



**Midvalley Connector Bus Rapid Transit**  
**Noise Analysis Technical Report**

June 2022

**Utah Transit Authority**

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## 1. Introduction

The Federal Transit Administration (FTA) and the Utah Transit Authority (UTA), in coordination with project partners Taylorsville City, Murray City, West Valley City, the Utah Department of Transportation (UDOT), Salt Lake Community College (SLCC), Salt Lake County, and Wasatch Front Regional Council (WFRC) are working together to prepare an Environmental Assessment (EA) for the proposed Midvalley Connector Bus Rapid Transit (BRT) project (see Figure 1). The proposed project is a new BRT facility connecting the Murray Central Station to the SLCC Redwood campus in Taylorsville to the West Valley Central Station (see Figure 12).

The portion of the BRT route from Murray Central Station to the SLCC Redwood campus was analyzed as the Preferred Alternative in the 2013 Taylorsville-Murray Transit ESR completed by UTA in coordination with Taylorsville, Murray, SLCC, WFRC, and Salt Lake County. Since the completion of the 2013 ESR, Murray, Taylorsville, West Valley City, and UTA have agreed to extend the proposed route from the SLCC Redwood campus to West Valley Central station. The BRT route, including the extension, were analyzed as the Locally Preferred Alternative (LPA) in the 2019 *Midvalley Connector BRT Project Final Environmental Study Report* (ESR) completed by UTA in coordination with Taylorsville, Murray, UDOT, SLCC, WFRC, and Salt Lake County. Since the completion of the 2019 ESR, the design has progressed to include some minor design refinements. The Midvalley Connector EA is being prepared to document refinements to the 2019 LPA, including design, land use and/or any regulatory or procedural changes, and any changes to the environment. In general, the overall project context and LPA have not changed substantially since the 2013 ESR and 2019 ESR were completed.

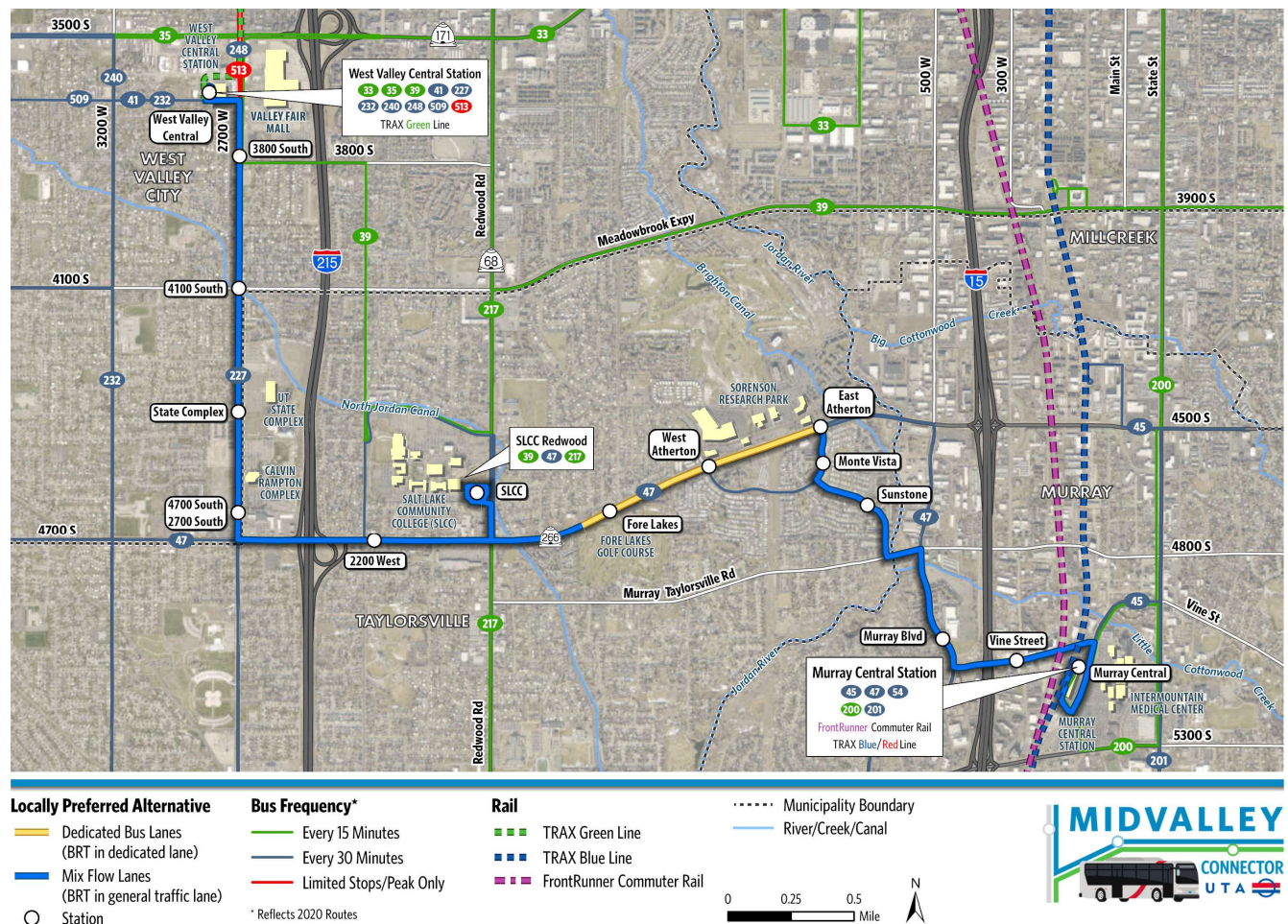
The LPA includes the following:

- 7 miles of BRT service to large employment, activity, and civic centers
- 15 stations with shelters, benches, real-time bus information, unique branding and infrastructure, and off-board fare collection/ticketing machines
- 1.4 miles of dedicated center-running transit lanes on 4500/4700 South with three center-running stations
- Frequent service throughout the day (10- to 15-minute headways), with transit signal priority for BRT vehicles at most intersections
- One new hub and two upgraded hubs
- 35-minute travel time from the Murray Central Station to the West Valley Central Station
- Shared-use path and complete street design elements along 4500/4700 South

This Noise Analysis Technical Report has been prepared in support of the Midvalley Connector EA and is intended to analyze potential noise impacts along the LPA.

The map displays the Midvalley Connector Study Area, a proposed transit corridor highlighted in dark blue. This corridor runs from the west side of Salt Lake County, through West Valley City, South Salt Lake, and Midvale, towards the south. The study area is situated between major highways I-15 and I-86. Surrounding municipalities and areas shown include Salt Lake City to the north, Holladay and Murray to the east, Cottonwood Heights and Sandy to the southeast, South Jordan to the south, and West Jordan to the southwest. The map also shows various state and federal roads, such as I-215, I-15, I-86, SR-186, SR-172, SR-154, SR-171, SR-173, SR-111, SR-134, SR-48, SR-209, SR-151, SR-135, SR-202, SR-201, SR-194, SR-269, SR-270, SR-71, SR-101, SR-195, SR-152, and SR-210. A scale bar at the bottom left indicates distances from 0 to 6 miles. The date 3/26/18 is noted in the bottom right corner.

Figure 2: Proposed Project



## 1.1 Project Need

The need for the Midvalley Connector BRT project includes the following:

- The existing transit network lacks an efficient and direct transit connection from FrontRunner commuter rail and TRAX to local and regional destinations in the project area.
- Accessibility and visibility are limited due to a lack of direct transit service connections between the redevelopment areas in the region.
- Transit service demand and the need for alternative mobility options will increase as the population and SLCC student enrollment continue to grow.

## 1.2 Project Purpose

The purpose of the Midvalley Connector BRT project is to:

- Provide a local and regional connection for destinations from the Murray Central Station to the West Valley Central Station.

- Improve transit service frequency and visibility to attract riders.
- Increase mobility and provide an alternative mode of transportation for future population and travel demand growth.
- Enhance the local economy by encouraging redevelopment and improving accessibility to existing and planned developments.

Under the LPA, a total of 10 buses would serve the BRT system and would run every 15 minutes the majority of the day (approximately 6 a.m. to 10 p.m.). Buses would run every 30 minutes during the hours of 10 p.m. to 12 a.m. and 4 a.m. to 6 a.m. However, this noise analysis assumed 10-minute headways during the day since this could be an option for the route and would provide a worst-case scenario. The final schedule would be determined by UTA during final design and implementation. Additional information on the project need and purpose is summarized in the EA.



## 2. Regulatory Setting

This noise analysis was conducted in accordance with the procedures outlined in the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* (FTA Noise Manual), September 2018 (FTA 2018).

According to the FTA Noise Manual, if a project is considered a multimodal project, a noise analysis should be conducted using FHWA's noise assessment methods. Multimodal projects can involve new highway construction providing general-purpose lanes as well as dedicated bus/high-occupancy vehicle (HOV) lanes and lane additions or reconfigurations on existing highways or arterials to accommodate buses/HOVs.

Although the proposed project would involve new roadway construction and dedicated bus/HOV lanes, this project would not be considered a multimodal project for the following reasons. According to the Federal Highway Administration's (FHWA) noise regulation under 23 CFR 772 for multimodal projects, a proposed transit project that would share an existing highway right-of-way is not necessarily a multimodal project under 23 CFR 772.7(a). A transit-only project that meets all three of the following criteria is not considered a multimodal project for purposes of 23 CFR 772:

1. Lead Agency: FTA is the lead agency in the National Environmental Policy Act (NEPA) process. FHWA's limited participation is as a cooperating agency.
2. Project Purpose: The main transportation purpose of the project, as stated in the purpose and need statement of the NEPA document, is transit-related and not highway-related.
3. Funding: No Federal-aid highway funds are being used to fund the project.

Transit-only projects that meet all three criteria should use FTA's *Transit Noise and Vibration Impact Assessment Manual* procedures to consider noise associated with the transit projects and any highway elements directly affected by the transit projects. Therefore, the FTA manual was used for this noise analysis since the project noise is exclusively due to new transit sources. This includes BRT improvements on separate roadways and bus operations on local streets and highways where the project does not include roadway construction or modification that significantly changes roadway capacity. It is assumed existing noise levels generated by roadway traffic and other sources would not change as a result of the project.

### 3. Noise Fundamentals

Noise is any disagreeable or undesired sound. Transit noise can come from transit vehicles in motion, stationary transit vehicles, and fixed-transit facilities. Noise is commonly measured in decibels and is expressed as "dB." Sound occurs over a wide range of frequencies. However, not all frequencies are detectable by the human ear; therefore, an adjustment is made to the high and low frequencies to approximate the way an average person hears traffic sounds. This adjustment is called A weighting and is expressed as "dBA." On the dBA scale, a change in noise levels perceived as a 3-dBA change is barely perceptible, a 5-dBA change is readily perceptible, and a 10-dBA change is perceived as a doubling or halving of noise.

Average hourly noise level (Leq) and day-night noise level (Ldn) are two noise descriptors typically used to represent the average noise level over a given period of time. Leq is the average noise level over one hour for daytime uses, such as parks and schools. For areas where nighttime noise is a concern, such as places where people sleep, the day-night noise level Ldn metric is used. Ldn logarithmically averages the noise levels over a 24-hour period and includes a 10-dBA penalty to nighttime noise levels between the hours of 10 p.m. and 7 a.m. to account for the increased noise sensitivity of people during nighttime hours.



## 4. Methodology

Per the FTA manual (FTA 2018), the FTA approach categorizes the noise sensitivity of receptors by the types of land uses and their sensitivity to noise. As discussed above, the noise metric that is used to describe the noise level is different depending upon whether the land use is sensitive to nighttime noise. Table 1 describes the types of land uses and metrics included in each category.

**Table 1: Land Use Categories and Metrics for Transit Noise Impact Criteria**

Land Use Category	Land Use Type	Noise Metric dB(A)	Description of Land Use Category
1	High Sensitivity	Outdoor Leq(1hr)*	Land where quiet is an essential element of its intended purpose. Example land uses include preserved land for serenity and quiet, outdoor amphitheaters and concert pavilions, and national historic landmarks with considerable outdoor use. Recording studios and concert halls are also included in this category.
2	Residential	Outdoor Ldn	This category is applicable to all residential land use and buildings where people normally sleep, such as hotels and hospitals.
3	Institutional	Outdoor Leq(1hr)*	This category is applicable to institutional land uses with primarily daytime and evening use. Example land uses include schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities are also included in this category.

