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

TECHNICAL RECONSTRUCTION GROUP CHAIRMAN'S FACTUAL REPORT

A. CRASH INFORMATION

Location:	Intersection of Northern Boulevard and Main Street, Flushing, NY
Vehicle #1:	2015 Motor Coach Industries Motorcoach
Operator #1:	Dahlia Group Inc., of Flushing, NY
Vehicle #2:	2015 New Flyer Transit Bus
Operator #2:	New York City Transit
Vehicle #3:	2009 Honda Odyssey
Operator #3:	Parked at curb, not running, unoccupied
Vehicle #4:	2002 Toyota Sequoia
Operator #4:	Parked at curb, not running, occupied by two passengers (one in the driver's seat, and one in the right-front passenger seat)
Date:	Monday, September 18, 2017
Time:	6:16 a.m. Eastern Daylight Time (EDT)
NTSB #:	**HWY17MH015**

B. TECHNICAL RECONSTRUCTION GROUP

Robert Squire – Highway Crash Investigator, Group Chairman
NTSB Office of Highway Safety
490 L'Enfant Plaza East, S.W., Washington, DC 20594

C. CRASH SUMMARY

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

D. DETAILS OF THE TECHNICAL RECONSTRUCTION INVESTIGATION

The Technical Reconstruction Group provided investigative support through documentation of the collision scene and the motor vehicles involved in the collision. Additional factual data was also coordinated through the review of documentation provided by other NTSB investigative groups.

Primary documentation involved photography and 3D laser scanning techniques. Photographs were taken in digital format, while scanning was accomplished using the FARO

Focus[3D] x330[1] laser scanner. Multiple scans of a subject were then processed into three-dimensional point clouds for further analysis. Five scan projects were completed that included the crash site, the two involved buses, and two exemplar buses. Video documentation of the approach to the area of the crash following the route of the MCI motorcoach was also completed.

Factual reports prepared by other NTSB investigative groups should be consulted for additional information.

1. Collision Site Documentation and Highway Description

The crash involved a 2016 Motor Coach Industries (MCI) J4500 motorcoach that collided with the driver (left) side rear of a 2015 New Flyer XD40 transit bus. The collision occurred when the MCI, traveling eastbound on Northern Boulevard (NY 25A) failed to stop for a red traffic signal at the intersection with Main Street and collided with the New Flyer as it was making a right turn from northbound Main Street onto eastbound Northern Boulevard. The New Flyer was facing a green right turn arrow indicator. The collision occurred within the intersection of the two highways. Two stationary passenger vehicles stopped along the right curb of Northern Boulevard east of the intersection were subsequently struck by the transit bus and forced into contact with each another. The right (passenger) side of the MCI also impacted the front of a building on the southeast corner of the intersection.

The NTSB Technical Reconstruction Group documented the collision site on September 24, 2017. The site and other relevant features were documented through photographs and laser scanning. Traffic and workspace limitations restricted the area of direct 3D scanning to an approximate 625-foot segment of eastbound Northern Boulevard between the west side of Prince Street and the east side of Main Street. Google Earth images and the Flushing River bridge plans were used as additional resources to augment site diagramming.[2]

Between Prince and Main Streets, the east- and westbound roadways of Northern Boulevard are separated by a median area that widens to about 72 feet in the eastward direction where it includes a vehicle parking area. On the east side of the Main Street intersection, the a similarly wide median area separating the roadways features trees, wide sidewalks and other pedestrian amenities. Westward of Prince Street, Norther Boulevard crosses the Flushing River atop two parallel bridges. Between the bridges and Prince Street, the opposing roadways are separated by a fixed concrete barrier.

Eastbound Northern Boulevard intersects with Main Street at an angle of about 108°. At the intersection Main Street allows for two-way, north-south traffic and has an overall curb-to-curb width of about 70 feet. The eastbound Northern Boulevard roadway exhibits four lanes on the western and eastern sides of the intersection. On the western side, the fourth lane is introduced

[1] The FARO Focus3D is a high-speed terrestrial laser scanner for 3D documentation. The scanner produces dense point cloud scans that are combined or linked from multiple positions to create a cohesive three-dimensional point cloud rendering of the subject target. The laser will only capture features within the direct line of sight to the scanner. Areas obstructed to the laser or where surfaces fail to provide a reflection will appear as a hole in the image. The point cloud data can be imported into a CAD application for additional analysis.

[2] References vary in the identification of the body of water as the Flushing River (e.g., NYDOT highway plans) or Flushing Creek (e.g., USGS topographic map).

about mid-block between Prince Street and Main Street. Additionally, just west of midblock the far-right lane becomes a right-turn only lane to southbound Main Street. On approach to the Main Street intersection, Northern Boulevard exhibits a curb-to-curb width of about 50 feet. West of the Prince Street intersection, eastbound Northern Boulevard exhibits three through travel lanes and a dedicated left-turn only lane for northbound Prince Street.

