

# Roanoke Counter Report

RVARC has counted 30 locations in the Roanoke Valley with five counters (one infrared, two infrared/pneumatic tubes, one with three permanent inductive loops, and one temporary inductive loop) provided by VDOT and 4 counters provided by Virginia Tech.

*Table 1. Sites counted with VDOT or Virginia Tech counters*

<b>Dates</b>	<b>Location</b>	<b>Locality</b>	<b>Counter/owner</b>	<b>Ped</b>	<b>Bike</b>
<b>12/9/2015 – current</b>	Memorial Avenue	City of Roanoke	Y2G14015018/VDOT		Greenway, bike lanes
<b>7/18/2019 – current</b>	10 <sup>th</sup> Street – East	City of Roanoke	YPI14027302/Virginia Tech, Metro counter with tubes	Sidewalk	Street
<b>7/18/2019 – 10/13/2020</b>	10 <sup>th</sup> Street – West	City of Roanoke	YPI15027303/Virginia Tech	Sidewalk	
<b>7/18/2019 – 10/30/2020</b>	Campbell Avenue – North	City of Roanoke	YP15027300/Virginia Tech	Sidewalk	
<b>7/18/2019 – current</b>	Campbell Avenue – South	City of Roanoke	YPI15027301/Virginia Tech	Sidewalk	
<b>10/28/2019 – 2/17/2020</b>	Elm Avenue – North	City of Roanoke	YMH19058690/VDOT	Sidewalk	Bike lane
<b>10/29/2019 – 2/17/2020</b>	Elm Avenue – South	City of Roanoke	YMH19058680/VDOT	Sidewalk	Bike lane
<b>11/20/2019</b>	Memorial Avenue	City of Roanoke	YSH19080684/VDOT	Sidewalk/Greenway	
<b>12/7/2019 – 4/12/2020</b>	Roanoke River Greenway – Rivers Edge	City of Roanoke	Y2H19058694/VDOT		Greenway
<b>2/4/2020 – 6/17/2020</b>	Pollard Street	Vinton	YMH19058680/VDOT	Sidewalk	
<b>2/8/2020 – 3/18/2020</b>	Hardy Road	Vinton	YMH19058690/VDOT	Sidewalk	
<b>3/16/2020 – 6/17/2020</b>	Ogden Road	Roanoke County	YMH19058690/VDOT	Social path	

<b>Dates</b>	<b>Location</b>	<b>Locality</b>	<b>Counter/owner</b>	<b>Ped</b>	<b>Bike</b>
<b>6/12/2020 – 7/27/2020</b>	Salem – Main Street – North	Salem	YMH19058680/VDOT	Sidewalk	
<b>6/13/2020 – 7/27/2020</b>	Salem – Main Street – South	Salem	YMH19058690/VDOT	Sidewalk	
<b>7/24/2020 – 8/7/2020</b>	Shaffers Crossing	City of Roanoke	YMH19058690/VDOT	Sidewalk	
<b>7/24/2020 – 8/7/2020</b>	Grandin Road	City of Roanoke	YMH19058680/VDOT	Sidewalk	
<b>8/5/2020 – 9/18/2020</b>	Roanoke – Main Street – East	City of Roanoke	YMH19058680/VDOT	Sidewalk	Bike lane
<b>8/5/2020 – 10/19/2020</b>	Roanoke – Main Street – West	City of Roanoke	YMH19058690/VDOT	Sidewalk	Bike lane
<b>9/16/2020 – 11/01/2020 ; 10/30/2020 – current</b>	Cove Road	City of Roanoke	YMH19058680/VDOT , YP15027300/Virginia Tech	Sidewalk	Bike lane
<b>9/26/2020 – current</b>	Jefferson Street – Downtown	City of Roanoke	YPI15027303/Virginia Tech	Sidewalk	
<b>10/16/2020 – 11/2/2020</b>	Jefferson Street – South	City of Roanoke	YMH19058690/VDOT	Sidewalk	
<b>10/30/2020 – 12/21/2020</b>	Orange Avenue – South/East	City of Roanoke	YMH19058690/VDOT , YMH19058680/VDOT	Sidewalk	
<b>10/30/2020 – 12/21/2020</b>	Orange Avenue – South/West	City of Roanoke	YMH19058690/VDOT , YMH19058680/VDOT	Sidewalk	
<b>11/18/2020 – 12/2/2020</b>	Orange Avenue – North/East	City of Roanoke	YMH19058680/VDOT	Sidewalk	
<b>11/18/2020 – 12/2/2020</b>	Orange Avenue – North/West	City of Roanoke	YMH19058690/VDOT	Sidewalk	
<b>12/22/2020 – 2/23/2021</b>	Melrose Street near	City of Roanoke	YMH19058680/VDOT	Sidewalk	Bike lane

