

CONSTRUCTION VIBRATION MONITORING SUMMARY REPORT

SEPTEMBER 1 – 30, 2018

**VIRGINIA AVENUE TUNNEL RECONSTRUCTION PROJECT
WASHINGTON, DC**

**Prepared for:
CSX Transportation**

**Prepared by:
Gannett Fleming Inc.**

September 2018

VIRGINIA AVENUE TUNNEL RECONSTRUCTION

Construction Vibration Monitoring Summary

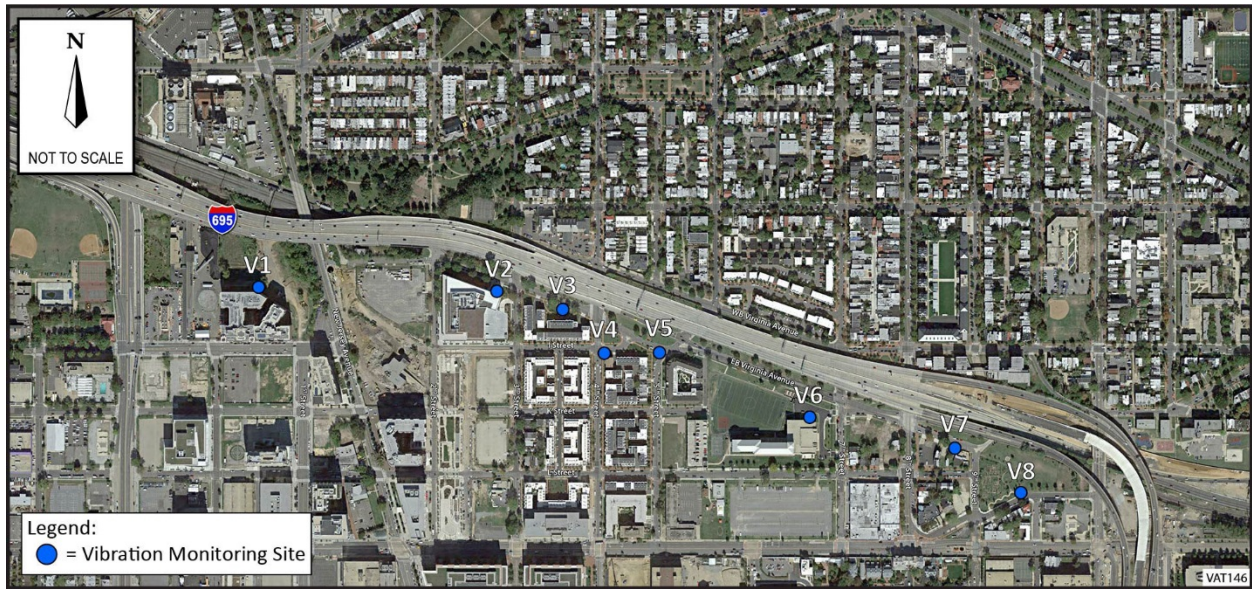
Gannett Fleming Inc. (GFI) has prepared this vibration monitoring report as part of the ongoing efforts to comply with the commitments presented in the Virginia Avenue Tunnel Reconstruction Final Environmental Impact Statement (FEIS) and Section 4(f) Evaluation dated May 2014 and further detailed in the Record of Decision (ROD), dated November 2014. CSX Transportation, the project sponsor, has agreed to a number of environmental commitments as mitigation for environmental impacts that will result from the Virginia Avenue Tunnel Reconstruction Project. The commitments are divided between those related to construction of the Project and those related to the restoration of affected areas upon project completion of the Selected Alternative. These environmental commitment measures are mitigations which avoid the impact altogether by not taking a certain action or parts of an action; minimize impacts by limiting the degree or magnitude of the action and its implementation; rectify the impact by repairing, rehabilitating, or restoring the affected environment; reduce or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensate for the impact by replacing or providing substitute resources or environments. This construction vibration monitoring summary report is intended to fulfill aspects of the vibration monitoring commitments contained in the ROD for the Virginia Avenue Tunnel reconstruction.

The Project Team has installed perimeter vibration monitoring stations adjacent to various buildings within the Project limits. These monitoring stations are intended to monitor construction vibration associated with the Project. Construction vibration will be monitored throughout the Project's construction period. Sophisticated monitoring devices have been installed at eight locations to ensure the construction activities are performed in compliance with the permitted vibration levels. The monitoring devices will record the vibration level and automatically report the data back to the Project Engineers.

