating a single route south of Meadowood Mall is an appropriate strategy at present. As the area develops, however, it can be expected that

TABLE F: ROUTE 57 Average Weekday Boarding by Stop and Hour

		5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	Daily Total	Percent of Directional Boardings
Northbound															
001	1645 S. VIRGINIA/DAMONTE RANCH (Time Point)	0.1	1.5	0.5	0.5	0.7	2.3	3.3	2.6	3.5	1.1	1.7	1.4	19.2	39.3%
002	1853 S. Virginia/Auto Center	0.1	0	0	0.3	0.7	0	1	0.1	0	0.3	0.1	0	2.6	5.3%
003	1646 S. VIRGINIA/(Winco Entrance) (Time Point)	0.7	0.3	0.8	0.4	0.4	2.1	1.6	2.4	1.4	0.2	0.5	1.2	12	24.6%
004	1647 S. VIRGINIA/PATRIOT	0	0	0.2	0	0.5	0.4	0.4	0.3	0.2	0	0	0.2	2.2	4.5%
005	1648 S. VIRGINIA/LONGLEY	0.8	0	0.2	0	0.1	0.4	0.2	0.3	0.2	0	0.3	0	2.5	5.1%
006	1478 VIRGINIA/(Butcher Boy)	1	0.4	1.8	2.8	1.3	0.1	0.1	0.1	0	0	0	0	7.6	15.6%
007	503 VIRGINIA/GREEN ACRES	0	0	0	0.2	0	0	0	0	0	0.1	0.1	0	0.4	0.8%
008	1622 S. VIRGINIA/SIERRA CENTER PKWY	0	0	0.2	0.1	0.2	0	0.4	0.2	0.2	0	0	0.1	1.4	2.9%
009	493 VIRGINIA/NEIL	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0	0	0	0.5	1.0%
010	1601 MEADOWOOD MALL CIRCLE/VIRGINIA	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0.2	0.4%
011	30 MEADOWOOD MALL (Time Point)	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0.2	0.4%
Total		2.7	2.2	3.7	4.4	4	5.4	7.2	6.1	5.7	1.7	2.7	3	48.8	100.0%
Southbound															
001	30 MEADOWOOD MALL (Time Point)	6	5.9	10.1	9.2	12.4	10.6	13.6	10.1	10.7	6	5	4.8	104.4	69.3%
002	1631 S. VIRGINIA/NEIL	0.1	0	0.2	0	0.2	0.7	0.1	0.1	0.2	0	0.1	0.1	1.8	1.2%
003	495 VIRGINIA/NEIL	0	0.1	0.1	0	0	0	0.2	0.4	0.4	0	0	0	1.2	0.8%
004	1623 S. VIRGINIA/(Sierra Center)	0	0	0.1	0	0.1	0.1	0.1	0	0	0.1	0	0	0.5	0.3%
005	496 VIRGINIA/GREEN ACRES	0.3	0	0.1	0.6	0.1	0	0	0.2	0	0.1	0	0	1.4	0.9%
006	1632 S. VIRGINIA/HUFFAKER LANE	1.1	0.1	0	0.3	0.5	0.2	0.3	0.5	0.4	0	0	0	3.4	2.3%
007	1633 S. VIRGINIA/PATRIOT	0.1	0	0.4	0	0.1	1.4	0.2	0.3	0.4	0	0.1	0.3	3.3	2.2%
008	1634 S. VIRGINIA/(Sierra RV)	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
009	1864 S. Virginia/Holcomb Ranch	0	0	0	0	0	0.4	0.1	0	0.1	0	0	0	0.6	0.4%
010	1697 S. VIRGINIA/(Winco Entrance)	0	0.1	0.3	0	0	0.3	0.2	0.1	0.5	0	0	0	1.5	1.0%
011	1636 S. MEADOWS PRKWAY/S. VIRGINIA (Time Point)	0	0	0	0	0	0.3	0	0	0	0	0.2	0	0.5	0.3%
012	1637 S. MEADOWS PRKWAY/GATEWAY	0	0	0	0.3	0.3	0.4	0.2	0	0.3	0.2	0.1	0	1.8	1.2%
013	1638 DOUBLE R/RENOWN	0	0	0	0.5	0.1	0.7	0.4	0.4	0.6	0.2	0	0.6	3.5	2.3%
014	1639 DOUBLE R/PROFESSIONAL CIRCLE	0	0	0	0	0	0	0.2	0	0.1	0	0.3	0.4	1	0.7%
015	1640 DOUBLE R/PROFESSIONAL CIRCLE	0	0	0	0	0.4	0	0	0	0	0	0	0	0.4	0.3%
016	1641 DOUBLE R/(Dentistry Kids)	0	0	0	0.1	0	0.2	0	0	0	0	0	0	0.3	0.2%
017	1642 DOUBLE R/(Legacy Wealth)	0	0	0	0	0	0.1	0.1	0.2	0	0.5	0.5	0	1.4	0.9%
018	1643 DOUBLE R/DOUBLE DIAMOND PRKWY	0.3	4.9	0	0.5	0	0.8	0.7	0.8	1.1	0.3	0.6	0.3	10.3	6.8%
019	1644 DAMONTE RANCH/HWY 395	0.5	0.8	0.6	0.4	0.8	2	2.6	2.3	1.8	0.6	0.6	0.3	13.3	8.8%
020	1645 S. VIRGINIA/DAMONTE RANCH (Time Point)	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total		8.4	11.9	11.9	11.9	15	18.2	19	15.4	16.6	8	7.5	6.8	150.6	100.0%
TOTAL: Both Directions		11.1	14.1	15.6	16.3	19	23.6	26.2	21.5	22.3	9.7	10.2	9.8	199.4	
Subtotal: Both Directions Along S. Virginia Street		4.3	2.5	4.9	5.2	5	8.5	8.3	7.7	7.6	1.9	2.9	3.3	62.1	

