

ROUTE 42C CASTLE SHANNON VIA BEECHVIEW
 ROUTE 42S SOUTH HILLS VILLAGE VIA BEECHVIEW
 ROUTE 47L LIBRARY VIA OVERBROOK
 ROUTE 47S SOUTH HILLS VILLAGE VIA OVERBROOK

Routes 42C & 42S and 47L & 47S provide nearly all of Port Authority’s light rail service (except along the limited service Allentown Line (Route 52)).

The 42-series Beechview LRT service connects South Hills Village and downtown Pittsburgh via the Beechview Line. The route serves 37 stations and stops located in Bethel Park, Castle Shannon, Mt. Lebanon Township, Dormont, Beechview, South Hills Junction, Station Square and the Downtown subway tunnel (see Figure 1). Route 42S South Hills Village via Beechview operates between South Hills Village and Downtown. Route 42C Castle Shannon via Beechview is a short-turn service that operates between Overbrook Junction in Castle Shannon and downtown Pittsburgh. Key destinations along the route include South Hills Village, Castle Shannon, Mt. Lebanon and Dormont business districts, South Hills Junction, Station Square and downtown Pittsburgh.

The 47-series Overbrook LRT line service operates from either South Park Township or South Hills Village to downtown Pittsburgh via the Overbrook Line. Route 47L operates from Library Station in South Park to Downtown. Route 47S operates between South Hills Village and Downtown. Overbrook Line operations serve 34 stations located in South Park Township, Bethel Park, Castle Shannon, Overbrook, Bon Air, Beltzhoover, South Hills Junction, Station Square and the Downtown subway tunnel. Key destinations along the route include South Hills Village, South Hills Junction, Station Square and Downtown.

The North Shore Connector is a 1.2-mile LRT extension from Gateway Center Station under Stanwix Street and the Allegheny

Figure 1: Routes 42C, 42S, 47L & 47S



River to the North Shore that currently is under construction and expected to be completed by the end of 2011. The new segment will consist of two stations: North Side near PNC Park, and Allegheny near Heinz Field and Carnegie Science Center. The Gateway Center station is also being reconstructed as part of the project.

Similar Routes

The 42 and 47-series operations are interrelated and form a north-south spine that connect Allegheny County's southern suburban neighborhoods and several City of Pittsburgh southern neighborhoods with downtown Pittsburgh. They use common track in two segments:

- Between Washington Junction and Overbrook Junction with stations in Castle Shannon, and the three intermediate stops (Martin Villa; St. Ann's; and Smith Road).
- Between South Hills Junction and Gateway Station in downtown Pittsburgh, and the four intermediate stations (Station Square; First Avenue; Steel Plaza; and Wood Street).

These segments include 10 of 37 stations served by Routes 42C and 42S, and 10 of 34 stations served by Routes 47L and 47S. The Overbrook Line also parallels the South Busway between South Bank Station and Station Square. The Beechview Line tracks are also located in the South Busway between the Palm Garden stop and Station Square. In addition to the services that operate along the South Busway, Routes 42C, 42S, 47L, and 47S overlap or run closely parallel to five other routes:

- Route 41B Bower Hill operates on West Liberty Avenue in proximity to Dormont Junction, Kelton and Potomac stations (Route 42C & 42S).
- Route 41D Brookline operates in Ebenshire Village and East Brookline in proximity to McNeilly and South Bank stations (Route 47L & 47S).
- Route 41G Dormont operates on West Liberty Avenue in proximity to Dormont Junction, Kelton and Potomac stations (Route 42C & 42S).
- Route 46F Baldwin Highlands operates on the South Busway in proximity to South Bank, Bon Air and Boggs stations (Route 47L & 47S).
- Route 52 Allentown serves South Hills Junction. Selected Route 42 trips overlay Route 52's alignment on East Warrington Avenue and Arlington Avenue. (This is also an alternative routing for all LRT service when the Mt. Washington Tunnel is closed for maintenance or other reasons).

Alignment/Service Patterns

Routes 42C, 42S, 47L and 47S serve two primary alignments north of Washington Junction, and two branches south of Washington Junction:

- Most Beechview Line service operates as Route 42S between South Hills Village and Downtown. On weekdays, during peak periods, much of the service operates as 42C, which is short-turn service that operates between Overbrook Junction and Downtown. Two trips in each direction also operate between South Hills Junction and downtown Pittsburgh via the Allentown Line. On weekends, all service operates as 42S.

- Overbrook Line service operates as either 47L between Library Station in South Park Township and downtown Pittsburgh or as 47S between South Hills Village and Downtown. On weekdays, service on the Library and South Hills Village branches generally alternate trips, while most off-peak service is provided with Route 47L. On weekends all service is provided as Route 47L.

The Beechview Line service uses six variants and the Overbrook Line uses four variants (see Table 1),

Table 1: Route 42 & Route 47 Service Variants

| Variant | Origin | Destination | Unique Feature | Weekday Trips |
|---------------------------|---------------------|---------------------|---------------------|---------------|
| Route 42 Beechview | | | | |
| 42C-I | Overbrook Junction | Downtown Pittsburgh | Weekday peak only | 32 |
| 42S-I | South Hills Village | Downtown Pittsburgh | Off-peak & weekends | 57 |
| 42S-IB | South Hills Village | Downtown Pittsburgh | Via Allentown Line | 2 |
| 42C-O | Downtown Pittsburgh | Overbrook Junction | Weekday peak only | 32 |
| 42S-O | Downtown Pittsburgh | South Hills Village | Off-peak & weekends | 57 |
| 42S-OB | Downtown Pittsburgh | South Hills Village | Via Allentown Line | 2 |
| Route 47 Overbrook | | | | |
| 47L-I | Library Road | Downtown Pittsburgh | Base alignment | 53 |
| 47S-I | South Hills Village | Downtown Pittsburgh | Weekday only | 46 |
| 47L-O | Downtown Pittsburgh | Library Road | Base alignment | 56 |
| 47S-O | Downtown Pittsburgh | South Hills Village | Weekday only | 43 |

Schedule

Service on the Beechview and Overbrook lines operate daily on generally complementary schedules. For example, South Hills Village is served by Route 47S during peak hours and by Route 42S at other times.