\* Leq(1hr) for the loudest hour of project-related activity during hours of noise sensitivity.

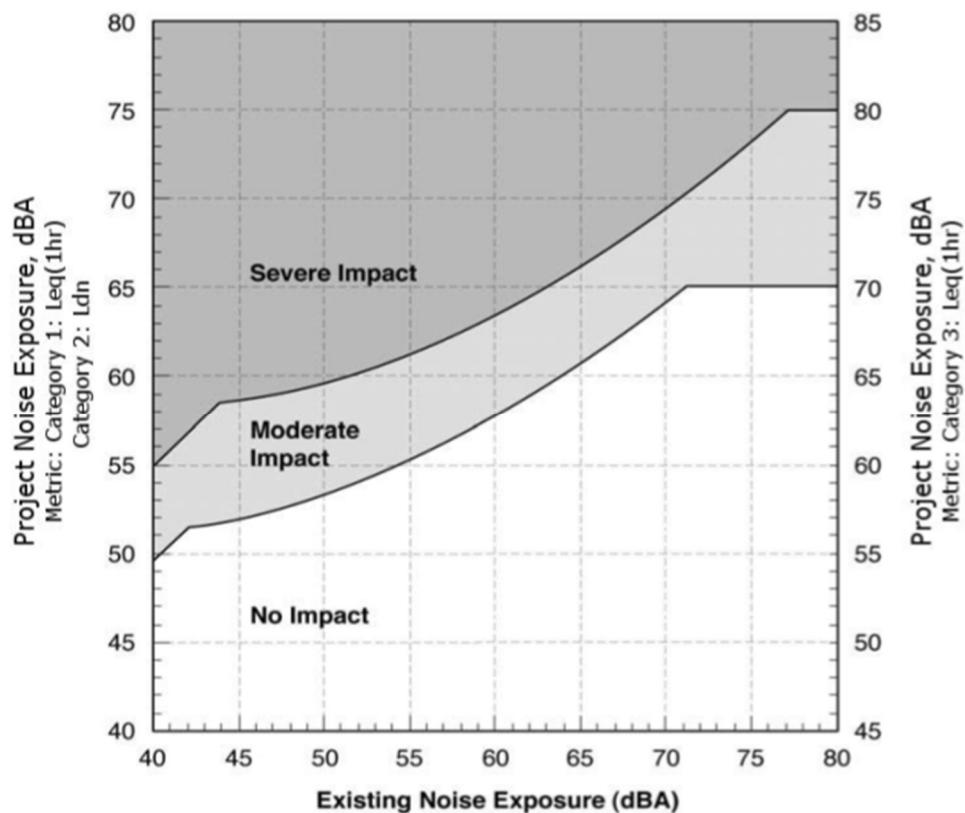
Source: FTA 2018.

FTA noise impact criteria to determine project noise exposure are based on a comparison of the existing outdoor noise levels (Leq or Ldn depending on land use category) and the future outdoor noise levels from the proposed project. Project impacts are categorized as “Moderate Impact” or “Severe Impact,” as determined from the allowable limit in project-generated noise exposure over the existing noise exposure (see Figure 3A and 3B).

The standard FTA Noise Impact Assessment Spreadsheet (FTA 2019) was used to conservatively quantify future project noise exposure associated with the operation of the LPA throughout the noise study area, which includes all project-related roadways analyzed in the project area.

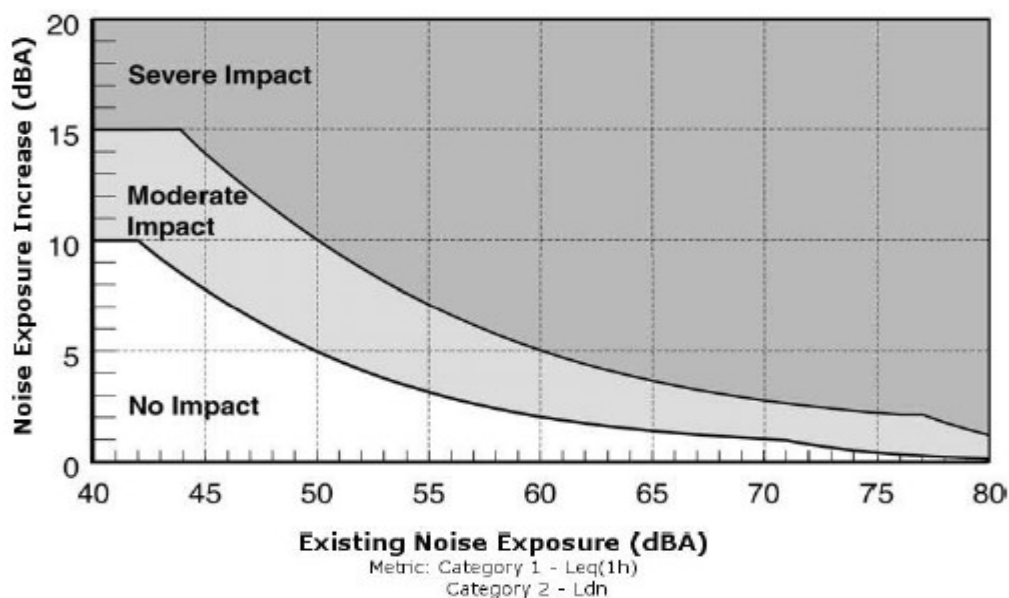
For this project, UTA is considering the use of diesel or electric buses. The type of buses would be determined by UTA during final design and implementation. Therefore, the noise analysis was conducted to provide results for two scenarios 1) use of diesel buses and 2) use of electric buses.

Figure 3A. Noise Impact Criteria for Transit Projects



Source: FTA 2018.

Figure 3B. Noise Impact Criteria for Transit Projects



Source: FTA 2018

## 5. Noise Analysis

The first step in a noise analysis is to conduct a screening procedure to identify if noise-sensitive land uses or receptors are located within the study area. If noise sensitive receptors are identified, then a General Noise Assessment (as defined in the FTA manual) is conducted based on a comparison of the existing outdoor noise levels and the future outdoor noise levels from the proposed project. The assessment considers activity interference caused by the transit project alone and annoyance due to the change in the noise environment caused by the transit project. Noise contours are developed to identify the number of noise sensitive receivers potentially impacted as a result of the project. Appendix A contains the FTA Noise Impact Assessment Spreadsheets (NIAS) (FTA 2019).

A vibration assessment was not conducted for this project since there are no improvements to existing rail or new rail alignment included.

A screening procedure was conducted to identify all noise sensitive receivers that may be impacted as a result of the project. According to FTA guidance, the screening distance for this project is based on BRT and Bus Transit Center with no intervening buildings, which results in a screening distance of 200 feet and 225 feet, respectively. However, due to the numerous noise sensitive receptors within the project area, representative receptors were selected to represent the different land use categories within the project area. The closest receptor in each area was selected to determine if noise impacts were anticipated as a result of the proposed project.

### 5.1 Existing Noise Conditions

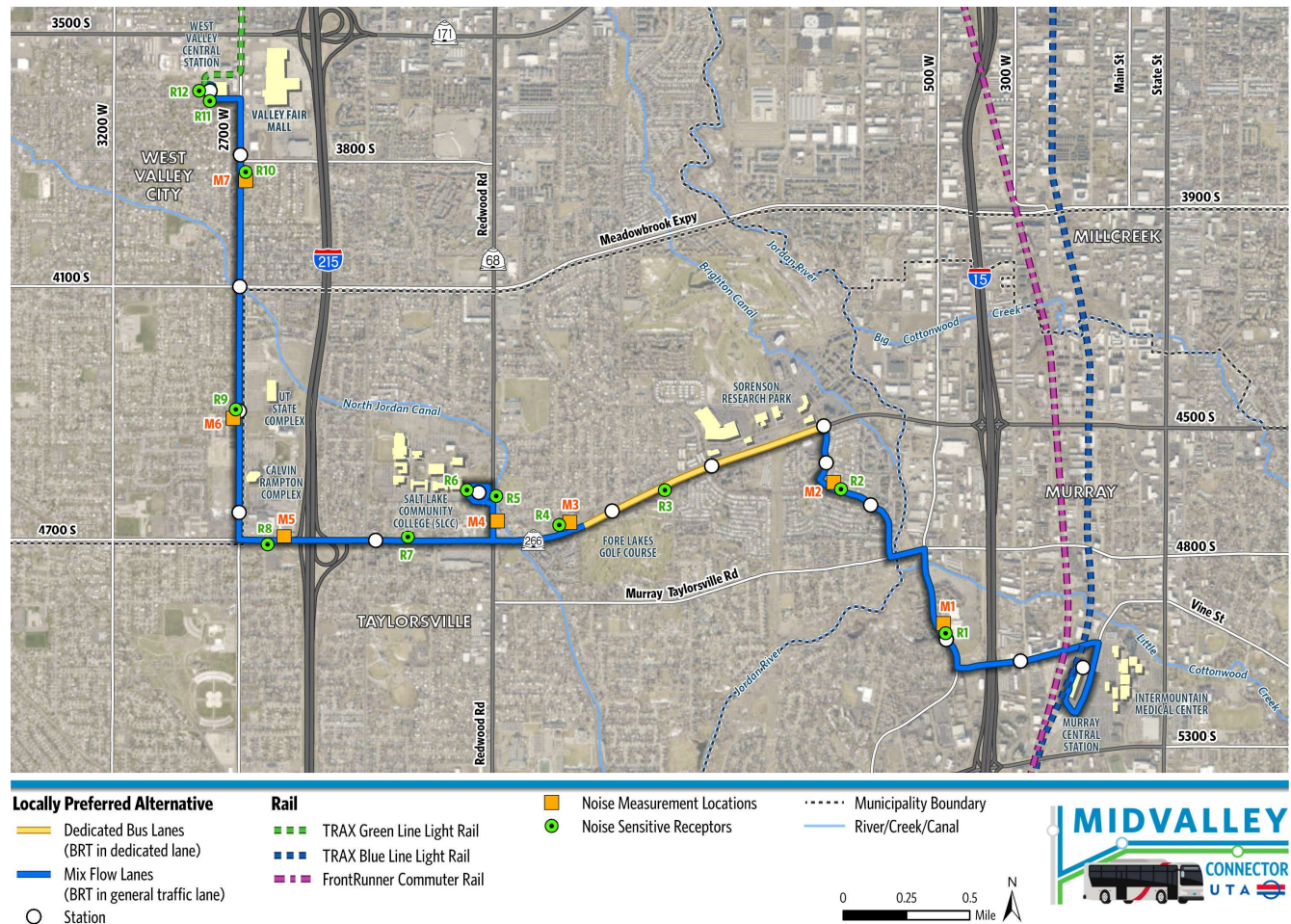
The majority of development within the study area along the existing BRT route from the Murray Central station to SLCC campus consists mostly of residential development with commercial development east of Murray Boulevard. There are no noise sensitive receptors within the screening distance for the Murray Central station.

The majority of development within the study area along the LPA from SLCC campus to West Valley Central station consists mostly of residential and commercial development mostly adjacent to Redwood Road and 4700 South. The only noise sensitive receptor within the screening distance of the SLCC campus is the SLCC campus, which does not provide student housing. Noise sensitive receptors within the screening distance of the West Valley Central station are a library and residential development.

There are 12 representative noise sensitive receptors within the study area that were selected based on changes in alignment and speeds along the LPA and represent the closest receptors in those areas.

The existing noise sources within the study area include mostly vehicle traffic as well as buses that use the existing route proposed for BRT. The existing noise exposure was based on field noise measurements collected for the 2013 and 2019 noise analyses (UTA 2019). The look-up tables in the FTA guidance were also used to determine existing noise exposure (FTA 2018). An adjustment factor was subtracted from the Leq in order to approximate the Ldn at residential development. Figure 4 depicts the proposed project area and noise sensitive receptors and measurement locations.