Methodology of Construction Vibration Monitoring

Construction vibration level data was collected for the reporting period starting September 1 through September 30, 2018. Eight fixed vibration monitoring locations have been measured continuously to monitor vibration levels since the beginning of major construction activities in May 2015. Vibration level data was collected every minute for the duration of the vibration monitoring period. The locations of the monitoring stations are depicted in Figure 1 and the addresses described in Table 1 on the following page.

Figure 1. Vibration Monitoring Locations



Note that monitoring locations V3 and V5 have been shifted slightly to avoid conflicts with current roadway restoration activities.

Table 1. Vibration Monitoring Locations Description

Site ID	Vibration Monitoring Location
V1	West of New Jersey Avenue SE
V2	Corner of 3 rd Street and Virginia Avenue SE
V3	Between 3 rd Street and 4 th Street SE, in front of Townhomes
V4	Corner of 4 th Street SE and I Street SE
V5	Corner of 5 th Street and Virginia Avenue SE, in front of Capper Senior Apartments
V6	Adjacent to fence of Marine Corps Recreational Facility on 6 th Street SE
V7	Between 8 th and 9 th Streets SE, in front of Commercial Buildings
V8	Virginia Avenue Park

Vibration Data Summary Charts

Table 2 presents the maximum and monthly average vibration levels measured during the month of September 2018 and shows how the measured levels compare to the established vibration criteria for structural damage. The maximum daily vibration level for each of the eight monitor locations is plotted in Figures 2 to 9. As shown in the table, and associated figures, there were no vibration exceedances due to construction activities recorded during the month.

Note that monitoring and data recording was interrupted at several monitors for a variety of reasons during the month of September. Location V1 unit was down on 9/1 to 9/5, 9/19 and 9/22 to 9/30 due to power losses at the trailers in NJ Yard. Location V2 unit was down on 9/18, 9/19 and 9/25 due to equipment maintenance (Modem failure). Location V3 unit was down on 9/8, 9/9 due to power losses and 9/12 to 9/19 due to faulty equipment after the unit relocation. Location V4 unit was down on 9/11 and 9/12 due to power losses. Location V5 unit was down with no access to the unit since the Capper Senior Center fire from 9/19 and due to a modem failure from 9/13 to 9/18 (ordering and testing new modem). Location 6 unit was down for most of the month (9/4 to 9/12 and 9/18 to 9/30) as the Marine Corps is not allowing access within the fenced facility to service the unit. Location 7 unit was down on 9/13 to 9/19 due to power losses and modem failure, and 9/23 – 9/25 due to power losses and blocked access to the unit.

Table 2. Maximum and Average Construction Vibration Monitoring Results – September 2018

Site ID	Vibration Monitoring Location	Maximum Level Recorded		Monthly Average Level		Structural Damage Criteria ^{a,b}		Number of Exceedances
		VdB	PPV (in/sec)	VdB	PPV (in/sec)	VdB	PPV (in/sec)	
V1	West of New Jersey Avenue SE	86	0.08	70	0.013	102 ^c	0.5 ^c	0
V2	Corner of 3 rd Street and Virginia Avenue SE	85	0.07	61	0.005	102 ^c	0.5 ^c	0
V3	Between 3 rd Street and 4 th Street SE, in front of Townhomes	88	0.1	65	0.009	94 ^{f,g}	0.2 ^{f,g}	0
V4	Corner of 4 th Street SE and I Street SE	89	0.12	60	0.004	90 ^e	0.12 ^e	0
V5	Corner of 5 th Street and Virginia Avenue SE, in front of Capper Senior Apartments	92	0.16	73	0.019	94 ^f	0.2 ^f	0
V6	Inside the fence of Marine Corps Recreation Facility on 6 th Street SE	87	0.09	60	0.004	94 ^f	0.2 ^f	0
V7	Between 8 th and 9 th Streets SE, in front of Commercial Buildings	92	0.15	68	0.010	94 ^f	0.2 ^f	0
V8	Virginia Avenue Park	88	0.10	66	0.008	94 ^f	0.2 ^f	0

a. Federal Railroad Administration (FRA). *CREATE Noise and Vibration Assessment Methodology*. December 2007.

b. Federal Transit Administration (FTA). *Transit Noise and Vibration Impact Assessment*. U.S. Department of Transportation Report No. FTA-VA-90-1003-06, May 2006.

c. Reinforced- concrete, steel or timber (no plaster)

d. Engineered Concrete and masonry (no plaster) buildings

e. Buildings extremely susceptible to vibration damage

f. Non-Engineered timber and masonry buildings

g. Note that the Structural Damage Criteria for Site V3 has been changed to a more conservative criterion based on revised assessment of the structural composition of the townhomes.