The Beechview Line’s weekday schedule contains 182 one-way trips, the Saturday schedule contains 132 trips, and the Sunday schedule contains 92 trips (see Table 2). Headways are

Table 2: Beechview Line Schedule Statistics

| | Span of Service | One-Way Trips | | Headways (minutes) |
|------------------|-------------------|---------------|----------|--------------------|
| | | Inbound | Outbound | |
| Weekdays | | | | |
| Early AM | 4:24 am – 5:59 am | 11 | 6 | 10 |
| AM Peak | 6:00 am – 8:59 am | 19 | 19 | 10 |
| Base | 9:00 am – 3:29 pm | 27 | 27 | 15 |
| PM peak | 3:30 pm – 5:59 pm | 14 | 16 | 10 |
| Evening | 6:00 pm – 1:55 am | 20 | 23 | 10-30 |
| All Day | 4:24 am – 1:55 am | 91 | 91 | |
| Saturdays | 4:54 am – 2:12 am | 66 | 66 | 18-36 |
| Sundays | 5:14 am – 1:36 am | 46 | 46 | 25-50 |

mostly even multiples of 10 minutes in both directions during peak periods, 15 minutes during the weekday base period, and 10-15 minutes in the early evening hours transitioning to 30 minutes on weeknights. Weekend headways are mostly 18 minutes on Saturdays and 25 minutes on Sundays.

The Overbrook Line’s weekday schedule contains 198 one-way trips, the Saturday schedule contains 66 trips, and the Sunday schedule contains 46 trips (see Table 3). Headways are mostly even multiples of six minutes in both directions during peak periods, 30 minutes during midday hours, and 15 minutes in the early evening hours, and transitioning to 30 minutes on weeknights. Weekend headways are mostly 35 minutes on Saturdays and 50 minutes on Sundays.

Table 3: Overbrook Line Schedule Statistics

| | Span of Service | One-Way Trips | | Headways (minutes) |
|-----------|--------------------|---------------|----------|--------------------|
| | | Inbound | Outbound | |
| Weekdays | | | | |
| Early AM | 4:36 am – 5:59 am | 13 | 6 | 6-12 |
| AM Peak | 6:00 am – 8:59 am | 28 | 30 | 6 |
| Base | 9:00 am – 3:29 pm | 21 | 20 | 30 |
| PM peak | 3:30 pm – 5:59 pm | 25 | 25 | 6 |
| Evening | 6:00 pm – 12:41 am | 12 | 18 | 15-30 |
| All Day | 4:36 am – 12:41 am | 99 | 99 | |
| Saturdays | 5:00 am – 1:01 am | 33 | 33 | 35 |
| Sundays | 4:52 am – 12:36 am | 23 | 23 | 50 |

As described in the next section, nearly 55% of total inbound weekday boardings occur at stations served by both the 42 and 47-series services. However, current schedules are not highly integrated and are presented to the public on separate timetables. Given that LRT service is extensive, the current practice of listing every trip individually on a public timetable, which is common for bus schedules, would need to change to the more general approach of citing headways by time period. Running times of the uniquely served segments are unequal, rendering it difficult to attain even headway spacing between trains on the common segments (see Table 4). For example, the one-way running time between South Hills Junction and Overbrook station is 23 minutes via Beechview, but only 16 minutes via Overbrook. While LRT service was designed such that Beechview runs as a local and Overbrook runs as the express, this constrains ability to provide even headways through the Castle Shannon common segment to the south, and the downtown subway tunnel common segment to the north. Similarly, the one-way running time on the South Hills Village branch is eight minutes from Overbrook and 19 minutes on the Library branch.

Ridership

Based on the manual ridechecks conducted for this study, Routes 42 and 47 carry over 25,400 passengers per average weekday. Routes 42C and 42S currently carry approximately 13,772 passengers per weekday, 7,180 passengers per Saturday, and 4,267 passengers per Sunday. Weekday ridership on Route 42 is split into five distinct markets, with downtown Pittsburgh being the primary travel destination. The Mt. Lebanon and Dormont business districts as well as Station Square are secondary destinations on the Beechview Line (see Figure 2):

**Table 4: Routes 42S & 47S Weekday Peak Combined Segment Schedule
 South Hills Village – Washington Junction**

| INBOUND | | | OUTBOUND | | |
|---------|-----------------------------|-----------------|----------|-----------------------------|-----------------|
| Route | Time at South Hills Village | Interval (mins) | Route | Time at Washington Junction | Interval (mins) |
| 42S | 4:24 am | -- | 47S | 6:03 pm | -- |
| 42S | 4:34 am | 10 | 42S | 6:03 pm | 0 |
| 42S | 4:44 am | 10 | 42S | 6:13 pm | 10 |
| 42S | 4:52 am | 8 | 47S | 6:15 pm | 2 |
| 47S | 4:54 am | 2 | 42S | 6:23 pm | 8 |
| 42S | 4:54 am | 0 | 47S | 6:27 pm | 4 |
| 42S | 5:00 am | 6 | 42S | 6:33 pm | 6 |
| 42S | 5:04 am | 4 | 42S | 6:37 pm | 4 |
| 42S | 5:14 am | 10 | 47S | 6:39 pm | 2 |
| 47S | 5:18 am | 4 | 42S | 6:43 pm | 4 |
| 47S | 5:24 am | 6 | 47S | 6:51 pm | 8 |
| 42S | 5:24 am | 0 | 42S | 6:53 pm | 2 |
| 47S | 5:30 am | 6 | | | |
| 47S | 5:42 am | 12 | | | |
| 47S | 5:54 am | 12 | | | |