Figure 4. Noise Receptor and Measurement Locations



## 5.2 Future Noise Conditions

After determining the existing noise exposure, the total project noise and total noise exposure are calculated to determine if the project would result in any potential noise impacts. The total project noise is the noise level from the project alone, and the total noise exposure is the cumulative noise level when the project noise is added to existing noise levels.

Based on 10-minute headways during majority of the day and 30 minutes during the evening, this analysis assumed an average of 12 buses per hour during the daytime hours as defined by FTA (7 a.m. to 10 p.m.) and an average of 3.1 buses per hour during the evening hours as defined by FTA (10 p.m. to 7 a.m.). Existing posted speeds along the local streets and arterials (Redwood and 2700 West) are 25 mph and 40 mph, respectively. Existing posted speeds along 4700 South east of Redwood is 50 mph and west of Redwood is 40 mph. Future posted speeds were assumed to be the same.

The additional buses along the existing BRT route would operate in mixed-flow lanes while the additional buses along the new BRT extension on 4700 South and the new road at 1780 West would operate in dedicated bus lanes only. The dedicated bus lanes along 4700 South would be constructed toward the median, resulting in little to no shifting of the existing through lanes. However, widening of the existing lanes near the intersections of Redwood Road, the golf course access, 1175 West, and Atherton Drive are anticipated to accommodate the



proposed improvements. The proposed shift of the existing 4700 South roadway was accounted for in the noise results for receptor R3.

As mentioned in Section 4.0, UTA is considering the use of diesel or electric vehicles and the proposed fleet would be determined by UTA during final design and implementation. The results of the noise analysis are provided for two scenarios (diesel buses and electric buses) as discussed below and shown in Tables 2 and 3.

### **5.2.1 Noise Results**

#### **Scenario #1: Diesel Buses**

The following summarizes the results for scenario #1 assuming the proposed bus fleet would use diesel. As shown in Table 2, all representative receptors, except R1 and R2, are located at a distance outside the "moderate" noise impact contour, indicating that those receptors would experience no noise impacts. The residential representative receptors R1 and R2 are located just within the "moderate" noise impact contour. For residential receptors R1 and R2, the results indicate a 3 dB increase above existing noise levels and less than 1 dB above the no impact threshold (see Figure 5). Per FTA manual, the need for noise mitigation is determined based on the magnitude of impact and consideration of a number of factors related to the proposed project, such as the increase in noise, the effectiveness and feasibility of mitigation, existing transportation noise, and the cost. However, since reasonableness is not strictly defined, FTA recommends project sponsor's develop a noise mitigation policy. For this, the FTA recommends using a 2 dB over the no impact threshold as an example of when there would be a strong need for mitigation. UTA's noise mitigation policy is based on reasonable and feasible considerations when considering the need for mitigation. Per UTA policy, noise mitigation is not required for no impact or low-moderate impact, will be considered for high-moderate impact, and will be required for severe impact (UTA 2018). As shown in Figure 5, noise levels at residential receptors R1 and R2 are in the low-moderate impact range, less than 1 dB over the no impact threshold. Therefore, no noise mitigation will be required for the proposed project.

#### **Scenario #2: Electric Buses**

The following summarizes the results for scenario #2 assuming the proposed bus fleet would use electric power. As shown in Table 3, all representative receptors are located at a distance outside the "moderate" noise impact contour, indicating that the proposed project would result in no noise impacts. Therefore, no noise mitigation will be required for the proposed project.

Table 2. Summary of Noise Analysis Results for Scenario #1 (Diesel Buses)

Noise Sensitive Receptor # - Land Use Category	Noise Sensitive Receptor Location <sup>1</sup>	Distance from Source to Receptor (feet) <sup>2</sup>	Existing Noise Exposure (dBA)	Total Project Noise (project alone) (dBA)	Total Noise Exposure (dBA)	Increase in Noise Levels	Noise Contours		Noise Impact
							Moderate Impact (feet)	Severe Impact (feet)	
R1 & R2 – Category 2	Residential dwellings 5013 S. Murray Blvd. and 4598 Sunstone Rd., Murray	30 feet	58	58	61	+3	37 feet	15 feet	Yes, moderate
R3 – Category 2	Residential dwellings 4576 S. Greenbrook Ct., Taylorsville	55 feet (43 feet with future)	65 <sup>3</sup>	60	66	+1	39 feet	17 feet	No
R4 – Category 3	Church 1495 W. 4630 S., Taylorsville	160 feet	60	50	60	0	21 feet	9 feet	No
R5 – Category 3	Taylorsville Memorial Park Cemetery 1635 W. 4535 S., Taylorsville	35 feet	67 <sup>4</sup>	58	68	+1	9 feet	4 feet	No
R6 – Category 3	SLCC Campus 1818 W. 4535 S., Taylorsville	100 feet	55 <sup>3</sup>	56	58	+3	65 feet	38 feet	No
R7 – Category 2	Residential dwellings 2035 W. 4680 S., Taylorsville	30 feet	70 <sup>3</sup>	61	71	+1	18 feet	8 feet	No
R8 – Category 3	Church 2603 W. 4700 S., Taylorsville	40 feet	65 <sup>4</sup>	57	66	+1	11 feet	5 feet	No
R9 – Category 2	Residential dwellings 2700 W. Bedford Rd., Taylorsville	40 feet	63	59	65	+2	38 feet	16 feet	No

Noise Sensitive Receptor # - Land Use Category	Noise Sensitive Receptor Location <sup>1</sup>	Distance from Source to Receptor (feet) <sup>2</sup>	Existing Noise Exposure (dBA)	Total Project Noise (project alone) (dBA)	Total Noise Exposure (dBA)	Increase in Noise Levels	Noise Contours		Noise Impact
							Moderate Impact (feet)	Severe Impact (feet)	
R10 – Category 3	Church 3831 S. 2700 W., West Valley City	100 feet	58	51	59	+1	20 feet	8 feet	No
R11 – Category 2	Residential dwellings 3650 S. Market St., West Valley City	175 feet	55 <sup>3</sup>	52	57	+2	125 feet	73 feet	No
R12 – Category 3	West Valley Library 2880 W. 3650 S., West Valley City	130 feet	55 <sup>3</sup>	53	57	+2	65 feet	38 feet	No

<sup>1</sup> Closest representative receptor to the BRT route or transit center

<sup>2</sup> Distance from the centerline of the nearest travel lane or center from activity at transit center

<sup>3</sup> Estimated using FTA look-up tables (FTA 2018)

<sup>4</sup> Based on nearby comparable meter location



Table 3. Summary of Noise Analysis Results for Scenario #2 (Electric Buses)

Noise Sensitive Receptor # - Land Use Category	Noise Sensitive Receptor Location <sup>1</sup>	Distance from Source to Receptor (feet) <sup>2</sup>	Existing Noise Exposure (dBA)	Total Project Noise (project alone) (dBA)	Total Noise Exposure (dBA)	Increase in Noise Levels	Noise Contours		Noise Impact
							Moderate Impact (feet)	Severe Impact (feet)	
R1 & R2 – Category 2	Residential dwellings 5013 S. Murray Blvd. and 4598 Sunstone Rd., Murray	30 feet	58	52	59	+1	15 feet	6 feet	No
R3 – Category 2	Residential dwellings 4576 S. Greenbrook Ct., Taylorsville	55 feet (43 feet with future)	65 <sup>3</sup>	58	66	+1	29 feet	13 feet	No
R4 – Category 3	Church 1495 W. 4630 S., Taylorsville	160 feet	60	48	60	0	16 feet	7 feet	No
R5 – Category 3	Taylorsville Memorial Park Cemetery 1635 W. 4535 S., Taylorsville	35 feet	67 <sup>4</sup>	55	67	0	5 feet	2 feet	No
R6 – Category 3	SLCC Campus 1818 W. 4535 S., Taylorsville	100 feet	55 <sup>3</sup>	56	58	+3	65 feet	38 feet	No
R7 – Category 2	Residential dwellings 2035 W. 4680 S., Taylorsville	30 feet	70 <sup>3</sup>	58	70	0	11 feet	5 feet	No
R8 – Category 3	Church 2603 W. 4700 S., Taylorsville	40 feet	65 <sup>4</sup>	54	65	0	6 feet	3 feet	No
R9 – Category 2	Residential dwellings 2700 W. Bedford Rd., Taylorsville	40 feet	63	56	64	+1	23 feet	10 feet	No

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Noise Sensitive Receptor # - Land Use Category	Noise Sensitive Receptor Location <sup>1</sup>	Distance from Source to Receptor (feet) <sup>2</sup>	Existing Noise Exposure (dBA)	Total Project Noise (project alone) (dBA)	Total Noise Exposure (dBA)	Increase in Noise Levels	Noise Contours		Noise Impact
							Moderate Impact (feet)	Severe Impact (feet)	
R10 – Category 3	Church 3831 S. 2700 W., West Valley City	100 feet	58	48	58	0	12 feet	5 feet	No
R11 – Category 2	Residential dwellings 3650 S. Market St., West Valley City	175 feet	55 <sup>3</sup>	52	57	+2	125 feet	73 feet	No
R12 – Category 3	West Valley Library 2880 W. 3650 S., West Valley City	130 feet	55 <sup>3</sup>	53	57	+2	65 feet	38 feet	No

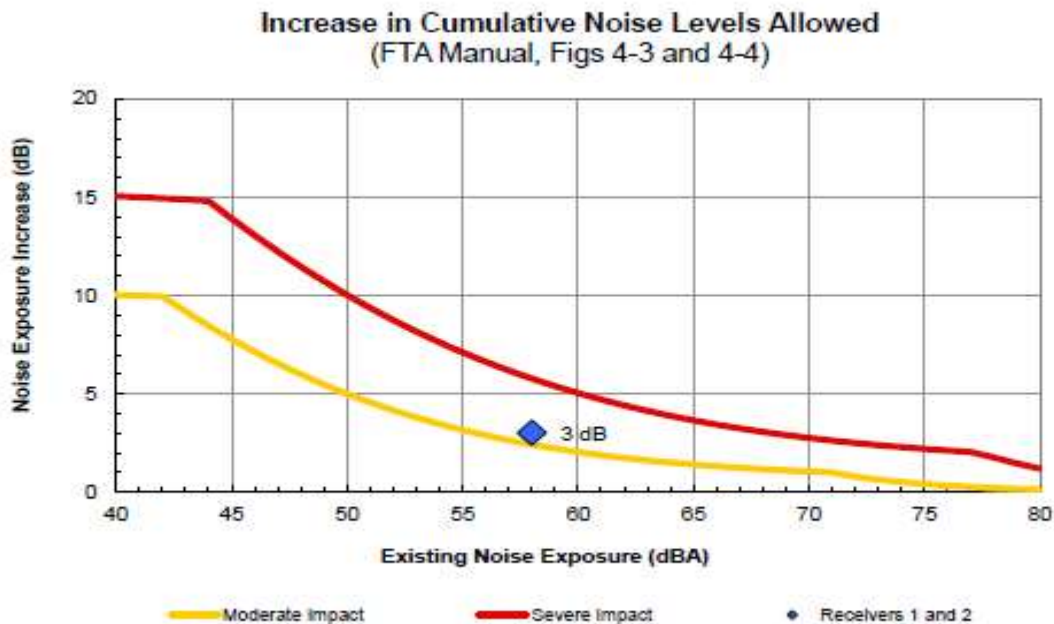
<sup>1</sup> Closest representative receptor to the BRT route or transit center

<sup>2</sup> Distance from the centerline of the nearest travel lane or center from activity at transit center

<sup>3</sup> Estimated using FTA look-up tables (FTA 2018)

<sup>4</sup> Based on nearby comparable meter location

Figure 5: R1 and R2 Noise Levels Compared to Noise Thresholds for Scenario #1 (Diesel Buses)



### 5.3 Construction Noise

Noise generated from construction activities can vary depending on the duration and complexity of the project. Construction activities with this proposed project could include: traffic detours along 4700 South, traffic along access and haul roads, prolonged activities near residents, and back-up alarms on heavy equipment. However, construction activities are temporary and would mostly be conducted during daytime hours. All construction work would be subject to Taylorsville, Murray, and West Valley City noise ordinances.