Lane widths along eastbound Northern Boulevard average about 11-12 feet with some greater width in areas where lanes diverge. Painted pavement markings delineate the roadway lanes, with dedicated lane movements controlled by additional pavement markings and signage.[3] At the main Street intersection, marked crosswalks are present on three of the four intersection legs. Scan data indicated that the crosswalks varied in width from about 15 to 19 feet. No marked crosswalk was provided along the northern leg that connected the east- and westbound roadways of Northern Boulevard. Painted stop lines were in place along the roadways entering the intersection. Likewise based on scan data, the stop line setbacks from the intersection were approximately 27 and 32 feet for eastbound Northern Boulevard and southbound Main Street respectively.[4]

The MCI entered Northern Boulevard from 127th Street, about .63 mile west of the Main Street intersection where the collision occurred.[5] At this location eastbound Northern Boulevard has three travel lanes with an initial heading of about 68° along a gradual curvature toward the east. The roadway continues the rightward curvature with a tangent beginning west of the Van Wyck Expressway. The tangent extends eastward at a heading of about 88° to the western abutment of the Flushing River bridge.

Near the western abutment of the bridge, the roadway exhibits a slight leftward curvature toward a heading of about 82° as the it ascends above the river. Approximately 160 feet east of the western abutment a ramp from the Van Wyck Expressway merges from south and creates the right-most of the four travel lanes across the eastbound span. Just east of the vertical crest for the bridge, the roadway exhibits a slight rightward curvature and descends toward Prince Street at a heading of about 92°.

After a slight leftward curvature through the Prince Street intersection, eastbound Northern Boulevard exhibits a heading of about 84° to the intersection with Main Street, a change of about 8° through the intersection. On the east side of Main Street, the roadway again exhibits a slight leftward curvature and departs the intersection at a heading of about 69° east-northeastward.

Design information for the eastbound bridge that spanned the Flushing River were acquired from profile plans provided by the State of New York Department of Transportation. The NTSB Technical Reconstruction Group used the plans to identify the roadway profile, specifically the grade, over a distance of approximately 2,900 feet beginning about 1,229 feet to the west of the bridge and ending about 630 feet east of the bridge.[6] The length of the bridge extended about

[3] The lane markings atop the Flushing River bridge were significantly degraded and were poorly visible. The degraded markings began and ended on the concrete road surface that included the bridge approaches and deck.
[4] The stop line setback was measured from the extension of curb lines along the intersecting roadway.
[5] Approximately 0.63 mile between approximate centers of intersections as measured from Google Earth.
[6] As measured from the respective bridge abutments.

1,041 feet between the west and east abutments. Based on survey stationing referenced in the roadway plans, the profile data covered the eastbound roadway beginning about 390 feet after the MCI entered Northern Boulevard from 127th Street and ended within five feet of the Main Street intersection. Over the distance covered by the highway profile plans, six vertical grade changes were referenced and are presented in **Table 1**.

Table 1: Eastbound roadway vertical grade within area covered by highway build plans

Vertical grade Percent / Angle	Segment length feet	Onset relative to intersection of bridge vertical grades feet
0.5 / 0.286°	55	1750 west
-0.6 / -0.344°	756	1695 west
4.001 / 2.291°	239	939 west
5.457 / 3.124°	700	700 west
-5.315 / -3.042°	619	
-0.456 / -0.261°	531	619 east
	Calculated distance rounded to nearest foot	

The vertical profile of the bridge transitions over a radius of approximately 6,502 feet with the points of curvature lying about 350 feet east and west of the maximum vertical grade.[7]

Traffic movement through the intersections at Prince and Main Streets is control by automatic traffic signals. The signal heads are both pole mounted, and cantilever mast-arm mounted. Generally, through traffic was controlled by signal heads positioned above the lanes by mast arms from poles located on both sides of the roadway.

Site observations concluded that the signals, particularly during hours of darkness, were visible and free of obstructions. The eastbound signals at Prince Street entered a driver's field of view as the crest vertical curve on the bridge was traversed. The through traffic signals at Main Street were observed to be unobstructed beginning about 225 feet west of Prince Street.

A site plan covering the eastbound roadway between the crest vertical curve on the bridge and the Main Street intersection is provided in **Figure 1**. **Figure 2** provides additional references regarding the eastbound roadway grade and other features. The NTSB Highway Factors Group Factual Report should be consulted for addition, and specific highway data.

[7] The crest vertical curve (apex) was calculated to be about 4.6 feet offset from the intersection of the two vertical grades.

