

# Appendix A

## **Design Standards and References**

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## Reference Material

### PLANS REVIEWED

[RT Transit Development Plan \(2014\)](#)

[City of Radford Comprehensive Plan \(2009\)](#)

[Pulaski County Comprehensive Plan \(2009\)](#)

[Montgomery County Comprehensive Plan \(2004\)](#)

[Town of Christiansburg Comprehensive Plan \(2013\)](#)

[Town of Blacksburg Comprehensive Plan \(2016\)](#)

[MPO Regional Transit Study \(2016\)](#)

[BT Bus Stop Safety and Accessibility Study \(2015\)](#)

[NRV Bicycle and Pedestrian Master Plan \(2014\)](#)

[Radford University Campus Plan \(2008\)](#)

[Virginia Tech Campus Master Plan \(2009\)](#)

[Virginia Tech Parking and Transportation Master Plan \(2015\)](#)

### STANDARDS AND PRECEDENTS

[APTA Bus Stop Design and Placement Security Recommendations \(2010\)](#)

[SEPTA Bus Stop Design Guidelines \(2012\)](#)

[TCRP \(TRB\) Strategy Guide to Enable and Promote the Use of Fixed-Route Transit by People with Disabilities \(2013\)](#)

[TCRP \(TRB\) Better On-Street Bus Stops \(2015\)](#)

[BTD Boston Complete Streets Guidelines \(2013\)](#)

[SFMTA Transit Stops & Stations: Stop Spacing, Location, and Infrastructure \(2015\)](#)

[TriMet Bus Stop Guidelines \(2010\)](#)

## **Appendix B**

# **Bus Stop Prioritization Criteria, Exercise, and Weighting**

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## Bus Stop Safety and Accessibility Study

### Prioritization Exercise

The New River Valley Metropolitan Planning Organization is conducting a study to identify safety and accessibility needs near Radford Transit (RT) bus stops. Please help us rank and weigh the categories we'll use to prioritize the bus stops.

1. Pick the **TOP 5** categories that are most important to you. Assign these to the "Rank" column.
2. Assign points to your **TOP 5** categories based on what you think is most important. Assign these points in the "Points" column. The points should total 100.

		Rank	Points	What is your role in the community? (Check all that apply)
Transit Use	Boarding and alightings, particularly bicycles and wheelchairs.			<input type="checkbox"/> Frequent Rider
Service Hours	Midday and late evening service.			<input type="checkbox"/> Commuter
Bus Stop Distance	Distance to the next closest bus stop.			<input type="checkbox"/> Monthly Pass User
Bus Stop Amenities	Benches, shelters, bicycle parking trash receptacles, and lighting.			<input type="checkbox"/> Radford City Resident
Connectivity	Service for multiple bus routes.			<input type="checkbox"/> Pulaski County Resident
Accessibility	Near by sidewalks, crosswalks, bike facilities, multi-use paths, etc.			<input type="checkbox"/> Montgomery County Resident
Safety	Crash history (involving bicyclists, pedestrians, and vehicles).			<input type="checkbox"/> C'burg/B'burg Resident
ADA Compliance	Barriers such as lack of curb ramps and steep slopes.			<input type="checkbox"/> Radford University Student
Cost & Constructibility	Construction constraints (e.g. slopes, right-of-way, utilities, cost, etc.)			<input type="checkbox"/> Radford University Faculty/Staff
Community Support	Locations recommended by the community to the City and drivers.			<input type="checkbox"/> Virginia Tech Student
Land Use/ Design	Local context and mix of residential and commercial land uses.			<input type="checkbox"/> Virginia Tech Faculty/Staff
	<i>Please describe.</i>			<input type="checkbox"/> Operator
Other				<input type="checkbox"/> Other: _____
		<b>Total</b>	<b>100</b>	

### Contact Information (Optional)

Name: \_\_\_\_\_

Email: \_\_\_\_\_

Please use this space or the back of this sheet to provide additional comments.

## Bus Stop Categories

Name	Definition	Notes
Transit Use	Daily boarding and alightings, particularly bicycles and wheelchairs.	Measured in week day and weekend boardings and alightings. 3= high use; 2= medium use; 1 = low use
Service Hours	Midday and late evening service.	<p><u>Midday</u>: 3 = potential high benefit for higher density res/com; 2= potential benefit for medium density; 1 = little or no benefit</p> <p><u>Evening</u>: 3 = potential high benefit for higher density res/com; 2= potential benefit for medium density; 1 = little or no benefit</p>
Service Type	Local context and mix of residential and commercial land uses.	<p><u>Business/Commercial</u>: 3 = higher density; 2 = single business or medium density; 1 = no business</p> <p><u>Residential</u>: 3 = higher density; 2 = medium to low density; 1 = no Business</p> <p><u>Origin/Destination Value</u>: 3 = Public Facility, School, or Health Service; 2 = Grocery Stores, Pharmacies, High to Medium Density Residential; 1 = Low density</p>
Pick-up/Drop-off Locations	Distance to the next closest bus stop.	<p><u>Curbside Boarding Area</u>: 3 = absent; 2 = paved surface (i.e. parking lot); 1 = sidewalk and/or level pad</p> <p><u>Turnout</u>: 3= defined; 2 = space available; 1 = poorly defined/limited area</p> <p><u>Defined Area</u>: 3 = defined; 2 = somewhat/unofficially defined; 1 = poorly/not defined</p> <p><u>Proximity</u>: proximity to next closest stop. 3=Needs another stop closeby; 2=may need another stop nearby; 1=does not need another stop nearby</p>
Bus Stop Amenities	Benches, shelters, bicycle parking trash receptacles, and lighting.	<p>All stops are filtered through ridership to evaluate amenity appropriateness. See RT Amenities Rubric for more info.</p> <p><u>Level Pad</u>: 3 = absent; 2 = level paved surface; 1 = well defined 5' x 8' minimum area</p> <p><u>Bench</u>: 3 = absent; 2= some form of seating (i.e. pic-nic table); 1 = bench in good condition</p> <p><u>Shelter</u>: 3 = absent; 2 = building canopy; 1 = formal shelter</p> <p><u>Bike Parking</u>: 3 = absent; 2 = parking nearby; 1 = bike parking present</p> <p><u>Lighting</u>: 3 = poor or absent ; 2 = lighting nearby/ambient; 1 = present at stop</p> <p><u>Trash</u>: 3 = absent; 2 = nearby; 1 = present</p> <p><u>Sign</u>: 3 = absent; 2 = present, but small/impaired visibility; 1 = present</p> <p><u>Map</u>: 3 = absent; 2 = frame present, but not filled; 1 = present</p> <p><u>Schedule</u>: 3 = absent; 2 = frame present, but not filled; 1 = present</p>