### 5.4 Conclusions

Under scenario #1 the proposed bus fleet would consist of diesel buses. Two of the representative receptors (R1 and R2) are located within the moderate noise impact contour. There are no severe noise impacts. Noise mitigation is not reasonable for this project under scenario #1. Therefore, no further analysis is required.

Under scenario #2 the proposed bus fleet would consist of electric buses. The proposed project would result in no noise impacts. Under scenario #2, noise mitigation is not required for this project and no further analysis is needed.

During final design and implementation, UTA will determine the final bus route schedule and proposed bus type.

## 6. References

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment*. September 2018. FTA Report No. 0123.

Federal Transit Administration (FTA). 2019. *Noise Impact Assessment Spreadsheet*. January 29, 2019.

Utah Transit Authority (UTA). 2018. *Standard Operating Procedures No. 002, Noise Assessment and Mitigation Procedures*. Revised April 13, 2018.

Utah Transit Authority (UTA). 2019. *Midvalley Connector BRT Project Final Environmental Study Report (ESR)*.

## **Appendix A. FTA Spreadsheets**

## Scenario #1: Diesel Bus Results

Project: Midvalley BRT - south of 4700

Receiver Parameters	
Receiver:	Receivers 1 and 2
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	58 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
	Source Type:	Highway/Transit
	Specific Source:	Buses (diesel-powered)
Daytime hrs	Speed (mph)	25
	Avg. Number of Events/hr	12
Nighttime hrs	Speed (mph)	25
	Avg. Number of Events/hr	3.1
Distance	Distance from Source to Receiver (ft)	30
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

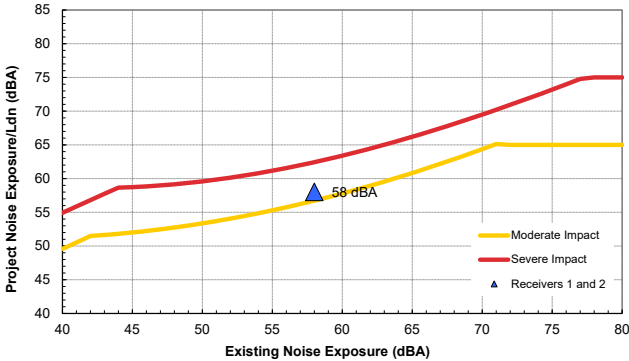
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Ldn:	58 dBA
Total Project Ldn:	58 dBA
Total Noise Exposure:	61 dBA
Increase:	3 dB
Impact?:	Moderate

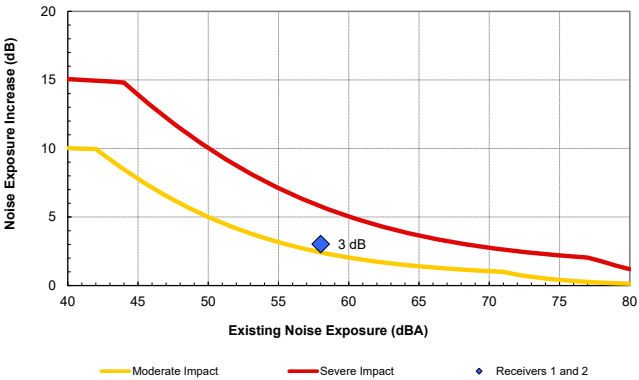
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	37 ft
Dist to Sev. Impact Contour (Source 1):	15 ft

Source 1 Results	
Leq(day):	56.0 dBA
Leq(night):	50.1 dBA
Ldn:	58.0 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)





Project: Midvalley BRT - 4700

Receiver Parameters	
Receiver:	Receiver 3
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	65 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
	Source Type:	Highway/Transit
	Specific Source:	Buses (diesel-powered)
Daytime hrs	Speed (mph)	50
	Avg. Number of Events/hr	12
Nighttime hrs	Speed (mph)	50
	Avg. Number of Events/hr	3.1
Distance	Distance from Source to Receiver (ft)	43
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

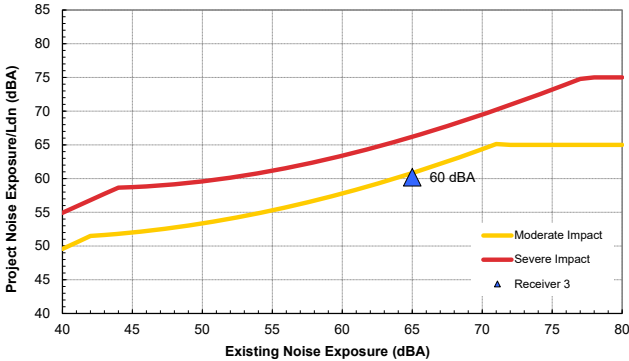
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Ldn:	65 dBA
Total Project Ldn:	60 dBA
Total Noise Exposure:	66 dBA
Increase:	1 dB
Impact?:	None

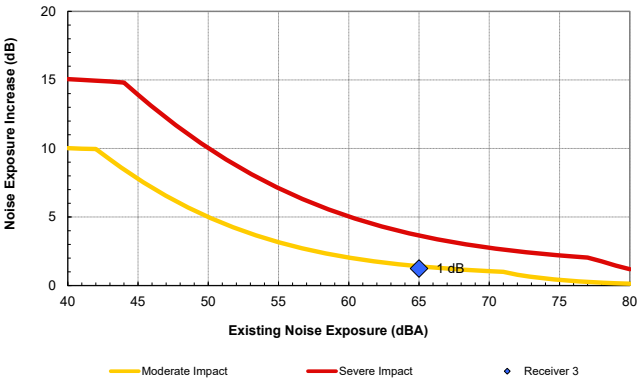
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	39 ft
Dist to Sev. Impact Contour (Source 1):	17 ft

Source 1 Results	
Leq(day):	58.2 dBA
Leq(night):	52.3 dBA
Ldn:	60.2 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)



Project: Midvalley BRT - 4700

Receiver Parameters	
Receiver:	Receiver 4
Land Use Category:	3. Institutional
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
Noisiest hr of Activity During Sensitive hrs	Source Type:	Highway/Transit
	Specific Source:	Buses (diesel-powered)
	Speed (mph)	50
	Number of Events/hr	12
Distance	Distance from Source to Receiver (ft)	160
	Number of Intervening Rows of Buildings	0
	Noise Barrier?	No
Adjustments		

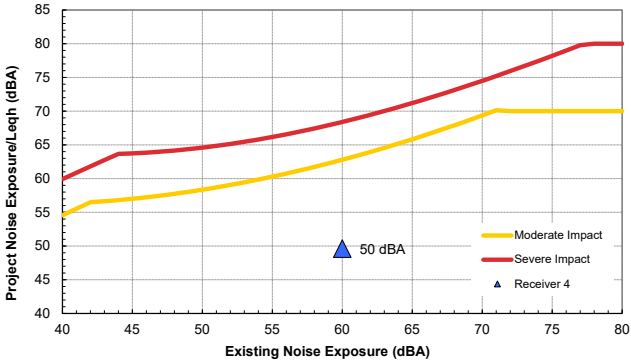
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Leqh:	60 dBA
Total Project Leqh:	50 dBA
Total Noise Exposure:	60 dBA
Increase:	0 dB
Impact?:	None

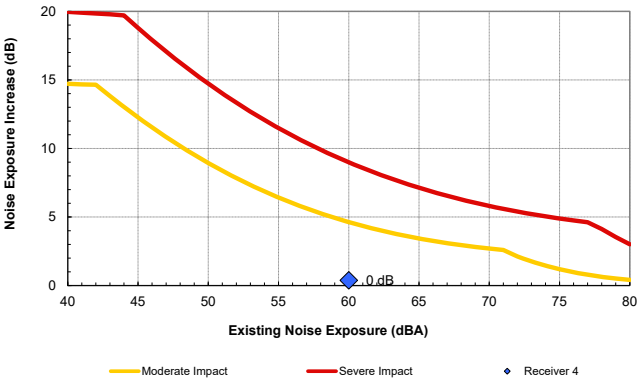
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	21 ft
Dist to Sev. Impact Contour (Source 1):	9 ft

Source 1 Results	
Leqh: 49.6 dBA	

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)



Project: Midvalley BRT - redwood

Receiver Parameters	
Receiver:	Receiver 5
Land Use Category:	3. Institutional
Existing Noise (Measured or Generic Value):	67 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
Noisiest hr of Activity During Sensitive hrs	Source Type:	Highway/Transit
	Specific Source:	Buses (diesel-powered)
	Speed (mph)	40
	Number of Events/hr	12
Distance	Distance from Source to Receiver (ft)	35
	Number of Intervening Rows of Buildings	0
	Noise Barrier?	No
Adjustments		

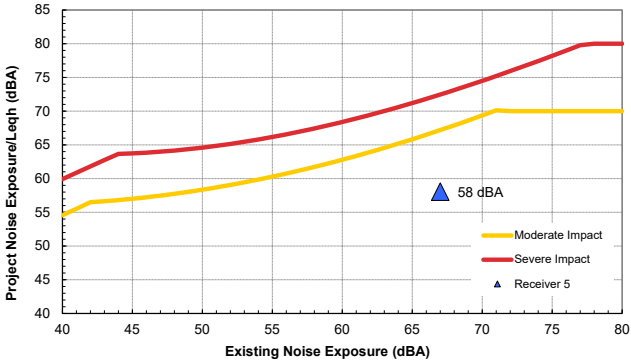
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Leqh:	67 dBA
Total Project Leqh:	58 dBA
Total Noise Exposure:	68 dBA
Increase:	1 dB
Impact?:	None

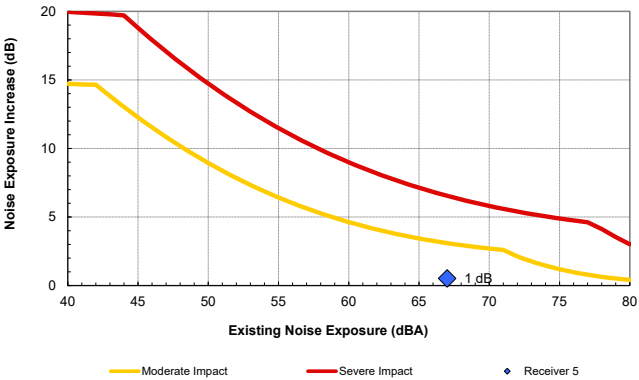
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	9 ft
Dist to Sev. Impact Contour (Source 1):	4 ft

Source 1 Results	
Leqh:	58.1 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)



Project: Midvalley BRT - SLCC station

Receiver Parameters	
Receiver:	Receiver 6
Land Use Category:	3. Institutional
Existing Noise (Measured or Generic Value):	55 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
	Source Type:	Stationary Source
	Specific Source:	Bus Transit Center
Noisiest hr of Activity During Sensitive hrs	Number of Buses/hr	12
Distance	Distance from Source to Receiver (ft)	100
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

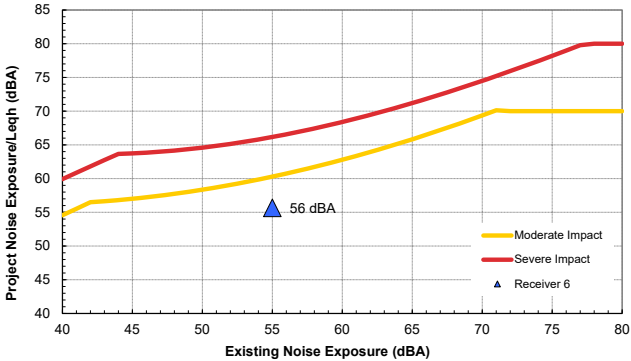
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Leqh:	55 dBA
Total Project Leqh:	56 dBA
Total Noise Exposure:	58 dBA
Increase:	3 dB
Impact?:	None