1. Riders boarding on the South Hills Village branch between South Hills Village and Casswell station comprise 9% of total inbound boardings. (However, six times as many passengers at these stations use Route 47S rather than Route 42S for a quicker ride to downtown Pittsburgh.)
2. Riders boarding in Castle Shannon at stations served by Routes 42C and 42S as well as 47L and 47S, including Washington Junction, Smith Road, St. Ann’s and Martin Villa, comprise about only 3% of total inbound passengers. (Three times as many passengers boarding at these stations ride Overbrook Line service rather than the Beechview Line service.)
3. Riders boarding in Mt. Lebanon and Dormont between Overbrook Junction and Potomac stations comprise 43% of inbound passengers. This segment contains four of the six highest boarding volume stations south of South Hills Junction.
4. Riders boarding on the Beechview segment between Overbrook Junction and Palm Garden station comprise 17% of inbound passengers.
5. Riders boarding between South Hills Junction and Gateway Center comprise 28% of total inbound passengers.

In summary, Route 42’s major ridership market is travel primarily between Mt. Lebanon, Dormont, and downtown Pittsburgh. Six stations generate 46% of total inbound weekday boardings: Castle Shannon, Dormont Junction, Mt. Lebanon, Potomac, South Hills Village, and Fallowfield. In total, 88% percent of total inbound boardings occur north of Overbrook Junction.

Route 42 ridership is heavily peaked; it is moderate to heavy inbound in the AM peak and outbound in the PM peak, but relatively light in the reverse direction and during off-peak periods (see Figure 3). On Route 42C, which operates during peak periods, ridership is moderate to

Figure 2: Routes 42C & 42S Ridership by Stop: All Day Inbound

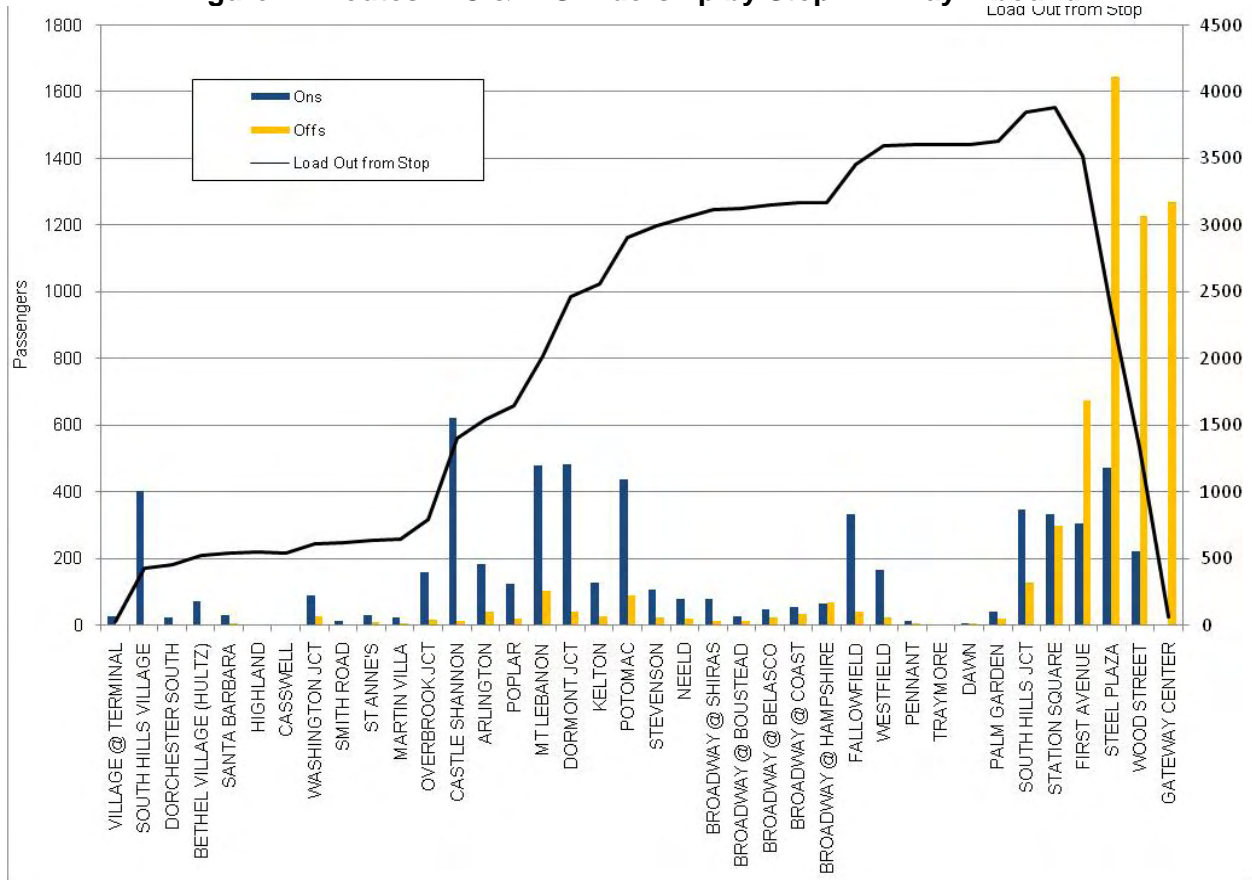
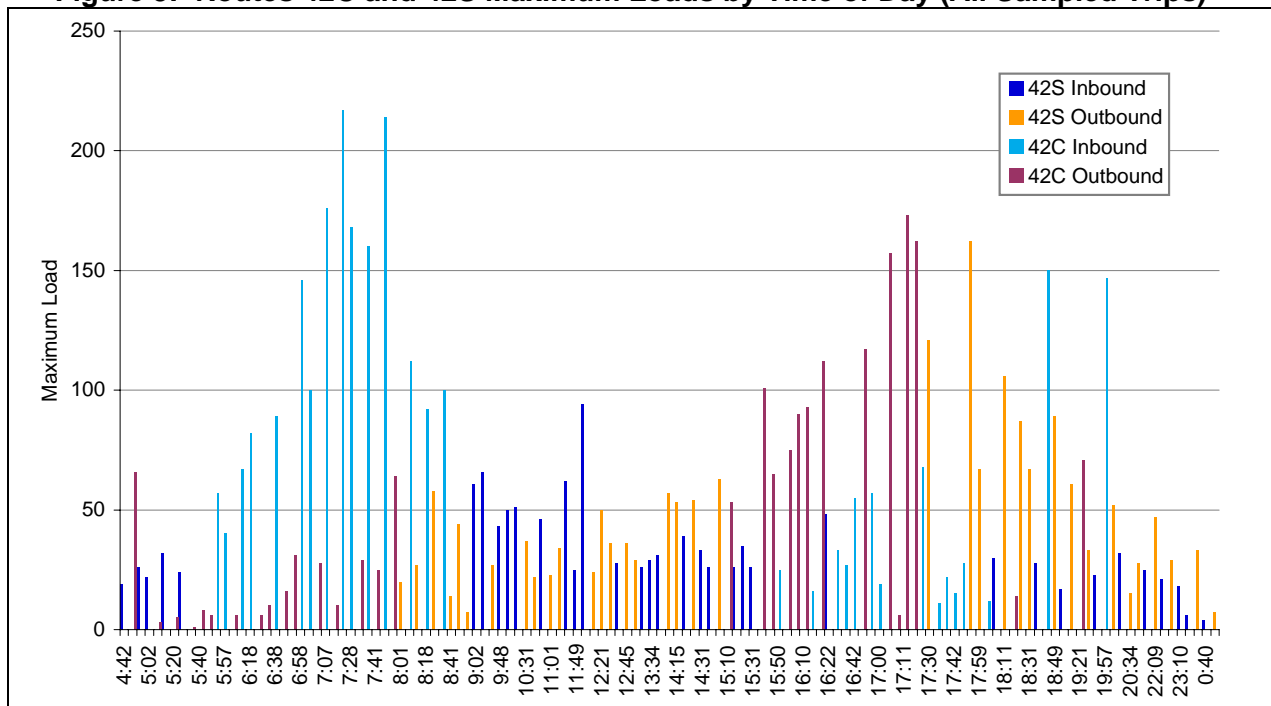


