

To

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From

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Metro Transit

Subject

Orange Line BRT – Metro Transit

Minneapolis, MN

Date

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Technical Memorandum

This technical memorandum presents the noise assessment for the proposed Orange Line BRT (Orange Line) in Minneapolis, MN. The assessment was based on the procedures for a General Noise Assessment as presented in FTA's 2006 *Transit Noise and Vibration Impact Assessment*¹ guidance manual.

Methodology

FTA's guidance manual contains noise criteria and analysis procedures for assessing impacts from transit projects. The general assessment procedures presented in Chapter 5 of the FTA guidance manual were used to predict potential noise impacts from the proposed Orange Line BRT. The general assessment included the following steps:

- Identify noise sensitive land uses along the Orange Line route using Google Maps®;
- Estimate existing noise levels in the study area;
- Predict Orange Line BRT project noise levels;
- Assess noise impact from the Orange Line BRT according to FTA Noise Impact Criteria;
- Recommend mitigation based on FTA guidance manual.

The FTA noise impact criteria are based on a comparison of existing outdoor and proposed future project created outdoor noise levels. The criteria were developed to address potential annoyance at receptors using Leq or Ldn as the noise descriptor depending on land use. Noise mitigation is to be considered for receptors exposed to a severe impact or those with a moderate impact that falls just below the severe impact range. The graphical representation of the FTA criteria, Figure 1, is based on three land use categories as follows:

¹ *Transit Noise and Vibration Impact Assessment, Prepared by Harris Miller Miller & Hanson, Inc., Federal Transit Administration, FTA-VA-90-1003-06, May 2006.*

- Category 1 - Tracts of land where quiet is an essential element in their intended purpose. Includes indoor concert halls, outdoor concert pavilions, National Historic Landmarks with significant outdoor use, and recording studios;
- Category 2 - Residences and buildings where people normally sleep, including hotels and hospitals; and
- Category 3 - Institutional land uses with primarily daytime and evening use, including libraries, places of worship, and schools.

Figure 1 - FTA Noise Impact Criteria for Transit Projects

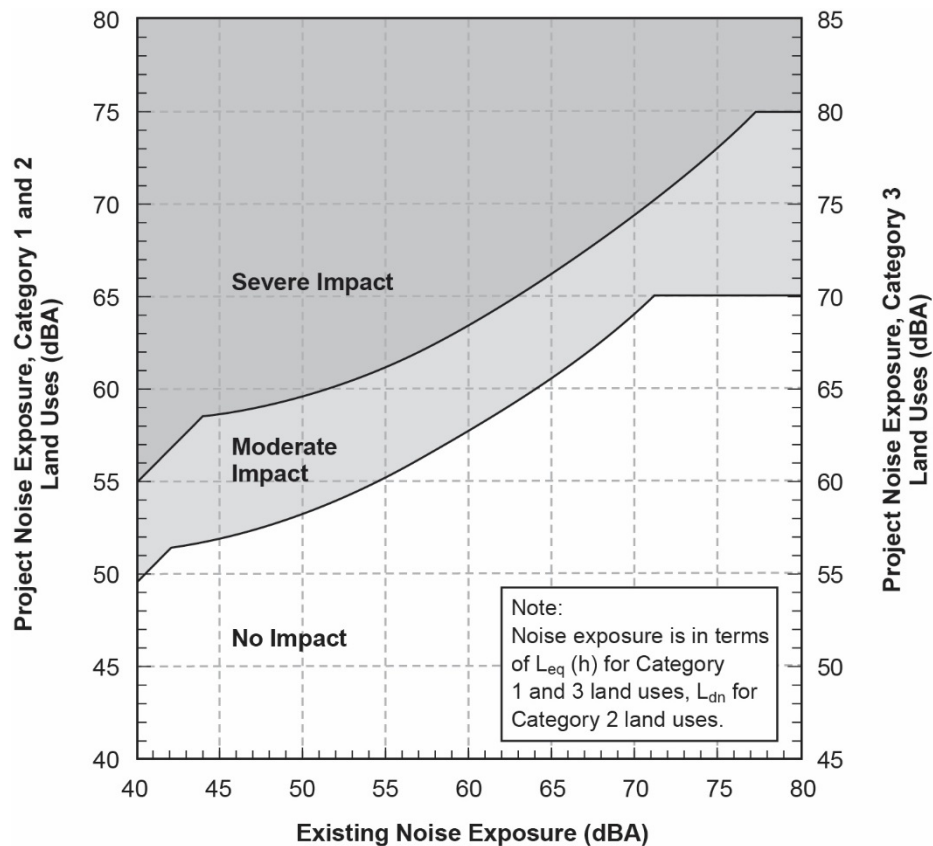


Figure Source Transit Noise and Vibration Impact Assessment, Figure 3-1.