<b>Dates</b>	<b>Location</b>	<b>Locality</b>	<b>Counter/owner</b>	<b>Ped</b>	<b>Bike</b>
	Peters Creek – South				
<b>12/24/2020 – 2/23/2021</b>	Melrose Street near Peters Creek – North	City of Roanoke	YMH19058690/VDOT	Sidewalk	Bike lane
<b>3/1/2021 – current</b>	Melrose Street at New Horizons	City of Roanoke	YMH19058690/VDOT	Sidewalk	
<b>3/4/2021 – 3/15/2021</b>	Norris Drive	City of Roanoke	YMH19058680/VDOT	Sidewalk	

In addition, RVARC has 24 active counters on greenways and trails, some of which have been collecting data since 2010. In 2010, Pathfinders for Greenways purchased \$500 TRAFx infrared counters for the growing greenway system. RVARC manages these and other TRAFx counters. TRAFx counters do not distinguish between bicyclists and pedestrians. RVARC staff visit the counters quarterly to retrieve the data. Locality staff use the information to make decisions about maintenance and amenities and to justify needs in grant applications. At the beginning of the pandemic, as people flocked to the Roanoke River Greenway, counts were important for public health decisions to close crowded greenways and open low traffic greenways.

In 2015, VDOT staff installed inductive loops during a road diet project on Memorial Avenue. The road diet included adding a wide sidepath to carry the Roanoke River Greenway as well as bike lanes. The inductive loops were installed in both bike lanes and in the greenway. This counter has data service but until recently, RVARC staff did not have access to the data.

In July 2019, Virginia Tech professor Dr. Steve Hankey provided four infrared EcoCounters and one pneumatic loop Metro counter to RVARC. These do not have data service. RVARC staff visit the EcoCounters monthly to retrieve data and visited the Metro counter weekly.

In October 2019, VDOT TMPD provided two MultiModal EcoCounters with data service to RVARC.

When VDOT Research Council launched a pilot statewide bike/ped count program, the City of Roanoke was approached about receiving permanent counters but unfortunately, negotiations stalled in the legal departments. The Research Council had to shift its focus away from the City but was able to install one infrared counter on Memorial Avenue that counts both bicyclists and pedestrians and using the data from that and the existing inductive loop in the greenway, create a virtual pedestrian counter. This counter has data service.

In December 2019, VDOT TMPD provided a Zelt loop counter with data service to RVARC. This was in place until a flood in April 2020 at which point the Zelt loop counter was returned to VDOT TMPD.

### *Reference counters*

We have used the Virginia Tech counters (that don't have data service) as reference counters since they were installed in July 2019. In November 2019, VDOT installed a counter on the Memorial Avenue greenway/sidewalk. This can also serve as a reference counter (with missing data for January/February 2021 when it vanished).

Two Virginia Tech counters were installed on Campbell Avenue, one on the south side of the street and one on the north. Two were installed on 10<sup>th</sup> Street, one on the east side and one on the west. The counts on opposite sides of the same street matched each other perfectly. Therefore, we thought it would make sense to split them up and get a broader picture of the region. One counter was moved to Jefferson Street (September 2020) and one to Cove Road (November 2020).

Each location has different characteristics and advantages and disadvantages as a reference counter.

