

Appendix E

***FTA NOISE MODELING WORKSHEETS
AND DETAILED METHODOLOGY***

APPENDIX E

General Noise Assessment

The FTA General Noise Assessment procedure was used for calculating noise from transit sources associated with the proposed project. The noise impact is assessed based on a combination of existing ambient noise exposure and the additional noise exposure that will be caused by the proposed project.

Existing Noise Exposure Levels: The Light Rail Rapid Transit (LRRT) system located on Main Street is the major source of existing noise in the vicinity of the proposed project. The FTA manual categorizes LRRT as a Fixed-Guideway Transit Source. The LRRT travels an average speed, S of 15 miles per hour across the project corridor. The average number of cars per train, N_{cars} is assumed to be three for this analysis (based on two cars during off-peak periods, three cars during peak periods, and four cars during special events and downtown sporting events). The LRRT system operates from approximately 5:30am to 1:00 am every day of the year. The LRRT operating schedule, obtained from NFTA website is presented in Table E-1.

Table E-1. LRRT Operating Schedule*						
	<u>Period</u>	<u>Headway (minutes)</u>		<u>Trains per hour</u>		<u>Total</u>
		<u>Inbound</u>	<u>Outbound</u>	<u>Inbound</u>	<u>Outbound</u>	
<u>Daytime</u>	7am - 9am	8	7	8	8	16
	9am - 2pm	9	8	7	7	14
	2pm - 7pm	8	8	8	7	15
	7pm - 10pm	6	7	10	9	19
<u>Nighttime</u>	10pm - 1am	6	7	10	9	19
	1am - 6am	--	--	--	--	--
	6am - 7am	8	7	8	8	16

*The schedule above is for weekdays. Assume the weekday schedule for all seven days of the week.

From Table E-1:

The average hourly volume of train traffic, V within the study area (i.e., from the Theater Station to Erie Canal Harbor) = 99 trains/24 hours = **4.1 trains/hour**;

The average hourly volume of traffic during daytime (7 am to 10 pm), V_d = 64 trains/15 hours = **4.3 trains/hour**; and

The average hourly volume of traffic during nighttime (10 pm to 7 am) V_n = 35 trains/9 hours = **3.9 trains/hour**

The rail track is jointed within the proposed project area and has an embedded track configuration (128 lb girder rail buried in concrete). There is no aerial structure with slab track. There is also no noise barrier blocking the line of sight from each noise sensitive receptor.

For the Category 2 receptors (Radisson Hotel and Youth Hostel), noise exposure in terms of L_{dn} at 50 ft (each of the three noise receptors are approximately 50 feet to the centerline of the LRRT's trackbed) were calculated as follows:

$$L_{eq}(\text{day}) = SEL_{ref} + 10 \log(N_{cars}) + 20 \log(S/50 \text{ feet}) + 10 \log(V_d) - 35.6$$

$$= 47 \text{ dBA}$$

Where SEL_{ref} , the reference sound exposure level for Rail Transit at 50 ft from track = 82 dBA (FTA, 2006).

The following adjustments were made in accordance with the FTA manual:

- Additional 5dBA for jointed track and additional 3 dBA for embedded track on grade.

Therefore, total $L_{eq}(\text{day}) = 47 \text{ dBA} + 8 \text{ dBA} = \mathbf{55 \text{ dBA}}$

$$L_{eq}(\text{night}) = SEL_{ref} + 10 \log(N_{cars}) + 20 \log(S/50 \text{ feet}) + 10 \log(V_n) - 35.6$$

$$= 46.6 \text{ dBA}$$

After adjusting for the jointed track and embedded track configuration,

Total $L_{eq}(\text{night}) = \mathbf{54.6 \text{ dBA}}$

$$L_{dn} \text{ at } 50 \text{ ft} = 10 \log [(15) \times 10^{(L_{eq}(\text{day})/10)} + (9) \times 10^{((L_{eq}(\text{night}) + 10)/10)}] - 13.8$$

$$= \mathbf{61.1 \text{ dBA}}$$

For the Category 3 receptor (St. Paul's Episcopal Cathedral Church), noise exposure in terms of hourly $L_{eq}(h)$ at 50 ft was calculated as follows:

$$L_{eq}(\text{hour}) = SEL_{ref} + 10 \log(N_{cars}) + 20 \log(S/50 \text{ feet}) + 10 \log(V) - 35.6$$

$$= 46.8 \text{ dBA}$$

After adjusting for the jointed track and embedded track configuration,

Total $L_{eq}(\text{hour}) = \mathbf{54.8 \text{ dBA}}$

Proposed Project Noise Exposure Levels: The proposed reintroduction of automobiles (cars and delivery trucks) to Main Street corridor would be an additional exposure to noise within the project's vicinity. The FTA manual categorizes these automobiles as Highway/Transit Sources. The automobile vehicles would be restricted to an average speed, S of 15 miles per hour.