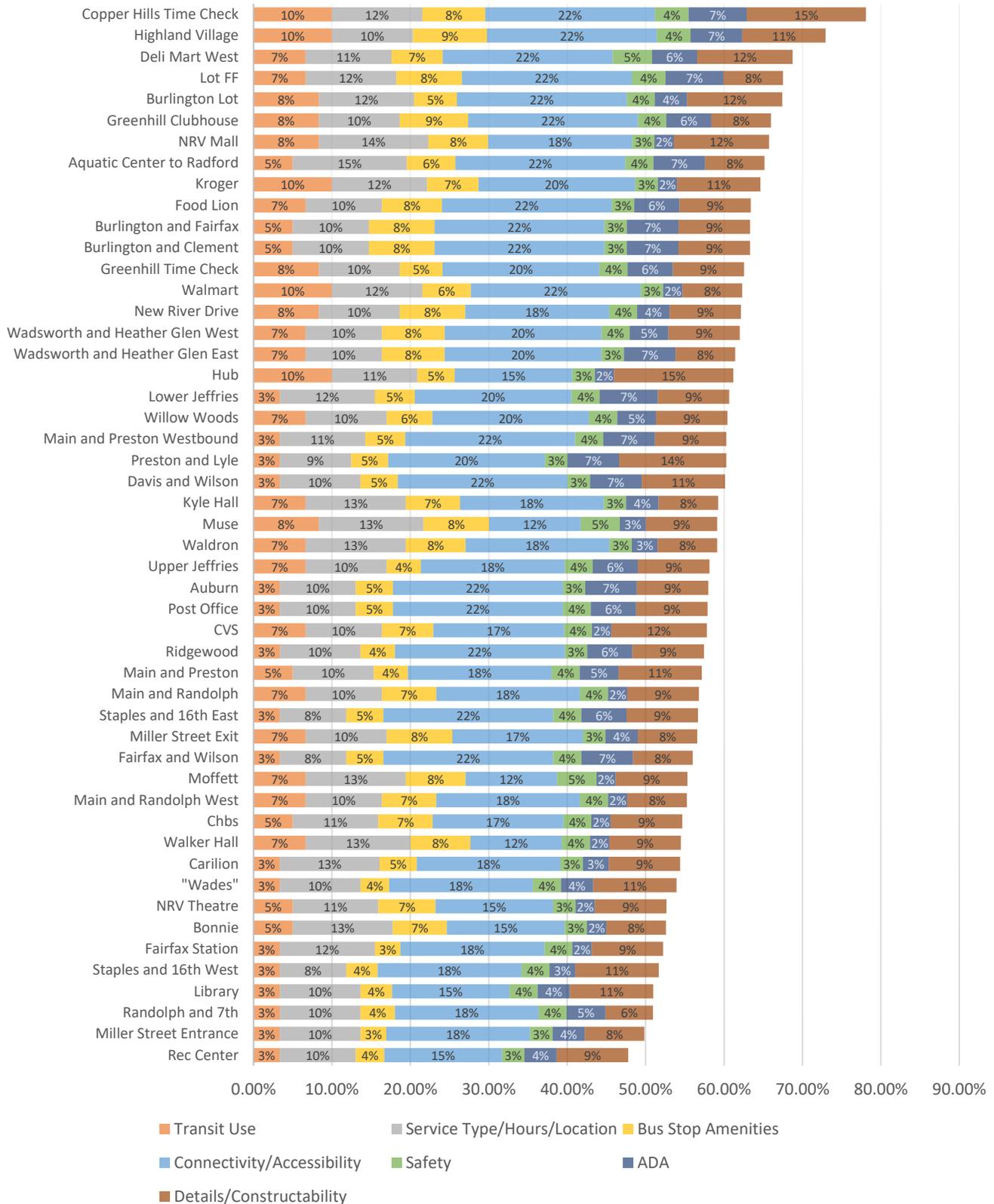
<u>Name</u>	<u>Definition</u>	<u>Notes</u>
Connectivity	Service for multiple bus routes.	3 = connection to other bus routes; 1 = no connection to other bus routes
Accessibility	Near by sidewalks, crosswalks, bike facilities, multi-use paths, etc.	<u>Sidewalk</u> : 3 = not connected to pedestrian infrastructure; 2 = moderate connectivity (i.e. through a parking lot to a sidewalk); 1 = good connectivity <u>Path</u> : 3 = not connected to nearby paths; 2 = path connections nearby; 1 = connected to path network <u>Shoulder</u> : 3 = absent or minimal; 2 = slight shoulder, unpaved; 1 = paved shoulder present <u>X-Walk</u> : 3 = no crosswalk within immediate vicinity ; 2 = crosswalk just outside of immediate vicinity, or barriers present to impede access to crosswalk; 1 = crosswalk within immediate vicinity
Safety	Crash history (involving bicyclists, pedestrians, and vehicles) and visibility.	<u>Crash</u> : 3 = fatality or severe injury; 2 = accident reported 1 = no accidents <u>Pedestrian Crash</u> : 3 = accident occurred; 1 = accident did not occur <u>Bike Crash</u> : 3 = accident occurred; 1 = accident did not occur <u>Visibility</u> : 3 = views from stop are impeded, especially between user and bus driver; 2 = views from stop are slightly impeded; 1 = views from stop are unimpeded, especially between user and bus driver
ADA Compliance	Barriers such as lack of curb ramps and steep slopes.	<u>5' Sidewalk</u> : 3 = absent; 2 = some sidewalk present, but maybe less than ADA requirements; 1 = ADA sidewalk <u>Ramps</u> : 3 = none; 2 = somewhere close; 1 = existing <u>Slope</u> : 3 = poor/severe; 2 = moderate; 1 = good slope conditions
Cost & Constructibility	Construction constraints (e.g. slopes, right-of-way, utilities, cost, etc.)	<u>Utility</u> : 3 = none present (lower cost potential); 2 = some present (potential challenge); 1 = many (potential higher cost) <u>ROW</u> : 3 = most likely public owned; 2 = private but potentially open; 1 = limited and/or smaller private area
Community Support	Locations recommended by the community to the City and drivers.	<u>Community Support/Users</u> : 3= If one of the following: a) Many phone call requesting amenities/features; b) 3 or more different types of users; c) High concentration of one type of user in need; 2=If on of the following: a) Phone calls for amenities features; b) 2 different type of users; c) Low concentration of one type of user in need; 1=If one of the following: a) No phone calls; b) One type of user
Other	Defined by person surveyed	<u>Other</u> : 3= if one of the following: a) Later service requested; b) restrooms requested; c) Earlier service request; d) blocked stop; 1=if none

Radford Transit				
Amenity	Stop Type			
	Basic	Enhanced	Hub	Hub+
Level concrete pad				
Safe access				
Adequate lighting				
Bus stop signs				
Route map and schedules				
Bench				
Shelter				
Trash receptacle				
Bike parking				
Detailed schedule				
Powered shelter(s)				
Benches in shelter				
System map				
Real-time travel information				
Potential conversion to transit center				

# Prioritization Exercise Results

ID	Role	Transit Use	Service Hours	Bus Stop Distance	Bus Stop Amenities	Connectivity	Accessibility	Safety	ADA Compliance	Cost & Constructability	Community Support	Land Use/Design	Other*	Totals
RT1	Operator	30			15	15			20	20				100
RT2	Resident	25			15			25	15		20			100
RT3	Planner	20			20	15	20				25			100
RT4	City Staff	30			10	25	20	15						100
RT5	Operator	20			10	10	30	30						100
RT6	University	10	10	10	10	10	10	9	10	7	11	3		100
RT7	Resident	20			15		30			15	20			100
RT8	Operator	15			15	15	15		40					100
RT9	Resident		20	20	20	20	20							100
RT10	Operator	20	20			20		20	20					100
RT11	Resident		20		20		20				20	20		100
RT12	Operator		35			10	5				20	30		100
RT13	Operator	40				10	15			15		20		100
RT14	Operator		20		20	20	20				20			100
RT15	Operator	20	30		10		20				20			100
RT16	Operator	10	15			40	15				20			100
RT17	Operator		20	20		20					20	20		100
RT18	Student		5		5		60	20			10			100
RT19	Resident			20		20	20		20		20			100
RT20	Operator		20				20		20	20	20			100
RT21	Operator	30		20		10		30			10			100
RT22	Resident		20	20		20	20				20			100
RT23	Operator				30	10	10			20	30			100
RT24	Operator			20	10	15		30			25			100
RT25	Operator		25		25				30		20			100
RT26	Operator				5		5	70	10		10			100
RT27	Operator		50	20	10	10					10			100
RT28	Operator												100	100
RT29	Operator		15		20	15	20		30					100
Totals		290	325	150	285	330	395	249	215	97	371	93	100	2900
Weight		10.0%	11.2%	5.2%	9.8%	11.4%	13.6%	8.6%	7.4%	3.3%	12.8%	3.2%	3.4%	100.0%
* Other: RT28-"Blocked bus stops"														

# RT BUS STOP SCORING



# Bus Stop Scoring-Full Weighting

Blue Text = Top 10   Red Text = Not Top 10   Green Text = Special Review

Name	Aggregate Total (max 93)	Weighted Total (100 point scale)
Copper Beech Time Check	85.00	78.10
Highland Village	83.00	72.96
Deli Mart West	75.00	68.74
Lot FF	79.00	67.54
Burlington Lot	71.00	67.45
Greenhill Clubhouse	76.00	65.99
NRV Mall	75.00	65.75
Aquatic Center to Radford	75.00	65.18
Kroger	70.00	64.65
Food Lion	71.00	63.43
Burlington and Fairfax	73.00	63.31
Burlington and Clement	73.00	63.31
Greenhill Time Check	67.00	62.57
Walmart	67.00	62.31
New River Drive	72.00	62.16
Wadsworth and Heather Glen West	71.00	62.02
Wadsworth and Heather Glen East	71.00	61.43
Hub	63.00	61.18
Lower Jeffries	68.00	60.67
Willow Woods	66.00	60.44
Main and Preston Westbound	66.00	60.30
Preston and Lyle	63.00	60.29
Davis and Wilson	64.00	60.13
Kyle Hall	69.00	59.23
Muse	74.00	59.14
Waldron	70.00	59.14
Upper Jeffries	62.00	58.14
Auburn	62.00	58.01
Post Office	62.00	57.90
CVS	64.00	57.80
Ridgewood	61.00	57.43
Main and Preston	61.00	57.17
Main and Randolph	64.00	56.79
Staples and 16th East	60.00	56.69
Miller Street Exit	68.00	56.60
Fairfax and Wilson	60.00	55.99
Moffett	69.00	55.31
Main and Randolph West	63.00	55.27
Chbs	64.00	54.67
Walker Hall	68.00	54.49
Carillion	61.00	54.41
"Wades"	57.00	53.95
NRV Theatre	63.00	52.65
Bonnie	64.00	52.59
Fairfax Station	56.00	52.24
Staples and 16th West	54.00	51.67
Library	56.00	50.98
Randolph and 7th	57.00	50.95
Miller Street Entrance	53.00	49.83
Rec Center	52.00	47.78