The noise impact criteria in Figure 1 are “defined by two curves which allow increasing project noise levels as existing noise increases up to a point, beyond which impact is determined based on project noise alone.”² The three levels of impact shown in Figure 1 are defined in the FTA guidance manual as follows:

- No Impact - Below the lower curve the proposed project is considered to have no noise impact since, on the average, the introduction of the project will result in an insignificant increase in the number of people highly annoyed by project noise;

² Ibid, page 3-5.

- Moderate Impact – In this range the change in the cumulative noise level is noticeable to most people, but may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation, such as the existing level, predicted level of increase over existing noise levels and the types and numbers of noise-sensitive land uses affected
- Severe Impact – In this range a significant percentage of people would be highly annoyed by project noise.

Existing Land Use

Noise-sensitive land uses in the Orange Line study area were identified based on aerial photography, land use maps, Google Maps[®] and project drawings. The I-35W corridor was reviewed for noise-sensitive land uses within approximately 50' of either right-of-way line. Orange Line travels within the I-35W corridor for the majority of its length and uses existing bus- only shoulders and managed lanes. Based on this information, noise- sensitive land uses for each segment of the corridor are as follows:

- **Segment 1: Downtown Minneapolis** – At its north terminus, Orange Line would originate at 3rd Street and operate on 2nd and Marquette Avenues through downtown Minneapolis. Downtown is made up of primarily commercial properties. Noise-sensitive uses downtown include several multi-family residential buildings and hotels, WCCO radio and TV studios, Orchestra Hall, three recording studios (Syring Music, In the Groove Music, and Danger Studios), and several houses of worship including: Sparkhouse, Christian Science Reading Room, St. Olaf Catholic Church, Westminster Presbyterian Church, and Central Lutheran Church.
- **Segment 2: I-35W in Minneapolis to 76th Street in Richfield** – Orange Line would use a new flyover bridge to enter I-35W south of downtown Minneapolis. I-35W is an interstate freeway with noise walls on both sides through Minneapolis and Richfield. Noise-sensitive land uses along I-35W in Minneapolis are dominated by single- and multi-family residential properties, but also include Pilgrim Lutheran Church and School, New Beginnings Baptist Tabernacle, Mayflower Church, Clinton Field Park, Rev. Dr. Martin Luther King, Jr. Memorial Park, Minnehaha Creek Park, and the Museum of Russian Art. Similarly, in Richfield, noise-sensitive land uses along I-35W are mostly single- and multi-family residences, in addition to Wood Lake Nature Center, Donaldson Park, and Richfield Church of Christ.
- **Segment 3: 76th Street in Richfield to 82nd Street in Bloomington** – Orange Line would operate on 76th Street, Knox Avenue South, a new transit underpass under I-494, and on 82nd Street in this segment. Multi-family homes and a hotel comprise the noise-sensitive uses along this part of the Orange Line.
- **Segment 4: I-35W from 82nd Street in Bloomington to Burnsville Parkway in Burnsville** – Orange Line would travel on I-35W from 82nd Street to Highway 13 in Burnsville, and exit onto Highway 13 to reach the station platforms on Nicollet Avenue and Burnsville Parkway before returning to I-35W. Along with single- and multi-family residences, Bloomington Cemetery, Minnesota Valley National Wildlife Refuge, and Nativity of Mary Catholic Church are noise-sensitive sites in Bloomington. There also are some multi-family housing noise-sensitive land uses near the southern terminus of the alignment east of I-35W in Burnsville.

FTA land use Categories 2 and 3 exists in all four segments of the corridor. Land uses in Category 1 are located only in downtown Minneapolis.

Existing Noise Levels

The proposed Orange Line BRT project is intended to replace the Metro Transit Local Bus Route 535 which presently operates on local streets and I-35W from W. 94th Street in City of Bloomington into downtown Minneapolis then on Trunk Highway (TH) 65 north of I-94. Route 535 operates approximately 17 hours per day, with 30 minute service during off-peak hours and 15 minute service during peak hours, resulting in 33 buses in each direction during the day, 7:00 a.m. to 10:00 p.m. and 5 buses in each direction during the night, 10:00 p.m. to 7:00 a.m.

At the south end of the proposed Orange Line corridor, five bus routes presently use TH 13 and five bus routes use I-35W. At the north end of the proposed corridor, 25 routes, in addition to Route 535, use I-35W. Twenty-three bus routes enter downtown Minneapolis from I-35W on TH 65. Existing AADT volumes on TH 13 from the Burnsville Transit Center to I-35W are 35,000. Traffic volumes on I-35W range from 96,000 at TH 13 to 182,000 AADT prior to the I-94/I-35W interchange. Existing traffic volumes on TH 65 entering downtown Minneapolis are 25,000 vehicles per day.³ The majority of residential areas abutting I-35W receive mitigation from noise barriers.