Source: RTC ridership data for weeks of 10/1/12 and 10/8/12. Route 57 service was terminated August 11, 2013 and portions of the route included in revised Route 56.

ultimately a second route serving the area will be warranted. Considering the land use pattern in the area (with low density residential uses to the west of the South Virginia corridor and a mix of higher density, employment and social services to the east), a reasonable route structure for planning purposes consists of the following:

- One route serving the area east of S. Virginia Street and US 395, including the Double Diamond area and major employers such as IGT.

- A second route providing direct service along S. Virginia Street to Summit Sierra Center and possibly to the Redfield Campus.

It is next appropriate to consider whether the South Virginia Street corridor south of Meadowood Mall would best be served by traditional fixed route service, or alternatively would warrant BRT service. A review of the transit planning literature yields a series of "thresholds" that are recommended as a minimum level of urban development that may warrant a full BRT program:

- The Seattle Metro transit system considers a minimum threshold of 10,000 employees in an employment center for cost-effective bus rapid transit.

- Seattle Metro also recommends a minimum of 50 employees per acre.

- The US Department of Transportation recommends a minimum Floor-to-Area Ratio (FAR)[1] of 2.0 for the primary employment district.

- The City of Portland Oregon recommends a minimum FAR of 1.0 within one half mile of BRT stations.[2]

- Public Transportation and Land Use Policy, authored by B. Pushkarev and J. Zupan, identifies a minimum of 12 dwelling units per acre for rapid transit service.

- Transit Cooperative Research Program (TCRP) Report 90: Bus Rapid Transit identifies a "radial route with strong commute pattern to downtown" as an important factor.

- TCRP Report 90 also indicates that rapid urban development is a factor indicating a higher potential for BRT. In addition, TCRP Report 90 indicates that the residential area should be no more than 20 miles from the downtown area.

- Finally, TCRP Report 90 indicates that the presence of traffic congestion on roadways parallel to the BRT system is an important determinate in BRT feasibility.

Table G presents an evaluation of the southern portion of the South Virginia Street corridor using these thresholds. Specifically, data was collected for the US Census block groups bordering South Virginia Street between Mt. Rose Highway and Neil Road, as well as along Mt. Rose Highway between S. Virginia Street and Redfield Campus. As indicated, none of the pertinent thresholds are met for BRT service in this corridor. In particular, the residential density is far below the minimum threshold, and the lack of consistent traffic congestion along roadways

[1] The Floor to Area Ratio is defined as the total square footage of floor area divided by the square footage of land area. As an example, a four story building with 1,000 square feet of floor area on each floor on a parcel 2,000 square feet in size would have an FAR of 2.0.

[2] This standard is applied to each separate potential BRT station area, while the US DOT standard of 2.0 is considered for the employment district as a whole.

in the corridor does not provide a strong incentive for bus ridership. While there is substantial employment in the corridor, much of it is located in low-density light manufacturing, warehousing and office complexes that would not be within a convenient walk distance of a BRT route. In addition, the abundance of free parking does not provide the incentive to shift to transit service that paid parking would. Finally, the suburban street and sidewalk networks along the corridor result in long walk distances from potential stops that also tend to discourage bus ridership.

