**NATIONAL TRANSPORTATION SAFETY BOARD**
**OFFICE OF HIGHWAY SAFETY**
**WASHINGTON, D.C.**

# HIGHWAY FACTORS & RAILROAD GRADE CROSSING GROUP CHAIRMANS' FACTUAL REPORT

## A. CRASH INFORMATION

| | |
|---|---|
| Location: | Lanetown Road and Buckingham Branch Grade Crossing near Crozet, Albemarle County, Virginia |
| Vehicle 1: | 2017 Freightliner refuse truck |
| Operator 1: | Time Disposal of Ruckersville, VA |
| Vehicle 2: | "Congressional Special Amtrak Train 923", consisting of 2 locomotives and 10 passenger cars |
| Operator 2: | National Railroad Passenger Corporation (Amtrak) |
| Date: | January 31, 2018 |
| Time: | Approximately 11:16 a.m. EST |
| NTSB #: | **HWY18MH005** |

## B. HIGHWAY FACTORS & RAILROAD GRADE CROSSING GROUP

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## C. CRASH SUMMARY

For a summary of the crash, refer to the *Crash Summary Report* in the docket for this investigation.

## D. DETAILS OF HIGHWAY & RAILROAD GRADE CROSSING INVESTIGATION

This Highway Factors and Railroad Grade Crossing Group Chairmans' Factual Report is based on reports, photographs, documents, and data provided by the Virginia Department of Transportation (VDOT), Buckingham Branch Railroad (BBRR), Amtrak, and the Albemarle County Police Department (ACPD), as well as information and photographs gathered on-scene by NTSB investigators. Data was obtained that included a limited construction history, daily traffic volumes, functional classification, and crash summaries.

The crash scene was documented by the Federal Bureau of Investigation's (FBI's) Evidence Response Team using total station survey equipment and a 3-dimensional laser scanner, from which a highly accurate 3-D model can be produced. Aerial images were captured by NTSB investigators utilizing a small Unmanned Aerial System (sUAS), which can also be used to generate a highly accurate 3-D model of the crash scene and the surrounding area.[1] The

[1] See *UAS Aerial Imagery Report* for additional information.

documentation included, but was not limited to the involved refuse truck, roadway, driveways, roadway evidence, and surrounding features.

## 1. CRASH LOCATION

The crash occurred at the Lanetown Road and Buckingham Branch Railroad railroad-highway grade crossing (grade crossing) (DOT crossing number 224704E) at railroad milepost number 195.85 near Crozet, Albemarle County, Virginia.[2] The crash location, shown in **Figure 1**, was located approximately 1-mile northwest of the downtown area of Crozet, Virginia. A satellite image of the crash location is shown in **Figure 2**.


**Figure 1:** Map Showing General Crash Location Northwest of Crozet, Virginia (modified from Google Maps)

[2] See *Highway and Rail Crossing Photograph 1 – Lanetown Road, North of Grade Crossing – Facing South-Southwest.*


**Figure 2:** Satellite Image of the Crash Location (modified from Google Earth)

## 2. HIGHWAY DESIGN

In the area of the collision, Lanetown Road/State Route 684 (SR-684) was a two-lane asphalt roadway that consisted of one northbound and one southbound travel lane. Each of the travel lanes were approximately 11-feet wide, with minimal earthen shoulders. The grade crossing was located in a compound horizontal and vertical curve. The approximate 22-foot wide paved area of the roadway widened to approximately 33-feet at the grade crossing. The northbound and southbound travel lanes were separated by two 4-inch wide solid yellow pavement markings. Shallow drainage ditches ran parallel to some parts of the roadway as necessary. A private driveway intersected Lanetown Road just south of the railroad tracks on the east side of the roadway. Two mailboxes were located across from the driveway adjacent to the west edge of the roadway. The crossing of Lanetown Road and the railroad tracks formed an angle that was approximately 65-degrees.

The crest of a vertical curve was located approximately 250-feet east-northeast of the crash location. Southbound traffic had an approximate -1.7% (downhill) grade north of the grade crossing, and an approximate -3.8% (downhill) grade south of the grade crossing. The southbound approach grade was found to be approximately 0.75-inches above track level at a distance of 30-feet from the nearest rail, with the northbound approach grade being approximately 15-inches below track level at a distance of 30-feet from the nearest rail. The speed limit on Lanetown Road in the area of the collision was posted at 35 miles per hour (mph).