Existing Ldn noise levels along the corridor range from 60 to 73 dBA based on FTA guidance on estimating existing noise levels⁴ and noise measurements performed for another transit project along I-35W⁵. The more conservative 60 dBA Ldn noise level will be used for determining noise impacts from the proposed project. The existing Ldn noise level along W. 82nd Street and W 76th Street based on FTA guidance is 56 dBA, while the downtown Ldn noise level along 2nd Street and Marquette are 58 dBA. Peak hour Leq noise levels along I-35W and downtown along 2nd Street and Marquette are 60 and 55 dBA, respectively.

Project Noise Levels

The proposed Orange Line BRT would operate approximately 20 hours per day, with 15 minute service during off-peak hours and 10 minute service during peak hours, resulting in 64 buses in each direction during the day, 7:00 a.m. to 10:00 p.m. and 25 buses in each direction during the night, 10:00 p.m. to 7:00 a.m.

The project Ldn and Leq noise levels were developed with FTA's Noise Impact Assessment Spreadsheet.⁶ The analysis was performed at six residential locations along the I-35W corridor from just north of W. 102nd Street to just south of E. 22nd Street. The first row of residences ranged from 175 to 230 feet from the I-35W corridor centerline. The BRT vehicles were all located on bus only shoulders therefore the BRTs were up to 90 feet away from residences on the near shoulder or up to 310 feet away from residences on the far shoulders. The majority of, but not all, residences are adjacent to noise barriers. Therefore, each analysis considered project noise levels with and

³ <http://www.dot.state.mn.us/traffic/data/tma.html>

⁴ *Transit Noise and Vibration Impact Assessment, Table 5-7.*

⁵ *Graham Johnson, "RE: Existing Noise Levels -I-35W Corridor", e-mail message, May 9, 2016.*

⁶ <https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/noise-impact-assessment-spreadsheet>, FTA, HMMH, 2007.

without noise barriers. The project Ldn noise levels without noise barriers ranged from 53 to 56 dBA. With noise barriers they ranged from 48 to 51 dBA.

The residences on W 82nd Street are 40 feet from the near lane of traffic and 87 feet from the far lane. Buildings along 2nd Street and Marquette are 40 feet from the centerline of the street. The BRT would be operating within the normal traffic lanes of the local city streets. The project Ldn noise levels along the local streets ranged from 56 to 58 dBA. The Orange Line BRT Ldn impact assessment is summarized in Table 1.

The project level Leq peak hour noise levels along I-35W without noise barriers would range from 50 to 52 dBA. With noise barriers they would range from 45 to 47 dBA. Along 2nd Street and Marquette the project level peak hour noise level would be 55 dBA. The Orange Line BRT Leq impact assessment is summarized in Table 2.

Table 1 – FTA General Assessment Impact Assessment Ldn Noise Levels

Scenario	Project Noise Source	Predicted Project Noise Level, Ldn, dBA	Existing Ambient Noise Level that would Cause a Moderate Impact, Ldn, dBA	Predicted Existing Noise Level, Ldn, dBA	Level of Noise Impact
I-35W With Noise Barriers	64 buses in each Direction from 7:00 a.m. to 10:00 pm 25 buses in each Direction from 10:00 p.m. to 7: 00 a.m.	48	<40	>60	No Impact
		51	<42	>60	No Impact
I-35W Without Noise Barriers		53	<49	>60	No Impact
		56	<57	>60	No Impact
W 82 nd Street, Knox, and W 76 th Street		56	<57	>65	No Impact
2 nd Street and Marquette		58	<60	>60	No Impact

Source: HNTB Corporation, May 2016

Table 2 – FTA General Assessment Impact Assessment Leq Noise Levels

Scenario	Project Noise Source	Predicted Project Noise Level, Leq, dBA	Existing Ambient Noise Level that would Cause a Moderate Impact, Leq, dBA	Predicted Existing Noise Level, Leq, dBA	Level of Noise Impact
I-35W With Noise Barriers	64 BRTs in each Direction from 7:00 a.m. to 10:00 pm	45	<40	>60	No Impact
		47	<40	>60	No Impact
I-35W Without Noise Barriers	25 BRTs in each Direction from 10:00 p.m. to 7:00 a.m.	50	<40	>60	No Impact
		52	<40	>60	No Impact
2 nd Street and Marquette		55	<40	>60	No Impact

Source: HNTB Corporation, May 2016

The predicted Ldn project noise levels in Table 1 were compared to Figure 1 to identify the levels at which a moderate impact would occur. If the existing noise levels were below 40 to 60 Ldn, dBA, there would be a moderate impact. Since the existing ambient noise levels, based on ambient measurements and FTA guidance for estimating Ldn noise levels is expected to be greater than 60 to 65 Ldn, dBA which is above the levels for moderate impact, no noise impact is predicted for the proposed Orange Line BRT. In like manner the Leq project levels in Table 2 were compared to Figure 1. Since all the predicted existing Leq noise levels were greater than 60 dBA and the existing ambient had to be below 40 dBA, none of the Orange Line BRT project level Leq noise levels would create an impact.