Figure 2. Location V1 Maximum Daily Construction Vibration Monitoring Data (VdB) – September 2018

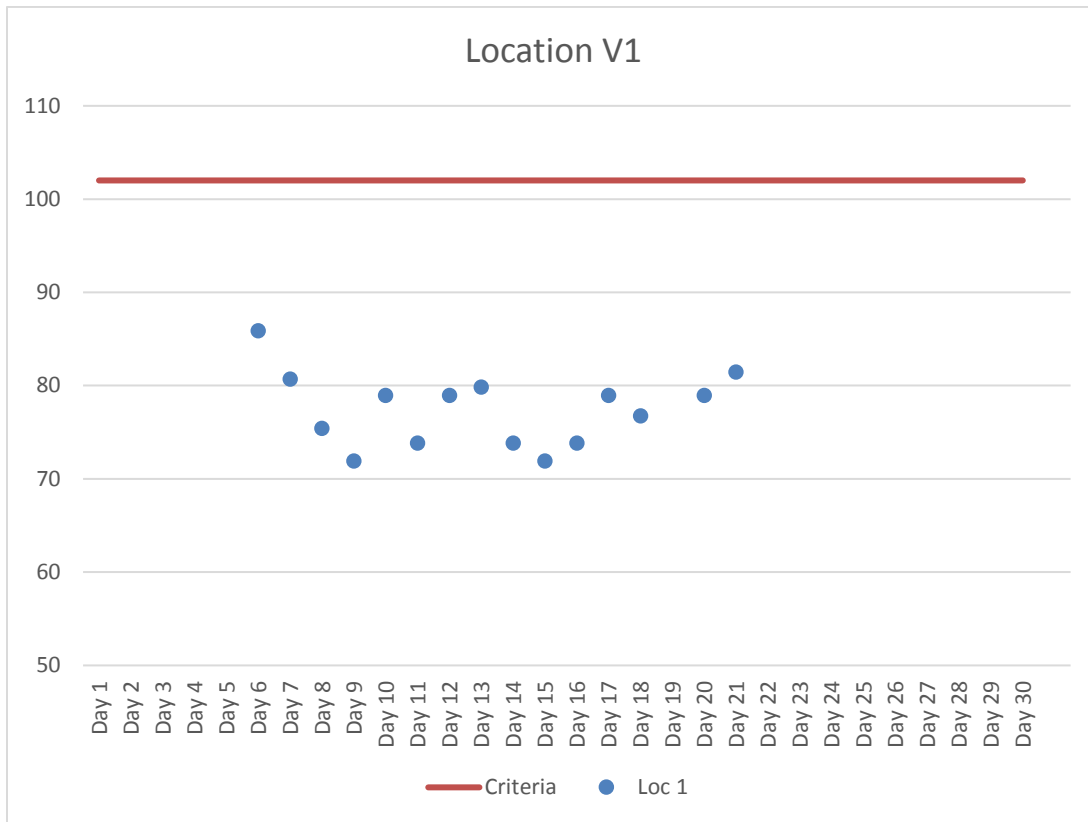


Figure 3. Location V2 Maximum Daily Construction Vibration Monitoring Data (VdB) – September 2018