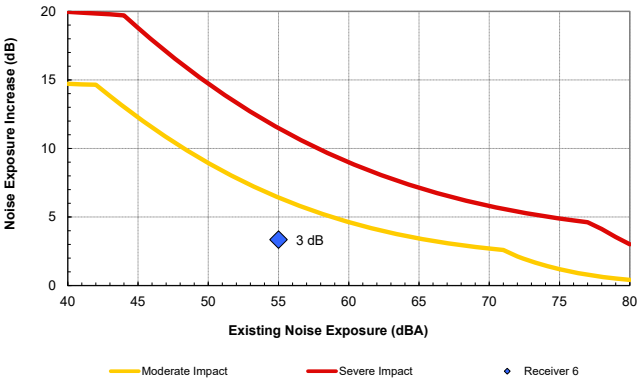
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	65 ft
Dist to Sev. Impact Contour (Source 1):	38 ft

Source 1 Results	
	Leqh: 55.7 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)



Project: Midvalley BRT - 4700

Receiver Parameters	
Receiver:	Receiver 7
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	70 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
	Source Type:	Highway/Transit
	Specific Source:	Buses (diesel-powered)
Daytime hrs	Speed (mph)	40
	Avg. Number of Events/hr	12
Nighttime hrs	Speed (mph)	40
	Avg. Number of Events/hr	3.1
Distance	Distance from Source to Receiver (ft)	30
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

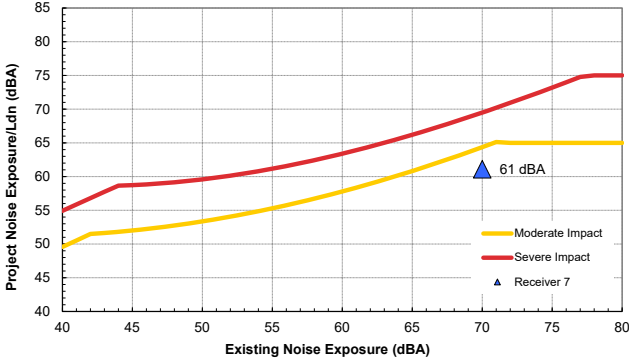
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Ldn:	70 dBA
Total Project Ldn:	61 dBA
Total Noise Exposure:	71 dBA
Increase:	1 dB
Impact?:	None

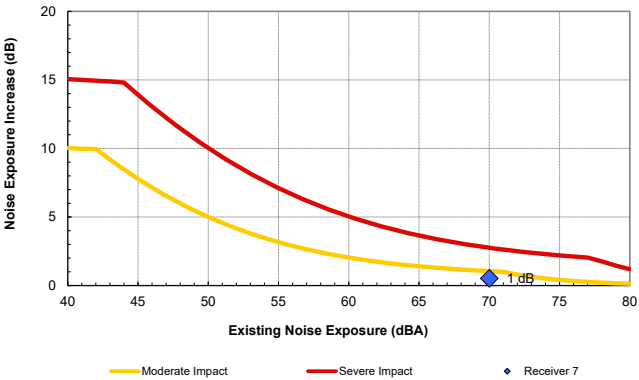
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	18 ft
Dist to Sev. Impact Contour (Source 1):	8 ft

Source 1 Results	
Leq(day):	59.1 dBA
Leq(night):	53.2 dBA
Ldn:	61.1 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)



Project: Midvalley BRT - 4700

Receiver Parameters	
Receiver:	Receiver 8
Land Use Category:	3. Institutional
Existing Noise (Measured or Generic Value):	65 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
Noisiest hr of Activity During Sensitive hrs	Source Type:	Highway/Transit
	Specific Source:	Buses (diesel-powered)
	Speed (mph)	40
	Number of Events/hr	12
Distance	Distance from Source to Receiver (ft)	40
	Number of Intervening Rows of Buildings	0
	Noise Barrier?	No
Adjustments		

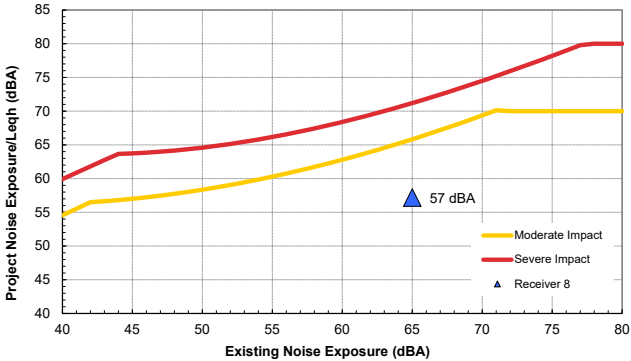
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Leqh:	65 dBA
Total Project Leqh:	57 dBA
Total Noise Exposure:	66 dBA
Increase:	1 dB
Impact?:	None

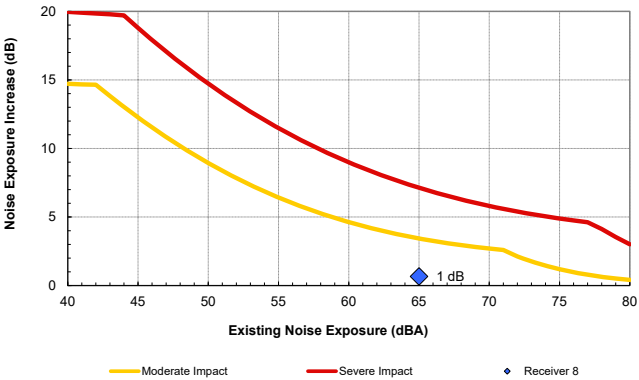
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	11 ft
Dist to Sev. Impact Contour (Source 1):	5 ft

Source 1 Results	
Leqh:	57.2 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)



Project: Midvalley BRT - 2700

Receiver Parameters	
Receiver:	Receiver 9
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	63 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
	Source Type:	Highway/Transit
	Specific Source:	Buses (diesel-powered)
Daytime hrs	Speed (mph)	40
	Avg. Number of Events/hr	12
Nighttime hrs	Speed (mph)	40
	Avg. Number of Events/hr	3.1
Distance	Distance from Source to Receiver (ft)	40
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

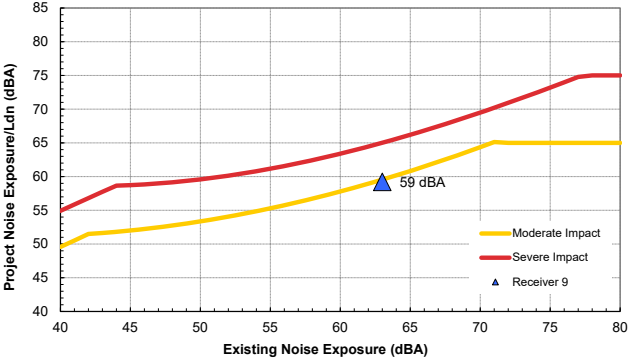
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Ldn:	63 dBA
Total Project Ldn:	59 dBA
Total Noise Exposure:	65 dBA
Increase:	2 dB
Impact?:	None

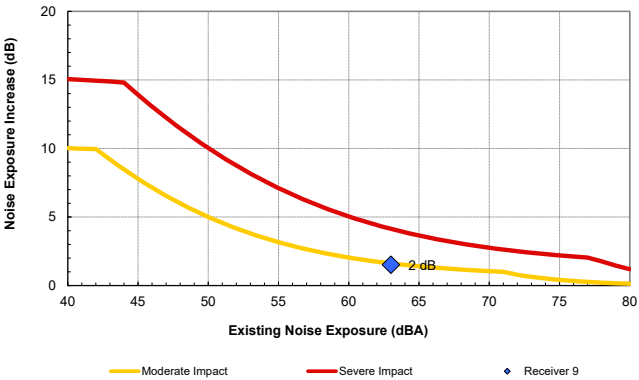
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	38 ft
Dist to Sev. Impact Contour (Source 1):	16 ft

Source 1 Results	
Leq(day):	57.2 dBA
Leq(night):	51.3 dBA
Ldn:	59.2 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)





Project: Midvalley BRT - 2700

Receiver Parameters	
Receiver:	Receiver 10
Land Use Category:	3. Institutional
Existing Noise (Measured or Generic Value):	58 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
Noisiest hr of Activity During Sensitive hrs	Source Type:	Highway/Transit
	Specific Source:	Buses (diesel-powered)
	Speed (mph)	40
	Number of Events/hr	12
Distance	Distance from Source to Receiver (ft)	100
	Number of Intervening Rows of Buildings	0
	Noise Barrier?	No
Adjustments		

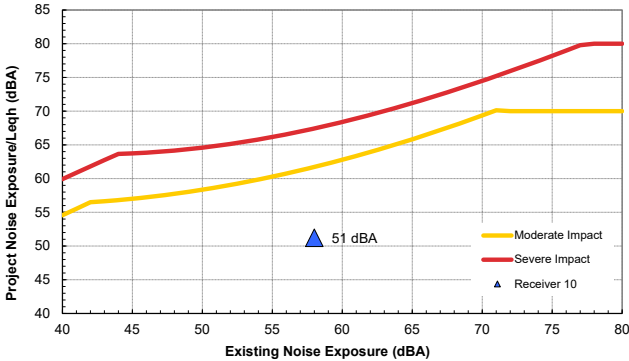
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Leqh:	58 dBA
Total Project Leqh:	51 dBA
Total Noise Exposure:	59 dBA
Increase:	1 dB
Impact?:	None

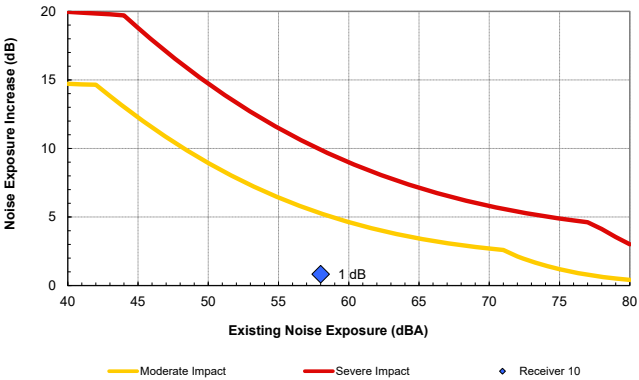
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	20 ft
Dist to Sev. Impact Contour (Source 1):	8 ft

Source 1 Results	
Leqh:	51.2 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)



version: 1/29/2019

Project: Midvalley BRT - WVC station

Receiver Parameters	
Receiver:	Receiver 11
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	55 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
Source Type:		Stationary Source
Specific Source:		Bus Transit Center
Daytime hrs	Avg. Number of Buses/hr	12
Nighttime hrs	Avg. Number of Buses/hr	3.1
Distance	Distance from Source to Receiver (ft)	175
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

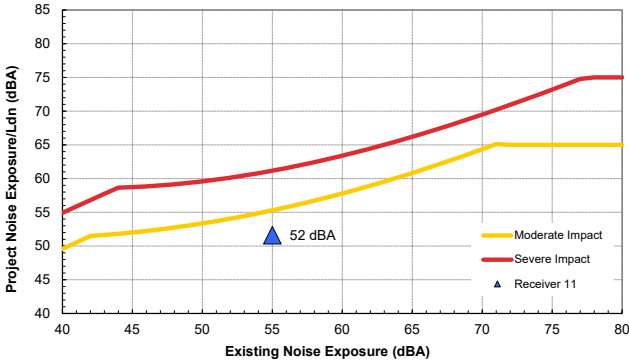
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Ldn:	55 dBA
Total Project Ldn:	52 dBA
Total Noise Exposure:	57 dBA
Increase:	2 dB
Impact?:	None

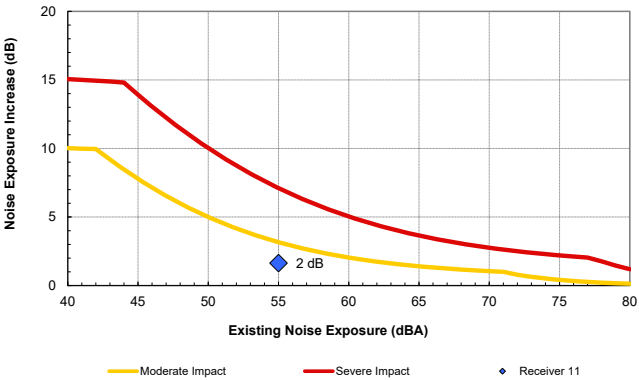
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	125 ft
Dist to Sev. Impact Contour (Source 1):	73 ft

Source 1 Results	
Leq(day):	49.6 dBA
Leq(night):	43.7 dBA
Ldn:	51.6 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)