The future (2025) Average Daily Traffic (ADT) volume for the Preferred Alternative is approximately 5,000 ADT (see section 7.0 – Transportation). This would result in an hourly traffic volume, V of 209 vehicles per hour, with projected average hourly daytime,

V_d (7 am to 10 pm) and nighttime, V_n (10 pm to 7 am) traffic volumes of 317 and 28 vehicles per hour, respectively.

The project noise exposure levels for the Preferred Alternative are calculated below:

For the Category 2 receptors (Radisson Hotel and Youth Hostel), noise exposure in terms of L_{dn} at 50 ft was calculated as follows:

$$\begin{aligned} L_{eq}(\text{day}) &= SEL_{ref} + 10 \log(V_d) + C_s \log(S/50 \text{ feet}) - 35.6 \\ &= \mathbf{47.7 \text{ dBA}} \end{aligned}$$

Where SEL_{ref} , the reference sound exposure level for automobiles and vans at 50 ft from roadway = 74 dBA (FTA, 2006); and

C_s , the Speed Constant for automobile and van pools = 30

$$\begin{aligned} L_{eq}(\text{night}) &= SEL_{ref} + 10 \log(V_n) + C_s \log(S/50 \text{ feet}) - 35.6 \\ &= \mathbf{37.2 \text{ dBA}} \end{aligned}$$

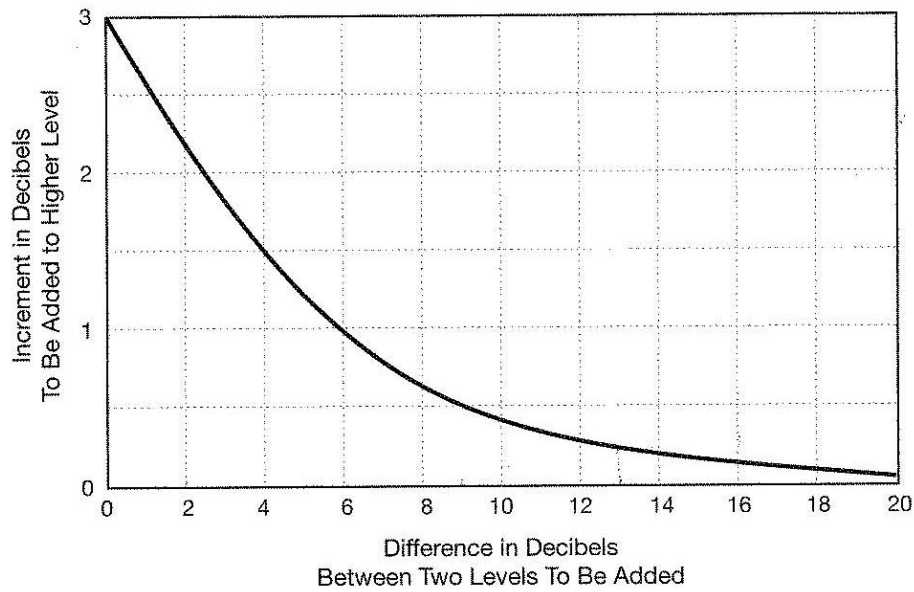
$$\begin{aligned} L_{dn} \text{ at } 50 \text{ ft} &= 10 \log [(15) \times 10^{(L_{eq}(\text{day})/10)} + (9) \times 10^{(L_{eq}(\text{night}) + 10)/10}] - 13.8 \\ &= \mathbf{47.5 \text{ dBA}} \end{aligned}$$

For the Category 3 receptor (St. Paul's Episcopal Cathedral Church), noise exposure in terms of hourly $L_{eq}(h)$ at 50 ft was calculated as follows:

$$\begin{aligned} L_{eq}(\text{hour}) &= SEL_{ref} + 10 \log(V) + C_s \log(S/50 \text{ feet}) - 35.6 \\ &= \mathbf{45.9 \text{ dBA}} \end{aligned}$$

Noise impact is assessed based on a combination of the existing ambient noise exposure (LRRT) and the additional noise exposure (automobile traffic) that will be caused by the proposed project. Figure E-1 provides a handy graph that can be used to add sound levels in decibels. For example, if two sound levels of 64 dB and 60 dB are to be added, the difference in decibels between the two levels to be added is 4 dB. The curve intersects the "4" where the increment to be added to the higher level is "1.5." Therefore the sum of the two levels is 65 dB.

Figure E-1. Graph for Approximate Decibel Addition



A summary of noise effects of the Preferred Alternative is presented in Table E-2.

Table E-2. Noise Effects of the Preferred Alternative

Criteria	Preferred Alternative						
	Share the Trackbed						
	Church	Radisson			Hostel		
Receptor	Leq(hour)	Leq(day)	Leq(night)	Ldn	Leq(day)	Leq(night)	Ldn
Traffic Noise	46	48	37	48	48	37	48
LRRT Noise	55	55	55	61	55	55	61
Combined Noise	56			61			61