## 3. SIGNAGE AND PAVEMENT MARKINGS RELATED TO GRADE CROSSING

A Parallel Grade Crossing and Intersection warning sign, in combination with a Low Ground Clearance Grade Crossing warning sign, accompanied by a Supplemental Arrow plaque,[3] were posted on both Mint Springs Road and Railroad Avenue, approximately 33-feet and 142-feet prior to their intersections with Lanetown Road respectively. On Lanetown Road, along the southbound approach to the crossing, a Low Ground Clearance Grade Crossing warning sign, accompanied by a 15 mph Advisory Speed plaque, was located approximately 449-feet prior to the crossing.[4] A grade crossing advanced warning symbol was located approximately 280-feet from the nearest rail. A grade crossing pavement-marking symbol was located in the southbound travel lane of Lanetown Road adjacent to the grade crossing advanced warning symbol.[5] A 2-foot wide white stop line was located approximately 33-feet from the automatic gate arm, and 46-feet from the nearest rail. The signal mast, warning devices, and attached Grade Crossing (Crossbuck) sign were located approximately 13-feet from the nearest rail. A summary of the signs found along the refuse truck's southbound approach to the grade crossing on Railroad Avenue and Lanetown Road can be found in **Table 1**.

On Lanetown Road, along the northbound approach to the crossing, a Low Ground Clearance Grade Crossing warning sign accompanied by a 15 mph Advisory Speed plaque was located approximately 340-feet prior to the crossing. A grade crossing advanced warning symbol was located approximately 198-feet from the nearest rail. A grade crossing pavement-marking symbol was located in the northbound travel lane of Lanetown Road adjacent to the grade crossing advanced warning symbol. A 2-foot wide white stop line was located approximately 18-feet from the automatic gate arm, and 32-feet from the nearest rail. The signal mast, warning devices, and attached Grade Crossing (Crossbuck) sign were located approximately 14-feet from the nearest rail. A fifth Low Ground Clearance Grade Crossing warning sign, accompanied by a Supplemental Arrow plaque, was posted on Orchard Drive approximately 550-feet prior to its intersection with Lanetown Road. A satellite image of the area surrounding the Lanetown Road grade crossing is shown in **Figure 3,** and has been annotated to show the crossing related advanced warning signs. **Figure 3** also shows the refuse truck's approximate approach route highlighted in blue.

[3] See *Highway and Rail Crossing Photograph 2 – Parallel Grade Crossing Warning Sign and Low Ground Clearance Grade Crossing Warning Sign with Supplemental Arrow Plaque on Railroad Avenue – Facing West-Northwest*.
[4] See *Highway and Rail Crossing Photograph 3 – Low Ground Clearance Grade Crossing Warning Sign with 15 mph Advisory Speed Plaque – Facing West*.
[5] See *Highway and Rail Crossing Photograph 4 – Grade Crossing Advanced Warning Sign with Grade Crossing Pavement Marking – Facing West*.

**Table 1:** Crossing Related Roadway Signs Along the Refuse Truck's Approach to Grade Crossing

| Type | MUTCD Code | Symbol | Condition | Size | Distance to Crossing |
|---|---|---|---|---|---|
| Parallel Grade Crossing and Intersection Warning | W10-3 |  | Good | 36-inch x 36-inch | 940-feet (on Railroad Ave.) |
| Low Ground Clearance Grade Crossing Warning | W10-5 |  | Good | 36-inch x 36-inch | 940-feet (on Railroad Ave.) |
| Supplemental Arrow Plaque | W16-6P |  | Good | 24-inch x 18- inch | 940-feet (on Railroad Ave.) |
| Low Ground Clearance Grade Crossing Warning | W10-5 |  | Good | 36-inch x 36-inch | 449-feet (on Lanetown Rd.) |
| 15 mph Advisory Speed Plaque | W13-1P (15) |  | Good | 18-inch x 18-inch | 449- feet (on Lanetown Rd.) |
| Grade Crossing Advanced Warning | W10-1 |  | Good | 36-inch diameter | 280-feet (on Lanetown Rd.) |
| Grade Crossing (Crossbuck) | R15-1 |  | Good | 36-inch x 36-inch | 13-feet (on Lanetown Rd.) |