## Scenario #2: Electric Bus Results

Project:	Midvalley BRT - south of 4700
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<b>Receiver Parameters</b>		
Receiver:	Receivers 1 and 2	
Land Use Category:	2. Residential	
Existing Noise (Measured or Generic Value):	58 dBA	

Noise Source Parameters	
Number of Noise Sources:	1

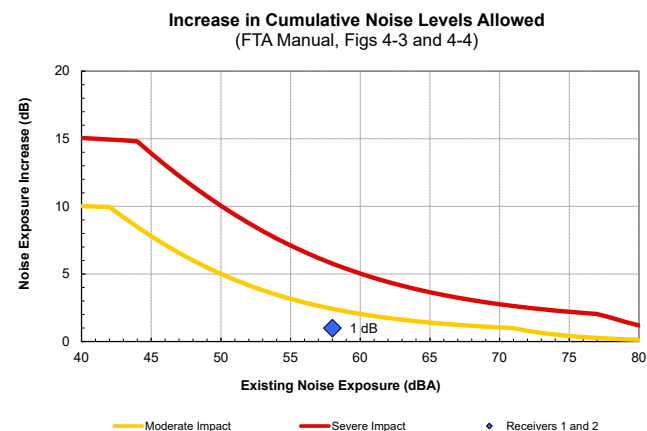
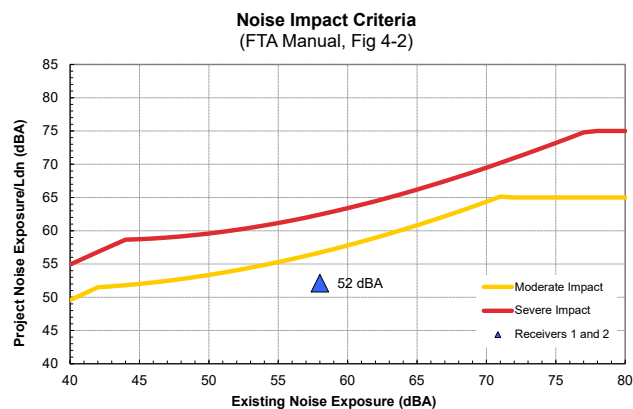
Noise Source Parameters		Source 1
	Source Type:	Highway/Transit
	Specific Source:	Buses (electric)
Daytime hrs		
	Speed (mph)	25
	Avg. Number of Events/hr	12
Nighttime hrs		
	Speed (mph)	25
	Avg. Number of Events/hr	3.1
Distance	Distance from Source to Receiver (ft)	30
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Existing Ldn:	58 dBA
Total Project Ldn:	52 dBA
Total Noise Exposure:	59 dBA
Increase:	1 dB
Impact?:	None

Dist to Mod. Impact Contour (Source 1):	15 ft
Dist to Sev. Impact Contour (Source 1):	6 ft

Leq(day): 50.1 dBA  
Leq(night): 44.2 dBA  
Ldn: 52.1 dBA



Receiver Parameters		
Receiver:	Receiver 3	
Land Use Category:	2. Residential	
Existing Noise (Measured or Generic Value):	65 dBA	

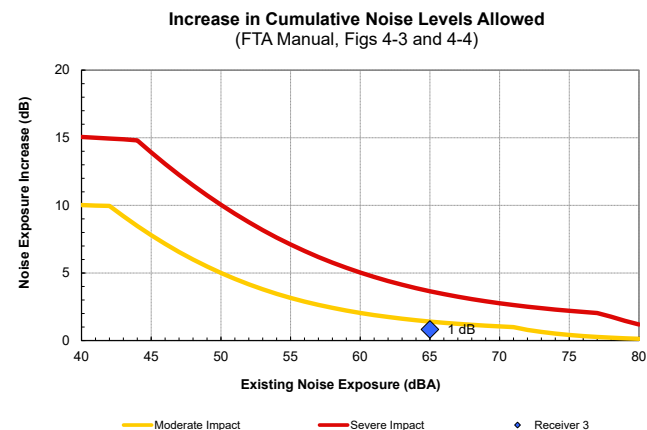
Noise Source Parameters		Source 1
	Source Type:	Highway/Transit
	Specific Source:	Buses (electric)
Daytime hrs		
	Speed (mph)	50
	Avg. Number of Events/hr	12
Nighttime hrs		
	Speed (mph)	50
	Avg. Number of Events/hr	3.1
Distance	Distance from Source to Receiver (ft)	43
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Existing Ldn:	65 dBA
Total Project Ldn:	58 dBA
Total Noise Exposure:	66 dBA
Increase:	1 dB
Impact?:	None

Dist to Mod. Impact Contour (Source 1):	29 ft
Dist to Sev. Impact Contour (Source 1):	13 ft

Leq(day): 56.2 dBA  
Leq(night): 50.3 dBA  
Ldn: 58.2 dBA



Project:	Midvalley BRT - 4700
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<b>Receiver Parameters</b>		
Receiver:	Receiver 4	
Land Use Category:	3. Institutional	
Existing Noise (Measured or Generic Value):	60 dBA	

Noise Source Parameters	
Number of Noise Sources:	1

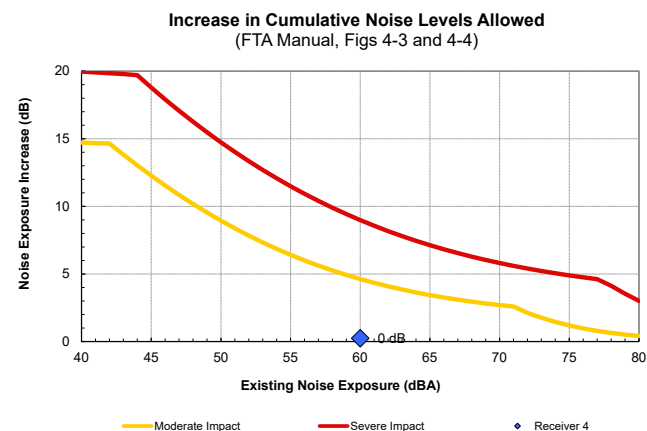
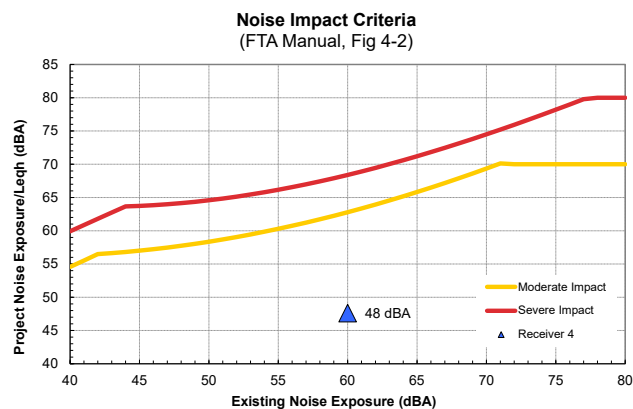
Noise Source Parameters		Source 1
Noisiest hr of Activity During Sensitive hrs	Source Type:	Highway/Transit
	Specific Source:	Buses (electric)
	Speed (mph)	50
	Number of Events/hr	12
Distance	Distance from Source to Receiver (ft)	160
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Existing Leqh:	60 dBA
Total Project Leqh:	48 dBA
Total Noise Exposure:	60 dBA
Increase:	0 dB
Impact?:	None

Dist to Mod. Impact Contour (Source 1):	16 ft
Dist to Sev. Impact Contour (Source 1):	7 ft

Leq: 47.6 dBA





Project:	Midvalley BRT - redwood
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Receiver Parameters		
Receiver:	Receiver 5	
Land Use Category:	3. Institutional	
Existing Noise (Measured or Generic Value):	67 dBA	

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
Noisiest hr of Activity During Sensitive hrs	Source Type:	Highway/Transit
	Specific Source:	Buses (electric)
	Speed (mph)	40
	Number of Events/hr	12
Distance	Distance from Source to Receiver (ft)	35
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


## Project Results Summary

Existing Leqh:	67 dBA
Total Project Leqh:	55 dBA
Total Noise Exposure:	67 dBA
Increase:	0 dB
Impact?:	None

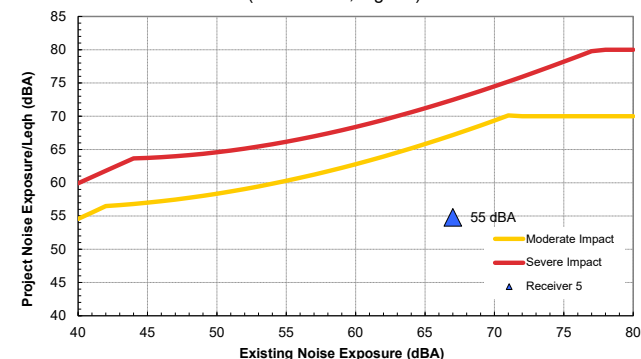
### Distance to Impact Contours

Dist to Mod. Impact Contour (Source 1):	5 ft
Dist to Sev. Impact Contour (Source 1):	2 ft

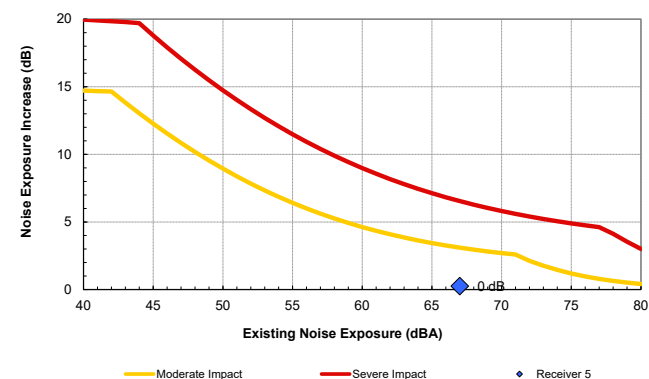
### Source 1 Results

Leq: 54.8 dBA

**Noise Impact Criteria**  
(FTA Manual, Fig 4-2)



**Increase in Cumulative Noise Levels Allowed**  
(FTA Manual, Figs 4-3 and 4-4)



Project: Midvalley BRT - SLCC station

Receiver Parameters	
Receiver:	Receiver 6
Land Use Category:	3. Institutional
Existing Noise (Measured or Generic Value):	55 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
	Source Type:	Stationary Source
	Specific Source:	Bus Transit Center
Noisiest hr of Activity During Sensitive hrs	Number of Buses/hr	12
Distance	Distance from Source to Receiver (ft)	100
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

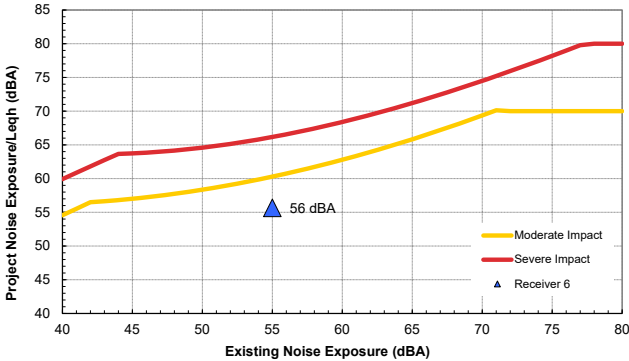
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Leq <sub>h</sub> :	55 dBA
Total Project Leq <sub>h</sub> :	56 dBA
Total Noise Exposure:	58 dBA
Increase:	3 dB
Impact?:	None

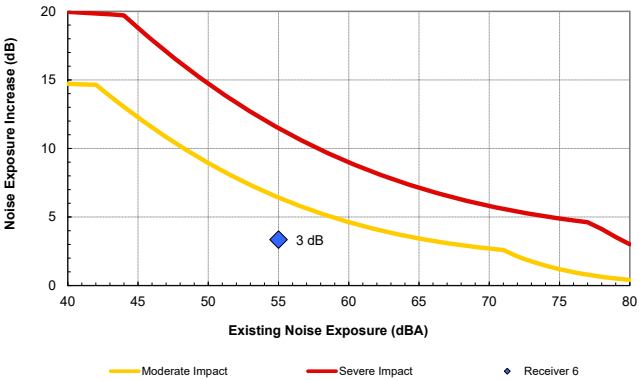
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	65 ft
Dist to Sev. Impact Contour (Source 1):	38 ft