1. Campbell Avenue: Downtown Roanoke near the bus station. This location has the highest pedestrian activity in the Valley, with the possible exception of Rivers Edge on a sunny Saturday. The traffic pattern here is unique to Downtown Roanoke with a pronounced weekday lunch peak. Sunday traffic is considerably lower than weekday and Saturday traffic. We have data at this location from July 2019 – current. The unique weekday lunch peak has been attenuated since the onset of the pandemic.
2. 10<sup>th</sup> Street: Northwest Roanoke near the Lick Run Greenway. This location has very low pedestrian activity. 10<sup>th</sup> Street was closed north of this location for three years for construction, including the first year these counters were in place (July 2019 – current). It was important to include a Northwest Roanoke location because this is an environmental justice community that has traditionally been underserved. However, the very low traffic could make this counter unreliable as a reference counter. A possible limitation of this location is that pedestrian traffic may be influenced by the nearby Lick Run Greenway and may be less relevant to an on-street location that is not influenced by a nearby Greenway.
3. Memorial Avenue: Southwest Roanoke on the Roanoke River Greenway. This sidewalk is extra wide to accommodate the greenway traffic and is a high traffic location. It is a virtual pedestrian counter created by an algorithm that counts as a bicycle if the inductive loop nearby also detected a signal a few seconds before or after (depending on the direction) a same-direction signal detected by the infrared counter. As with the 10<sup>th</sup> Street counter, a possible limitation of this location is that pedestrian traffic is the influence of the Greenway, and since the Greenway actually routes directly onto this sidewalk that influence may be even stronger than the 10<sup>th</sup> Street location. StreetLight InSight data suggests that most of

the pedestrian traffic is continuing on the street but a substantial share is coming from or going to the Greenway.

4. Jefferson Street: Downtown Roanoke in front of the Social Security office near the library. This location also has high pedestrian activity and traffic patterns match those observed for Campbell Avenue. This counter was placed mid-pandemic, in September 2020, so it is not known if it will also show the pronounced weekday lunch peak.
5. Cove Road: Northwest Roanoke near an intersection with new high visibility crosswalks. This location has higher pedestrian activity than 10<sup>th</sup> Street. It was placed in November 2020. When it has been in place for a full year, the 10<sup>th</sup> Street counter will probably be moved to a new location.

Nowhere else in the Valley has the same traffic pattern as Downtown Roanoke. Downtown Salem, Downtown Vinton, and Grandin Village might reasonably be expected to have a similar pattern but none of them have the pronounced midweek lunch peak. Therefore, it might make sense to keep only one reference counter in downtown Roanoke and move the other to another location, probably one of the other downtowns. (Grandin Village is close to Memorial Avenue where there is another reference counter and we want to distribute the counters widely.) The 10<sup>th</sup> Street counter should also be moved to another location because the traffic there is too low to be reliable.

*It is important for local staff to have access to the counter data.*

Because RVARC staff now have access to the data for the inductive loops, the infrared counter, and the virtual pedestrian counter, RVARC was aware that something had happened to the infrared counter on or about January 4, 2020. Staff visited the counter to assess the situation and discovered that the counter had vanished and the sign post it was installed on had changed. Staff worked with the City and Eco-Visio to track it down. On January 4, a driver swerved to avoid a vehicle that pulled out in front of him and hit the sign post, breaking it into two pieces and knocking the counter off. The driver called the police and cleaned up the scene, throwing the broken pieces and the counter into his car. When RVARC staff contacted him, he realized what he had and promptly returned the counter to RVARC.

#### *Hours required*

The weekly visits required by the Metro counter to retrieve data make it time consuming and impractical. Monthly and quarterly data retrieval is more manageable, depending on how many counters and how accessible they are. Four counters require monthly visits. A dozen or so require quarterly visits, and some of those require hiking up a mountain to access.

Counters that have data service and transmit to the cloud require very little time to access the data. The counters should be monitored frequently for the first few days. After that once a week is reasonable and staff can follow up if something looks strange.

It doesn't do any good to collect data if no one sees it. The inductive loops embedded in the pavement on Memorial Avenue bike lanes and greenway were not seen by anyone for several years. Now that RVARC staff have access to this data, it's a gold mine of historical patterns. It's important to allow for staff time to review, analyze, and report data.

