

Transforming Dixie Highway
 BRT Ridership Forecast: Dixie Gardens to Downtown
 6/5/15

Existing Service (2014)						
Route	Length (Valley to Downtown), mi	Travel Time to Downtown, min (X ₁)	Avg. Speed (mph)	Frequency, buses/hr (Y ₁)	Existing Daily Ridership (Boardings) (R ₁)	Boardings per Mile
Route 18	13.9	64	13.0	4	4800	345

Step 1: Apply Frequency Elasticity to Existing Service							
Route	Revised Frequency local, buses/hr	BRT Frequency, buses/hr	Revised Frequency, buses/hr (Y ₂)	Boardings/Mile			
				Shrinkage		Midpoint	
				min	max	min	max
Route 18	2	4	6.0	397	432	389	422

Step 2: Allocate Ridership to Local/BRT													
Route	Local Frequency Ratio (Y ₂ /Y ₁)	Manual Adjust-ment	Adjusted Freq Ratio	Local Boardings/Mile				BRT Boardings/Mile					
				Shrinkage		Midpoint		Shrinkage		Midpoint			
				min	max	min	max	min	max	min	max		
				min	max	avg	min	max	avg				
Route 18	0.33	0	0.33	132	144	130	141	265	288	276	260	281	270

Inputs

Note: This forecast uses equations from TCRP Report 118: *Rapid Transit Practitioner's Guide*

Step 3: Apply Travel Time Elasticity to BRT (using Step 2 Avg)						
Route	Travel Time Savings	BRT Travel Time, min (X ₂)	Boardings/Mile			
			Shrinkage		Midpoint	
			min	max	min	max
Route 18	15%	54	297	289	293	284

Step 4: Increased BRT Ridership due to BRT Features					
Route	Percent Increase	Boardings/Mile			
		Shrinkage		Midpoint	
		min	max	min	max
Route 18	15%	342	332	337	327

Step 5: Min/Max Aggregation					
Route	Local		BRT		Total
	per mile		per mile		
	min	max	min	max	
	min	max	min	max	
Route 18	130	144	327	342	472

Step 6: Total Riders per Day					
Route	Local		BRT		Total
	per mile		per mile		
	min	max	min	max	
	min	max	min	max	
Route 18	1804	2000	4539	4747	6543

Note: This forecast compares ridership for the 13.9 mile section from Bethany to Downtown

Comparison: Current Daily Ridership vs. New Daily Ridership						
Baseline Ridership (Boardings)*	New Ridership Local+BRT		Increase		% Growth	
	min	max	min	max	min	max
	4604	6344	6747	1740	2143	38%

*This ridership number assumes reduced frequency south of Heaton in the baseline

Comparison: Annual Ridership 2014						
Multiplier for Annual Ridership*	New Ridership Local+BRT		Increase		% Growth	
	min	max	min	max	min	max
	305	1,404,198	1,934,807	2,057,896	530,608	653,698

* Based on factor used to convert 2014 Route 18 annual ridership to daily ridership

30 Year Ridership Forecasts						
Historic Annual Ridership Growth*	Year	No-Build Ridership	Build Ridership (Avg)	Ridership Increase	% Growth	
		2018	1,408,134	2,001,947	593,813	42%
		2048	1,438,007	2,044,417	606,410	42%
	30 Yr Total	42,692,117	60,695,464	18,003,347	42%	

* Based on typical TARC system wide ridership growth from 2002 to 2014

Transforming Dixie Highway

BRT Ridership Forecast: Greenwood to Downtown

6/5/15

Existing Service (2014)						
Length (Valley to Downtown), mi	Travel Time to Downtown, min (X ₁)	Avg. Speed (mph)	Frequency, buses/hr (Y ₁)	Existing Daily Ridership (Boardings) (R ₁)	Boardings per Mile	
Route 18	10.1	48	12.6	4	4400	436

Step 1: Apply Frequency Elasticity to Existing Service							
Revised Frequency local, buses/hr	BRT Frequency, buses/hr	Revised Frequency, buses/hr (Y ₂)	Boardings/Mile				
			Shrinkage		Midpoint		
			min	max	min	max	
2	4	6.0	501	545	491	532	

Step 2: Allocate Ridership to Local/BRT												
Local Frequency Ratio (Y ₂ /Y ₁)	Manual Adjust-ment	Adjusted Freq Ratio	Local				BRT					
			Boardings/Mile									
			Shrinkage		Midpoint		Boardings/Mile					
			min	max	min	max	min	max	avg			
0.33	0	0.33	167	182	164	177	334	363	349	328	355	341

Inputs

Note: This forecast uses equations from TCRP Report 118: Rapid Transit Practitioner's Guide