TABLE G: Comparison of South Virginia Street South of Meadowoood Mall Corridor Charactistics with BRT Thresholds

		South Virginia Corridor
Input Data		
Population		**8,643**
Households		**3,425**
Employees		**7,878**
Land Area (Square Miles)		**10.81**
Households per Acre		**0.50**
EMPLOYMENT CENTER THRESHOLD	**Source**	
10,000 Employees for Cost-Effective Bus Transit	***Seattle Metro***	**No** **79%**
RESIDENTIAL CENTER THRESHOLDS		
Minimum of 12 Dwelling Units per Acre (2)	***Pushkarev and Zupan***	**No** **4%**
Presence of Traffic Congestion on Parallel Roadways	***TCRP Report 90***	**No**

Another key consideration is the increase in operating costs that would be incurred by extension of BRT-level service southward along S. Virginia Street. Considering only weekday service, provision of service on a corridor extending from Meadowood Mall to Redfield Campus over the RTC RIDE's typical 17.5 hours per day would require 8,925 vehicle-hours of bus service annually if operated every 30 minutes, compared with 26,775 vehicle-hours if operated on RAPID's 10-minute headways. At RTC RIDE's current marginal operating cost of $69.60 per vehicle-hour, BRT service would incur a cost of approximately $1.24 Million more per year than would 30-minute frequency route service.

Overall, extension of RAPID service south of the current terminus in the Meadowood Mall area is not warranted, and is not recommended. However, future growth in the area may ultimately warrant introduction of a fixed-route along South Virginia, and the provision of a bus should be included in plans for any new or expanded transfer station in the vicinity.

CONCLUSIONS / RECOMMENDATIONS

Based on the discussion above, LSC provides the following conclusions and recommendations:

- Under current levels of ridership demand, the existing Meadowood Mall location is the overall best location for the transfer site serving the southern portion of the RTC RIDE route system. The reduction in ridership associated with moving the transfer site elsewhere would be greater than additional ridership generated by service to new stops.

- The two northern alternative sites (6050/6100 S. Virginia and 6250 S. Virginia) in particular provide no significant benefits while incurring substantial costs. The 6870 S. Virginia site is slightly preferable to the two northernmost site options, in that it provides the opportunity to extend service to Summit Sierra Mall, but it would still result in an overall reduction in ridership.

- The S. Virginia / Longley site only makes sense as part of a larger program of developing the overall parcel, such as a mixed-land-use project that takes advantage of an adjacent transit center.

- Barring interest in a joint development strategy at S. Virginia/Longley, extension of RAPID service south of Meadowood Mall would not be cost-effective or generate a productive level of ridership, and is not recommended.

- Ultimately, an additional traditional route on South Virginia Street between Meadowood Mall, Summit Sierra Mall and the Redfield Campus will probably be warranted. The effectiveness of this additional route would be increased by future development along the corridor, and/or efforts to expand ridership generated by Redfield Campus.

- The RTC should focus on the existing Meadowood Mall transfer center (again, barring a joint development project at the S. Virginia/Longley site). Improvements to this existing site are warranted, given bus and passenger activity levels. The following improvements are recommended:

    - Expansion of bus loading bay space to provide dedicated bus bays for each route, designed to avoid conflicted between bus travel paths (such as sawtooth bays). This would require an expansion of the site “footprint”.

    - Shelter to provide protection from the elements for up to 90 passengers. Of these waiting passengers, seating should be provided for half. The typical floor area required for waiting passengers is 15 square feet for every seated passenger and 10 square feet for every standing passenger. Applying these factors and including space for trash bins, approximately 1,200 square feet of protected passenger waiting space would be desirable. Optimally, this space would be within a structure with climate control. At a minimum, bus shelters on site should be expanded (preferably designed specifically for the site).

    - Restrooms, for the public and for drivers.

    - Improved outside seating and landscaping areas.