Some other steps that take staff time:

- Solicit requests for count locations from locality staff, local advocates, and other agencies (i.e. Downtown Roanoke Inc., Roanoke Regional Partnership).
- Research why the counts have been requested, what type of counts (bike or ped), etc.
- Research the area to identify candidate locations. This may require more back-and-forth if an ideal location isn't available in order to identify a feasible location that is close enough to the place of interest. For example, many people want to know about crosswalk activity, which isn't possible, and they usually settle for knowing the activity on one or two approaches near the intersection.
- Determine a day with appropriate weather to retrieve and deploy the counter. This may require coordinating with locality staff.
- Alert locality staff of the final location and the date the counter is deployed.

#### *Flooding, snow, streetsweeping*

The Zelt loop was placed at a location that had flooded only once in ten years. While it was in place, that location nearly flooded twice. The third time the counter was at risk of flooding, it was removed and the location did flood. It flooded two more times after that – after flooding just once in ten years, it flooded three times in a single year. While the counter was in place, staff had to monitor flood levels.

Another issue with the Zelt loop was the possibility of snow. The greenway gets plowed after snowfall, which would destroy the wires and could damage the counter. While the counter was in place, December through April, staff had to monitor the weather and be prepared to go out in adverse conditions to pull up the counter potentially under a blanket of snow.

The same issue was true for pneumatic tubes. Staff placed pneumatic tubes in the bike lane on Melrose Avenue on December 23. Staff had to monitor the weather and be prepared to go out in adverse conditions to pull up the tubes before the snowplow got there.

Although there was no snow accumulation on Melrose Avenue when the tubes were in place, one of the bike lanes dropped to zero counts suddenly. Staff discovered that the tubes on that side had come loose and half of one tube was missing entirely. The most likely explanation is a streetsweeper. In the future, staff will contact maintenance before installing tubes in the bike lane and work around the streetsweeping schedule.

#### *Locality partners*

RVARC staff can install infrared counters with no assistance but have relied on locality staff to install pneumatic tubes. It will be more efficient for RVARC to purchase supplies such as asphalt nails, a heavy hammer, etc. RVARC doesn't have a company vehicle but will purchase a flashing light that employees can mount on their private vehicles to provide work zone protection.

Vinton and Roanoke County installed a 3-foot tall sign post to mount the counter to in locations that didn't have a post in the right place.

### *Bike lanes or not*

So far staff have only counted bikes where there are bike lanes or on bike paths. Localities have repeatedly requested counts at locations that do not yet have bike lanes. They want counts before and after bike lanes are installed. They want counts on roads that they think bicyclists are using, but they aren't sure. Eco-Visio has advised RVARC that larger diameter tubes that can stand up to motor vehicles can be used and that these should be purchased from Eco-Visio – other manufacturers' tubes do not work with Eco-Visio equipment, in their experience. RVARC has purchased this tubing and other equipment to start counts on roads without bike lanes.

### *Finding the right place to count*

The infrared counters are easy to install but there are limitations on where they can be placed. Some of the issues we have experienced:

- Elm Avenue, one of the counters didn't transmit data. After some trouble shooting with Eco-Visio, it was determined that the signal strength was insufficient at that location. This didn't affect the data but did generate several trips to the counter to investigate what was wrong.
- Pollard Street, ghost counts probably from reflections of traffic off a glass window. The counter was moved to a location facing a brick wall. Options were limited because of parking lots and glass windows.
- Ogden Road, after several weeks of normal counts, started having ghost counts sometimes. These increased in frequency. When the counter was moved, it was discovered that a bush had grown over the counter.
- Orange Avenue South/East, extreme ghost counts (tens of thousands). This was probably electromagnetic interference. Staff installed a Faraday cage (e.g. wrapped the sensor in aluminum foil) which reduced but did not abolish the ghost counts.
- Melrose Street at New Horizons, insufficient signal strength. This didn't affect the data but generated several trips to the counter to investigate what was wrong.

An issue in placement of the pneumatic tubes came up on Cove Road. The initial site was too close to a curve and traffic encroached in the bike lane causing extra counts. Another site was found further from the curve.

### *Correct wire banding*

Staff attempted to order wire banding to attach the counters but got the wrong type, 0.030" thickness instead of 0.015" thickness. That makes the band extremely difficult to cut and difficult to fit through the slots. On the other hand, this makes the counter more securely attached (the one that got hit by a car and broke off the signpost was attached with 0.015" banding).