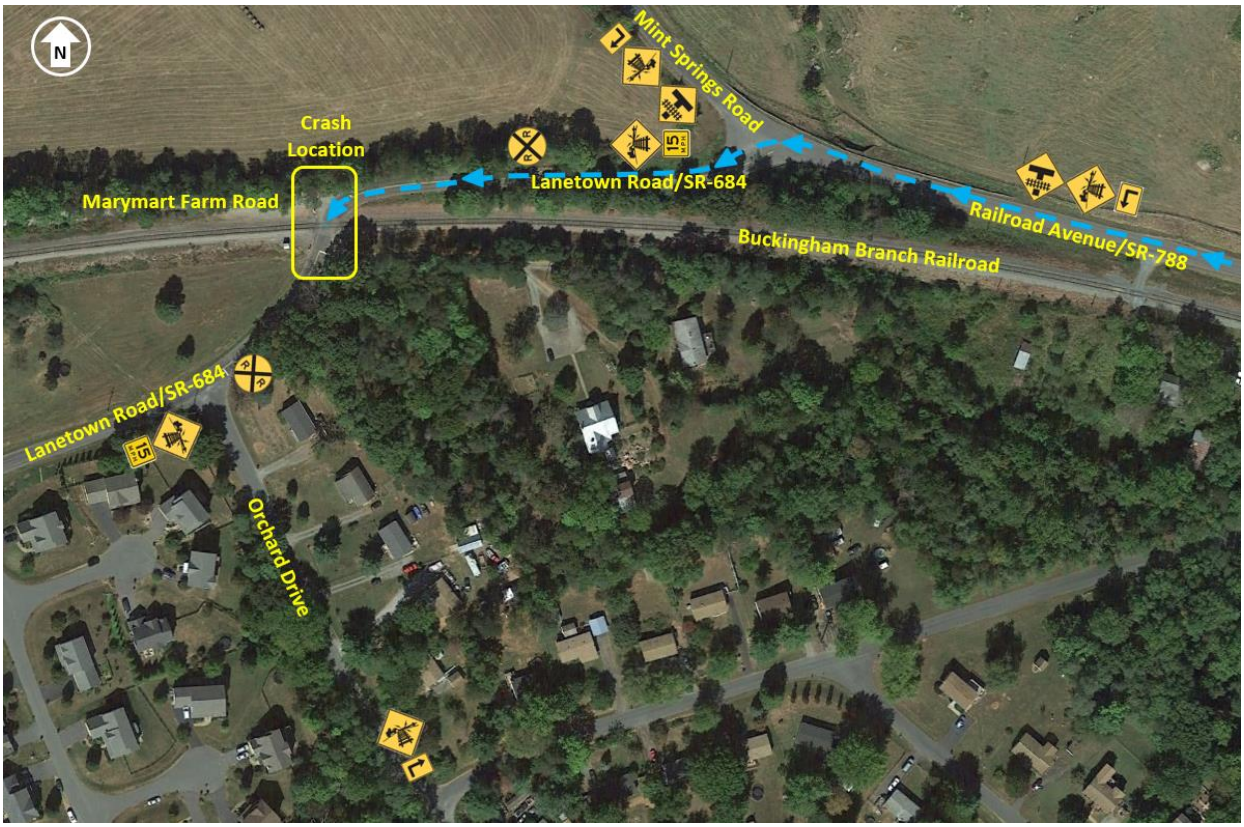



**Figure 3:** Crossing Related Advanced Warning Signs Near the Lanetown Road Grade Crossing (modified from: Google Earth)

## 4. HIGHWAY CONSTRUCTION AND MAINTENANCE HISTORY

An exact date of when Lanetown Road was first constructed is not available; however, information provided by the VDOT indicates that Lanetown Road existed prior to 1932, when it was taken into the VDOT Secondary System of Highways under the Byrd Act.[6] All existing county roads that met certain public benefit criteria were taken into the Secondary System of Highways in that year. At that time, Lanetown Road was graded and unsurfaced. A 1932 map of Albemarle County shows both Lanetown Road (designated County Road 131 on the map) and the grade crossing both existed at that time.[7]