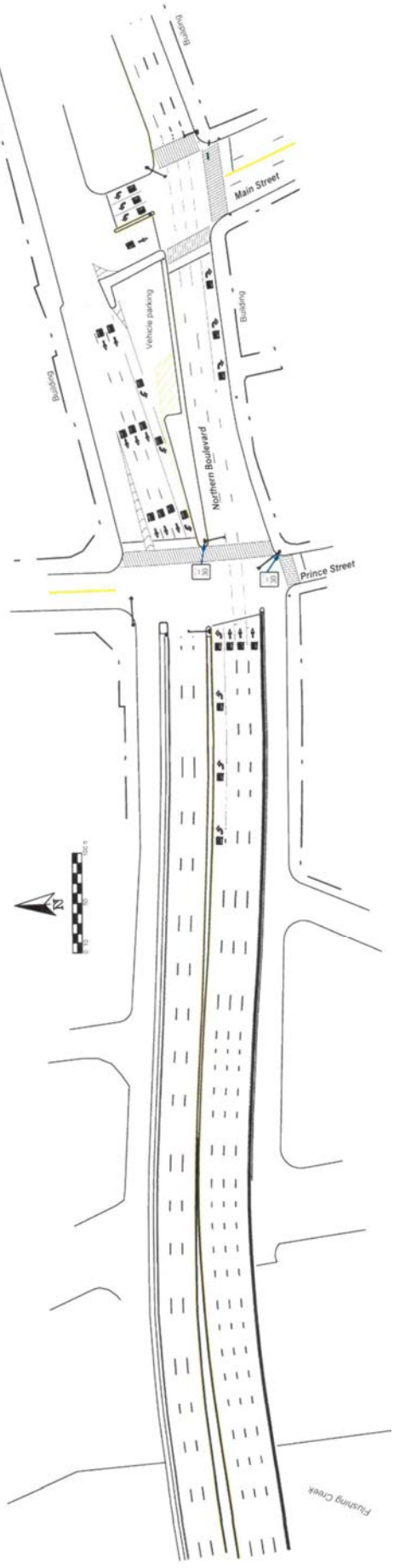

Figure 1: Scaled site map depicting the eastbound roadway of Northern Boulevard between the Flushing Creel bridge and Main Street intersection.

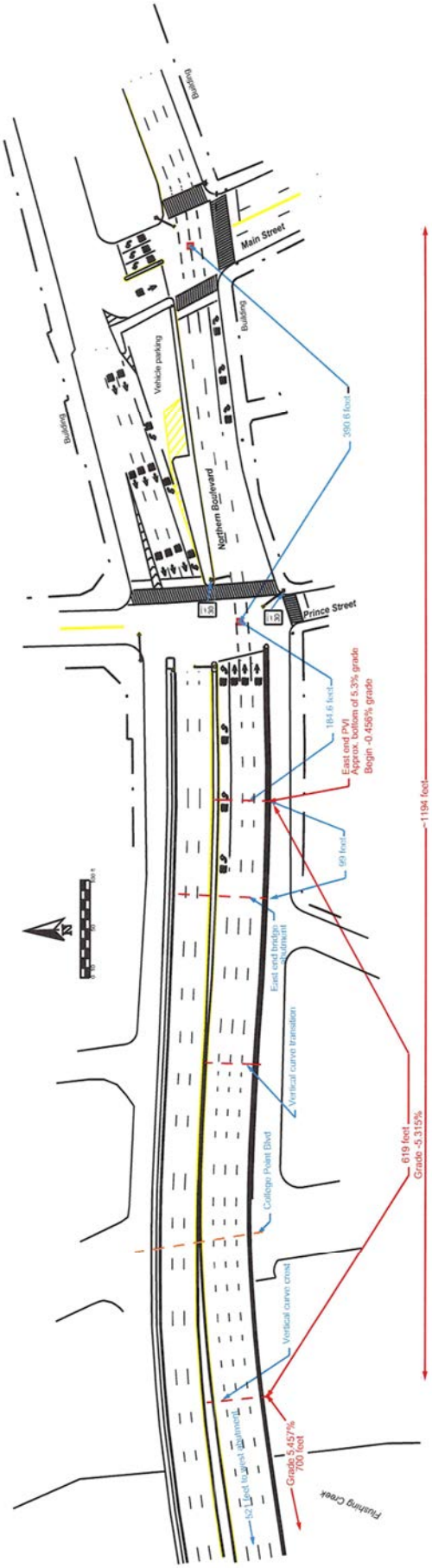

Figure 2: Scaled site map depicting the eastbound roadway of Northern Boulevard between the Flushing Creel bridge and Main Street intersection depicting certain dimensional data.

1.1. Vehicle positions of rest and roadway evidence

Photographs provided by New York law enforcement and transit authority investigators depicted the post-collision positions of rest for the MCI, transit bus and the two stationary (parked) passenger vehicles on the east side of the intersection. The photographs also depicted damage to the building and a toppled steel utility pole that had supported one of the intersection traffic signals. The images were used in conjunction with the site scan to map the vehicle position of rest as depicted in **Figure 3**. Although the transit bus rotated during the collision, the vehicles remained in contact at final rest.