# Bus Stop Scoring-Full Weighting

Blue Text = Top 10   Red Text = Not Top 10   Green Text = Special Review

Name	Transit Use (daily)		Score	Weight
	WK Day	WK End		10.00%
Copper Beech Time Check	3	3	6	10.00%
Highland Village	3	3	6	10.00%
Deli Mart West	2	2	4	6.67%
Lot FF	2	2	4	6.67%
Burlington Lot	3	2	5	8.33%
Greenhill Clubhouse	3	2	5	8.33%
NRV Mall	2	3	5	8.33%
Aquatic Center to Radford	1	2	3	5.00%
Kroger	3	3	6	10.00%
Food Lion	2	2	4	6.67%
Burlington and Fairfax	2	1	3	5.00%
Burlington and Clement	2	1	3	5.00%
Greenhill Time Check	3	2	5	8.33%
Walmart	3	3	6	10.00%
New River Drive	3	2	5	8.33%
Wadsworth and Heather Glen West	2	2	4	6.67%
Wadsworth and Heather Glen East	2	2	4	6.67%
Hub	3	3	6	10.00%
Lower Jeffries	1	1	2	3.33%
Willow Woods	2	2	4	6.67%
Main and Preston Westbound	1	1	2	3.33%
Preston and Lyle	1	1	2	3.33%
Davis and Wilson	1	1	2	3.33%
Kyle Hall	3	1	4	6.67%
Muse	3	2	5	8.33%
Waldron	3	1	4	6.67%
Upper Jeffries	2	2	4	6.67%
Auburn	1	1	2	3.33%
Post Office	1	1	2	3.33%
CVS	2	2	4	6.67%
Ridgewood	1	1	2	3.33%
Main and Preston	2	1	3	5.00%
Main and Randolph	2	2	4	6.67%
Staples and 16th East	1	1	2	3.33%
Miller Street Exit	3	1	4	6.67%
Fairfax and Wilson	1	1	2	3.33%
Moffett	2	2	4	6.67%
Main and Randolph West	2	2	4	6.67%
Chbs	2	1	3	5.00%
Walker Hall	2	2	4	6.67%
Carillion	1	1	2	3.33%
"Wades"	1	1	2	3.33%
NRV Theatre	1	2	3	5.00%
Bonnie	2	1	3	5.00%
Fairfax Station	1	1	2	3.33%
Staples and 16th West	1	1	2	3.33%
Library	1	1	2	3.33%
Randolph and 7th	1	1	2	3.33%
Miller Street Entrance	1	1	2	3.33%
Rec Center	1	1	2	3.33%

# Bus Stop Scoring-Full Weighting

Blue Text = Top 10   Red Text = Not Top 10   Green Text = Special Review

Name	Service Type			Service Hours		Pick-Up/Drop-off Locations				Score	Weight 16.38%
	BUS	RES	O/D/V	Midda y	Evenin g	Curbsi de	Turno ut	Def Area	Proxi mity		
Copper Beech Time Check	1	3	2	2	3	1	3	3	1	19	11.53%
Highland Village	1	3	2	1	3	1	3	2	1	17	10.31%
Deli Mart West	2	2	1	2	2	3	3	2	1	18	10.92%
Lot FF	2	2	3	2	3	1	3	2	1	19	11.53%
Burlington Lot	2	3	2	2	3	3	3	1	1	20	12.13%
Greenhill Clubhouse	1	3	2	1	3	1	3	2	1	17	10.31%
NRV Mall	3	2	3	3	3	1	3	2	3	23	13.95%
Aquatic Center to Radford	1	1	3	2	2	1	1	2	2	24	14.56%
Kroger	3	1	2	3	3	1	3	2	2	20	12.13%
Food Lion	2	1	2	2	2	1	3	2	1	16	9.71%
Burlington and Fairfax	1	2	1	1	2	3	3	2	1	16	9.71%
Burlington and Clement	1	3	1	1	3	1	3	2	1	16	9.71%
Greenhill Time Check	1	3	2	1	3	1	3	2	1	17	10.31%
Walmart	3	1	2	3	3	1	3	2	1	19	11.53%
New River Drive	1	3	2	1	3	1	3	2	1	17	10.31%
Wadsworth and Heather Glen West	1	3	1	1	3	1	3	2	1	16	9.71%
Wadsworth and Heather Glen East	1	3	1	1	3	1	3	2	1	16	9.71%
Hub	3	1	3	3	3	1	1	2	1	18	10.92%
Lower Jeffries	1	3	2	1	3	3	3	3	1	20	12.13%
Willow Woods	1	3	2	1	3	1	3	2	1	17	10.31%
Main and Preston Westbound	1	1	3	3	1	3	3	2	1	18	10.92%
Preston and Lyle	1	2	1	1	2	3	2	2	1	15	9.10%
Davis and Wilson	1	2	2	1	2	3	3	2	1	17	10.31%
Kyle Hall	3	2	3	3	3	1	3	2	1	21	12.74%
Muse	3	3	3	3	3	1	3	2	1	22	13.35%
Waldron	3	2	3	3	3	1	3	2	1	21	12.74%
Upper Jeffries	1	3	2	1	3	1	3	2	1	17	10.31%
Auburn	1	2	1	1	2	3	3	2	1	16	9.71%
Post Office	1	1	3	3	1	1	3	2	1	16	9.71%
CVS	2	1	2	2	2	1	3	2	1	16	9.71%
Ridgewood	1	3	2	1	3	1	3	2	1	17	10.31%
Main and Preston	2	1	3	3	1	1	3	2	1	17	10.31%
Main and Randolph	3	1	1	2	2	1	3	2	1	16	9.71%
Staples and 16th East	1	2	1	1	2	1	3	2	1	14	8.49%
Miller Street Exit	1	3	2	1	3	1	3	2	1	17	10.31%
Fairfax and Wilson	1	2	1	1	2	1	3	2	1	14	8.49%
Moffett	3	2	3	3	3	1	3	2	1	21	12.74%
Main and Randolph West	3	1	1	2	2	1	3	2	1	16	9.71%
Chbs	3	2	3	3	2	1	1	2	1	18	10.92%
Walker Hall	3	3	3	3	3	1	3	2	1	22	13.35%
Carillion	3	1	3	3	3	1	3	3	1	21	12.74%
"Wades"	2	1	3	3	1	1	3	2	1	17	10.31%
NRV Theatre	3	2	2	2	2	1	3	2	1	18	10.92%
Bonnie	3	2	3	3	3	1	3	2	1	21	12.74%
Fairfax Station	3	2	3	3	3	1	3	1	1	20	12.13%
Staples and 16th West	1	2	1	1	2	1	3	2	1	14	8.49%
Library	2	1	3	3	1	1	3	2	1	17	10.31%
Randolph and 7th	2	1	3	3	1	1	3	2	1	17	10.31%
Miller Street Entrance	1	3	2	1	3	1	3	2	1	17	10.31%
Rec Center	1	1	3	2	3	1	3	1	1	16	9.71%

# Bus Stop Scoring-Full Weighting

Blue Text = Top 10    Red Text = Not Top 10    Green Text = Special Review

Name	Bus Stop Amenities									Score	Weight 9.83%
	Lvl PAD	Bench	Shelter	Bike PRK	Lighting	Trash	Sign	Map	Sched		
Copper Beech Time Check	3	3	3	3	2	1	3	2	2	22	8.01%
Highland Village	3	3	3	3	3	3	2	3	3	26	9.46%
Deli Mart West	2	3	3	1	3	3	1	1	1	18	6.55%
Lot FF	3	3	3	1	3	3	1	3	3	23	8.37%
Burlington Lot	1	1	1	3	1	1	1	3	3	15	5.46%
Greenhill Clubhouse	3	3	3	3	2	3	1	3	3	24	8.74%
NRV Mall	1	3	3	3	1	1	3	3	3	21	7.64%
Aquatic Center to Radford	2	1	2	1	2	1	2	3	3	17	6.19%
Kroger	2	1	2	3	1	1	2	3	3	18	6.55%
Food Lion	2	3	3	1	2	3	1	3	3	21	7.64%
Burlington and Fairfax	3	3	3	1	3	3	1	3	3	23	8.37%
Burlington and Clement	3	3	3	1	3	3	1	3	3	23	8.37%
Greenhill Time Check	1	1	1	3	1	1	1	3	3	15	5.46%
Walmart	1	1	3	3	1	1	1	3	3	17	6.19%
New River Drive	2	3	3	3	2	3	1	3	3	23	8.37%
Wadsworth and Heather Glen West	2	3	3	1	3	3	1	3	3	22	8.01%
Wadsworth and Heather Glen East	2	3	3	1	3	3	1	3	3	22	8.01%
Hub	1	1	1	1	1	1	1	3	3	13	4.73%
Lower Jeffries	3	1	1	1	2	1	3	1	1	14	5.10%
Willow Woods	1	3	3	1	3	2	1	1	1	16	5.82%
Main and Preston Westbound	3	1	1	1	3	1	2	1	1	14	5.10%
Preston and Lyle	3	1	1	1	3	1	1	1	1	13	4.73%
Davis and Wilson	3	1	1	1	3	1	1	1	1	13	4.73%
Kyle Hall	1	3	3	3	1	1	1	3	3	19	6.92%
Muse	3	3	3	3	1	3	1	3	3	23	8.37%
Waldron	1	3	3	3	1	3	1	3	3	21	7.64%
Upper Jeffries	1	1	1	1	2	3	1	1	1	12	4.37%
Auburn	3	1	1	1	3	1	1	1	1	13	4.73%
Post Office	3	1	1	1	3	1	1	1	1	13	4.73%
CVS	2	3	3	1	1	3	1	2	2	18	6.55%
Ridgewood	2	1	1	1	3	1	1	1	1	12	4.37%
Main and Preston	3	1	1	1	2	1	1	1	1	12	4.37%
Main and Randolph	1	3	3	1	1	3	1	3	3	19	6.92%
Staples and 16th East	3	1	1	1	3	1	1	1	1	13	4.73%
Miller Street Exit	1	3	3	3	3	3	1	3	3	23	8.37%
Fairfax and Wilson	3	1	1	1	3	1	1	1	1	13	4.73%
Moffett	3	3	3	1	1	3	1	3	3	21	7.64%
Main and Randolph West	1	3	3	1	1	3	1	3	3	19	6.92%
Chbs	1	3	3	1	1	3	1	3	3	19	6.92%
Walker Hall	3	3	3	1	1	3	1	3	3	21	7.64%
Carillion	1	1	1	1	3	1	3	1	1	13	4.73%
"Wades"	2	1	1	1	1	1	1	1	1	10	3.64%
NRV Theatre	1	3	3	1	2	3	1	3	3	20	7.28%
Bonnie	1	3	3	1	1	3	1	3	3	19	6.92%
Fairfax Station	1	1	1	1	1	1	1	1	1	9	3.28%
Staples and 16th West	1	1	1	1	3	1	1	1	1	11	4.00%
Library	3	1	1	1	1	1	1	1	1	11	4.00%
Randolph and 7th	2	1	1	1	3	1	1	1	1	12	4.37%
Miller Street Entrance	1	1	1	1	1	1	1	1	1	9	3.28%
Rec Center	1	1	1	1	2	1	1	1	1	10	3.64%

