

13. Vibration

13.1. Chapter Overview

13.1.1. Introduction

This chapter discusses the changes to the potential for vibration impacts associated with modification of the Preferred Alternative as presented in the DEIS. The following revisions specifically apply to the vibration analysis:

- Change in project terminus: the Preferred Alternative ends in Englewood; consequently, the project would not cause any vibration impacts in Tenafly.
- West Side Avenue alignment: the relocation of the alignment requires assessment of the potential for vibration impacts.
- Relocation of Leonia Station parking deck: the parking deck would be relocated so it would no longer be adjacent to the Kulite building, where facility operators were concerned about construction- and operations-related vibration impacting manufacturing operations.

Public comments on the DEIS noted concern with potential vibration impacts during construction to manufacturing activities at the Kulite facility adjacent to the Leonia Station parking deck proposed in the DEIS. The change in location of the Leonia deck resolves this concern. This reassessment addresses only the changes to the SDEIS Preferred Alternative.

13.1.2. Summary of Findings of the DEIS and SDEIS

The Preferred Alternative would impact two resources, Bergen PAC Performing Arts School and a residence in downtown Englewood. Potential impacts to these resources can be mitigated during design such that the resources would not be impacted by the project. For the tracks near the noted residence, high resilience fasteners would be incorporated into the design. For the tracks near the Bergen PAC Performing Arts School, resiliently supported ties would be used. Table 13-1 details the estimated project vibration level and the mitigated vibration level, as compared to the Federal Transit Administration's (FTA) impact criteria.

Table 13-1: Vibration Levels of Buildings Impacted by the Preferred Alternative

Building	Criteria	Estimated Project Vibration Level	Mitigated Vibration Level
<i>Englewood</i>			
Bergen PAC Performing Arts School	65 VdB	73 VdB	63 VdB
Englewood Residence	72 VdB	74 VdB	69 VdB

13.2. Methodology

The methodology and criteria for this assessment is the same as that described in the DEIS. The assessment was prepared in accordance with the FTA's *Transit Noise and Vibration Impact Assessment* published in May 2006. Impacts are determined by estimating future ground-borne vibration levels and comparing those levels to the criteria shown in Table 13-2. For the DEIS analysis the criteria for frequent events were used, since the project would create more than 70 events per day. Likewise, the service level for the SDEIS analysis would have more than 70 events per day, so the criteria for frequent events were

used. The FTA guidance was used to determine the distance at which impact would occur for each land use category. These distances are shown in Table 13-2.

Table 13-2: Ground-Borne Vibration and Noise Impact Criteria

Land Use Category	Ground-Borne Vibration Impact Levels (VdB re 1 micro in/sec) for Frequent Events ⁽¹⁾	Impact Distance
Category 1: Buildings where vibration would interfere with interior operations	65 VdB	50 feet
Category 2: Residences and buildings where people normally sleep	72 VdB	40 feet
Category 3: Institutional land uses with primarily daytime use	75 VdB	15 feet
(1) "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive equipment is not sensitive to ground-borne vibration noise.		

Source: FTA's Transit Noise and Vibration Impact Assessment (May 2006) and Jacobs 2014.

For receptors with project-related vibration levels above the criteria, mitigation measures were identified for inclusion in the design. Measures that would reduce VdB include the use of high resilience fasteners, ballast mats, resiliently supported ties, and floating slab trackbed (refer to Table 13-3).

Table 13-3: FTA Vibration Mitigation Measures

Mitigation Measure	Effectiveness
High Resilience Fasteners	5 VdB
Ballast Mats	10 VdB
Resiliently Supported Ties	10 VdB
Floating Slab Trackbed	15 VdB

Source: FTA Transit Noise and Vibration Assessment, May 2006.

13.3. Environmental Review

13.3.1.1. Existing Conditions

The only changes to existing conditions as compared with the DEIS is that the study area has been changed in North Bergen and Bennett Studios, a recording studio in Englewood, is now the Bergen PAC Performing Arts School. In North Bergen the uses adjacent to the alignment are industrial/warehouse, Category 3 uses.

The Bergen PAC Performing Arts School still partially functions as a recording studio for the students; it would still be classified as a Category 1 use. The school is equipped with its own special vibration isolation system, allowing it to operate alongside the CSX freight operation.

13.3.1.2. Potential Impacts and Mitigation

No Build Alternative

There are no changes to the No Build Alternative as compared with the DEIS.

Preferred Alternative

There are no buildings in North Bergen within the 15-foot impact distance; therefore, there would be no new impacts. The new elevated portion of the alignment between West Side Avenue and the Northern Branch running track results in no change in the vibration scenario because there are no sensitive receptors in the vicinity of the alignment. The Bergen PAC Performing Arts School is approximately 10 feet west of the rail right-of-way. One residence located north of West Ivy Lane is approximately 30 feet west of the rail right-of-way. As shown in Table 13-4, the vibration level at the Bergen PAC Performing Arts School is 8 VdB over the criteria, while the residence is 2 VdB over the criteria.

Table 13-4: Vibration Levels of Buildings in Englewood Impacted by the Preferred Alternative

Building	Criteria	Estimated Project Vibration Level	Mitigated Vibration Level
Bergen PAC Performing Arts School	65 VdB	73 VdB	63 VdB
Englewood residence north of West Ivy Lane, west of rail right-of-way	72 VdB	74 VdB	69 VdB

Source: Jacobs, 2009.

Mitigation

To reduce the vibration levels associated with the project, resiliently supported ties would be used for the rail adjacent to the Bergen PAC Performing Arts School and high resilience fasteners would be used adjacent to the residence north of W. Ivy Lane. With these design measures, the vibration levels would be reduced to 63 VdB at the Bergen PAC Performing Arts School and 69 VdB at the residence, well below the FTA criteria of 65 VdB and 72 VdB, respectively.

13.4. Summary of Potential Environmental Effects of the DEIS and SDEIS

The Preferred Alternative would have the potential to impact two resources – the Bergen PAC Performing Arts School and a residence – both located in Englewood. Potential impacts to these resources can be mitigated during design such that the resources would not be impacted by the project. For the tracks near the noted residence, high resilience fasteners would be incorporated into the design. For the tracks near Bergen PAC Performing Arts School, resiliently supported ties would be used.

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