APPENDIX A

Ridership Data for Routes Serving Meadowood Mall

ROUTE 6 Average Weekday Boarding by Stop and Hour

		Hour Beginning																									
		12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Total	Percent of Directional Boardings
Northbound																											
001	30 MEADOWOOD MALL (Time Point)	0	0	0	0	0.4	1.6	3.7	5.1	8	4.3	3.1	6.2	4.6	5.4	3.4	8.4	9.3	6.5	5.6	3.8	3	5.4	0	0	87.8	22.2%
002	31 NEIL LN/NEIL RD	0	0	0	0	0	0.1	0.4	1.5	0.1	0.3	0.2	0.5	0.2	0	0.5	0.5	0.9	0.8	0.2	0	0	0	0	0	6.2	1.6%
003	32 NEIL/MEADOWOOD LN	0	0	0	0	0	0.2	0	0.1	0	0	0.4	0.5	0.6	0.1	0.1	0.4	0.2	0.3	0.1	0.1	0.2	0	0	0	3.3	0.8%
004	33 NEIL/MARVEL	0	0	0	0	0	0	0	0	0	0	0	0.8	0	0	0	0.5	0	0	0	0	0	0	0	0	1.3	0.3%
005	34 NEIL/McCARRAN	0	0	0	0	0	0	0	0	0.3	0.2	0.2	0.2	0.1	0	0.2	0.8	0	0	0	0	0.1	0	0	0	2.1	0.5%
006	305 McCARRAN/SMITHRIDGE	0	0	0	0	0.7	0	0.1	0.8	0.4	0.4	0.6	1.5	0.7	1.3	0.7	1	1.3	1.3	1.3	0.6	0	0.1	0	0	12.8	3.2%
Total -- In Study Area		0	0	0	0	1.1	1.9	4.2	7.5	8.8	5.2	4.5	9.7	6.2	6.8	4.9	11.6	11.7	8.9	7.2	4.5	3.3	5.5	0	0	113.5	28.7%
Total -- Entire Route		0	0	0	0	5.3	11.9	24.1	35.2	36.5	23.7	20	28.4	20.6	27.6	18.1	31	29.6	30.5	18.9	16.5	9.6	8.5	0	0	396	100.0%
Southbound																											
029	303 McCARRAN/MEADOWOOD MALL W	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0.3	0.1%
030	26 NEIL/McCARRAN	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0.2	0	0.1	0.1	0	0	0	0.1	0	0	0.7	0.1%
031	27 NEIL/MARVEL	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0.0%
032	28 NEIL/MEADOWOOD LN	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.2	0	0	0	0.1	0	0	0	0	0	0.4	0.1%
033	29 NEIL LN/NEIL RD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0.0%
034	30 MEADOWOOD MALL (Time Point)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	0.4	0.1%
Total -- In Study Area		0	0	0	0	0	0	0	0	0.1	0	0.1	0.2	0.1	0.1	0.4	0	0.2	0.2	0.1	0	0	0.1	0.4	0	2	0.4%
Total -- Entire Route		0	0	0	0	0	9.3	30	36.7	46.5	30.9	26.8	31.7	30.8	25.2	57.1	46	49.9	36	20.5	13.3	13	9.8	6.9	0	520.4	100.0%

ROUTE 9 Average Weekday Boarding by Stop and Hour

		Hour Beginning																						
		12:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Total	Percent of Directional Boardings
Northbound																								
001	30 MEADOWOOD MALL (Time Point)	3	1.7	2	5.2	11.2	7.4	6.5	12.2	10.4	12.7	13.5	11.3	18.5	16.4	15.3	6.8	8.3	8.3	9.6	6.4	2.6	189.3	22.7%
002	31 NEIL LN/NEIL RD	0.1	0	0.1	0.6	1.8	0.2	0.3	1.1	0.5	0.8	0.6	1	1.4	1.7	1.1	0.2	0.1	0.1	0.7	0.3	0	12.7	1.5%
003	32 NEIL/MEADOWOOD LN	0.1	0	0.3	0	0.1	0	0.1	5.5	1	1.3	1.1	2	2	0.7	0.5	0.4	0.1	0.1	0	0	0	15.3	1.8%
004	33 NEIL/MARVEL	0	0	0	0	0	0	0	0.2	0.1	0.1	0	0.5	0.2	0.1	0	0	0.2	0	0	0	0	1.4	0.2%
005	34 NEIL/McCARRAN	0	0	0	0	0	0.5	0.7	0.8	0.7	0.3	1.2	0.2	0.8	0.9	0.5	0	0	0.1	0	0	0	6.7	0.8%
Total -- In Study Area		3.2	1.7	2.4	5.8	13.1	8.1	7.6	19.8	12.7	15.2	16.4	15	22.9	19.8	17.4	7.4	8.7	8.6	10.3	6.7	2.6	225.4	27.1%
Total -- Entire Route		7.8	6.4	30.7	40.7	66.1	53.9	42.2	73.5	52.4	56	62.7	75.7	64.7	54.3	51.4	19.7	15.5	18.1	24.5	12.3	7.2	832.6	100.0%
Southbound																								
030	26 NEIL/McCARRAN	0	0	0	0	0	0	0	0.2	0	0	0	0	0.3	0.1	0	0	0	0	0	0	0	0.6	0.1%
031	27 NEIL/MARVEL	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0.1	0.1	0	0	0	0	0	0	0.5	0.1%
032	28 NEIL/MEADOWOOD LN	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0.3	0.0%
033	29 NEIL LN/NEIL RD	0	0	0	0	0.1	0	0	0.2	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0.5	0.1%
034	30 MEADOWOOD MALL (Time Point)	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.5	0	0	0	0	0	0	0.8	0.1%
Total -- In Study Area		0	0	0	0	0.1	0	0.1	0.4	0.1	0.2	0	0.2	0.3	0.5	0.7	0	0	0.1	0	0	0	2.7	0.3%
Total -- Entire Route		6.4	17.3	0	35.1	72.3	66.8	68.1	61.9	66.2	65.7	59	91.1	82.9	85.2	65.7	45.1	19.7	20	18.5	16.3	13.7	977	100.0%