# Bus Stop Scoring-Full Weighting

Blue Text = Top 10   Red Text = Not Top 10   Green Text = Special Review

Name	Connectivity/Accessibility					Score	Weight 25.00%
	Sidewalk	Path	Shoulder	X-Walk	Other Bus		
Copper Beech Time Check	3	3	3	3	1	13	21.67%
Highland Village	3	3	3	3	1	13	21.67%
Deli Mart West	3	3	3	3	1	13	21.67%
Lot FF	3	3	3	3	1	13	21.67%
Burlington Lot	3	3	3	3	1	13	21.67%
Greenhill Clubhouse	3	3	3	3	1	13	21.67%
NRV Mall	2	1	3	2	3	11	18.33%
Aquatic Center to Radford	3	2	2	3	3	13	21.67%
Kroger	1	3	3	2	3	12	20.00%
Food Lion	3	3	3	3	1	13	21.67%
Burlington and Fairfax	3	3	3	3	1	13	21.67%
Burlington and Clement	3	3	3	3	1	13	21.67%
Greenhill Time Check	2	3	3	3	1	12	20.00%
Walmart	2	3	3	2	3	13	21.67%
New River Drive	1	3	3	3	1	11	18.33%
Wadsworth and Heather Glen West	2	3	3	3	1	12	20.00%
Wadsworth and Heather Glen East	2	3	3	3	1	12	20.00%
Hub	1	3	3	1	1	9	15.00%
Lower Jeffries	3	3	2	3	1	12	20.00%
Willow Woods	2	3	3	3	1	12	20.00%
Main and Preston Westbound	3	3	3	3	1	13	21.67%
Preston and Lyle	3	3	2	3	1	12	20.00%
Davis and Wilson	3	3	3	3	1	13	21.67%
Kyle Hall	3	1	3	3	1	11	18.33%
Muse	1	3	1	1	1	7	11.67%
Waldron	1	3	3	3	1	11	18.33%
Upper Jeffries	2	3	2	3	1	11	18.33%
Auburn	3	3	3	3	1	13	21.67%
Post Office	3	3	3	3	1	13	21.67%
CVS	1	3	3	2	1	10	16.67%
Ridgewood	3	3	3	3	1	13	21.67%
Main and Preston	2	3	3	2	1	11	18.33%
Main and Randolph	1	3	3	3	1	11	18.33%
Staples and 16th East	3	3	3	3	1	13	21.67%
Miller Street Exit	1	3	3	2	1	10	16.67%
Fairfax and Wilson	3	3	3	3	1	13	21.67%
Moffett	1	3	1	1	1	7	11.67%
Main and Randolph West	1	3	3	3	1	11	18.33%
Chbs	1	3	2	3	1	10	16.67%
Walker Hall	1	3	1	1	1	7	11.67%
Carillion	1	3	3	3	1	11	18.33%
"Wades"	1	3	3	3	1	11	18.33%
NRV Theatre	2	2	1	1	3	9	15.00%
Bonnie	1	3	3	1	1	9	15.00%
Fairfax Station	1	3	3	3	1	11	18.33%
Staples and 16th West	1	3	3	3	1	11	18.33%
Library	1	3	3	1	1	9	15.00%
Randolph and 7th	1	3	3	3	1	11	18.33%
Miller Street Entrance	1	3	3	3	1	11	18.33%
Rec Center	1	3	3	1	1	9	15.00%

# Bus Stop Scoring-Full Weighting

Blue Text = Top 10    Red Text = Not Top 10    Green Text = Special Review

Name	Safety				Score	Weight 8.59%	ADA			Score	Weight 7.41%
	Crash	PED Crsh	BK Crsh	Visibili ty			5' Sdwlk	Ramps	Slope		
Copper Beech Time Check	1	1	1	3	6	4.29%	3	3	3	9	7.41%
Highland Village	1	1	1	3	6	4.29%	3	3	2	8	6.59%
Deli Mart West	2	3	1	1	7	5.01%	3	3	1	7	5.77%
Lot FF	1	1	1	3	6	4.29%	3	3	3	9	7.41%
Burlington Lot	1	1	1	2	5	3.58%	3	1	1	5	4.12%
Greenhill Clubhouse	2	1	1	1	5	3.58%	3	3	1	7	5.77%
NRV Mall	1	1	1	1	4	2.86%	1	1	1	3	2.47%
Aquatic Center to Radford	1	1	1	2	5	3.58%	2	3	3	8	6.59%
Kroger	1	1	1	1	4	2.86%	1	1	1	3	2.47%
Food Lion	1	1	1	1	4	2.86%	3	3	1	7	5.77%
Burlington and Fairfax	1	1	1	1	4	2.86%	3	3	2	8	6.59%
Burlington and Clement	1	1	1	1	4	2.86%	3	3	2	8	6.59%
Greenhill Time Check	1	1	1	2	5	3.58%	3	3	1	7	5.77%
Walmart	1	1	1	1	4	2.86%	1	1	1	3	2.47%
New River Drive	2	1	1	1	5	3.58%	3	1	1	5	4.12%
Wadsworth and Heather Glen West	1	1	1	2	5	3.58%	2	2	2	6	4.94%
Wadsworth and Heather Glen East	1	1	1	1	4	2.86%	2	3	3	8	6.59%
Hub	1	1	1	1	4	2.86%	1	1	1	3	2.47%
Lower Jeffries	1	1	1	2	5	3.58%	3	3	3	9	7.41%
Willow Woods	2	1	1	1	5	3.58%	1	3	2	6	4.94%
Main and Preston Westbound	1	1	1	2	5	3.58%	3	3	2	8	6.59%
Preston and Lyle	1	1	1	1	4	2.86%	3	3	2	8	6.59%
Davis and Wilson	1	1	1	1	4	2.86%	3	3	2	8	6.59%
Kyle Hall	1	1	1	1	4	2.86%	2	2	1	5	4.12%
Muse	2	3	1	1	7	5.01%	1	1	2	4	3.30%
Waldron	1	1	1	1	4	2.86%	1	2	1	4	3.30%
Upper Jeffries	1	1	1	2	5	3.58%	3	2	2	7	5.77%
Auburn	1	1	1	1	4	2.86%	3	3	2	8	6.59%
Post Office	2	1	1	1	5	3.58%	3	3	1	7	5.77%
CVS	2	1	1	1	5	3.58%	1	1	1	3	2.47%
Ridgewood	1	1	1	1	4	2.86%	3	3	1	7	5.77%
Main and Preston	2	1	1	1	5	3.58%	2	2	2	6	4.94%
Main and Randolph	1	1	1	2	5	3.58%	1	1	1	3	2.47%
Staples and 16th East	2	1	1	1	5	3.58%	3	3	1	7	5.77%
Miller Street Exit	1	1	1	1	4	2.86%	1	3	1	5	4.12%
Fairfax and Wilson	2	1	1	1	5	3.58%	3	3	2	8	6.59%
Moffett	2	3	1	1	7	5.01%	1	1	1	3	2.47%
Main and Randolph West	2	1	1	1	5	3.58%	1	1	1	3	2.47%
Chbs	2	1	1	1	5	3.58%	1	1	1	3	2.47%
Walker Hall	2	1	1	1	5	3.58%	1	1	1	3	2.47%
Carillion	1	1	1	1	4	2.86%	1	2	1	4	3.30%
"Wades"	2	1	1	1	5	3.58%	1	3	1	5	4.12%
NRV Theatre	1	1	1	1	4	2.86%	1	1	1	3	2.47%
Bonnie	1	1	1	1	4	2.86%	1	1	1	3	2.47%
Fairfax Station	1	1	1	2	5	3.58%	1	1	1	3	2.47%
Staples and 16th West	2	1	1	1	5	3.58%	1	2	1	4	3.30%
Library	2	1	1	1	5	3.58%	1	3	1	5	4.12%
Randolph and 7th	2	1	1	1	5	3.58%	2	3	1	6	4.94%
Miller Street Entrance	1	1	1	1	4	2.86%	1	3	1	5	4.12%
Rec Center	1	1	1	1	4	2.86%	1	3	1	5	4.12%