Figure 3: Routes 42C and 42S Maximum Loads by Time of Day (All Sampled Trips)



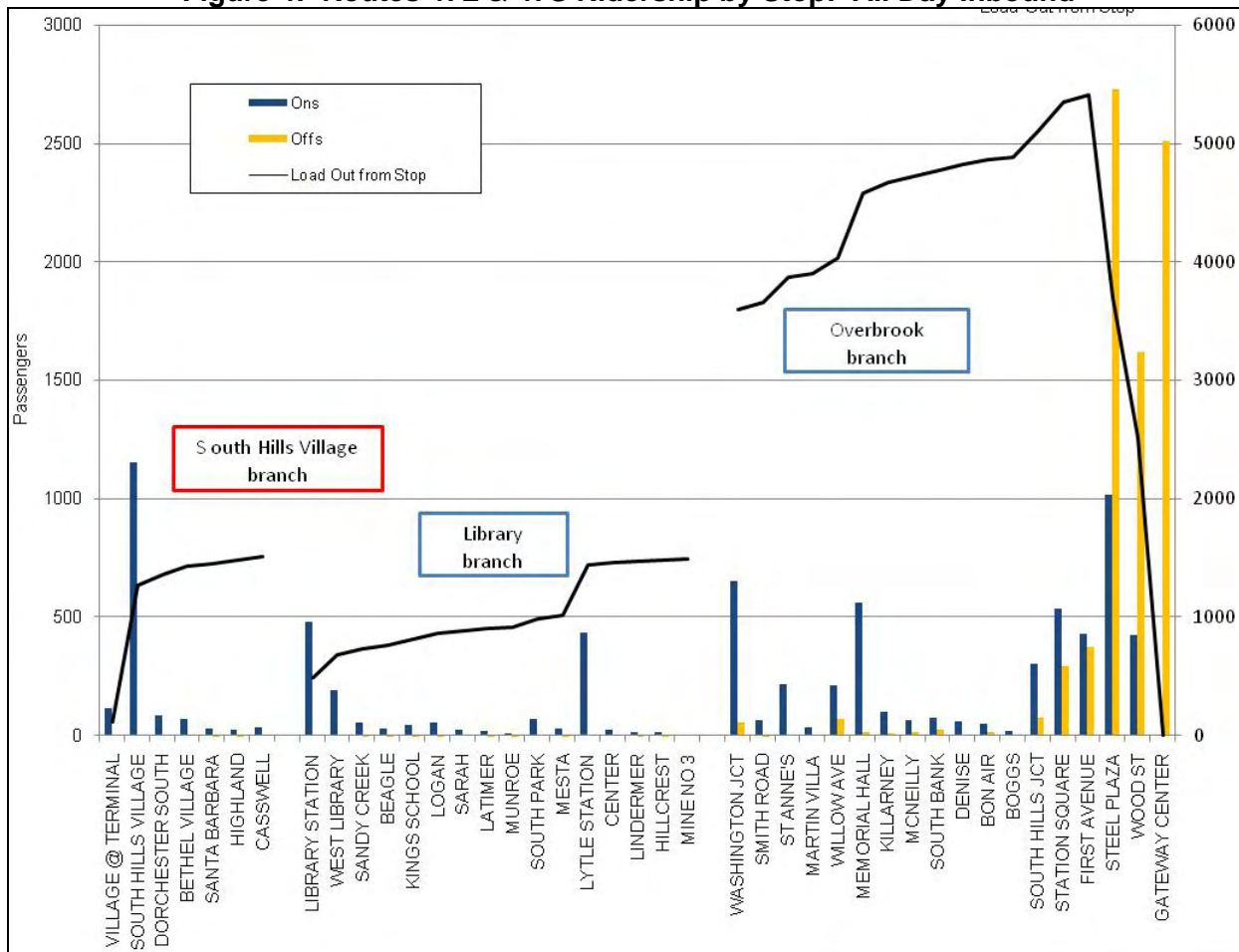
heavy on most peak direction trips. Peak direction trips arriving in downtown Pittsburgh between 7:30 am and 8:30 am typically carry standees with loads ranging from 125% to 175% of seated capacity (124 per two-car train). In the afternoon, trains departing between 4:15 pm and 5:30 pm also carry standees up to 130% of seated capacity.