ROUTE 54 Average Weekday Boarding by Stop and Hour

		5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	Daily Total	Percent of Directional Boardings
Northbound																		
001	30 MEADOWOOD MALL (Time Point)	0	3.3	5.8	4.8	3	4.1	3.2	3.9	4.7	6	4.4	4.7	6	5.1	4	63	57.9%
002	31 NEIL LN/NEIL RD	0	0	2.4	0.1	0.1	0.1	0	0	0.2	0	0.1	0	0.1	0	0	3.1	2.8%
003	32 NEIL/MEADOWOOD LN	0	0	0	0.2	0	0	0	0.8	0	0.3	0	0.1	0	0.2	0.2	1.8	1.7%
004	33 NEIL/MARVEL	0	0	0	0.1	0	0	0	0.1	0.2	0.2	0.1	0	0	0	0	0.7	0.6%
005	34 NEIL/McCARRAN	0	0	1.3	0.6	0	0.3	0.2	0.1	0.2	0.1	0.5	0.4	0.3	0.4	0	4.4	4.0%
Total -- In Study Area		0	3.3	9.5	5.8	3.1	4.5	3.4	4.9	5.3	6.6	5.1	5.2	6.4	5.7	4.2	73	67.1%
Total -- Entire Route		0	5.2	12.3	8.1	4.9	6.8	5.6	8.8	7.9	12.8	7.7	7.2	8.5	7.2	5.8	108.8	100.0%
Southbound																		
023	26 NEIL/McCARRAN	0	0	0	0	0.1	0.1	0	0.1	0.2	0	0	0	0	0	0	0.5	0.4%
024	27 NEIL/MARVEL	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0.2	0.2%
025	28 NEIL/MEADOWOOD LN	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0.1%
026	29 NEIL LN/NEIL RD	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1%
027	30 MEADOWOOD MALL (Time Point)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total -- In Study Area		0	0	0.1	0	0.1	0.1	0.1	0.1	0.3	0.1	0	0	0	0	0	0.9	0.7%
Total -- Entire Route		5.6	10.3	12.3	12.3	8.3	9	7.5	8.9	11.4	7.1	17.8	9	5.4	3.9	0	128.8	100.0%