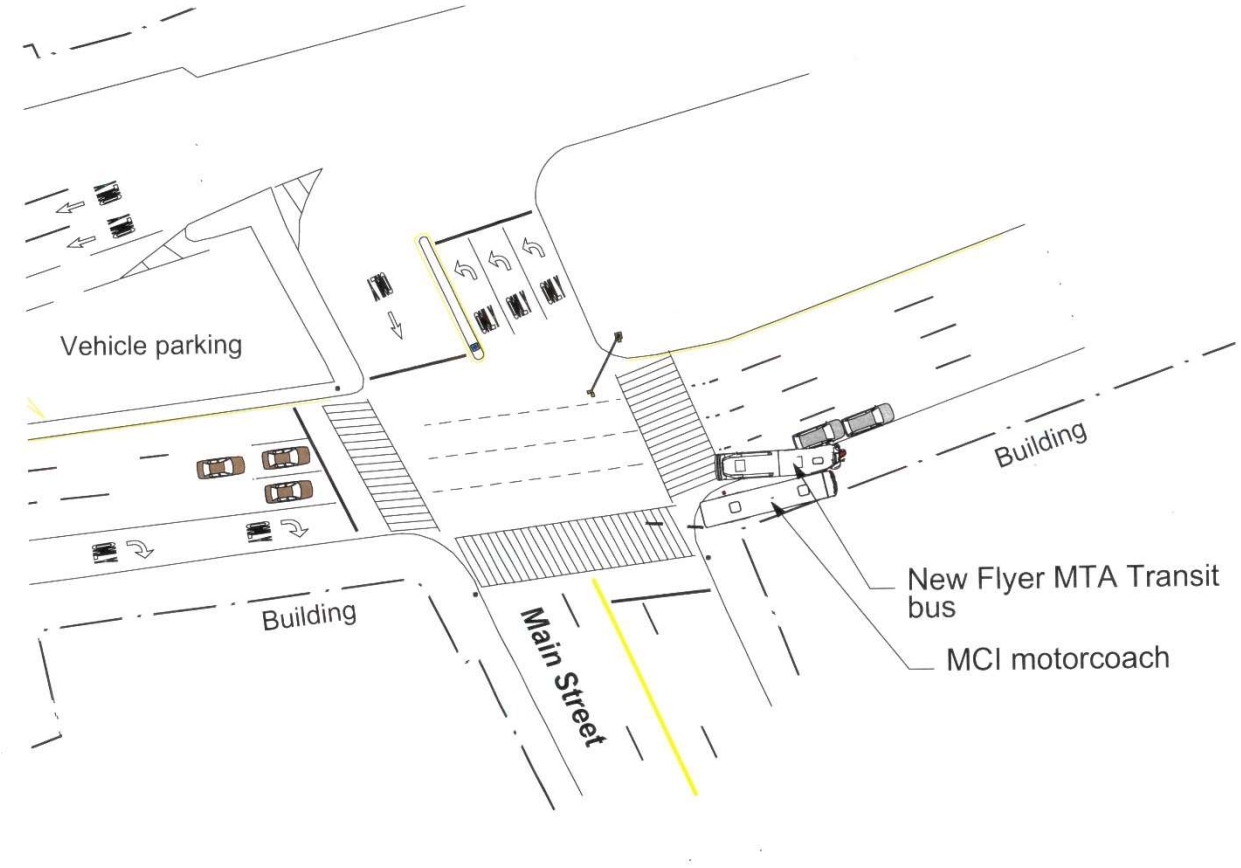

Figure 3: Illustration depicting post-collision position rest for the involved vehicles.

The photographs depicted the presence of tire friction marks and metal scars on the roadway and sidewalk surfaces. The tire friction marks were observed atop portions of the painted crosswalk on the southern leg of Main Street. The tire marks appeared to project an angular heading toward the southeast corner of the of the intersection. The most prominent mark, that remained clearly visible when the site was scanned by the NTSB, appeared as a single linear mark that exhibited characteristics of parallel tread grooves and an over-deflection of the tire. The mark

appeared consistent with the heading of the MCI and was approximately located between nine and 17 feet from the curb (also depicted in Figure 3). About 30 feet from the curb near the northern edge of the crosswalk, less prominent tire friction marks likewise angled toward the southeast corner were observed. These marks were characteristic of a single set of dual wheels and were predominantly only visible atop three to four of the white crosswalk lines covering a distance of about 8.5 feet. The tire marks were located primarily with the northbound lane of Main Street, near the roadway centerline. The location and heading of these tire marks were consistent with MCI path of travel immediately following impact with the transit bus.

Addition tire friction (scuff) marks and surface scrapes (metal scars) were depicted in photographs about the area of final rest for the two buses, although the locations of tire marks or other evidence were not marked by on-scene investigators. By the time the site was scanned by the NTSB, debris had been cleared and restoration of damaged infrastructure had begun. Additional roadway scrapes and tire marks related to the recovery of the two buses were present and superimposed atop crash-related evidence.

The law enforcement photographs depicted no additional tire mark or other roadway evidence indicative of a pre-impact event. Although those scene photos depict the road surface as went, pre-collision video evidence and other site observations indicate that rainfall occurred after the collision. At the time of the crash the road surface had been dry.