Since 1932, Lanetown Road has not been fully reconstructed, but has been maintained. Sometime between 1971 and 1975, Lanetown Road was surfaced with bituminous concrete, which is commonly referred to as asphalt.[8] Maintenance records for Lanetown Road for the three-year period prior to the collision were reviewed. Various routine maintenance items, such as patching potholes, mowing, removing trash and other debris, removing downed trees, and storm damage

[6] See *Highway and Rail Crossing Attachment – Information and Data Received from Virginia Department of Transportation.*
[7] See *Highway and Rail Crossing Attachment – Albemarle County Maps – Dated 1932, 1940, 1971, and 1975*.
[8] Ibid.

repairs were also documented. No major projects or changes to the horizontal or vertical alignment of the roadway were noted.

## 5. HIGHWAY FUNCTIONAL CLASSIFICATION

In the area of the collision, Lanetown Road is functionally classified as being part of a rural local road system.[9] The American Association of State Highway and Transportation Officials (AASHTO) describe a rural local road system as follows:[10]

> *The rural local road system, in comparison to collectors and arterial systems, primarily provide access to land adjacent to the collector network and serves travel over relatively short distances. The local road system constitutes all rural roads not classified as principal arterials, minor arterials, or collector roads.*

Local road systems make up approximately 65 to 75-percent of the total road length in the Rural Functional System.

## 6. AVERAGE DAILY HIGHWAY TRAFFIC VOLUMES

The average daily traffic (ADT) for both directions of Lanetown Road in the vicinity of the collision was provided by the VDOT. In the ten years preceding the collision, traffic volume data was collected in 2003, 2009, and 2015.[11] At the request of NTSB investigators, the VDOT conducted an additional five-day traffic study between March 14, 2018, and March 19, 2018.[12] This study, which included traffic counts, vehicle classifications, and a vehicle speed study, was conducted at two locations on Lanetown Road, one north and one south of the grade crossing. The ADT for each of these four studies is shown in **Table 2**.

**Table 2:** Average Daily Traffic (ADT) Volumes on Lanetown Road

| Year | Vehicles per Day |
|---|---|
| 2003 | 560 |
| 2009 | 600 |
| 2015 | 744 |
| 2018 | 1,128 |

[9] See *Highway and Rail Crossing Attachment – Information and Data Received from Virginia Department of Transportation*.
[10] See section 1.3.3 – Functional Systems for Rural Areas in "A Policy on Geometric Design of Highways and Streets". American Association of State Highway Transportation Officials (AASHTO), 6th edition.
[11] See *Highway and Rail Crossing Attachment – Virginia DOT Traffic Study Data for 2003, 2009, and 2015*.
[12] See *Highway and Rail Crossing Attachment – Virginia DOT Traffic Study Data for March 2018*.

## 7. 85th PERCENTILE SPEEDS AND VEHICLE USE CLASSIFICAITON

Traffic and speed study data provided by the VDOT shows that, prior to the collision, 85th percentile speed[13] and vehicle classification studies were most recently conducted along Lanetown Road in July 2015.[14] As part of the NTSB requested study in March 2018, the VDOT also conducted a vehicle speed study at two locations on Lanetown Road, one north and one south of the grade crossing.[15] A summary of the 85th percentile speeds for two locations on Lanetown Road, both before and after the collision, is shown in **Table 3**. The March 2018, vehicle classification study conducted on Lanetown Road south of the grade crossing showed that 80% of the vehicles using the roadway were passenger cars, 16% were classified as two-axle four-tire vehicles[16], 2% were motorcycles, with all other vehicle types combined making up the remaining 2%.[17] The vehicle classification study on Lanetown Road north of the grade crossing yielded very similar results.

Table 3: Results of 85th Percentile Speed Studies

| Speed Study Location | 85th Percentile Speed | |
|---|---|---|
| | 2015 | 2018 |
| South of Crossing | 32.1 mph | 30.7 mph |
| North of Crossing | 38.8 mph | 27.3 mph |

## 8. GRADE CROSSING CRASH HISTORY

The Federal Railroad Administration (FRA) grade crossing accident report history indicated that there has been one prior collision at the Lanetown Road grade crossing.[18] The crash, which occurred in February of 1999, involved an unoccupied passenger car that was stuck between the rails and was struck by an oncoming train.