ROUTE 56 Average Weekday Boarding by Stop and Hour

		5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	Daily Total	Percent of Directional Boardings
Northbound																					
001	1463 DOUBLE DIAMOND/SOUTH MEADOWS (	0.4	0.9	0.3	0.5	0.1	0.6	0.2	0.2	0.1	0.1	0.3	0.8	0.4	0.2	0.2	0	0	0	5.3	3.7%
002	1464 SOUTH MEADOWS/EVERGREEN	0	1.7	0.2	0.7	1.3	0.1	0.5	1	0.5	0.4	1	0.6	0.2	0.7	0.1	0.5	0.2	0.8	10.5	7.3%
003	1465 SOUTH MEADOWS/TRUCKEE MEADOW	0.1	1.9	1.2	0.4	0.9	0.6	0.9	0.7	0.6	1.3	1.7	1.5	0.5	0.9	0.2	0.1	0.3	0	13.8	9.6%
004	1466 SOUTH MEADOWS/(VINTAGE AT SOUTI	0	0	0	0	0.1	0.1	0	0.2	0.1	0.1	0	0.2	0	0.2	0.2	0	0	0	1.2	0.8%
005	1467 SOUTH MEADOWS/PRARIE DOG	0.2	0.2	0.6	1.1	1.2	0.6	1.5	2.5	2.4	1.7	2.1	2	2.7	0.9	2.2	0.7	0.8	1	24.4	17.0%
006	1468 SOUTH MEADOWS/DOUBLE R	0	0	0.5	0.3	0.4	0.3	0.6	0.8	0.3	0.6	0.7	0.1	1	0.7	0	0.2	0.2	0.5	7.2	5.0%
007	1469 GATEWAY/(RESIDENCE INN)	0	0.1	0.1	0.1	0.1	0.5	0.7	0.4	0.6	0.9	0.2	0.7	0.4	0	0.1	0.1	0.1	0	5.1	3.6%
008	1470 GATEWAY/DOUBLE EAGLE	0	0	0	0	0	0.1	0.5	0.4	0.1	0.2	0.6	0.8	0.1	0	0	0	0	0	2.8	2.0%
009	1471 GATEWAY/PROTOTYPE	0	0	0	0	0.1	0.1	0.1	0.2	0	0.1	0.7	0.1	0.1	0	0.1	0	0.1	0	1.7	1.2%
010	1472 GATEWAY/(Office drive way)	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.2	0.3	0	0	0.6	0.4%
011	1473 OFFENHAUSER/(HILLVIEW TERRACE D'	0	0	0	0	0.1	0.2	0.1	0.1	0.1	0	0	0	0	0	0.1	0	0	0	0.7	0.5%
012	1474 OFFENHAUSER/(HILLVIEW TERRACE M	0.3	0	0.8	0.7	0.9	0.2	0.5	0.3	0.3	0.2	0.2	0.1	0.2	0.1	0.1	0	0.1	0	5	3.5%
013	1475 OFFENHAUSER/(Hillview Terf)	0.2	1	0.8	0.4	0.5	0.8	0.8	2.9	1.1	0.6	0.5	0.2	0.2	0.1	0.8	0.4	0	0.1	11.4	7.9%
014	1476 BLUESTONE/PORTMAN (Time Point)	0	4.4	1.6	0.5	0.5	0.9	1.7	1.7	1	0.2	0.7	0.5	0.5	0.3	0.1	0.2	0	0.1	14.9	10.4%
015	1477 BLUESTONE/E. HUFFAKER	0.1	1.3	1.4	1.6	1.5	1.3	1.7	0.3	1.3	0.7	0.5	0.6	1	0	0.2	0.5	0	0	14	9.8%
016	955 HUFFAKER/LONGLEY	0	0.2	0	0.2	0.1	1.1	0.3	0.5	1.2	1.3	0.5	0.8	0.5	0.9	0.4	0.2	0.1	0.3	8.6	6.0%
017	1656 SIERRA CENTER/PATRIOT	0	0	0	0	0	0.1	0	0	0.2	0	0.2	1.6	0	0	0	0	0	0	2.1	1.5%
018	1657 SIERRA CENTER/MAESTRO	0	0	0.7	0	0.1	0	0.1	0	0.1	0	2	1.3	1.7	1.4	0.7	0.4	0.1	0	8.6	6.0%
019	1658 SIERRA CENTER/(Intuit Entrance)	0	0	0	0.1	0.2	0.2	0	0	0	0.2	0	0.2	0.6	0.1	0.3	0	0	0	1.9	1.3%
020	1659 CAMPUS WAY/NEIL ROAD	0	0	0	0.3	0.2	0.2	0	0	0.3	0	0.4	0.1	0.2	0.1	0	0.2	0	0	2	1.4%
021	505 NEIL/DELUCCHI	0	0.4	0.2	0	0	0.1	0	0	0	0	0.2	0	0	0	0	0	0	0	0.9	0.6%
022	29 NEIL LN/NEIL RD	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0.2	0.1%
023	30 MEADOWOOD MALL (Time Point)	0	0	0.2	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0.2	0.6	0.4%
Total -- In Study Area		0	0.4	1.1	0.4	0.5	0.6	0.1	0	0.6	0.2	2.8	3.6	2.5	1.6	1	0.6	0.1	0.2	16.3	11.4%
Total -- Entire Route		1.3	12.1	8.6	6.9	8.4	8.1	10.2	12.2	10.3	8.6	12.5	12.6	10.3	6.6	6	3.8	2	3	143.5	100.0%
Southbound																					
001	30 MEADOWOOD MALL (Time Point)	2.6	17.2	10.1	13.3	7.6	11.2	10	11.7	9.3	12.2	9.1	11.1	9.6	6.4	5	3.7	4.5	0	154.6	72.0%
002	31 NEIL LN/NEIL RD	1.9	0.3	1.3	0.4	0.6	0.1	0.9	0.3	0.2	0.9	0.4	1	0.1	0	0	0	0	0	8.4	3.9%
003	1150 NEIL /DELUCCHI LN	0	0	0	0	0	0	0	0	0.5	0.1	0	0.1	0	0	0	0	0	0	0.7	0.3%
004	1650 CAMPUS WAY/(Sierra Pacific)	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0.2	0.1%
005	1651 SIERRA CENTER/CAMPUS WAY	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0.2	0.1%
006	1652 SIERRA CENTER/(Sierra Town Center	0	0	0	0	0	0.5	0	0	0	0.3	0	0.1	0.1	0	0	0	0.1	0	1.1	0.5%
007	1653 SIERRA CENTER/MAESTRO	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.2	0.1%
008	1654 SIERRA CENTER/PATRIOT	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0.2	0.1%
Total -- In Study Area		4.6	17.5	11.4	13.7	8.2	11.8	11	12	10.1	13.5	9.6	12.5	9.8	6.5	5	3.7	4.7	0	165.6	77.2%
Total -- Entire Route		5.7	19	13.7	14.6	9.2	14.4	13.1	14.6	11.7	28.8	14.3	17.9	11.4	7.8	5.7	5.8	6.9	0	214.6	100.0%