1.2. Highway sight line

The direct line-of-sight along the eastbound roadway between the Flushing River bridge and Main Street was slightly affected by the various changes in roadway heading. While traveling eastbound and descending from the bridge, trees and fixtures on the left side of the roadway (median area) created partial sightline obstructions toward the northern half of the Main Street intersection. This partial obstruction was inconsequential as the distance, and potential for intervening traffic, would be a limiting factor with identifying the specific movement of vehicles at the intersection. From the bridge, the line-of-sight to the Prince Street intersection, including the traffic signals, was unobstructed. As an eastbound observer approached to within about 200-225 feet of the Prince Street stop line (as observed from the center through lane) the entire width of the Main Street intersection was visible. The distance between the approximate mid-points of the Prince and Main Street intersections was measured at about 390 feet.

Regarding the line-of-sight from northbound Main Street westward along Northern Boulevard, buildings presented the primary source of obstruction. For example, from the left edge of the right northbound lane at the stop line, the sightline distance was calculated at approximately 230 feet to the center of the left eastbound lane. The distance decreases toward the right lanes due to the angular offset of the intersecting roadways. Once past the building setback (about 16 feet from the roadway), there is an unobstructed line-of-sight extending west of the Prince Street intersection.

2. Vehicle Documentation

The MCI motorcoach and New Flyer transit bus involved in the initial impact were examined and documented through photographs and 3D laser scanning. A summary of those activities is provided in this section. The NTSB Vehicle Factors Group Factual Report should be consulted for additional vehicle data.

2.1. MCI motorcoach

The motorcoach, identified as a 2015 MCI J4500, and an exemplar were photographed, and laser scanned on September 21 and 23, 2017, respectively, at an NYPD vehicle storage facility in Flushing, NY. The accident motorcoach was scanned from nine exterior positions, while the exemplar was scanned from six exterior positions. **Figures 4** through **6** depict screen captures of the colorized three-dimensional linked scans of the accident and exemplar vehicles respectively.

Figure 4: Depiction of linked 3D scans of the involved MCI motorcoach from the passenger side.

Figure 5: Depiction of linked 3D scans of the involved MCI motorcoach from the driver side.

Figure 6: Depiction of linked 3D scans of the exemplar MCI motorcoach from the passenger side.

The MCI exhibited frontal impact damage with additional contact and induced damage extending rearward to the steer axle tires. During the examination, both steer axle tires were found deflated and unable to rotate due to impingement from structural displacement. Impact damage across the front the vehicle appeared relatively uniform from ground level to a vertical height of about six feet. The frontal structure at about the level of the interior floor was displaced rearward approximately 27 inches, while the structure at the bumper level exhibited a rearward displacement of about 17 inches. Vertically above the approximate six-foot level, structures on the right (passenger) side exhibited slightly more rearward displacement than on the left (driver) side due to contact with the building. **Figure 7** is a line drawing depicting the rearward displacement of the frontal structure as observed from the left (driver) side.

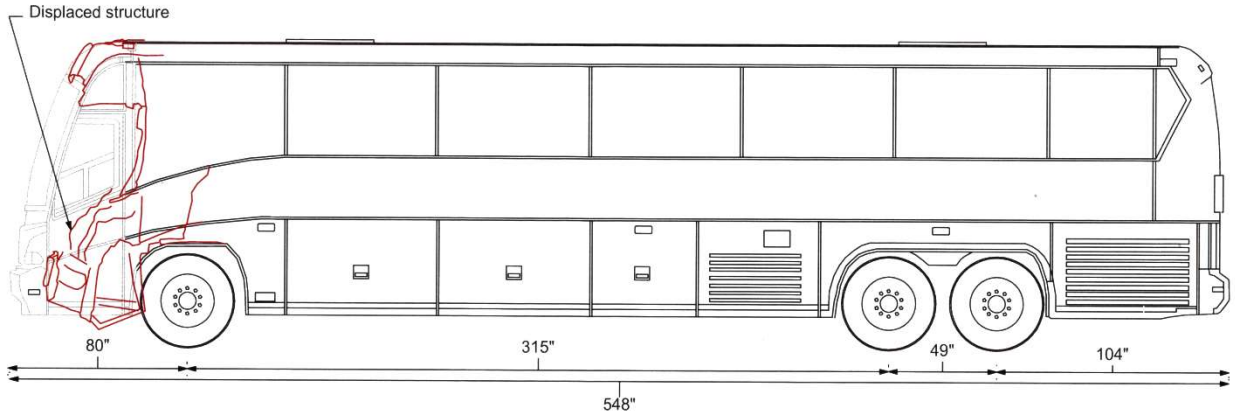

Figure 7: Illustration of collision damage to the MCI motorcoach as viewed from the left (driver) side.

2.2. New Flyer transit bus

The transit bus, identified as a 2015 New Flyer XD40, and an exemplar were photographed, and laser scanned on September 22, 2017 at a Metropolitan Transportation Authority (MTA) facility in the Bronx, NY. The accident bus was scanned from seven exterior and four interior positions. The exemplar was scanned from seven exterior and two interior positions. **Figures 8** and **9** depict screen captures of the colorized three-dimensional linked scans of the accident and exemplar vehicles respectively.