Step 3: Apply Travel Time Elasticity to BRT (using Step 2 Avg)						
Travel Time Savings	BRT Travel Time, min (X ₂)	Boardings/Mile				
		Shrinkage		Midpoint		
		min	max	min	max	
15%	41	375	364	370	358	

Step 4: Increased BRT Ridership due to BRT Features					
Percent Increase	Boardings/Mile				
	Shrinkage		Midpoint		
	min	max	min	max	
15%	431	419	426	412	

Note: This forecast only compares ridership for the 10.1 mile section from Greenwood to Downtown

11,183 Ridecheck for North
939 Ridecheck for South
12,122 Total
8% Percent in South

Step 5: Min/Max Aggregation					
	Local		BRT		
	per mile		per mile		
	min	max	min	max	
		164	182	412	431

Step 6: Total Riders per Day					
	Local		BRT		
	per mile		per mile		
	min	max	min	max	
		1654	1833	4161	4352

Comparison: Current Daily Ridership vs. New Daily Ridership						
Baseline Ridership (Boardings)*	New Ridership Local+BRT		Increase		% Growth	
	min	max	min	max	min	max
	4291	5815	6185	1524	1894	36%

*This ridership number assumes reduced frequency south of Heaton in the baseline

Comparison: Annual Ridership								
Multiplier for Annual Ridership*	Original Ridership (Boardings)		New Ridership Local+BRT		Increase		% Growth	
	min	max	min	max	min	max	min	max
	305	1,308,777	1,773,573	1,886,405	464,796	577,628	36%	44%

* Based on factor used to convert 2014 Route 18 annual ridership to daily ridership

30 Year Ridership Forecasts					
Historic Annual Ridership Growth*	Year	No-Build Ridership		Build Ridership (Avg)	
		Ridership	Ridership	Ridership Increase	% Growth
		2018	1,312,445	1,835,118	522,673
2048	1,340,288	1,874,049	533,761	40%	
30 Yr Total	39,791,006	55,637,509	15,846,509	40%	

* Based on typical TARC system wide ridership growth from 2002 to 2014

Transforming Dixie Highway

Auto Diversion and Changes to Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT)

6/5/15

Auto Diversion and VMT / VHT Reductions										
Scenario	Year	Annual New Transit Riders	Assumed Percent from Auto Mode	Annual Persons from Auto Mode	Auto Occupancy (1)	Annual Auto Trips	Avg Vehicle Trip Length in Miles (2)	Annual VMT Reduced in Region	Avg Vehicle Trip Duration in Minutes (3)	Annual VHT Reduced in Region
Bethany to Downtown	2018	593,813	50%	296,906	1.62	183,276	5.1	934,705	18.41	56,235
	2048	606,410	50%	303,205	1.62	187,164	5.1	954,535	18.41	57,428
Greenwood to Downtown	2018	522,673	50%	261,336	1.62	161,319	5.1	822,726	18.41	49,498
	2048	533,761	50%	266,881	1.62	164,741	5.1	840,179	18.41	50,548

Notes 1, 2, & 3 - KIPDA estimates for Jefferson County based on 2001 survey data in:
http://www.kipda.org/files/pdf/transportation_division/Information/Full_Report--Laser.pdf

Transforming Dixie Highway
BRT Incremental Operating and Maintenance Costs

6/5/15

BRT Incremental Operating and Maintenance Costs											
Year		New One-way Buses in Service for Required New Headways	Two-Way Bus Frequency Required for New Headways	One-Way Trips per Hour	Approximate One-Way Travel Time Including Layovers (Min)	Vehicle Hours of Operation per Hour	Hours of Operation per Day (6AM - 7PM)	Vehicle Hours of Operation per Day	Vehicle Hours of Operation per Year	Cost per Service Hour	Annual Cost
2014	North & South Section	2	4	4	60	4.0	13	52	16,224	\$106.00	\$1,720,000
	South Section Only	2	4	4	30	2.0	13	26	8,112	\$106.00	\$860,000
	Total					6.0	13	78	24,336	\$106.00	\$2,580,000
2018	North & South Section	2	4	4	60	4.0	13	52	16,224	\$114.74	\$1,862,000
	South Section Only	2	4	4	30	2.0	13	26	8,112	\$114.74	\$931,000
	Total					6.0	13	78	24,336	\$114.74	\$2,792,000
2048	North & South Section	2	4	4	60	4.0	13	52	16,224	\$207.83	\$3,372,000
	South Section Only	2	4	4	30	2.0	13	26	8,112	\$207.83	\$1,686,000
	Total					6.0	13	78	24,336	\$207.83	\$5,058,000

Cost Escalation per year 2.00%

*Cost is in analysis year dollars and is based on the cost per service hour provided by TARC planning staff.
 Cost assumes 13 hours of expanded service per weekday.
 Cost assumes more limited service on weekends than on weekdays, consistent with the current service schedule.*