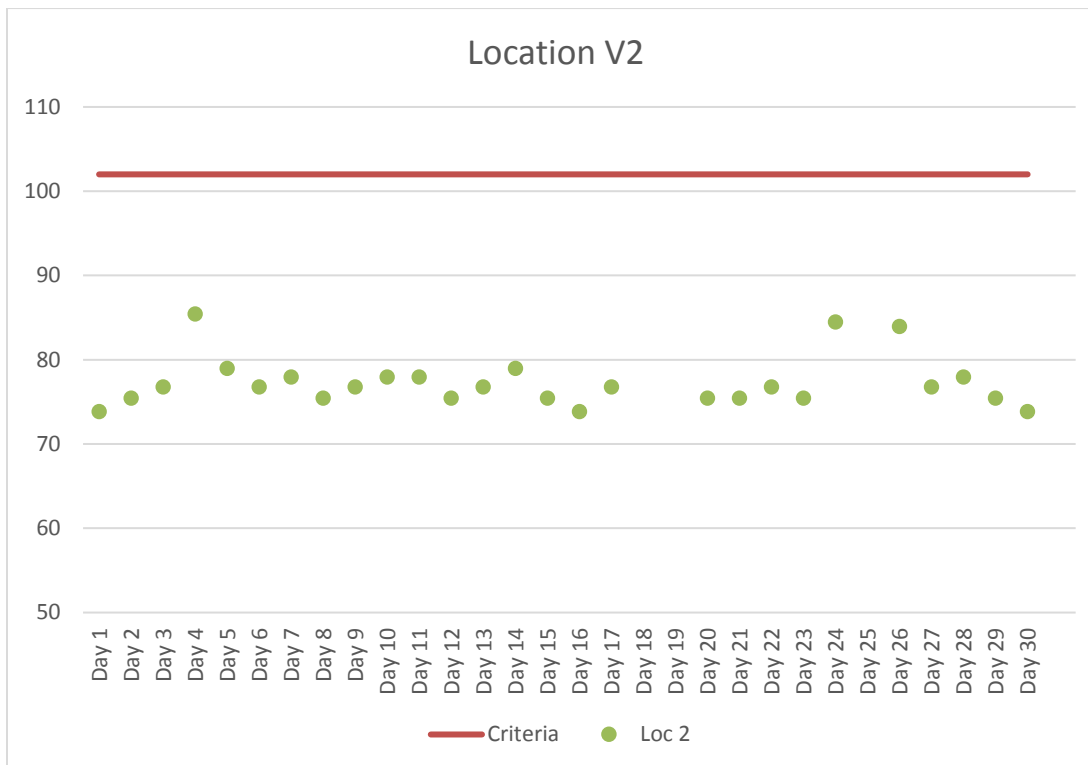


Figure 4. Location V3 Maximum Daily Construction Vibration Monitoring Data (VdB) – September 2018