According to VDOT records, one additional collision occurred at the grade crossing in August of 2016.[19] In this crash, a hit-and-run vehicle struck the railroad crossing automatic gate arm located in the northwest quadrant of the crossing, crossed over the railroad tracks, and impacted the signal bungalow. No train was involved in this collision. As a result, the signal bungalow was replaced. The hit-and-run vehicle was never located.

[13] The 85th percentile speed is the speed that 85 percent of the traffic does not exceed. Or, in other words, 85 percent of vehicles travel at or below the 85th percentile speed, while only 15 percent of vehicles exceed this speed.
[14] See *Highway and Rail Crossing Attachment – Virginia DOT Traffic Study Data for 2003, 2009, and 2015*.
[15] See *Highway and Rail Crossing Attachment – Virginia DOT Traffic Study Data for March 2018*.
[16] According to the FHWA, the classification of two-axle, four-tire vehicles includes pickups, panel vans, and other vehicles such as campers, motor homes, ambulances, hearses, carryalls, and minibuses. This classification does not, by definition, include passenger cars.
[17] See *Highway and Rail Crossing Attachment – Virginia DOT Traffic Studies, March 2018.*
[18] See *Highway and Rail Crossing Attachment – FRA Grade Crossing Accident History for Lanetown Road Crossing*.
[19] See *Highway and Rail Crossing Attachment – Commonwealth of Virginia - Department of Motor Vehicles - Police Crash Report*.

## 9. TRAIN CONTROL SIGNAL SYSTEM

Train movements on the Buckingham Branch Railroad (BBRR), North Mountain Subdivision of the Richmond & Alleghany Division, are governed by operating rules, general orders, timetable instructions, and wayside signal indications. The North Mountain Subdivision is oriented in an east/west timetable direction and runs between Gordonsville, Virginia (milepost 160.4) and Clifton Forge, Virginia (milepost 276.0). The maximum authorized timetable speed on the subdivision is 60 mph for passenger trains, and 40 mph for freight trains with permanent speed restrictions posted in the timetable. CSX freight trains and Amtrak passenger trains also operate on the North Mountain Subdivision of the BBRR.

The North Mountain Subdivision single main track uses a traffic control signal system with coded track circuits for train occupancy detection and signal communication. Wayside signals are equipped with signal heads capable of displaying green, yellow, red, and lunar aspects.

Train movements are remotely coordinated by a rail traffic controller located in the BBRR rail traffic control center in Staunton, Virginia. The RTC rail traffic controllers use a RailCom software package to coordinate train movements with the signal system on the North Mountain Subdivision.

## 10. U.S. DOT CROSSING INVENTORY INFORMATION

**Table 4** summarizes the U.S. DOT Crossing Inventory Information at the Lanetown Road and BBRR grade crossing.

**Table 4:** U.S. DOT Crossing Inventory Information

| Inventory Item | Crossing Inventory Information |
|---|---|
| Crossing Number | 224704E |
| Railroad | Buckingham Branch Railroad |
| Type and Position | Public at Grade |
| Division | Richmond & Alleghany |
| Subdivision | North Mountain |
| Railroad Milepost | 195.85 |
| State | Virginia |
| County | Albemarle |
| City | Crozet |
| Street or Road Name | Lanetown Road |
| Highway Type | Local Road |
| Latitude | 38.0773340 |
| Longitude | -78.7167410 |

## 11. GRADE CROSSING WARNING SYSTEM

The grade crossing on Lanetown Road is equipped with an active grade crossing warning system with a bell, gates, and flashing lights. Twelve, 12-inch light-emitting diode (LED) flashing

light units, and 2 gate arms mounted on two signal masts are arranged to provide warning for all directions of highway traffic on Lanetown Road. The signal masts are located to the right of Lanetown Road on both approaches to the grade crossing. In the lowered position, the two gate arms extend across each lane for both directions of traffic approaching the railroad tracks. Each aluminum/fiberglass gate arm has alternating red and white retro-reflective striping and are equipped with three, 3-inch LED light units mounted along the top. When the grade crossing warning system is activated, the light unit mounted at the tip of the gate arms is configured to be constantly lit, while the other two light units flash alternately.