# Bus Stop Scoring-Full Weighting

Blue Text = Top 10    Red Text = Not Top 10    Green Text = Special Review

Name	Details/Constructability				Score	Weight 22.79%
	Utility	ROW	Csup/ Users	Other		
Copper Beech Time Check	2	2	3	3	10	15.20%
Highland Village	1	2	1	3	7	10.64%
Deli Mart West	2	2	3	1	8	12.16%
Lot FF	1	2	1	1	5	7.60%
Burlington Lot	2	2	1	3	8	12.16%
Greenhill Clubhouse	1	2	1	1	5	7.60%
NRV Mall	2	2	3	1	8	12.16%
Aquatic Center to Radford	1	2	1	1	5	7.60%
Kroger	1	2	1	3	7	10.64%
Food Lion	2	2	1	1	6	9.12%
Burlington and Fairfax	2	2	1	1	6	9.12%
Burlington and Clement	2	2	1	1	6	9.12%
Greenhill Time Check	2	2	1	1	6	9.12%
Walmart	1	2	1	1	5	7.60%
New River Drive	2	2	1	1	6	9.12%
Wadsworth and Heather Glen West	2	2	1	1	6	9.12%
Wadsworth and Heather Glen East	2	1	1	1	5	7.60%
Hub	2	2	3	3	10	15.20%
Lower Jeffries	2	2	1	1	6	9.12%
Willow Woods	2	2	1	1	6	9.12%
Main and Preston Westbound	3	1	1	1	6	9.12%
Preston and Lyle	3	2	1	3	9	13.68%
Davis and Wilson	1	2	1	3	7	10.64%
Kyle Hall	1	2	1	1	5	7.60%
Muse	2	2	1	1	6	9.12%
Waldron	1	2	1	1	5	7.60%
Upper Jeffries	2	2	1	1	6	9.12%
Auburn	2	2	1	1	6	9.12%
Post Office	2	2	1	1	6	9.12%
CVS	2	2	3	1	8	12.16%
Ridgewood	2	2	1	1	6	9.12%
Main and Preston	2	1	3	1	7	10.64%
Main and Randolph	1	1	1	3	6	9.12%
Staples and 16th East	2	2	1	1	6	9.12%
Miller Street Exit	1	2	1	1	5	7.60%
Fairfax and Wilson	1	2	1	1	5	7.60%
Moffett	2	2	1	1	6	9.12%
Main and Randolph West	2	1	1	1	5	7.60%
Chbs	2	2	1	1	6	9.12%
Walker Hall	2	2	1	1	6	9.12%
Carillion	2	2	1	1	6	9.12%
"Wades"	2	1	3	1	7	10.64%
NRV Theatre	2	2	1	1	6	9.12%
Bonnie	1	2	1	1	5	7.60%
Fairfax Station	2	2	1	1	6	9.12%
Staples and 16th West	3	2	1	1	7	10.64%
Library	2	2	2	1	7	10.64%
Randolph and 7th	1	1	1	1	4	6.08%
Miller Street Entrance	1	2	1	1	5	7.60%
Rec Center	2	2	1	1	6	9.12%

# Bus Stop Scoring-Full Weighting

Blue Text = Top 10   Red Text = Not Top 10   Green Text = Special Review

Name	Notes From Site Visit
Copper Beech Time Check	Student housing/residents
Highland Village	Very poor visibility due to parking and overgrown vegetation.
Deli Mart West	Swale on north side of road. No connection to neighborhood outside road.
Lot FF	There is an emergency button. Poor visibility. On slope. Not clear where to wait.
Burlington Lot	Lots of amenities.
Greenhill Clubhouse	In grass no connections
NRV Mall	
Aquatic Center to Radford	On steep slope. No crosswalk to facility.
Kroger	
Food Lion	Island; poor connections; parking lot stop.
Burlington and Fairfax	Sign only. No other amenities.
Burlington and Clement	Basic stop near corner.
Greenhill Time Check	No ramp. Close to apartment connections. Electricity at shelter. Lots of amenities.
Walmart	
New River Drive	Good connections, 4' sidewalk. Over stormwater drain.
Wadsworth and Heather Glen West	Narrow sidewalk. On slight slope.
Wadsworth and Heather Glen East	On hill. 4' sidewalk. No ramps.
Hub	Many amenities. No lighting or electricity in shelter. Good connectivity.
Lower Jeffries	Very steep. No defined area. Not clear where people are picked up.
Willow Woods	Next to stairway, poor lighting.
Main and Preston Westbound	Sign shrouded. On blind corner of alleyway. Poor connection.
Preston and Lyle	Gravel turnout and a sign.
Davis and Wilson	Sign only. No other amenities.
Kyle Hall	Dropoff on grass in front of building.
Muse	On slight slope.
Waldron	Dropoff in front of storm drain.
Upper Jeffries	Possible electric connection. Light across street. Ramp is somewhat steep and dumps people on street. No connectivity.
Auburn	Cluttered stop on corner with very few amenities.
Post Office	No connections. Some utilities.
CVS	People j walk to library. No connection to CVS.
Ridgewood	Basic stop.
Main and Preston	Stop on corner. Connected. No sidewalk.
Main and Randolph	Visibility is poor due to trees. On corner.
Staples and 16th East	Person requested a bench. Steep drop off into swale.
Miller Street Exit	Stop on stormwater drain.
Fairfax and Wilson	Basic stop near corner.
Moffett	Curbside and grass
Main and Randolph West	On corner.
Chbs	Set up to have more amenities and a shelter later
Walker Hall	Curbside and grass.
Carillon	No sign and no defined area for pickup or dropoff
"Wades"	May be replaced.
NRV Theatre	
Bonnie	Basic stop near corner.
Fairfax Station	Island; no cross walk to other areas. Many amenities.
Staples and 16th West	Ramp leads to road.
Library	No ramp into library. Many amenities.
Randolph and 7th	Accessibility issues. Dark and overgrown. Potentially unsafe at night.
Miller Street Entrance	Close to curved corner-possible traffic conflict.
Rec Center	Defined area.

# Bus Stop Scoring-Full Weighting

Blue Text = Top 10   Red Text = Not Top 10   Green Text = Special Review

Name	Notes From Meeting
Copper Beech Time Check	
Highland Village	high use
Deli Mart West	High use
Lot FF	mod use, access issues, nighy visibilit, might mov
Burlington Lot	high use, intramural field
Greenhill Clubhouse	high use, safety issues from exit
NRV Mall	NRCC, moderate use, shared
Aquatic Center to Radford	safety
Kroger	safety concerns, shared stop, high use, move to Kr
Food Lion	moderate use, unsafe
Burlington and Fairfax	moderate
Burlington and Clement	high use
Greenhill Time Check	high use, not ADA
Walmart	high use, safety, connectivity
New River Drive	High use
Wadsworth and Heather Glen West	Moderate use
Wadsworth and Heather Glen East	No sidewalk, moderate use
Hub	High use
Lower Jeffries	No shelter, high use
Willow Woods	High use
Main and Preston Westbound	Drop off
Preston and Lyle	
Davis and Wilson	Moderate Use
Kyle Hall	Deliveries, high use, "loading zone only?"
Muse	High use
Waldron	Time check along sidewalk at entrance
Upper Jeffries	Shelter, high use, used by people with wheelchairs
Auburn	low use, review for ADA, safety concerns 35mph
Post Office	
CVS	High use
Ridgewood	low use, review for ADA
Main and Preston	High use, social services, people sit on hillside
Main and Randolph	Blind corner, moderate use
Staples and 16th East	Moderate use
Miller Street Exit	high use
Fairfax and Wilson	
Moffett	high use
Main and Randolph West	Moderate use
Chbs	moderate use
Walker Hall	
Carillion	No marking
"Wades"	Future NR Community Services
NRV Theatre	moderate use, alightings
Bonnie	Moderate Use, will go away
Fairfax Station	New bus shelters, stops
Staples and 16th West	Moderate
Library	Shelter, high use, potentially move to light
Randolph and 7th	Moderate use, Radford Health and Rehab, deviation
Miller Street Entrance	High use
Rec Center	High use

# Bus Stop Scoring-Full Weighting

Blue Text = Top 10   Red Text = Not Top 10   Green Text = Special Review

Name	RT Notes
Copper Beech Time Check	
Highland Village	
Deli Mart West	
Lot FF	
Burlington Lot	Stop 38 has had shelter requests
Greenhill Clubhouse	Requests to move closer to Kroger
NRV Mall	
Aquatic Center to Radford	Request for Downtown Christiansburg
Kroger	
Food Lion	
Burlington and Fairfax	
Burlington and Clement	
Greenhill Time Check	
Walmart	
New River Drive	Requests to have stop at Best Buy and 1st and Main (Blacksburg), and for connectivity
Wadsworth and Heather Glen West	
Wadsworth and Heather Glen East	
Hub	
Lower Jeffries	
Willow Woods	
Main and Preston Westbound	
Preston and Lyle	
Davis and Wilson	
Kyle Hall	
Muse	Requests for vending and bathroom
Waldron	
Upper Jeffries	
Auburn	
Post Office	
CVS	
Ridgewood	
Main and Preston	
Main and Randolph	
Staples and 16th East	
Miller Street Exit	
Fairfax and Wilson	Requests for shelter
Moffett	
Main and Randolph West	
Chbs	
Walker Hall	
Carillion	
"Wades"	
NRV Theatre	
Bonnie	Many types of users
Fairfax Station	
Staples and 16th West	Requests for shelter
Library	
Randolph and 7th	Requests for shelter
Miller Street Entrance	
Rec Center	

# Appendix C

## **Specifications for Recommended Improvements**

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## **Design Standards: Specifications for Recommended Improvements**

Recommendations for the high priority stops from this study focus on safety and accessibility improvements. These improvements include amenities that either directly or indirectly improve safety and accessibility. For example, an ADA compliant ramp to a stop is a direct improvement, because it allows those with a disability to access the stop with as little effort as possible. An indirect improvement would be a map and schedule as part of the bus stop sign. Directly, the map and schedule assists users in knowing where they are, and when they would be picked up. Indirectly, having these amenities encourages use at the stop, and more people using a stop assists in the user's perception of safety. Also, more branded elements at each stop also adds to a perception of safety.