On Route 42S, which operates largely during early morning, midday and evening hours, passenger loads generally do not exceed 50% of seated capacity, except on outbound trips departing downtown Pittsburgh between 6:00 pm and 7:00 pm. Trips that operate after midnight generate very few boardings. Port Authority staff indicates this is contrary to anecdotal evidence of overcrowding on AM inbound trains based on complaints by Beechview residents.

Routes 47L Library via Overbrook and 47s South Hills Village via Overbrook

Routes 47L and 47S carry 11,642 passengers per weekday, 1,824 passengers per Saturday, and 1,012 passengers per Sunday. Weekday ridership on Routes 47L and Route 47S is heavily oriented toward trips to downtown Pittsburgh, and is split into five distinct markets (see Figure 4):

Figure 4: Routes 47L & 47S Ridership by Stop: All Day Inbound



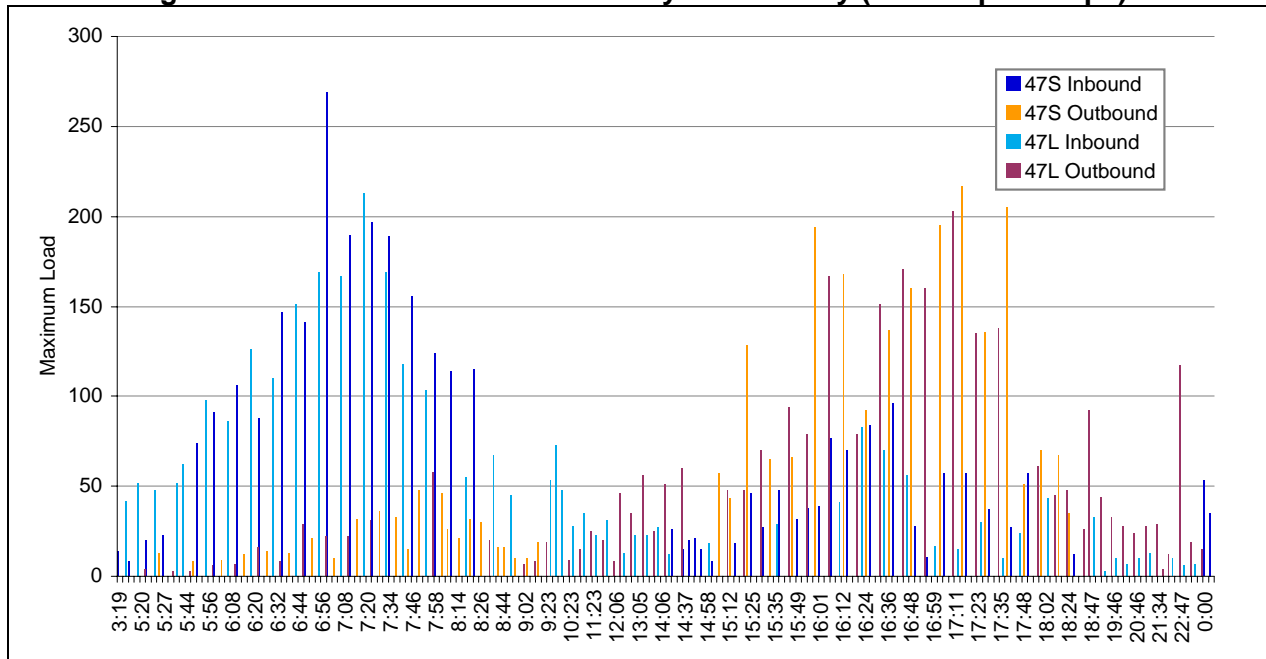
1. Riders boarding in South Park Township and Bethel Park along the Library Line south of Washington Junction comprise 19% of total inbound passengers.
2. Riders boarding on the South Hills Village Line between the South Hills Village Station and Casswell stop comprise 19% of total inbound boardings.
3. Riders boarding in Castle Shannon at stations served by Routes 47L and 47S as well as 42C and 42S, including Washington Junction, Smith Road, St. Ann’s and Martin Villa comprise 12% of total inbound passengers.
4. Riders boarding on the Overbrook Line between Willow and Boggs stations comprise 15% of inbound passengers.
5. Riders boarding on the segment between South Hills Junction and Gateway Center comprise 35% of total inbound passengers.