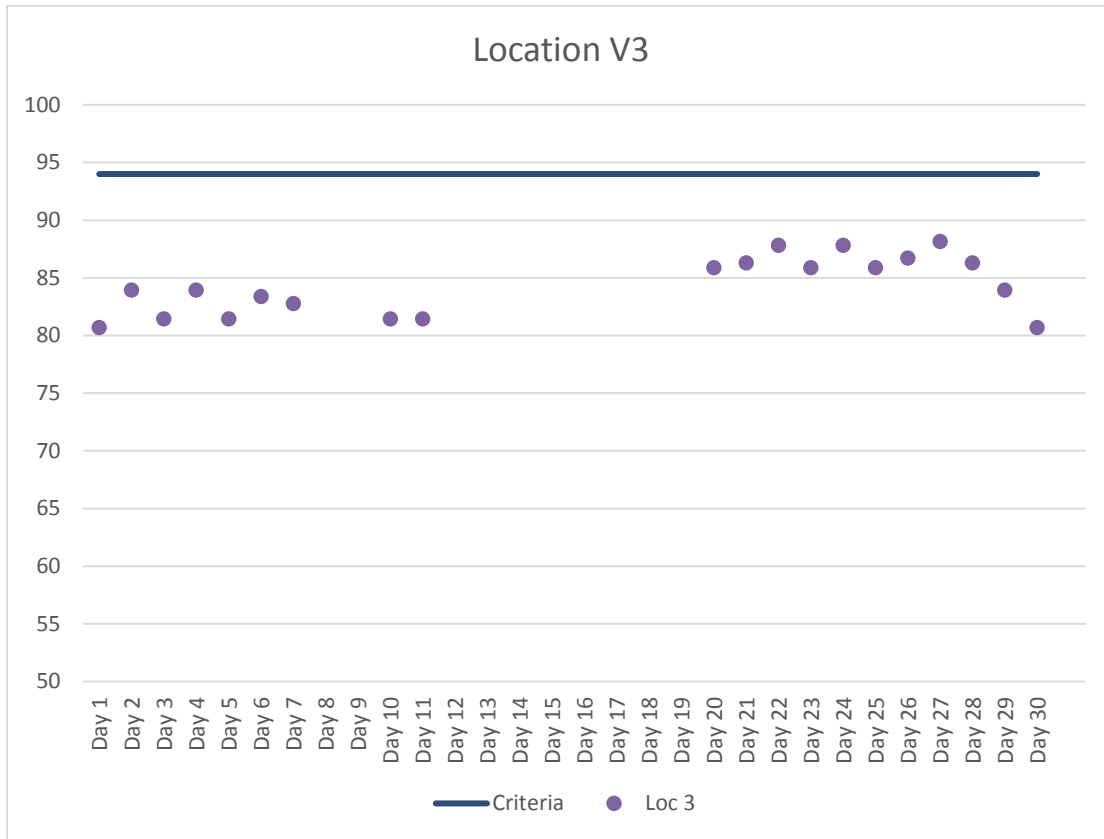


Figure 5. Location V4 Maximum Daily Construction Vibration Monitoring Data (VdB) – September 2018

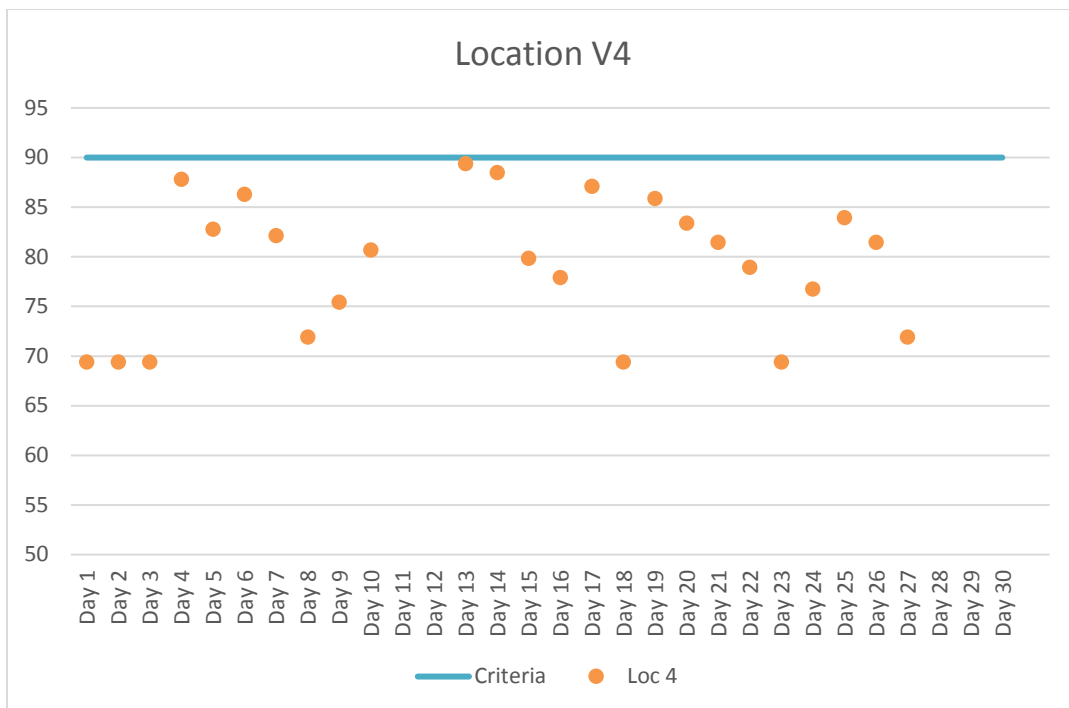


Figure 6. Location V5 Maximum Daily Construction Vibration Monitoring Data (VdB) – September 2018