The grade crossing warning devices operate on commercial power and are equipped with a standby battery backup system. Both signal masts have blue signs affixed with a toll-free telephone number to report problems or emergencies. The telephone number will contact the BBRR rail traffic control center, which is manned 24-hours per day.

Train detection and warning system activation is configured with a microprocessor-based grade crossing predictor (Safetrain, GCP-3000) to provide a minimum of 30 seconds of warning time for all trains traveling at or below the maximum authorized timetable speed of 60 mph. The grade crossing predictor calculates the speed of approaching trains and provides a constant warning time for approaching trains. The GCP-3000 unit has a primary and secondary microprocessor. Internal logic detects microprocessor problems and can transfer control of the grade crossing warning devices between the primary and secondary units.

The 2009 MUTCD recommends the following regarding flashing light signals, gates, and traffic control signals (MUTCD Figure 8C-1, which is referred to frequently in the following text, as shown in **Figure 4**.):

***Section 8C.02 <u>Flashing-Light Signals</u>***

***Standard:***

*If used, the flashing-light signal assembly (shown in Figure 8C-1) on the side of the highway shall include a standard Crossbuck (R15-1) sign, and where there is more than one track, a supplemental Number of Tracks (R15-2P) plaque, all of which indicate to motorists, bicyclists, and pedestrians the location of a grade crossing.*

*If used, flashing-light signals shall be placed to the right of approaching highway traffic on all highway approaches to a grade crossing. They shall be located laterally with respect to the highway in compliance with Figure 8C-1 except where such location would adversely affect signal visibility.*

*Each red signal unit in the flashing-light signal shall flash alternately. The number of flashes per minute for each lamp shall be 35 minimum and 65 maximum. Each lamp shall be illuminated approximately the same length of time. Total time of illumination of each pair of lamps shall be the entire operating time. Flashing-light units shall use either 8-inch or 12-inch nominal diameter lenses.*

***Section 8C.04 <u>Automatic Gates</u>***

***Standard:***

*The automatic gate (see Figure 8C-1) shall consist of a drive mechanism and a fully retroreflectorized red- and white-striped gate arm with lights. When in the down position, the gate arm shall extend across the approaching lanes of highway traffic.*

*In the normal sequence of operation, unless constant warning time detection or other advanced system requires otherwise, the flashing-light signals and the lights on the gate arm (in its normal upright position) shall be activated immediately upon the detection of approaching rail traffic. The gate arm shall start its downward motion not less than 3 seconds after the flashing-light signals start to operate, shall reach its horizontal position at least 5 seconds before the arrival of the rail traffic, and shall remain in the down position as long as the rail traffic occupies the grade crossing.*

*When the rail traffic clears the grade crossing, and if no other rail traffic is detected, the gate arm shall ascend to its upright position, following which the flashing-light signals and the lights on the gate arm shall cease operation.*

*Gate arms shall be fully retroreflectorized on both sides and shall have vertical stripes alternately red and white at 16-inch intervals measured horizontally.*

***Standard:***

*Gate arms shall have at least three red lights as provided in Figure 8C-1.*

*When activated, the gate arm light nearest the tip shall be illuminated continuously and the other lights shall flash alternately in unison with the flashing-light signals.*