RAPID Average Weekday Boarding by Stop and Hour

		6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	Total Daily	% of Directional Boardings
Northbound																			
001	30 MEADOWOOD MALL (Time Point)	1.2	44.8	40.4	36.7	38.2	51.1	60.5	62.4	63.5	81.0	73.0	60.0	56.5	31.4	24.1	--	724.8	38%
002	1991 Virginia/Meadowood Mall Way	0.0	3.0	1.3	5.0	5.6	6.6	9.9	10.3	10.5	11.1	7.6	12.4	10.4	6.4	3.5	--	103.6	5%
003	1950 Virginia/Peckham (Time Point)	1.2	17.0	17.7	17.3	22.6	24.5	30.5	36.5	42.2	40.4	36.4	26.8	25.6	14.8	12.4	--	365.9	19%
004	45 VIRGINIA/(PEPPERMILL)	1.9	26.9	24.9	20.9	25.5	24.1	26.0	30.5	28.9	34.7	31.8	26.6	18.2	15.2	9.9	--	346.0	18%
005	1951 Virginia/(Parklane) (Time Point)	1.7	4.1	6.4	5.9	4.9	3.0	2.5	5.8	7.2	4.2	6.7	4.5	4.8	1.9	1.9	--	65.5	3%
006	49 VIRGINIA/HOLCOMB	1.4	8.8	9.8	7.6	13.8	11.1	9.4	11.2	11.2	15.8	9.5	8.6	6.8	3.7	2.2	--	130.9	7%
007	1995 Center/Burns	3.0	8.9	6.6	7.3	9.1	6.2	7.2	7.8	7.8	4.0	3.8	2.5	3.3	1.6	1.5	--	80.6	4%
008	1996 Center/Liberty	0.5	4.9	6.0	7.8	5.8	9.8	8.9	9.5	8.2	9.7	8.1	3.8	2.3	0.5	0.4	--	86.2	5%
009	1972 Bay L 4SS (RAPID) (Time Point)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.6	0.0	--	1.9	0%
Total		11	118	113	109	126	136	155	174	180	201	177	145	129	76	56	--	1905.4	100%
Southbound																			
001	1972 Bay L 4SS (RAPID) (Time Point)	29.5	67.1	92.0	96.6	109.4	116.9	111.4	119.4	133.4	120.0	109.0	102.9	76.7	15.8	18.8	6.9	1325.8	71%
002	1993 Virginia/California	1.0	4.0	11.1	14.5	18.5	15.2	13.7	14.1	17.1	11.8	14.3	10.8	8.0	1.8	1.5	0.5	157.9	8%
003	7 VIRGINIA/MARY	2.2	2.8	4.0	3.5	4.4	4.4	3.4	3.6	4.6	3.9	4.9	4.0	3.4	0.7	0.4	0.2	50.4	3%
004	9 VIRGINIA/MT. ROSE	0.6	1.9	3.9	4.6	5.8	4.8	6.8	7.1	7.2	7.6	6.9	5.5	4.5	1.1	0.4	0.1	68.8	4%
005	1948 Virginia/Orchard Plaza (Time Point)	1.0	2.4	2.6	3.8	3.4	4.9	4.4	4.2	3.5	4.5	2.7	3.2	2.0	0.9	0.7	0.1	44.3	2%
006	15 VIRGINIA/BRINKBY	1.5	4.5	4.7	9.3	6.6	9.6	11.0	9.3	9.8	13.1	12.4	7.1	4.1	1.6	2.5	0.5	107.6	6%
007	1949 Virginia/Peckham (NS) (Time Point)	2.0	1.4	3.7	5.6	7.5	6.7	10.0	8.7	9.3	10.0	8.8	6.0	4.7	1.0	0.2	0.1	85.7	5%
008	1412 Virginia/(Best Buy)	0.0	0.0	0.3	0.5	1.7	1.3	1.4	2.4	2.6	2.0	1.0	0.9	0.7	0.4	0.5	0.0	15.7	1%
009	30 MEADOWOOD MALL (Time Point)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.0	1.4	0.1	2.2	0%
Total		37.8	84.1	122.3	138.4	157.3	163.8	162.1	168.8	187.5	172.9	160.0	140.7	104.5	23.3	26.4	8.5	1858.4	100%