Figure 8: Depiction of linked 3D scans of the MTA New Flyer transit bus involved in the collision.

Figure 9: Depiction of linked 3D scans of an exemplar MTA New Flyer transit bus.

The transit bus exhibited evidence of impact damage to the left (driver) side rear beginning approximately five feet aft of the drive axle. The impact force displaced the entire body aft of the drive axle toward the right (passenger) side of the vehicle approximately 16 inches and partially ejected the engine through the rear of the vehicle. **Figure 10** is a line drawing depicting the area

of direct contact and lateral displacement of the vehicle body as observed from an overhead perspective.

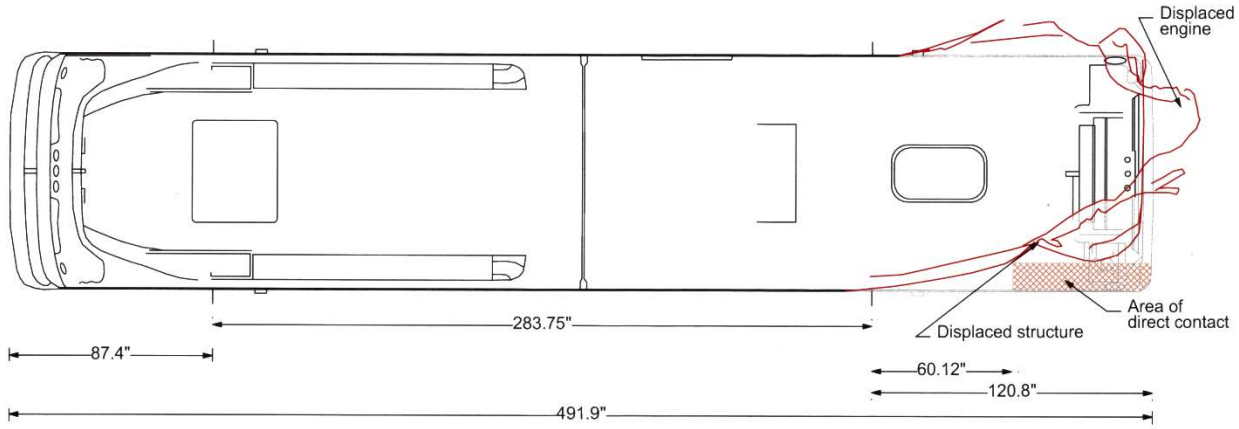

Figure 10: Illustration of collision damage to the New Flyer transit bus as viewed from an overhead perspective.

The vehicle interior exhibited similar lateral displacement at the rear of the vehicle. **Figure 11** depicts a 40-inch thick longitudinal cross section of the 3D scan covering the interior of the New Flyer. The cross section depicted covers an area just below the axle line to about the lower side window sills.

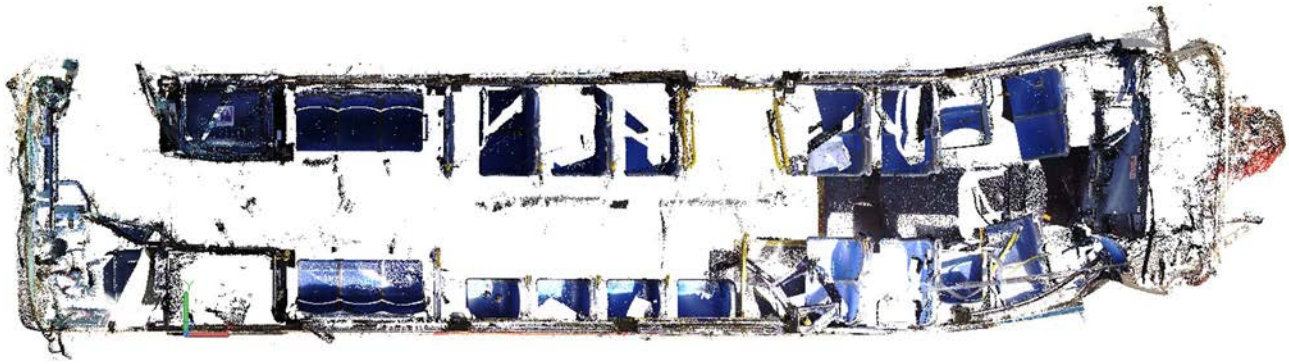

Figure 11: Longitudinal cross section of the 3D scan depicting the interior of the New Flyer transit bus.

3. Electronic Vehicle Data

Numerous sources of potential electronic data related to movement of the MCI and New Flyer were identified and their respective data acquired by NTSB investigators. Several data sources were useful to the Technical Reconstruction Group for analysis of vehicle pre-collision movement.

3.1. External Video

Video imagery was acquired from sources external to the involved vehicles. Those sources included imagery from another transit vehicle and stationary surveillance cameras. One such stationary camera was located on a building near the Northern Boulevard split (Flushing Bay Promenade) west of the Van Wyck Expressway, about 565 feet from where the MCI entered onto Northern Boulevard. In that video, which captured a portion of Northern Boulevard adjacent the building on which it was positioned, the MCI can be recognized for about eight seconds traveling within the eastbound right-center lane. Just past the building, the far-right curb lane became an exit-only onto the Flushing Bay Promenade. Parked vehicles can also be seen occupying the curb lane west of the roadway split.