In summary, the major ridership markets for Routes 47L and 47S are travel primarily to downtown Pittsburgh from Bethel Park, South Hills Township, Castle Shannon and City of Pittsburgh neighborhoods. Five stations located south of South Hills Junction generate 42% of total inbound weekday boardings, all with significant park and ride capacity:

- South Hills Village
- Washington Junction
- Memorial Hall
- Library Station
- Lytle Station

As with Routes 42C and 42S, ridership on routes 47L and 47S are also heavily peaked. Ridership is moderate to heavy inbound in the AM peak and outbound in the PM peak, but relatively light in the reverse direction and during off-peak periods (see Figure 5). Route 47L Library trips that arrive in downtown Pittsburgh between 7:00 am and 8:00 am typically carry standees with loads ranging from 110% to 170% of seated capacity (124 seats per two-car

Figure 5: Route 47 Maximum Loads by Time of Day (All Sampled Trips)



train). In the afternoon, trains departing from Downtown between 3:45 pm and 5:30 pm also carry standees with loads ranging from 110% to 160% of seated capacity. During midday and evening hours, when one-car trains passenger are running, passenger loads range from 50% to 75%.

Route 47S South Hills Village trips that arrive in downtown Pittsburgh between 7:00 am and 8:30 am typically carry standees with loads ranging from 100% to 210% of seated capacity (124 per two-car train). In the afternoon, trains departing between 4:00 pm and 5:30 pm also carry standees with loads ranging from 110% to 175% of seated capacity.

Routes 42C, 42S, 47L and 47S Combined Ridership

In total, ridership on Routes 42C, 42S, 47L and 47S is heavily oriented toward commute trips to and from downtown Pittsburgh from dispersed origins in Pittsburgh, Dormont, Castle Shannon, Bethel Park and South Park Township (see Table 5). Ninety-three percent of all inbound weekday alightings occur between South Hills Village and Wood Street Station.

Table 5: Weekday Boardings & Alightings by LRT Segment

| Segment | 42C/S | 47L/S | Total | | 42C/S | 47L/S | Total | |
|---------------------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
| | Ons | Ons | Ons | % | Offs | Offs | Offs | % |
| South Hills Village | 554 | 1,514 | 2,068 | 14.9% | 12 | 2 | 14 | 0.1% |
| Library | -- | 1,524 | 1,524 | 11.0% | -- | 37 | 37 | 0.3% |
| Castle Shannon | 148 | 969 | 1,117 | 8.1% | 42 | 68 | 110 | 0.8% |
| Overbrook | -- | 1,146 | 1,146 | 8.3% | -- | 163 | 163 | 1.2% |
| Beechview | 3,611 | -- | 3,611 | 26.1% | 631 | -- | 631 | 4.6% |
| Subway | 1,676 | 2,716 | 4,392 | 31.7% | 5,240 | 7,598 | 12,838 | 93.0% |
| Total | 5,989 | 7,869 | 13,858 | 100.0% | 5,925 | 7,868 | 13,793 | 100.9% |

There is a wide range of inbound boarding volumes occurring at LRT stations (see Figure 6). Fifteen inbound stations generate at least 300 boardings each per average weekday, and collectively these stations generate 76% of total inbound ridership (see Table 6). Among these stations, five are located in the South Hills Junction – Downtown segment (including Station Square and South Hills Junction), five are on the Beechview Line, two are on the Library Line, and one each are on the Overbrook Line, South Hills Village Line, and the Castle Shannon segment served by both routes.

Twenty stations generate fewer than 50 inbound boardings per average weekday, and collectively these stations generate less than four percent of total inbound ridership (see Table 7). Ten of these stations are located on the Library branch, six are on the Beechview line, and two each are on the South Hills Village branch and Overbrook line.