These improvements recommended in the following pages generally include the following:

- ADA-compliant ramp: includes 1:12 ramp slope ratio, or 4.8 degrees slope. The ramp requires a 5' x 5' flat, unobstructed area at the top and bottom of the ramp. A minimum width of 36" of clear space is required across the ramp.
- Seating: any provided seating should have unobstructed views towards oncoming traffic, for both bus drivers and users. Seating should face the street, be set towards the back side of the sidewalk, and anchored.
- Level pad: a minimum of 5'x8' loading area must be provided for ADA compliance. This area must be firm, stable, and slip resistant. It should be connected to a nearby pedestrian path or sidewalk (see DCRPC 2012)
- Map and Schedule: must be up to date and should be accessible to people with low vision.
- Lighting: should ensure visibility of waiting passengers to the bus, and other oncoming traffic.
- Shelter: should provide weather protection for waiting passengers. Must be large enough for wheelchair access and be transparent enough for bus operators to see inside the shelter.

Some stops could include additional amenities, due to high use, or other reasons pointed out by the Working Committee. These additional amenities could include:

- Trash or Recycling Receptacles: should be covered or fit within a shelter. Receptacles should be maintained frequently.
- Bike racks: should be placed to not block pedestrian access to the bus boarding and alighting area.
- Real-time bus information: provides users with an increased sense of security. Must be secured to mitigate vandalism and theft.

# Appendix D

## **Bus Stop Types**

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## Bus Stop Types

The following comes from the 2016 NRVMP Regional Transit Study:

The table<sup>1</sup> (below) provides examples of amenity considerations based on daily ridership.

Table 1: TRB Amenities vs. Ridership

Amenity	Daily Customer Boarding Activity				
	< 50	51 - 100	101 - 300	301 - 500	501 <
Level concrete pad	+	+	+	+	+
Safe access	+	+	+	+	+
Adequate lighting	+	+	+	+	+
Bus stop signs	+	+	+	+	+
Route map and schedules	+	+	+	+	+
Standard shelter	-	+	+	+	+
Trash receptacle	-	+	+	+	+
Detailed schedule	-	-	+	+	+
Larger/multiple shelters	-	-	+	+	+
Benches in shelter	-	-	+	+	+
System map	-	-	-	+	+
Real-time travel information	-	-	-	+	+
Potential conversion to transit center	-	-	-	-	+

Key: + applicable - not applicable or appropriate

The Regional Commission utilized the Transportation Research Board's *Elements Needed to Create High Ridership Transit Systems: Interim Guidebook* in combination with the American Public Transportation Association's 2010 *Recommended Practice for Bus Rapid Transit Stations and Stops*<sup>2</sup> to link service environments to existing overlapping stops in the region. Stops were classified in to three service environments: 1) Basic, 2) Enhanced, and 3) Hub (see *Service Environments-Linking Design to Scale*).

### Basic Stop

Also referred to as a curbside stop, a basic service environment is a designated point located adjacent to an existing bus route. This stop typically has the fewest amenities and is inexpensive and quick to install; however, the stops do not communicate permanence nor do they attract "choice" riders (riders that have other means of transportation). At a minimum, the stops should include branding elements and basic safety/accessibility features.

<sup>1</sup> TCRP H-32: Interim Guidebook, 2005. WMATA Regional Bus Study, Table 5-7. Retrieved: [http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp\\_webdoc\\_32.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_webdoc_32.pdf)

<sup>2</sup> APTA Standards Development Program, APTA BTS-BRT-RP-002-10, 2010. Retrieved: <http://www.apta.com/resources/standards/Documents/APTA-BTS-BRT-RP-002-10.pdf>

### Enhanced Stop

The enhanced service environment is similar to a basic stop; however, more passenger amenities are present. This stop is also considered a lower cost and typically features a shelter, passenger information, seating, lighting, and branding elements. Stop features increase the visibility of public transit services and accommodate low to moderate demand. In addition, the amenities require little space when compared to a larger hub.

### Hub Stop

Also referred to as a transit station, the hub service environment is a substantial facility. The stops create an attractive image for public transit services and convey permanence. In addition, the stops accommodate higher levels of capacity when compared to enhanced and basic stops. Passenger amenities should include handicapped accessibility, lighting, shelter(s), trash receptacles, level boarding, real-time passenger information, and advanced fare collection. The service environments are recommended especially when higher demand is expected, passenger experience is a high priority, where it is desired to protect passengers from weather conditions, or when transit-oriented development is desired or proposed.

### **Service Environments-Linking Design to Scale**

In 2010, the American Public Transportation Association released a *Recommended Practice for Bus Rapid Transit Stations and Stops*<sup>3</sup> guidance document. The guidance document is intended to assist transit agencies, local governments, planners, developers, and others interested in developing new and/or enhancing existing transit systems. Furthermore, the guidance document acknowledges the key role that bus stops play in overall transit system's performance. Examples of good stop design influences the following:

- attract new riders
- promote visibility and facilitate branding of the system
- provide shelter from the weather
- ensure safe accessibility for all, including people with disabilities
- provide passengers with information, including system maps and real-time arrival info
- safe environment that incorporates cameras, lighting, security phones, and fencing
- attractive environment that incorporates landscaping and public art
- ensure ease of access to other modes of transportation

The guide outlines specific design solutions for bus stops based on a number of parameters, including passenger demand, project budget, available right-of-way, and more. In the New River Valley, existing bus stop characteristics have many variables, including ridership, number of intersecting services, proximity to other modes of transportation, and property ownership. However, the region's stops could be categorized into three simple types of stops: 1) Basic, 2) Enhanced, and 3) Station/Hub. The table (shown below) provides an overview of recommended minimum and optimum applications for each Service Environment.

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<sup>3</sup> American Public Transportation Association. "Bus Rapid Transit Stations and Stops." APTA BTS-BRT-RP-002-10. 1666 K Street, NW, Washington, DC, 20006-1215. October, 2010.



# Appendix E

## **Bus Stop User Surveys**

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**Do you feel safe at the bus stops serviced by Radford Transit?**

- Yes
- No
- Sometimes

**Have you ever had difficulty getting to or from a bus stop serviced by Radford Transit?**

- Yes
- No
- Sometimes

**Would having a shelter help you feel safe at the bus stop you use?**

- Yes
- No
- Don't Know
- Makes No Difference

**Do you feel safe at the bus stops serviced by Radford Transit?**

- Yes
- No
- Sometimes

**Have you ever had difficulty getting to or from a bus stop serviced by Radford Transit?**

- Yes
- No
- Sometimes

**Would having a shelter help you feel safe at the bus stop you use?**

- Yes
- No
- Don't Know
- Makes No Difference

**Do you feel safe at the bus stops serviced by Radford Transit?**

- Yes
- No
- Sometimes

**Have you ever had difficulty getting to or from a bus stop serviced by Radford Transit?**

- Yes
- No
- Sometimes

**Would having a shelter help you feel safe at the bus stop you use?**

- Yes
- No
- Don't Know
- Makes No Difference

**Do you feel safe at the bus stops serviced by Radford Transit?**

- Yes
- No
- Sometimes

**Have you ever had difficulty getting to or from a bus stop serviced by Radford Transit?**

- Yes
- No
- Sometimes

**Would having a shelter help you feel safe at the bus stop you use?**

- Yes
- No
- Don't Know
- Makes No Difference

# What do you think?



## HIGHLAND VILLAGE

*Write here!*

## BURLINGTON AND CLEMENT

*Write here!*



## BURLINGTON AND FAIRFAX



*Write here!*

# What do you think?



## LOT FF

*Write here!*

## GREENHILL CLUBHOUSE

*Write here!*



## GREENHILL TIME CHECK

*Write here!*

# What do you think?

## COPPER BEECH TIME SHARE

*Write here!*



## DAVIS AND WILSON

*Write here!*

## THE HUB

*Write here!*



"Getting you where you need to go!"