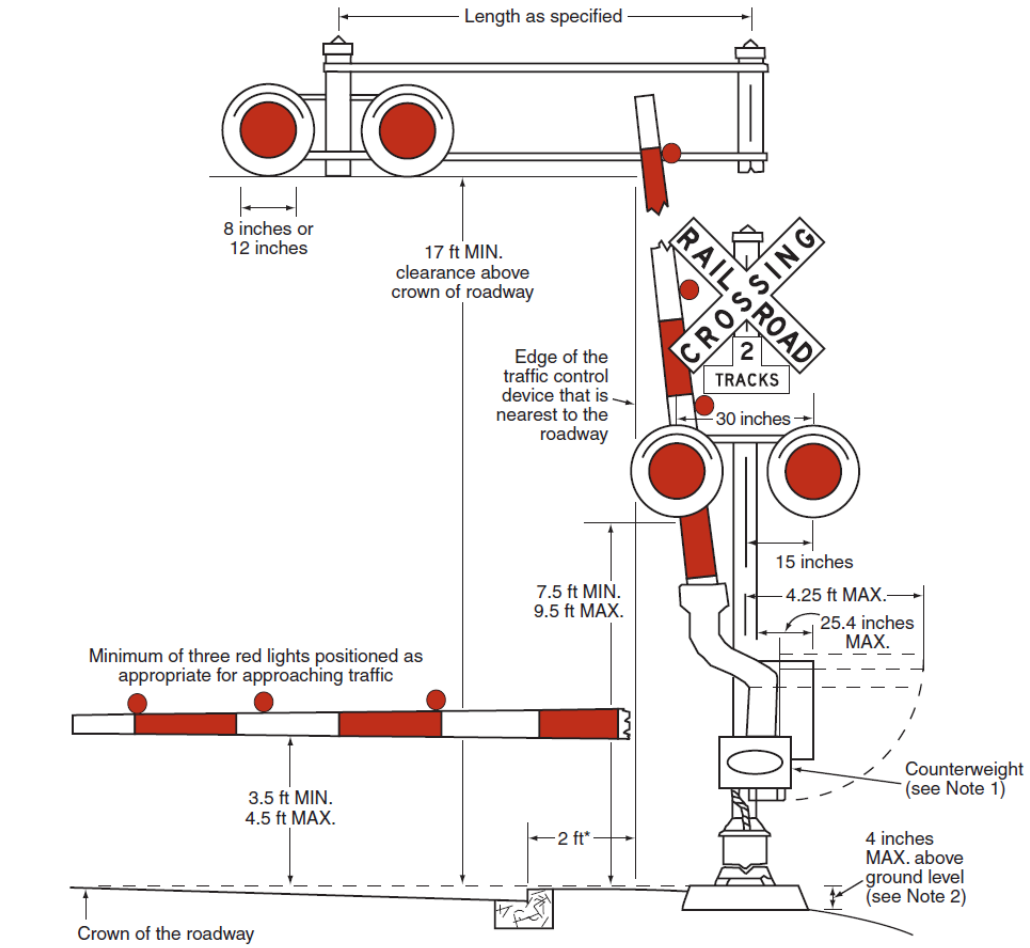
*The entrance gate arm mechanism shall be designed to fail safe in the down position.*

*Guidance:*

*The gate arm should ascend to its upright position in 12 seconds or less.*

*In its normal upright position, when no rail traffic is approaching or occupying the grade crossing, the gate arm should be either vertical or nearly so (see Figure 8C-1).*

*The gates should cover the approaching highway to block all highway vehicles from being driven around the gate without crossing the center line.*




*For locating this reference line on an approach that does not have a curb, see Section 8C.01.

Notes:

1. Where gates are located in the median, additional median width may be required to provide the minimum clearance for the counterweight supports.
2. The top of the signal foundation should be no more than 4 inches above the surface of the ground and should be at the same elevation as the crown of the roadway. Where site conditions would not allow this to be achieved, the shoulder side slope should be re-graded or the height of the signal post should be adjusted to meet the 17-foot vertical clearance requirement.

**Figure 4:** Composite Drawing of Active Traffic Control Devices for Grade Crossings Showing Clearances (source: Figure 8C-1 in FHWA's Manual on Uniform Traffic Control Devices)

## 12. GRADE CROSSING WARNING SYSTEM DATA LOG

The post-collision examination of the grade crossing warning equipment at Lanetown Road found the signal bungalow was destroyed during the collision sequence. The vital electro-mechanical relays were found in the wreckage and examined. The three relays showed damage to the plastic enclosure as a result of the collision, but the electrical contacts did not show any evidence of electrical arcing and the armature could be manipulated with no evidence of binding.

The approach track circuits were measured for both directions approaching the roadway and for the island track circuit that spans the roadway. The east approach track circuit (for westbound trains) extends approximately 2,708 feet. The west approach track circuit (for

eastbound trains) extends approximately 2,706 feet. The island track circuit extends approximately 125 feet between the two approach circuits. Whistle boards are located on the railroad wayside approximately 1,300 feet from the crossing in both directions.