Figure 6: Routes 42C, 42S, 47L & 47S Ridership by Stop: All Day Inbound

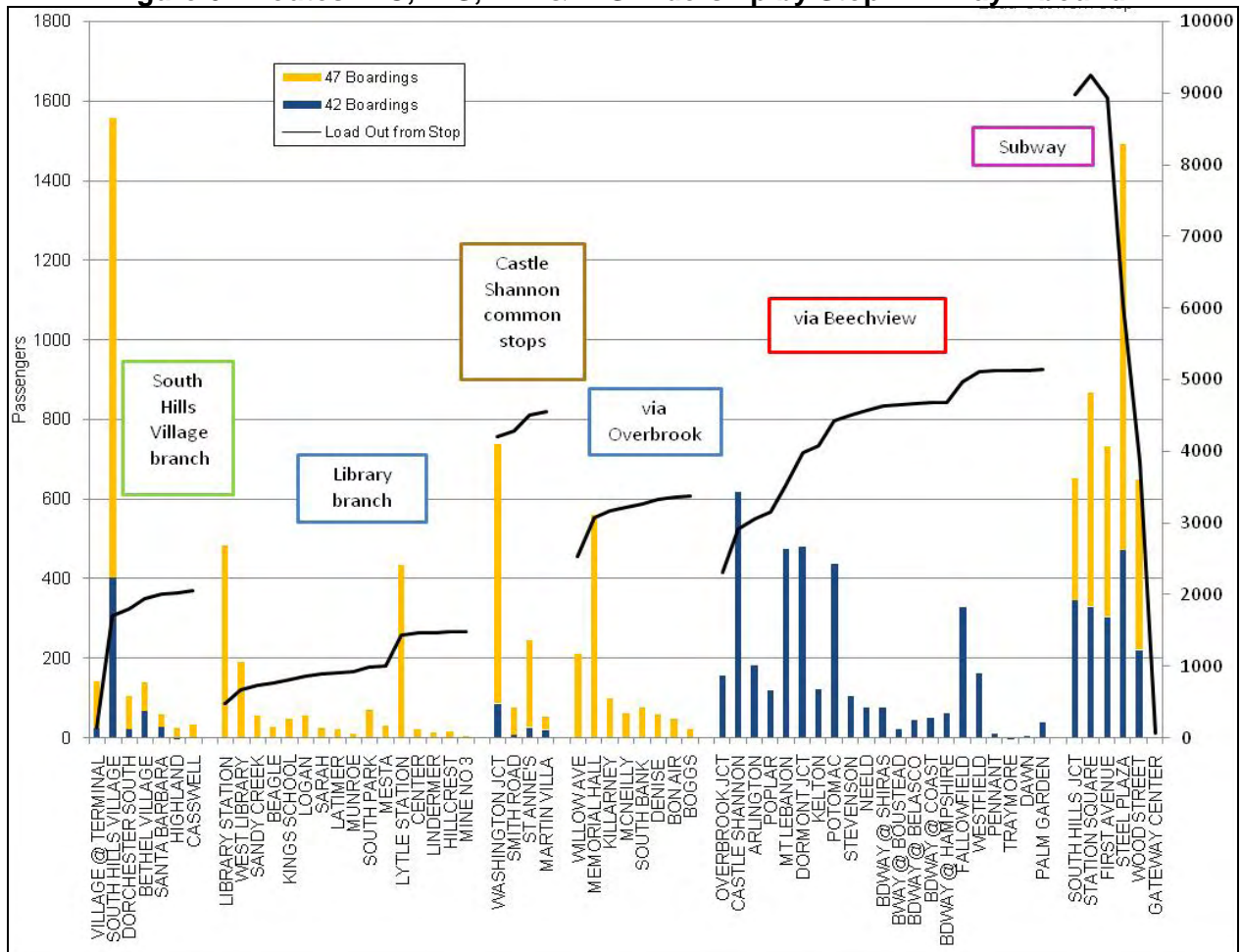


Table 6: High Volume LRT Inbound Boarding Locations

| Station | Weekday Boardings | Segment |
|----------------------|-------------------|---------------------|
| South Hills Village | 1,557 | South Hills Village |
| Steel Plaza | 1,491 | Subway |
| Station Square | 866 | SHJ - Downtown |
| Washington Junction | 739 | Castle Shannon |
| First Avenue | 734 | SHJ - Downtown |
| South Hills Junction | 652 | SHJ - Downtown |
| Wood Street | 649 | SHJ - Downtown |
| Castle Shannon | 620 | Beechview |
| Memorial Hall | 561 | Overbrook |
| Library | 483 | Library |
| Dormont | 481 | Beechview |
| Mt. Lebanon | 477 | Beechview |
| Potomac | 438 | Beechview |
| Lytle | 435 | Library |
| Fallowfield | 331 | Beechview |
| Total | 10,514 | |

Table 7: Low Volume LRT Inbound Boarding Locations

| Station | Weekday Boardings | Segment |
|---------------------|-------------------|---------------------|
| Traymore | 1 | Beechview |
| Mine No. 3 | 5 | Library |
| Dawn | 6 | Beechview |
| Munroe | 11 | Library |
| Pennant | 12 | Beechview |
| Lindermer | 14 | Library |
| Hillcrest | 16 | Library |
| Boggs | 22 | Overbrook |
| Latimer | 22 | Library |
| Center | 23 | Library |
| Boustead (Broadway) | 24 | Beechview |
| Highland | 26 | South Hills Village |
| Sarah | 27 | Library |
| Beagle | 30 | Library |
| Mesta | 31 | Library |
| Casswell | 34 | South Hills Village |
| Palm Garden | 41 | Beechview |
| Belasco (Broadway) | 48 | Beechview |
| Kings School | 48 | Library |
| Bon Air | 49 | Overbrook |
| Total | 490 | |

Productivity

As would be expected, LRT routes generally are productive relative to the bus system (see Table 8).

Operating Cost/Passenger: Combined weekday LRT weekday service costs an average of \$4.41 per passenger. Routes 42C and 42S have the lowest operating cost per passenger among LRT routes at \$2.84 to \$3.94 per passenger. This is due to high passenger volumes in Dormont and Pittsburgh on the Beechview line. The Library Line (47L and 47S) services have higher costs per passenger, at over \$5.00 per passenger.

Ridership per Unit of Service: Combined weekday LRT carries 100 passengers per train hour. The 380 one-way trips in the weekday schedule carry nearly 67 passengers per train trip, equivalent to 54% of seated capacity on a two-car train. The 198 one-way Saturday trips average about 45 passengers per train trip, and 138 one-way Sunday trips average 38 passengers per train trip. Service productivity is highest during peak periods in the peak direction, when most trips operate with standees. Route 42C and 42S have the highest ridership productivity among LRT routes, and average 121 passengers per revenue vehicle hour.

Table 8: LRT Weekday Productivity

| | Rt 42C | Rt 42S | Rt 47L | Rt 47S | Rt 52 | Combined LRT |
|--|--------|--------|--------|--------|--------|--------------|
| Operating Cost/ Passenger | \$2.84 | \$3.94 | \$5.42 | \$5.24 | \$6.29 | \$4.41 |
| Passengers/Revenue Train Hour | 136.2 | 114.6 | 85.9 | 88.1 | 47.8 | 101.3 |
| Passengers/Total Train Hour | 117.5 | 102.1 | 60.9 | 76.0 | 66.2 | 83.3 |
| Passengers/ Revenue Train Mile | 10.4 | 7.5 | 4.0 | 5.8 | 6.0 | 6.1 |
| Total Vehicle Hours/Revenue Train Hour | 1.16 | 1.12 | 1.41 | 1.16 | 0.72 | 1.22 |
| Average Speed (mph) | 13.1 | 15.3 | 21.4 | 15.3 | 8.0 | 16.7 |
| Stops/Mile | 5.7 | 3.3 | 2.0 | 1.8 | 9.2 | 0.7 |
| Directness | 1.04 | 0.84 | 0.87 | 0.94 | 0.99 | 0.91 |
| Number of Variations | 2 | 4 | 2 | 2 | 2 | 11 |

Total Vehicle Hours Versus Revenue Vehicle Hours: Based on Winter 2007 schedules, the ratio of total vehicle hours to revenue vehicle hours is 1.21. The rail yard is located at the end of the South Hills Village branch.