Source 1 Results	
	Leq <sub>h</sub> : 55.7 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)



Project:	Midvalley BRT - 4700
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Receiver Parameters		
Receiver:	Receiver 7	
Land Use Category:	2. Residential	
Existing Noise (Measured or Generic Value):	70 dBA	

Noise Source Parameters	
Number of Noise Sources:	1

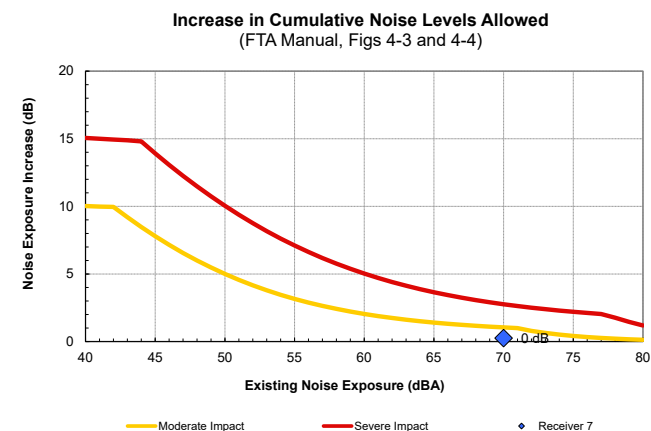
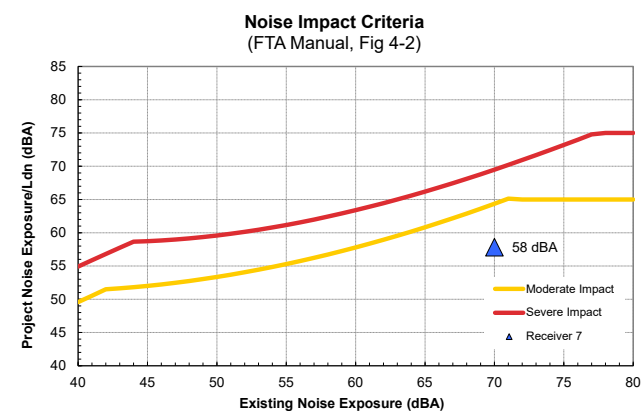
Noise Source Parameters		Source 1
	Source Type:	Highway/Transit
	Specific Source:	Buses (electric)
Daytime hrs		
	Speed (mph)	40
	Avg. Number of Events/hr	12
Nighttime hrs		
	Speed (mph)	40
	Avg. Number of Events/hr	3.1
Distance	Distance from Source to Receiver (ft)	30
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Existing Ldn:	70 dBA
Total Project Ldn:	58 dBA
Total Noise Exposure:	70 dBA
Increase:	0 dB
Impact?:	None

Dist to Mod. Impact Contour (Source 1):	11 ft
Dist to Sev. Impact Contour (Source 1):	5 ft

Leq(day): 55.8 dBA  
Leq(night): 49.9 dBA  
Ldn: 57.8 dBA



Project:	Midvalley BRT - 4700
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Receiver Parameters	
Receiver:	Receiver 8
Land Use Category:	3. Institutional
Existing Noise (Measured or Generic Value):	65 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
	Source Type:	Highway/Transit
	Specific Source:	Buses (electric)
Noisiest hr of Activity During Sensitive hrs	Speed (mph)	40
	Number of Events/hr	12
Distance	Distance from Source to Receiver (ft)	40
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

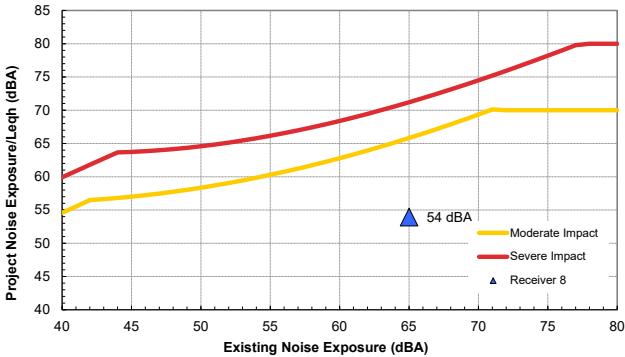
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Leq <sub>h</sub> :	65 dBA
Total Project Leq <sub>h</sub> :	54 dBA
Total Noise Exposure:	65 dBA
Increase:	0 dB
Impact?:	None

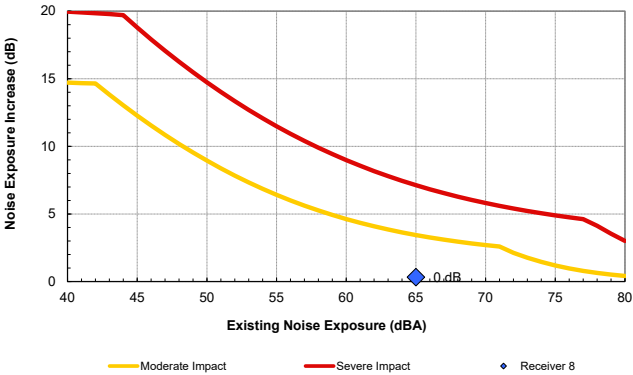
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	6 ft
Dist to Sev. Impact Contour (Source 1):	3 ft

Source 1 Results	
Leq <sub>h</sub> :	53.9 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)



<b>Receiver Parameters</b>		
Receiver:	Receiver 9	
Land Use Category:	2. Residential	
Existing Noise (Measured or Generic Value):	63 dBA	

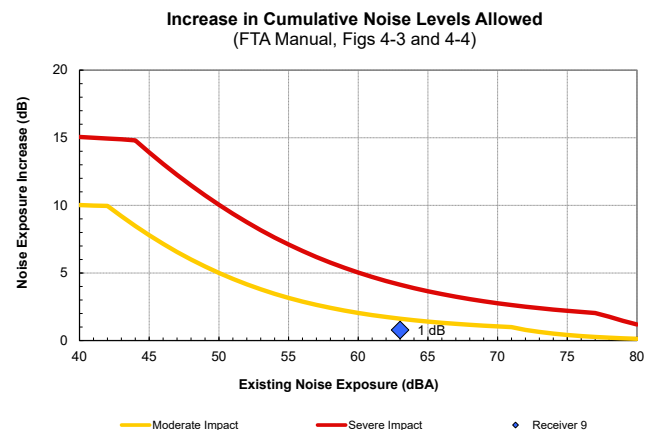
Noise Source Parameters		Source 1
	Source Type:	Highway/Transit
	Specific Source:	Buses (electric)
Daytime hrs		
	Speed (mph)	40
	Avg. Number of Events/hr	12
Nighttime hrs		
	Speed (mph)	40
	Avg. Number of Events/hr	3.1
Distance	Distance from Source to Receiver (ft)	40
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Existing Ldn:	63 dBA
Total Project Ldn:	56 dBA
Total Noise Exposure:	64 dBA
Increase:	1 dB
Impact?:	None

Dist to Mod. Impact Contour (Source 1):	23 ft
Dist to Sev. Impact Contour (Source 1):	10 ft

Leq(day): 53.9 dBA  
Leq(night): 48.1 dBA  
Ldn: 56.0 dBA



Project:	Midvalley BRT - 2700
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<b>Receiver Parameters</b>		
Receiver:	Receiver 10	
Land Use Category:	3. Institutional	
Existing Noise (Measured or Generic Value):	58 dBA	

Noise Source Parameters	
Number of Noise Sources:	1

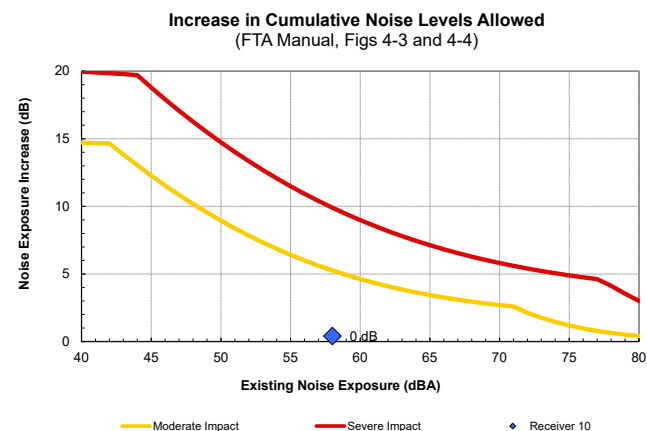
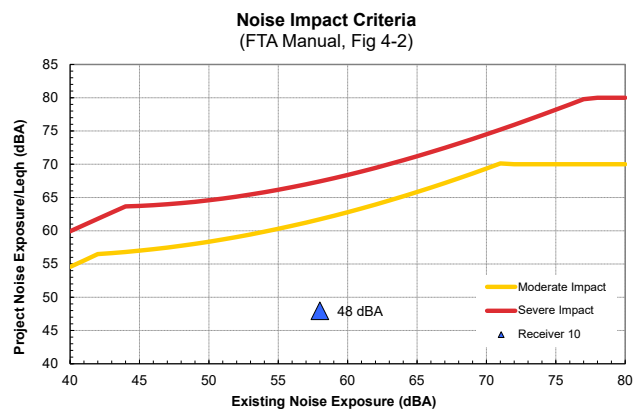
Noise Source Parameters		Source 1
Noisiest hr of Activity During Sensitive hrs	Source Type:	Highway/Transit
	Specific Source:	Buses (electric)
	Speed (mph)	40
	Number of Events/hr	12
Distance	Distance from Source to Receiver (ft)	100
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Existing Leq:	58 dBA
Total Project Leq:	48 dBA
Total Noise Exposure:	58 dBA
Increase:	0 dB
Impact?:	None

Dist to Mod. Impact Contour (Source 1):	12 ft
Dist to Sev. Impact Contour (Source 1):	5 ft

Leq: 48.0 dBA



Project: Midvalley BRT - WVC station

Receiver Parameters	
Receiver:	Receiver 11
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	55 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
	Source Type:	Stationary Source
	Specific Source:	Bus Transit Center
Daytime hrs	Avg. Number of Buses/hr	12
Nighttime hrs	Avg. Number of Buses/hr	3.1
Distance	Distance from Source to Receiver (ft)	175
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

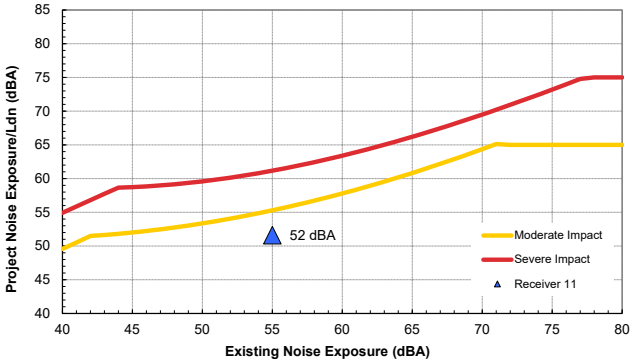
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Ldn:	55 dBA
Total Project Ldn:	52 dBA
Total Noise Exposure:	57 dBA
Increase:	2 dB
Impact?:	None

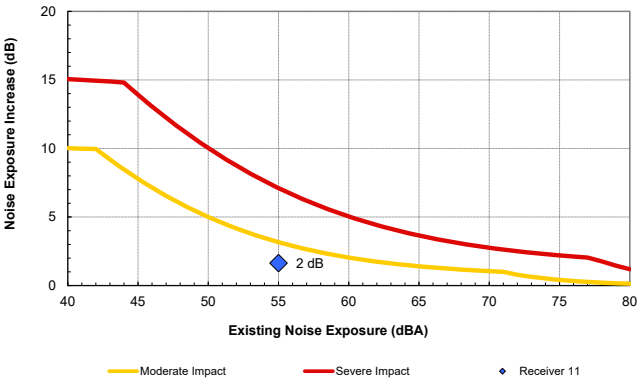
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	125 ft
Dist to Sev. Impact Contour (Source 1):	73 ft

Source 1 Results	
Leq(day):	49.6 dBA
Leq(night):	43.7 dBA
Ldn:	51.6 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)