The flashing light units were locked and secured, and no evidence of vandalism or tampering was found. The lighting circuits from the signal mast to the flashing light units were energized, and all LED units and gate arm lights were able to illuminate. Examination of the gate mechanism did not identify any damaged electrical contacts. No further activation tests could be performed due to the destroyed signal bungalow. Data was not available from the grade crossing warning system data logger due to crash-related damage.

The grade crossing gate arms were examined and documented. The north gate arm was approximately 19 feet long and extended the width of the approaching travel lane. When fully descended, the north gate arm measured approximately 41 inches from the top of the asphalt road to the tip of the gate arm. The south gate arm measured approximately 17 feet long. When fully descended, the south gate arm measured approximately 40 inches from the top of the asphalt road to the tip of the gate arm. The investigation group did not identify any view obstructions to the flashing light units from either direction.

Post-collision data was downloaded from the dispatching system at the BBRR Rail Traffic Control Center. The signal and train control data indicate the rail traffic controller requested a route from CP Charlottesville to CP Afton for a westbound route on the main track at 10:41:06 am. At 10:41:09, the signal system indicated the route was lined and locked. Data indicate a track occupancy at CP West Crozet at 11:15:36.

## 13. RAILROAD MAINTENANCE RECORDS

Railroad records were provided regarding the required periodic inspections, tests, and repairs of the Lanetown Road grade crossing warning equipment.[20] Monthly and quarterly test records indicate the warning system was maintained in accordance with Federal requirements. Electro-mechanical relay test records were performed every four years as required and indicated they were in compliance. Insulation resistance tests were completed within the 10-year required testing cycle and did not indicate any deficiencies.

FRA regulations require railroads to maintain a log of all reported grade crossing warning system malfunction reports from railroad employees, law enforcement, or citizens, and document any remedial action taken. BBRR searched their grade crossing malfunction reports for the previous 12 months and did not identify any reports for the Lanetown Road grade crossing.

Virginia DOT searched their database for any reports regarding the Lanetown Road grade crossing for the previous 12 months but did not identify any reports.

[20] See *Highway and Rail Crossing Attachment – Railroad Grade Crossing Maintenance Records*.

### 14. DAMAGES TO GRADE CROSSING WARNING EQUIPMENT

The grade crossing warning system sustained damages estimated at $120,000 as a result of the collision.

## E. DOCKET MATERIAL

The following attachments and photographs are included in the docket for this investigation:

*LIST OF ATTACHMENTS*

| | |
|---|---|
| Highway & Rail Crossing Attachment - | Information and Data Received from Virginia Department of Transportation |
| Highway & Rail Crossing Attachment - | Albemarle County Maps – Dated 1932, 1940, 1971, and 1975 |
| Highway & Rail Crossing Attachment - | Virginia DOT Traffic Study Data for 2003, 2009, and 2015 |
| Highway & Rail Crossing Attachment - | Virginia DOT Traffic Study Data for March 2018 |
| Highway & Rail Crossing Attachment - | FRA Grade Crossing Accident History for Lanetown Road Crossing |
| Highway & Rail Crossing Attachment - | Commonwealth of Virginia - Department of Motor Vehicles - Police Crash Report |
| Highway & Rail Crossing Attachment - | Railroad Dispatch Center Data Log |
| Highway & Rail Crossing Attachment - | Richmond & Alleghany Division Operating Bulletin |
| Highway & Rail Crossing Attachment - | Grade Crossing Incident Report (August 2016) |
| Highway & Rail Crossing Attachment - | Insulation Resistance Test Records |
| Highway & Rail Crossing Attachment - | Electro-Mechanical Relay Test Records |
| Highway & Rail Crossing Attachment - | Monthly Test Records |
| Highway & Rail Crossing Attachment - | Annual Test Record |
| Highway & Rail Crossing Attachment - | Track Chart |

*LIST OF PHOTOGRAPHS*



END OF REPORT

Steven L. Prouty, P.E., Senior Highway Engineer, Office of Highway Safety
Ruben Payan, Electrical Engineer, Office of Railroad, Pipeline, and Haz-Mat Investigations