## BUS STOP SAFETY AND ACCESSIBILITY STUDY

# What do you think?



## DELI MART WEST

*Write here!*



## MAIN AND PRESTON

*Write here!*



## BUS STOP SAFETY AND ACCESSIBILITY STUDY

## User Survey Results

<u>User ID</u>	<u>Questions</u>		
	Do you feel safe?	Problems with accessibility?	Would improvements help you use transit more?
1	y	n	y
2	y	n	y
3	y	n	y
4	y	s	y
5	s	n	y
6	y	n	y
7	s	y	y
8	y	n	m
9	s	n	y
10	y	s	y
11	y	n	m
12	y	s	y
13	y	s	m
14	y	n	y
15	y	n	y
16	y	n	y
17	y	n	y
18	y	n	m
19	y	n	y
20	y	n	y
21	y	n	y
22	y	y	y
23	y	n	y
24	y	n	y
25	y	n	y
26	y	n	y
27	s	s	y
28	y	n	y
29	y	s	y

Total

25  
86%

21  
72%

25  
86%

<u>Key</u>	
y = yes	n = no
s = sometimes	m = makes no difference

This survey was conducted on November 15th and 17th, 2017, at multiple transit stops, and along transit routes supporting these stops.

# Appendix F

## High Priority Bus Stop Concepts

---



STOP  
BUS STOP



Highland Village

750 4356

1000 Westwood

Raymond R. Foster  
bus stop

96  
Raymond R. Foster







**RADFORD UNIVERSITY**  
THE FOLLOWING ARE PROHIBITED BY RADFORD UNIVERSITY:  
PETS  
MOTORIZED VEHICLES  
BICYCLES/SKATEBOARDS  
ALCOHOL/DRUGS  
TOBACCO PRODUCTS  
UNAUTHORIZED ACCESS

**RADFORD UNIVERSITY**  
ENTRY ONLY WHEN GATE IS UNLOCKED  
VALID RADFORD UNIVERSITY ID REQUIRED

**RADFORD UNIVERSITY**  
TRANSIT

**RADFORD UNIVERSITY**  
TRANSIT







CLEAN

STOP

4-WAY

FOR RENT

FOR RENT

STOP

FOR RENT

FOR RENT



GREENHILL APARTMENTS  
BY RANSFORD

GREENHILL APARTMENTS  
BY RANSFORD

Coca-Cola

Don't stop





RISE



BUY - SELL - TRADE  
WELCOME  
NICE PREPARED VEHICLES  
NICE EQUIPMENT  
NICE SERVICE

CAR DOCTORS

W. 10th St

Bus Stop

Social Services

OFFICE OF PROPERTY  
MANAGEMENT

## Appendix G

# **Bus Stop Improvement Cost Estimates and Notes**

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## Bus Stop Improvement Cost Estimates

Row	Item Information			Copper Beech		HighInd Village		Deli Mart		
	Description	Measure	Cost	Quant.	Cost	Quant.	Cost	Quant.	Cost	
1	Concrete Pad	square feet	\$20	100	\$2,000	100	\$60,000	80	\$48,000	
2	Bench (basic)	quantity	\$600	1	\$600	1	\$1,300	1	\$1,300	
3	Bench (architectural styled)	quantity	\$1,300		\$0		\$0		\$0	
4	Shelter (base)	quantity	\$2,000		\$0	1	\$3,700	1	\$3,700	
5	Shelter (medium)	quantity	\$3,700	1	\$3,700		\$0		\$0	
6	Shelter (large)	quantity	\$5,800		\$0		\$0		\$0	
7	Power Hook-up	quantity	\$2,000		\$0		\$0		\$0	
8	Solar Powered Shelter	quantity	\$7,000		\$0		\$0		\$0	
9	Bike Rack	quantity	\$250	1	\$250	1	\$2,600		\$0	
10	Lighting (architectural styled)	quantity	\$2,600		\$0		\$0		\$0	
11	Lighting (existing pole attachment)	quantity	\$400		\$0		\$0		\$0	
12	Trash Receptacle (base)	quantity	\$850		\$0	1	\$1,750	1	\$1,750	
13	Trash Receptacle (architectural styled)	quantity	\$1,750	1	\$1,750		\$0		\$0	
14	Sign enclosure (small)	quantity	\$350	1	\$350	1	\$1,750	1	\$1,750	
15	Sign enclosure (medium)	quantity	\$1,750		\$0		\$0		\$0	
16	Sign enclosure (large)	quantity	\$2,500		\$0		\$0		\$0	
17	Sign (digital/programmable)	quantity	\$1,500		\$0		\$0		\$0	
18	Sign/interactive kiosk	quantity	\$3,250		\$0		\$0		\$0	
19	Sidewalk (concrete)	linear feet	\$50		\$0	25	\$300		\$0	
20	Pathway (4' asphalt)	linear feet	\$12		\$0		\$0		\$0	
21	Pathway (10' asphalt)	linear feet	\$30		\$0		\$0		\$0	
22	Crosswalk (pavement markings)	quantity	\$2,500		\$0		\$0	1	\$3,000	
23	Crosswalk (yield sign - road center)	quantity	\$3,000		\$0		\$0		\$0	
24	ADA ramp w/detectable warning device	quantity	\$2,000	1	\$2,000	2	\$600	1	\$300	
25	Brick structure/formal hub	square feet	\$300		\$0		\$0		\$0	
26	Demolition/Clearing	linear feet	\$5	100	\$500	250	\$0	20	\$0	
27	Grading	lump sum				\$0		\$0		\$0
28	Landscaping	square feet	\$12.25		\$0		\$0		\$0	
29	Right-of-way	square feet	\$0.15	100	\$15	500	\$0		\$0	
30	Installation/construction	cost of materials				\$11,165		\$72,000		\$59,800
31	Engineering/Architecture Services	10-25% of materials				\$0		\$0		\$0
32	Contract Administration/Environmental	10% of materials				\$0		\$0		\$0
33	Contingency	10% of materials				\$0		\$0		\$0

*Totals:*                   \$22,330                   \$144,000                   \$119,600  
*Material Cost Only:*   \$11,150                   \$72,000                   \$59,800

## Bus Stop Improvement Cost Estimates

Row	Item Information			Lot FF		Burlington Lot		Greenhill Clubhouse	
	Description	Measure	Cost	Quant.	Cost	Quant.	Cost	Quant.	Cost
1	Concrete Pad	square feet	\$20	80	\$1,600		\$0	80	\$1,600
2	Bench (basic)	quantity	\$600	1	\$600		\$0	1	\$600
3	Bench (architectural styled)	quantity	\$1,300		\$0		\$0		\$0
4	Shelter (base)	quantity	\$2,000	1	\$2,000		\$0	1	\$2,000
5	Shelter (medium)	quantity	\$3,700		\$0	1	\$3,700		\$0
6	Shelter (large)	quantity	\$5,800		\$0		\$0		\$0
7	Power Hook-up	quantity	\$2,000		\$0		\$0		\$0
8	Solar Powered Shelter	quantity	\$7,000		\$0		\$0		\$0
9	Bike Rack	quantity	\$250		\$0		\$0		\$0
10	Lighting (architectural styled)	quantity	\$2,600		\$0		\$0		\$0
11	Lighting (existing pole attachment)	quantity	\$400		\$0		\$0		\$0
12	Trash Receptacle (base)	quantity	\$850	1	\$850		\$0	1	\$850
13	Trash Receptacle (architectural styled)	quantity	\$1,750		\$0		\$0		\$0
14	Sign enclosure (small)	quantity	\$350	1	\$350		\$0	1	\$350
15	Sign enclosure (medium)	quantity	\$1,750		\$0		\$0		\$0
16	Sign enclosure (large)	quantity	\$2,500		\$0		\$0		\$0
17	Sign (digital/programmable)	quantity	\$1,500		\$0		\$0		\$0
18	Sign/interactive kiosk	quantity	\$3,250		\$0		\$0		\$0
19	Sidewalk (concrete)	linear feet	\$50		\$0		\$0		\$0
20	Pathway (4' asphalt)	linear feet	\$12		\$0		\$0		\$0
21	Pathway (10' asphalt)	linear feet	\$30		\$0		\$0		\$0
22	Crosswalk (pavement markings)	quantity	\$2,500		\$0		\$0	1	\$2,500
23	Crosswalk (yield sign - road center)	quantity	\$3,000		\$0		\$0		\$0
24	ADA ramp w/detectable warning device	quantity	\$2,000	1	\$2,000		\$0	1	\$2,000
25	Brick structure/formal hub	square feet	\$300		\$0		\$0		\$0
26	Demolition/Clearing	linear feet	\$5	20	\$100		\$0	20	\$100
27	Grading	lump sum				\$0		\$0	\$0
28	Landscaping	square feet	\$12.25		\$0		\$0		\$0
29	Right-of-way	square feet	\$0.15		\$0		\$0		\$0
30	Installation/construction	cost of materials				\$7,500		\$3,700	\$10,000
31	Engineering/Architecture Services	10-25% of materials				\$0		\$0	\$0
32	Contract Administration/Environmental	10% of materials				\$0		\$0	\$0
33	Contingency	10% of materials				\$0		\$0	\$0

*Totals:*           \$15,000           \$7,400           \$20,000  
*Material Cost Only:*   \$7,500           \$3,700           \$10,000