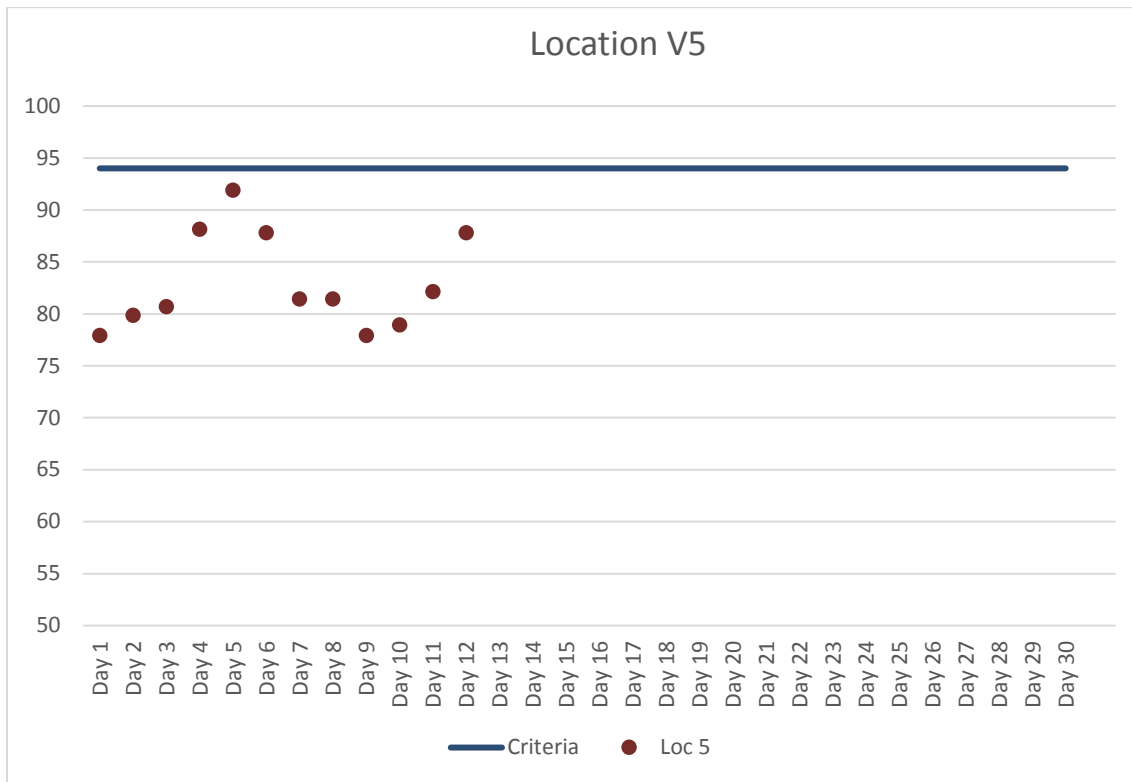


Figure 7. Location V6 Maximum Daily Construction Vibration Monitoring Data (VdB) – September 2018