Source: RTC ridership data for weeks of 10/1/12 and 10/8/12

Route 1 Average Weekday Boarding by Stop and Hour

	Hour Beginning																								
	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Total	Percent of Directional Boardings
Northbound																									
001 30 MEADOWOOD MALL (Time Point)	0	2.6	2.2	12.9	1.3	7	4.4	10.6	12.1	13.9	15	16.4	18.5	12.9	17.6	15.2	15.6	15.5	16.5	9.8	17	31.6	14.4	5.7	288.7	33.2%
002 506 VIRGINIA/MEADWOOD CIR	0	0.1	0	0	0	0.1	0.5	0.2	0.2	0.8	1.2	0.8	0.6	1.2	2.6	1.3	1.9	2.3	0.5	0.8	2.3	2.1	1.1	0	20.6	2.4%
003 1411 VIRGINIA/MEADOWOOD	0	0	0.1	0	0.1	0	0.1	0	0.4	1.1	3.1	0.6	1.1	1.4	1.2	0.5	1.8	2.4	0.7	1.7	0.6	4.5	1.1	0	22.5	2.6%
004 99 VIRGINIA/KIETZKE	0	0.1	0.1	0.1	0.1	1.5	0.5	2.1	1	0.7	3.2	4.1	3.6	3.3	2.8	3.4	2.2	2.6	1.9	0.7	2.3	1.2	0.6	0.3	38.4	4.4%
Total	1.2	5.4	6.1	16.1	6.1	30.3	31.2	35.8	35.5	43.1	54.6	56.5	53.5	53.1	51.6	51.4	42.4	39.5	34	27.7	48.8	67.5	46.5	30.5	868.4	100.0%
Southbound																									
018 1994 Virginia/Meadowood Mall Way	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0.2	0.2	0.1	0.3	0.3	0	0.3	0.2	0.4	0	2.4	0.2%
019 1601 MEADOWOOD MALL CIRCLE/VIRGINIA	0	0	0	0	0	0	0	0	0	0	0.1	0.3	0.2	0.2	0	0.1	0.2	0.3	0	0.2	0	0.6	0.4	0.2	2.8	0.3%
020 30 MEADOWOOD MALL (Time Point)	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	1	0.1%
Total	22.8	6.6	6.6	8.4	23.9	28.9	33	20.5	43.1	57.6	60.6	58	68.7	58.5	66.2	59.4	60.3	49.4	40.1	53.3	42.5	46.4	43.3	28.1	986.2	100.0%

APPENDIX B

Level Of Service Analysis

Intersection	
Intersection Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	20	1323	20	20	1111
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	200	-	120	120	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	22	1438	22	22	1208

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2085	719	0	0	1438	0
Stage 1	1438	-	-	-	-	-
Stage 2	647	-	-	-	-	-
Follow-up Headway	3.52	3.32	-	-	2.22	-
Pot Capacity-1 Maneuver	46	371	-	-	468	-
Stage 1	185	-	-	-	-	-
Stage 2	483	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	44	371	-	-	468	-
Mov Capacity-2 Maneuver	44	-	-	-	-	-
Stage 1	185	-	-	-	-	-
Stage 2	460	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.3	0	0.2
HCM LOS	C		

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	0	371	468	-
HCM Lane V/C Ratio	-	-	+	0.059	0.046	-
HCM Control Delay (s)	-	-	0	15.3	13.067	-
HCM Lane LOS			A	C	B	
HCM 95th %tile Q(veh)	-	-	+	0.186	0.146	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

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