## Bus Stop Improvement Cost Estimates

Row	Item Information			Burlington-Fairfax		Burlington-Clement		Greenhill	
	Description	Measure	Cost	Quant.	Cost	Quant.	Cost	Quant.	Cost
1	Concrete Pad	square feet	\$20	80	\$1,600	80	\$1,600		\$0
2	Bench (basic)	quantity	\$600	1	\$600	1	\$600		\$0
3	Bench (architectural styled)	quantity	\$1,300		\$0		\$0		\$0
4	Shelter (base)	quantity	\$2,000	1	\$2,000	1	\$2,000		\$0
5	Shelter (medium)	quantity	\$3,700		\$0		\$0		\$0
6	Shelter (large)	quantity	\$5,800		\$0		\$0		\$0
7	Power Hook-up	quantity	\$2,000		\$0		\$0		\$0
8	Solar Powered Shelter	quantity	\$7,000		\$0		\$0		\$0
9	Bike Rack	quantity	\$250		\$0		\$0		\$0
10	Lighting (architectural styled)	quantity	\$2,600	1	\$2,600		\$0		\$0
11	Lighting (existing pole attachment)	quantity	\$400		\$0		\$0		\$0
12	Trash Receptacle (base)	quantity	\$850	1	\$850	1	\$850		\$0
13	Trash Receptacle (architectural styled)	quantity	\$1,750		\$0		\$0		\$0
14	Sign enclosure (small)	quantity	\$350	1	\$350	1	\$350		\$0
15	Sign enclosure (medium)	quantity	\$1,750		\$0		\$0		\$0
16	Sign enclosure (large)	quantity	\$2,500		\$0		\$0		\$0
17	Sign (digital/programmable)	quantity	\$1,500		\$0		\$0		\$0
18	Sign/interactive kiosk	quantity	\$3,250		\$0		\$0		\$0
19	Sidewalk (concrete)	linear feet	\$50		\$0		\$0		\$0
20	Pathway (4' asphalt)	linear feet	\$12		\$0		\$0		\$0
21	Pathway (10' asphalt)	linear feet	\$30		\$0		\$0		\$0
22	Crosswalk (pavement markings)	quantity	\$2,500	1	\$2,500	1	\$2,500		\$0
23	Crosswalk (yield sign - road center)	quantity	\$3,000		\$0		\$0		\$0
24	ADA ramp w/detectable warning device	quantity	\$2,000	1	\$2,000	1	\$2,000	1	\$2,000
25	Brick structure/formal hub	square feet	\$300		\$0		\$0		\$0
26	Demolition/Clearing	linear feet	\$5	20	\$100	20	\$100		\$0
27	Grading	lump sum			\$0		\$0		\$0
28	Landscaping	square feet	\$12.25		\$0		\$0		\$0
29	Right-of-way	square feet	\$0.15		\$0		\$0		\$0
30	Installation/construction	cost of materials			\$12,600		\$10,000		\$2,000
31	Engineering/Architecture Services	10-25% of materials			\$0		\$0		\$0
32	Contract Administration/Environmental	10% of materials			\$0		\$0		\$0
33	Contingency	10% of materials			\$0		\$0		\$0

*Totals:*                   \$25,200                   \$20,000                   \$4,000  
*Material Cost Only:*   \$12,600                   \$10,000                   \$2,000

## Bus Stop Improvement Cost Estimates

Row	Item Information			Hub		Davis-Wilson		Main-Preston		
	Description	Measure	Cost	Quant.	Cost	Quant.	Cost	Quant.	Cost	
1	Concrete Pad	square feet	\$20	1250	\$25,000	80	\$1,600		\$0	
2	Bench (basic)	quantity	\$600		\$0	1	\$600		\$0	
3	Bench (architectural styled)	quantity	\$1,300	2	\$2,600		\$0	1	\$1,300	
4	Shelter (base)	quantity	\$2,000		\$0	1	\$2,000	1	\$2,000	
5	Shelter (medium)	quantity	\$3,700		\$0		\$0		\$0	
6	Shelter (large)	quantity	\$5,800		\$0		\$0		\$0	
7	Power Hook-up	quantity	\$2,000	1	\$2,000		\$0		\$0	
8	Solar Powered Shelter	quantity	\$7,000		\$0		\$0		\$0	
9	Bike Rack	quantity	\$250	4	\$1,000		\$0		\$0	
10	Lighting (architectural styled)	quantity	\$2,600	4	\$10,400		\$0		\$0	
11	Lighting (existing pole attachment)	quantity	\$400		\$0		\$0		\$0	
12	Trash Receptacle (base)	quantity	\$850		\$0		\$0		\$0	
13	Trash Receptacle (architectural styled)	quantity	\$1,750	2	\$3,500		\$0		\$0	
14	Sign enclosure (small)	quantity	\$350		\$0	1	\$350	1	\$350	
15	Sign enclosure (medium)	quantity	\$1,750		\$0		\$0		\$0	
16	Sign enclosure (large)	quantity	\$2,500		\$0		\$0		\$0	
17	Sign (digital/programmable)	quantity	\$1,500		\$0		\$0		\$0	
18	Sign/interactive kiosk	quantity	\$3,250	1	\$3,250		\$0		\$0	
19	Sidewalk (concrete)	linear feet	\$50		\$0		\$0	25	\$1,250	
20	Pathway (4' asphalt)	linear feet	\$12		\$0		\$0		\$0	
21	Pathway (10' asphalt)	linear feet	\$30		\$0		\$0		\$0	
22	Crosswalk (pavement markings)	quantity	\$2,500	2	\$5,000		\$0		\$0	
23	Crosswalk (yield sign - road center)	quantity	\$3,000		\$0		\$0	1	\$3,000	
24	ADA ramp w/detectable warning device	quantity	\$2,000	3	\$6,000	1	\$2,000	1	\$2,000	
25	Brick structure/formal hub	square feet	\$300	450	\$135,000		\$0		\$0	
26	Demolition/Clearing	linear feet	\$5	1500	\$7,500		\$0	35	\$175	
27	Grading	lump sum				\$0		\$0		\$0
28	Landscaping	square feet	\$12.25		\$0		\$0	100	\$1,225	
29	Right-of-way	square feet	\$0.15		\$0	100	\$15		\$0	
30	Installation/construction	cost of materials				\$201,250		\$6,565		\$11,300
31	Engineering/Architecture Services	10-25% of materials				\$40,250		\$0		\$0
32	Contract Administration/Environmental	10% of materials				\$44,275		\$0		\$0
33	Contingency	10% of materials				\$20,125		\$0		\$0

*Totals:*                    \$507,150                    \$13,130                    \$22,600  
*Material Cost Only:*    \$201,250                    \$6,550                    \$11,300

## Bus Stop Improvement Cost Estimates

<u>Name</u>	<u>Notes</u>
Bench (basic)	GlobalIndustrial.com, Frost Site Furnishings, 48" bench, T9FB1455033
Bench (architectural styled)	Red Maple Bench, Sealcoating.com
Shelter (base)	No Butts 3-sided smoking shelter, Global Industrial
Shelter (medium)	GlobalIndustrial.com, smoking shelter, vented poly-hip roof, three sided with open front, Item#T9F239983A, 7.5 ft W
Shelter (large)	GlobalIndustrial.com, Item #T9F239988A, 12 ft W
Power Hook-up	BT similar expense
Bike Rack	Hitch Post Bike Parking Rack, from ParkWarehouse.com = \$141
Lighting (architectural styled)	Decorative Street light with fixture post, GotitWholesale.com
Lighting (existing pole attachment)	Lithonia KAD 250W Metal Halide Outdoor Area Light, LBCLighting
Sign enclosure (medium)	peerless indoor/outdoor protective enclosure, FPE42F-S Wall Mount, 42 inch screen
Sign/interactive kiosk	47" IR Touch Kiosk from ShopIEKiosk
Sidewalk (concrete)	July 2017, VDOT bid tabs, \$90 SY, \$10 SF
Pathway (4' asphalt)	125 lbs/SY @ VDOT Bid Tabs: \$125/ton = 13.89 lbs/SF = 55.56 lbs/FT or \$3.50/ft +\$2.50/ft for 2 inches of stone *\$6 doubled to \$12
Brick structure/formal hub	National cemetery administration, public restroom construction: \$250/sf for free standing building or \$300/sf inside admin/info center building. <a href="https://www.cem.va.gov/cem/grants/public_restrooms.asp">https://www.cem.va.gov/cem/grants/public_restrooms.asp</a>
Landscaping	<a href="http://www.commonsenselandscaping.com/articles/howtocreateabudget-revised.htm">http://www.commonsenselandscaping.com/articles/howtocreateabudget-revised.htm</a>
Right-of-way	\$5k per acre divided by 43,560 sf

## **Special Thanks**

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- Melissa Skelton, City of Radford
- Erik Olsen, Blacksburg Transit
- Trevor Sakry, Radford Transit
- Mishell Evans, Radford Transit
- City of Radford
- Laura Harmon, Radford University
- Dan Brugh, NRV Metropolitan Planning Organization

This study was developed by the New River Valley Regional Commission, under contract to the New River Valley Metropolitan Planning Organization. The project management team included:

- Kevin R. Byrd, Executive Director
- Elijah N. Sharp, Deputy Executive Director
- Michael Gottfredson, Regional Planner
- Zachary D. Swick, Data Systems Manager
- James Randall Jones, Regional Planner

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