Average Speed: Combined LRT scheduled service operates at an average of 15 mph. Route 47 runs fastest among LRT routes at 16 mph; and Route 52, which has on-street running and serves an excessive number of stops, is slowest at 11 mph.

Stations/Mile: Route 42 serves an average of 3.3 stations and stops per mile, or one every 1,600 feet. Route 47 serves an average of 2.0 stations and stops per mile, or one every 2,640 feet.

Number of Variations: Routes 42C, 42S, 47L and 47S collectively operate 380 weekday trips on 10 different route patterns.

Service Design

The LRT system provides a north-south mostly exclusive transit right-of-way with the ability to efficiently transport a large volume of passengers to and from downtown Pittsburgh. The peak period service configuration, in which Route 42C inbound trains originate at Overbrook Junction while Route 47S and 47L covers both the South Hills Village and Library lines, is beneficial to downtown commuters from South Park Township and Bethel Park. Routes 47L and 47S use the Overbrook Line, which has an exclusive right-of-way and is five minutes faster to downtown Pittsburgh.

The service configuration changes during off-peak and weekend operations, however. This is more characteristic of bus service than of rail service. Route 42S inbound service originates at South Hills Village at these times, and Route 47L is confined to the Library branch. This configuration likely benefits the secondary flow of passengers traveling between Beechview, Dormont and South Hills Village during off-peak times. However, it also is confusing to passengers and operationally less efficient than the peak service configuration. Route 42S and 47S trains provide duplicative service on the South Hills Village branch during fringe peak hours, which increases operating costs.

Service Improvement Opportunities

Service improvement options include:

Truncate all Beechview Line Service at Overbrook Junction: The variable lengths of the Beechview and Overbrook segments between downtown Pittsburgh and Overbrook Junction, and common segments situated both north and south of the uneven segments render it nearly impossible to schedule even headways between trains. Rail schedules would be simplified greatly if the current peak service configuration is used at all times. This would also help to better balance loads between the two branches and take better advantage of the faster service that the Overbrook branch can provide.

Simplify LRT Service Presentation to Customers: Existing LRT routes and schedules are unnecessarily complex. Most multi-modal transit systems distinguish rail lines using colors rather than bus route numbers to simplify the system and facilitate bus-rail transfers. Most use simple alignments and standardized bracketed headways that tend to minimize the need for printed timetables (*e.g., the Red Lines runs every 10 minutes during rush hours...*). Currently, Routes 42 and 47 appear on two large, unwieldy timetables that make it very difficult for customers to know when different trains stop at the 10 stations served by both routes. Alternatively, these routes could be presented as three lines:

| Route | Origin | Destination |
|------------|-----------------------------------|---------------------|
| Red Line | Castle Shannon via Beechview | Downtown Pittsburgh |
| Green Line | Library via Overbrook | Downtown Pittsburgh |
| Blue Line | South Hills Village via Overbrook | Downtown Pittsburgh |

Installation of real-time schedule information displays at LRT stops would facilitate the transition to bracketed headways for customers.

Eliminate Low Ridership Stops: Weekday ridership data shows a wide variation in boarding and alighting activity at various LRT stations. Additional data should be compiled to support selective elimination of low volume stations to further improve running times. Eleven inbound stations currently generate fewer than 25 boardings per average weekday. Examples of candidates for elimination could include Traymore, Dawn and Pennant on the Beechview line; and Mine #3, Munroe, Lindermer and Hillcrest on the Library Line. Strictly from a service perspective, closure of low volume stations should be considered, albeit contingent upon achieving actual reductions in scheduled running times. As these stations were only recently renovated in 2004, closure may not be practical; however, the number of trains servicing low-volume stops could be reduced to reduce LRT travel times where possible.

Designate Overbrook Junction and Willow as a Single Station: These stations should be identified as a single location on transit maps to facilitate transfers between Beechview and Overbrook trains.

Increase Park and Ride Capacity: With the exception of the South Hills Village garage, most park and ride lots at LRT stations are heavily utilized during commute periods. A plan for increasing capacity at key stations should be developed.

Increase Feeder Bus Access: As described above, peak period peak direction service is heavily utilized, but other service is not. Unless additional peak period peak direction capacity is added, there appears to be only limited potential to convert South Hills radial routes to feeders to LRT during peak periods. However, there are large amounts of excess capacity during other periods, which would provide the opportunity to operate some radial routes to and from downtown during peak periods and to and from light rail during off-peak periods. Based on analyses of bus services in South Hills communities, several LRT stations are in favorable locations for feeder bus routes that may be proposed in the future. These include: South Bank; Memorial Hall; Overbrook Junction/Willow; Dormont Junction and Mt. Lebanon. Significant physical limitations exist at these stations that impede feeder bus access, however. Access improvements should be considered at these locations if possible.

Increase Operating Speeds: As described above, operating speeds are slow. In some cases, this is due to self-imposed maximum operating speeds (for example 35 mph on the Overbrook Line, and 10 to 15 mph through gated grade crossing) that are likely slower than required for safe operation. The Port Authority should re-assess these speed limits to determine whether speeds can be increased.

Increase Light Rail Capacity: With planned signal system improvements, it will be possible to run service closer together on the Overbrook Line. In combination with the deployment of additional vehicles (which are available), peak period capacity could be increased to allow the conversion of some peak period radial service to light rail feeder service.

Convert Some North Side Routes to Feeders Once the North Shore Connector has been Completed: Completion of the North Shore Connector in 2011 will result in new direct connections to the stadiums, museum and other commercial development located across the river from the Golden Triangle. The extension is projected to generate 4.2 million passenger trips annually, of which 12% are related to Pirates and Steelers games. Depending on Port Authority's operating plan, there will be sufficient capacity to also convert some North Side routes to light rail feeders. Further consideration should be given to truncating selected routes at North Shore LRT stations to make use of new LRT capacity while reducing the number of buses on surface streets in the Golden Triangle.