Project: Midvalley BRT - WVC station

Receiver Parameters	
Receiver:	Receiver 12
Land Use Category:	3. Institutional
Existing Noise (Measured or Generic Value):	55 dBA

Noise Source Parameters	
Number of Noise Sources:	1

Noise Source Parameters		Source 1
	Source Type:	Stationary Source
	Specific Source:	Bus Transit Center
Noisiest hr of Activity During Sensitive hrs	Number of Buses/hr	12
Distance	Distance from Source to Receiver (ft)	130
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No

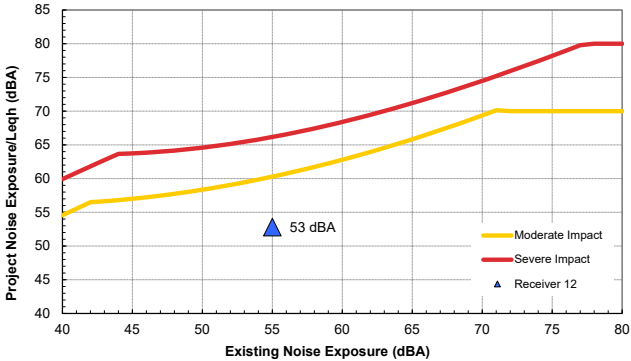
	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No


Project Results Summary	
Existing Leqh:	55 dBA
Total Project Leqh:	53 dBA
Total Noise Exposure:	57 dBA
Increase:	2 dB
Impact?:	None

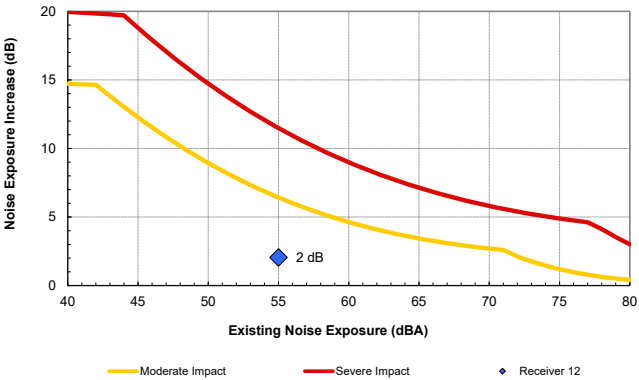
Distance to Impact Contours	
Dist to Mod. Impact Contour (Source 1):	65 ft
Dist to Sev. Impact Contour (Source 1):	38 ft

Source 1 Results	
Leqh:	52.8 dBA

Noise Impact Criteria  
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed  
(FTA Manual, Figs 4-3 and 4-4)





## **Appendix B. Field Measurement Datasheets**

Noise Measurement Data Sheet						
Site <u>3-2717 Bedford Rd. frontage Rd.</u>					Date <u>11/28</u>	
Noise Meter Model: <u>2900</u>				Response Fast <input type="checkbox"/> Slow <input checked="" type="checkbox"/>	Weighting A <input type="checkbox"/> C <input type="checkbox"/>	Battery* <u>8.0</u> *replace if below 50%
Calibrator Model			Calibrator @ 114 dBA Start <u>A</u> End			
Weather Data Temp <u>48°</u> Humidity <u>46%</u> Wind Speed <u>6</u> mph Notes <u>clear sky</u>						
Measurement Data						
Event	Begin Time	End Time	L <sub>eq</sub> (dBA)	L <sub>min</sub> (dBA)	L <sub>max</sub> (dBA)	
<u>2A</u>	<u>4:48</u>	<u>5:02</u>	<u>72.4</u>			
<u>2G</u>	<u>5:03</u>	<u>5:23</u>	<u>72.4</u>	<u>52</u>	<u>84.4</u>	
Traffic Data (Speed =          mph)						
Event	Direction	Autos	Medium Trucks	Heavy Trucks	Motorcycle	Buses
<u>2A</u>	<u>SB</u>	<u>312</u>				<u>1</u>
<u>2A</u>	<u>NB</u>	<u>164</u>	<u>3</u>			
<u>2G</u>	<u>SB</u>	<u>206</u>	<u>3</u>			
<u>2G</u>	<u>NB</u>	<u>333</u>				<u>1</u>
<div style="display: flex; justify-content: space-between;"> <div> <p>Site Sketch</p> </div> <div> <p>AMEX</p> </div> </div>						
<p>Notes (Major sources, background noise, unusual events, etc.)</p> <p>Plane overhead 6 min → 1st run time (Event 2A) 10 min 19 min</p> <hr/> <p>12 min 2nd run time (Event 2G)</p>						

meter 10<sup>-12</sup> ft. from Roadway  
4 lanes - 1 median  
low veg roadside

175 ft.  
from intersection  
4390 S  
2700 W

Noise Measurement Data Sheet						
Site <u>Frontage - meter 5 // BRT Meter</u>				Date <u>12/1/2017</u>		
<u>Noise Meter</u> Model: <u>2900</u>			<u>Response</u> Fast <input type="checkbox"/> Slow <input type="checkbox"/>		<u>Weighting</u> A <input type="checkbox"/> C <input type="checkbox"/>	
<u>Calibrator</u> Model:			Calibrator @ 114 dBA Start                      End			
<u>Weather Data</u> Temp <u>37</u> Humidity <u>88%</u> Wind Speed <u>light</u> mph Notes						
Measurement Data						
Event	Begin Time	End Time	Leq (dBA)	Lmin (dBA)	Lmax (dBA)	
S2	8:02	8:22	66.5	60.4	77.5	
S3	8:24		65.2	61.7	71.8	
Traffic Data (Speed = <u>35</u> mph)						
Event	Direction	Autos	Medium Trucks	Heavy Trucks	Motorcycle	Buses
S2	4700 E	803	12	1	0	1
	4700 W	366	8	10	0	4
S3	E	783	8	2		1
	W	406	6	1	0	3
<u>Site Sketch</u> <span style="float: right;">(1-2K south)</span>						
<div style="position: relative; width: 100%; height: 100%;"> <div style="position: absolute; top: 10%; left: 40%; transform: translateX(-50%); font-size: 2em;">East</div> <div style="position: absolute; top: 40%; left: 45%; transform: translateX(-50%); font-size: 2em;">West</div> <div style="position: absolute; bottom: 10%; left: 30%; width: 60%;"> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;">FIZZ DRIVE THROUGH</div> <div style="display: flex; justify-content: space-between; border-top: 1px solid black; padding-top: 5px;"> <div style="width: 45%; text-align: center;">Xmeter</div> <div style="width: 50%; text-align: center;">FIZZ drinks</div> </div> </div> </div>						
<u>Notes</u> (Major sources, background noise, unusual events, etc.) <u>3 cars used drive through (S2)</u>						

approx.  
60 ft.  
from Rd.

approx.  
7 ft.  
veg

Noise Measurement Data Sheet						
Site <u>Meter 1 - BRT</u>					Date <u>2/2/18</u>	
Noise Meter Model			Response Fast <input type="checkbox"/> Slow <input type="checkbox"/>		Weighting A <input type="checkbox"/> C <input type="checkbox"/>	Battery*  *replace if below 50%
Calibrator Model			Calibrator @ 114 dBA Start                      End			
Weather Data Temp <u>45°</u> Humidity <u>61%</u> Wind Speed <u>5-10 mph</u> Notes						
Measurement Data						
Event	Begin Time	End Time	<u>L<sub>eq</sub></u> (dBA)	<u>L<sub>min</sub></u> (dBA)	<u>L<sub>max</sub></u> (dBA)	
<u>70</u>		<u>8:49</u>	<u>60.1</u>	<u>52.2</u>	<u>68.1</u>	
<u>71</u>		<u>9:11</u>	<u>61.3</u>	<u>50.1</u>	<u>80.3</u>	
Traffic Data (Speed =                      mph)						
Event	Direction	Autos	Medium Trucks	Heavy Trucks	Motorcycle	Buses
<u>70</u>	<u>EB</u>	<u>228</u>	<u>4</u>	<u>0</u>	<u>1</u>	<u>2</u>
	<u>WB</u>	<u>262</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>3</u>
<u>71</u>	<u>EB</u>	<u>319</u>	<u>4</u>	<u>0</u>	<u>1</u>	<u>2</u>
	<u>WB</u>	<u>231</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>1</u>
Site Sketch <div style="text-align: center;"> <u>Shoulder</u>                      <u>BUS STOP</u>                      <u>Residential</u>    <u>Dirt Median</u>  <u>FENCE</u>  <u>BUS STOP</u>  <u>X Meter</u>  <u>Parking</u>  <u>LDS Church</u> </div> <div style="text-align: right; margin-top: 20px;"> <u>N</u>  </div>						
Notes (Major sources, background noise, unusual events, etc.) <u>- Plane overhead approx. 15 min. in (70)</u>  <u>- disregard new event 69</u>						

Noise Measurement Data Sheet						
Site <u>Meter 2 - BRT</u>					Date <u>2/2/18</u>	
Noise Meter Model			Response Fast <input type="checkbox"/> Slow <input type="checkbox"/>		Weighting A <input type="checkbox"/> C <input type="checkbox"/>	Battery*  *replace if below 50%
Calibrator Model			Calibrator @ 114 dBA Start                      End			
Weather Data Temp <u>46°</u> Humidity <u>53%</u> Wind Speed <u>5</u> mph Notes						
Measurement Data						
Event	Begin Time	End Time	$L_{eq}$ (dBA)	$L_{min}$ (dBA)	$L_{max}$ (dBA)	
<u>72</u>	<u>9:36</u>	<u>9:56</u>	<u>67.0</u>	<u>61.3</u>	<u>77.5</u>	
<u>73</u>	<u>9:58</u>	<u>10:18</u>	<u>67.8</u>	<u>62.1</u>	<u>80.3</u>	
Traffic Data (Speed =                      mph)						
Event	Direction	Autos	Medium Trucks	Heavy Trucks	Motorcycle	Buses
<u>72</u>	<u>NB</u>	<u>413</u>	<u>5</u>	<u>2</u>	<u>0</u>	<u>3</u>
	<u>SB</u>	<u>367</u>	<u>6</u>	<u>3</u>	<u>1</u>	<u>4</u>
<u>73</u>	<u>NB</u>	<u>304</u>	<u>4</u>	<u>3</u>	<u>0</u>	<u>3</u>
	<u>SB</u>	<u>345</u>	<u>5</u>	<u>5</u>	<u>0</u>	<u>3</u>
Site Sketch <u>Walgreens</u> <u>Del Taco drive thru</u> 						
Notes (Major sources, background noise, unusual events, etc.) - <u>Beto's drive thru south of meter. A few cars passed through during both readings</u>						

# Noise Measurement Data Sheet

Site <u>Meter 6 - BRT</u>		Date <u>2/2</u>	
Noise Meter Model		Response Fast <input type="checkbox"/> Slow <input type="checkbox"/>	Weighting A <input type="checkbox"/> C <input type="checkbox"/>
		Battery* *replace if below 50%	

Calibrator Model	Calibrator @ 114 dBA Start      End
------------------	--

Weather Data Temp <u>46°</u> Humidity <u>53%</u> Wind Speed <u>5</u> mph Notes			
---	--	--	--

Measurement Data					
Event	Begin Time	End Time	L <sub>eq</sub> (dBA)	L <sub>min</sub> (dBA)	L <sub>max</sub> (dBA)
74		11:12	59.0	47.6	72.2
75		11:37	58.1	48.2	71.9

Traffic Data (Speed =      mph)						
Event	Direction	Autos	Medium Trucks	Heavy Trucks	Motorcycle	Buses
74	NB	163	0	3	0	2
	SB	110	1	1	0	0
	NB	155	2	1	0	0
	SB	136	3	1	0	2

<p>Site Sketch</p> <p>Residential</p> <p>3835 W. 60</p> <p>← SB</p> <p>LEFT TURN LN.</p> <p>NB →</p> <p>Parking lot</p> <p>Baptist church</p>
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<p>Notes</p> <p>(Major sources, background noise, unusual events, etc.)</p> <p>X meter</p> <p>- dog barking @ beginning of event 75</p> <p>- planes overhead both runs</p>
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approx.  
90  
ft.

1/2 lanes