Other useful imagery included forward-facing video recorded by an uninvolved MTA transit bus that was positioning to turn left from westbound Northern Boulevard onto southbound Main Street as the MCI approached that intersection. Within a segment of the video file, the MCI can be seen descending the latter portion of the eastern end of the Flushing River bridge and continuing through the Prince Street intersection. While a portion of the camera field-of-view toward the oncoming MCI is obstructed by objects in the median (e.g., trees), the approach of the MCI is recognizable for about 10 seconds. As the MCI reaches the Main Street intersection, it passes to the right of other eastbound traffic stopped at the intersection and then departs the camera's field-of-view (FOV). The video provided useful information pertaining to the vehicle's path of travel, external environment, and corroboration with other time sources. The impact between the MCI and transit bus was not captured by the video.

3.2. MCI TracManager Vehicle Tracking

Dahlia Group, operator of the MCI, employed a telematics subscription application identified as TracManager to assist the carrier with fleet management. Data of interest preceded the collision and included vehicle position, expressed by latitude and longitude, speed and time. The pre-collision data comprised 21 data points that covered 4 minutes, 51 seconds between 06:11:19 hours and 06:16:10 hours. The track over this period of time appeared to update at a rate between one and 78 seconds. The data indicated that the MCI entered Northern Boulevard from 127th Street an indicated time of about 06:15:04 hours.

Table 2 lists the position, speed and time data of interest from the TracManager data.

Table 2: MCI TracManager position, speed and time data for accident trip

Latitude	Longitude	Indicated Speed	Indicated Time	Time Interval mm:ss
40.76099	-73.84189	1 mph	6:11:19	
40.76077	-73.84227	8 mph	6:11:20	00:01
40.76069	-73.84255	4 mph	6:11:28	00:08
40.76061	-73.84261	0 mph	6:12:42	01:14
40.76055	-73.84279	7 mph	6:14:00	01:18
40.76051	-73.84301	7 mph	6:14:22	00:22
40.76054	-73.84318	7 mph	6:14:28	00:06
40.76069	-73.84322	9 mph	6:14:34	00:06
40.76167	-73.84373	7 mph	6:14:58	00:24
40.76185	-73.84361	10 mph	6:15:04	00:06
40.76195	-73.84338	14 mph	6:15:08	00:04
40.76224	-73.84235	23 mph	6:15:18	00:10
40.76234	-73.84186	25 mph	6:15:22	00:04
40.76238	-73.8416	25 mph	6:15:24	00:02
40.76243	-73.84105	28 mph	6:15:28	00:04
40.76247	-73.84044	30 mph	6:15:32	00:04
40.76253	-73.83802	37 mph	6:15:46	00:14
40.76271	-73.8359	45 mph	6:15:56	00:10
40.76272	-73.83541	48 mph	6:15:58	00:02
40.76267	-73.83373	58 mph	6:16:04	00:06
40.76269	-73.8331	60 mph	6:16:06	00:02
40.76277	-73.83182	61 mph	6:16:10	00:04

The NTSB Vehicle Recorders Specialist Factual Report should be consulted for additional details regarding the TracManager system.

3.3. New Flyer MTA Transit Vehicle Tracking

Metropolitan Transit Authority staff provided NTSB investigators with data acquired from a Clever Devices fleet management system that was operating aboard the involved transit bus. Data of interest included reported vehicle position (latitude and longitude) and speed. **Table 3** provides a subset of recorded position and speed data (conveyed in feet per second) for 19 seconds preceding impact. Timestamps and duplicative data points were removed from the original data sheet provided.

As noted in the NTSB Vehicle Recorders Specialist Factual Report, reconstruction of the data may have influenced the data timestamps, which were offset from other data sources. That report should be consulted for details regarding the Clever Devices IVN4 fleet management system.

Table 3: Select data reported by the Clever Devices IVN4 fleet management system.

		Indicated Speed	
Longitude	Latitude	fps	mph
-73.831647	40.762577	0	0.0
-73.831647	40.762577	0	0.0
-73.831647	40.762577	0	0.0
-73.831647	40.762577	0	0.0
-73.831647	40.762577	0	0.0
-73.831647	40.762577	0	0.0
-73.831647	40.762577	0	0.0
-73.831647	40.762577	0	0.0
-73.831647	40.762577	0	0.0
-73.83165	40.762583	0.674	0.5
-73.831658	40.762595	2.584	1.8
-73.831672	40.762613	4.813	3.3
-73.831698	40.762633	7.865	5.4
-73.831727	40.762655	10.225	7.0
-73.831755	40.762678	11.264	7.7
-73.831755	40.762678	11.152	7.6
-73.831777	40.762702	10.449	7.1
-73.831795	40.762725	9.326	6.4
-73.831807	40.762745	8.202	5.6
-73.831813	40.762767	8.202	5.6
-73.831813	40.762767	7.865	5.4

3.4. MCI Onboard GPS/Video Data

A Garmin dēzlCam™ LMTHD Global Positioning System device was recovered from the MCI motorcoach by law enforcement investigators. Information indicates that the device was installed and used at the discretion of the vehicle driver. In additional to navigation functions, the device featured a forward-facing camera. NTSB investigators acquired several video files recorded by the camera, two of which were useful for analysis undertaken by the Technical Reconstruction Group.