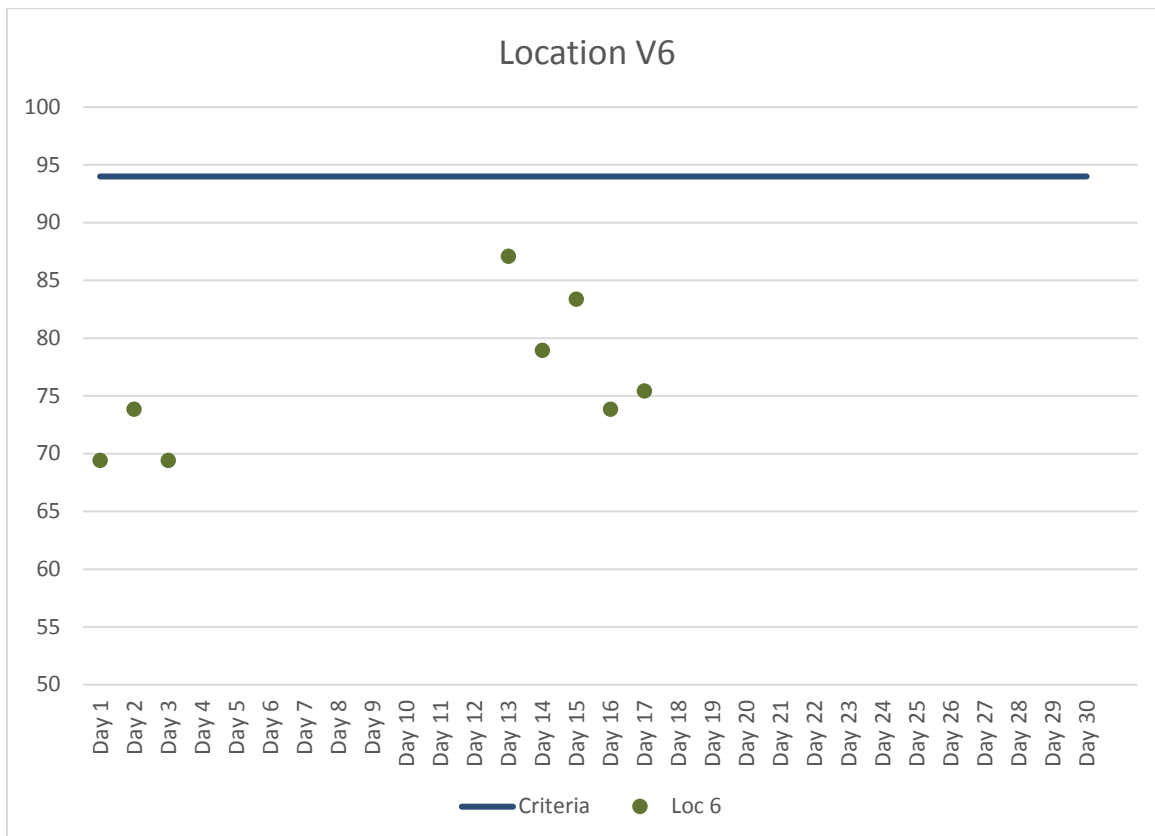


Figure 8. Location V7 Maximum Daily Construction Vibration Monitoring Data (VdB) – September 2018

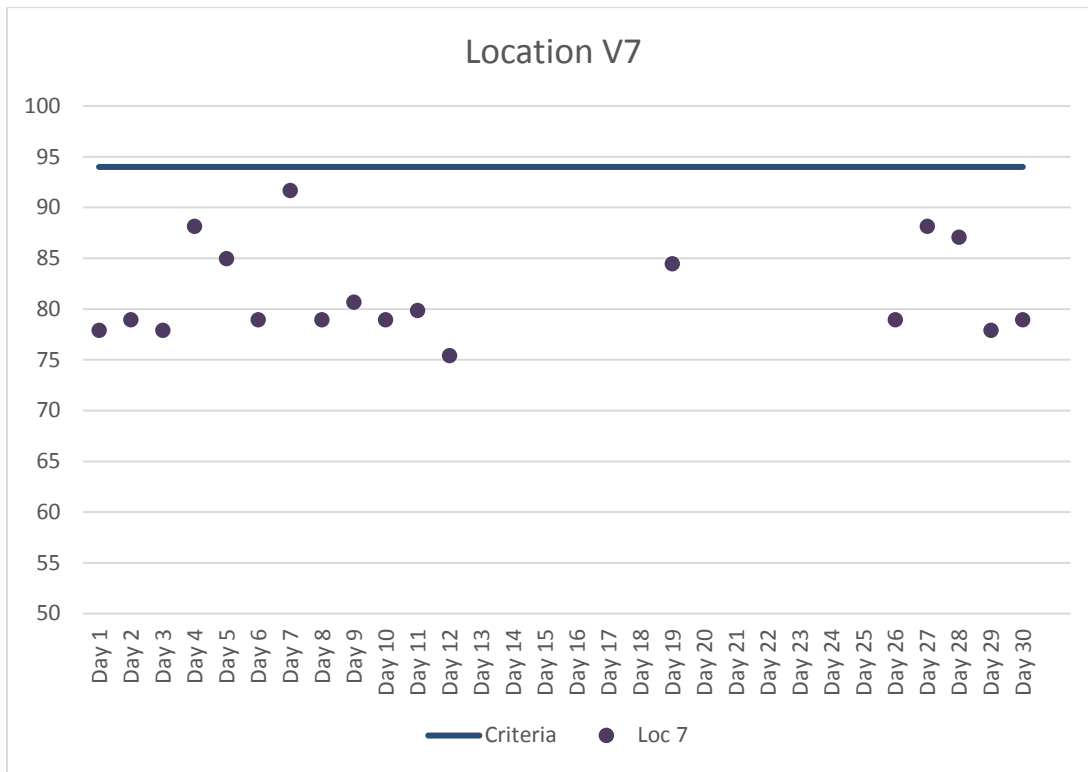


Figure 9. Location V8 Maximum Daily Construction Vibration Monitoring Data (VdB) – September 2018