While no log data was recovered, date, time, and position (latitude and longitude) data were superimposed in the footer of video image. Examination of the video revealed a playback speed of 30 frames per second with the displayed data updating once per second. The primary imagery and data of interest covered a period of 41 seconds, beginning about 765 feet after the MCI entered Northern Boulevard and concluded as the MCI entered the Main Street intersection. The collision was not captured in the video segment. The timestamps and speed displayed in the video appeared reasonably consistent with other data sources such as the other transit bus video and the TracManager data. When plotted on Google Earth, the positional data did appear to lag the actual vehicle position as viewed through the video. It is unknown if the offset is a function of typical

consumer-grade GPS accuracy or the means by which the position data, or data display, is processed by the Garmin unit video or possibly the Google Earth application.[8]

Presuming relative positional accuracy of the data displayed in the Garmin video, the data associated with each timestamp during the 41 second video were viewed relative to the roadway vertical grade as interpreted from the highway profile plan. Regarding the main span of the Flushing River bridge, the grade was calculated at 50-foot intervals relative to the apex of the crest vertical curve. **Table 4** lists the timestamp, position, and speed for each of the 41-one second intervals in addition to the relative vertical grade on the vehicle was traveling at the time.

[8] Garmin literature conveys a positional accuracy of at least 10 meters.

Table 4: Garmin video indicated time, position and speed relative to roadway vertical grade.

	Location-Video Display		Displayed Speed	Grade
Displayed Time	Latitude	Longitude	mph	% Grade (bridge profile plans)
6:15:27	40.76239	-73.84130	26	
6:15:28	40.76241	-73.84114	26	-0.600
6:15:29	40.76242	-73.84100	27	-0.600
6:15:30	40.76243	-73.84089	28	-0.600
6:15:31	40.76244	-73.84074	28	-0.600
6:15:32	40.76244	-73.84060	29	-0.600
6:15:33	40.76245	-73.84044	30	-0.600
6:15:34	40.76245	-73.84029	30	-0.600
6:15:35	40.76246	-73.84013	30	-0.600
6:15:36	40.76247	-73.83997	31	-0.600
6:15:37	40.76247	-73.83983	30	-0.600
6:15:38	40.76247	-73.83966	30	-0.600
6:15:39	40.76248	-73.83950	30	4.001
6:15:40	40.76249	-73.83934	30	4.001
6:15:41	40.76250	-73.83916	32	4.001
6:15:42	40.76250	-73.83897	33	4.001
6:15:43	40.76251	-73.83879	34	4.001
6:15:44	40.76251	-73.83862	35	5.457
6:15:45	40.76252	-73.83842	36	5.457
6:15:46	40.76252	-73.83822	36	5.457
6:15:47	40.76252	-73.83802	36	5.457
6:15:48	40.76253	-73.83781	37	5.457
6:15:49	40.76254	-73.83762	38	5.457
6:15:50	40.76255	-73.83743	39	4.617
6:15:51	40.76258	-73.83723	39	3.847
6:15:52	40.76262	-73.83704	40	3.078
6:15:53	40.76263	-73.83682	40	2.308
6:15:54	40.76265	-73.83659	42	1.539
6:15:55	40.76266	-73.83637	43	0.769
6:15:56	40.76268	-73.83614	43	0.769
6:15:57	40.76269	-73.83591	45	-1.539
6:15:58	40.76270	-73.83568	46	-2.308
6:15:59	40.76271	-73.83543	48	-3.078
6:16:00	40.76271	-73.83520	50	-3.847
6:16:01	40.76270	-73.83494	51	-5.232
6:16:02	40.76270	-73.83466	53	-5.315
6:16:03	40.76269	-73.83438	56	-5.315
6:16:04	40.76268	-73.83408	57	-5.315
6:16:05	40.76268	-73.83376	58	-0.456
6:16:06	40.76267	-73.83344	59	-0.456
6:16:07	40.76269	-73.83312	60	-0.456
6:16:08	40.76272	-73.83281	60	-0.456

Area highlighted by blue box is between east and west bridge abutments.

Figure 12 depicts a Google Earth image with the track of the MCI as expressed by the Garmin and TracManager position data.

Figure 12: Modified Google Earth image depicting MCI track along Northern Boulevard as indicated by TracManager and Garmin GPS data.

E. DOCKET MATERIAL

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

LIST OF ATTACHMENTS

None

END OF REPORT

Robert J. Squire
Highway Accident Investigator