OR 217 Southbound and Northbound Auxiliary Lanes:

Beaverton-Hillsdale Highway to OR 99W

Noise Technical Report

Prepared for: Oregon Department of Transportation

Key 18841

SLR Ref: 108.00494.00012

August 2018

Noise Technical Report

Prepared for:

Oregon Department of Transportation

Key 18841

Oregon Department of Transportation
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This document has been prepared by SLR International Corporation. The material and data in this report were prepared under the supervision and direction of the undersigned.

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GLOSSARY

Activity Category B NAAC	The exterior noise impact criterion for Activity Category B is Leq 65 dBA. This ODOT standard defines the noise levels constituting an impact for residences.
Activity Category C NAAC	The exterior noise impact criterion for Activity Category C is Leq 65 dBA. This ODOT standard defines the noise levels constituting an impact for active sports arenas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio stations, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
Activity Category D NAAC	The interior noise impact criterion for Activity Category D is Leq 50 dBA. This ODOT standard defines the noise levels constituting an impact for auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio stations, recording studios, schools, and television studios.
Activity Category E NAAC	The exterior noise impact criterion for Activity Category E activities is Leq 70 dBA. This ODOT standard defines the noise levels constituting an impact for hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A—D or F.
Ambient Noise	The background sound of an environment in relation to which all foreground sounds are heard. Ambient noise level is a measure of the background noise of an environment over a given period of time, in decibels.
A-Weighted Decibel (dBA)	This scale accounts for humans' ability to hear only a limited range of frequencies by filtering out those frequencies that the human ear does not respond to.
Decibel (dB)	The unit used to measure the loudness of sound is a decibel.
Cumulative Impacts	The impact on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.
Leq	Hourly equivalent sound pressure level.
Receptor	Specific outdoor location representing a certain land use where noise impacts are analyzed.
Receiver	Modeling or measurement location that represents noise sensitive land uses; can represent multiple receptors or equivalent units.

ACRONYMS

CFR	Code of Federal Regulations
dB	Decibel
dBA	A-Weighted Decibel
DEQ	Oregon Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
MP	Milepost
NAC	Noise Abatement Criteria
NAAC	Noise Abatement Approach Criteria
NTR	Noise Technical Report
OAR	Oregon Administrative Rule
ODOT	Oregon Department of Transportation
TNM	Federal Highway Administration Traffic Noise Model
WES	Westside Express Service

SUMMARY

The OR 217 Auxiliary Lane Project consists of two separate sub-projects in the same project area. OR 217: OR 10 – OR 99W Auxiliary Lane Project is a public safety and congestion reduction project in the southwest portion of the Portland metro area in the cities of Beaverton and Tigard. The project includes the extension of the southbound auxiliary lane from just south of the Beaverton Hillsdale Highway (OR 10)/SPRR overcrossing structure to OR 99W and creation of a barrier-separated collector/distributor road between Allen Boulevard and Denney Road in the southbound direction. This is referred to as the "Southbound Auxiliary Lane Project." The OR 217: Progress (Scholls Ferry Road) Interchange – Tigard (OR 99W) Interchange Northbound Auxiliary Lane Project will extend the Northbound Auxiliary Lane from the OR 99W exit to the Scholls Ferry Road Exit. An additional auxiliary lane will be created from the Northbound OR 99W loop entrance ramp to the Greenburg Road exit ramp. This is referred to as the "Northbound Auxiliary Lane Project."

This project is constructing auxiliary lanes greater than 1,500 feet in length, which meets the Federal Highway Administration's definition of a Type I project. A traffic noise impact and abatement analysis is required.

This Noise Technical Report (NTR) is the primary technical report for the entire project corridor. It presents the project background and elements for both sub-projects. Due to project design development timelines, the noise impacts from the Southbound Auxiliary Lane have been assessed first. This NTR contains the analysis results for the Southbound Auxiliary Lane Project area. An addendum to the NTR will be prepared for the modeling and analysis of the Northbound Auxiliary Lane Project impacts and abatement.

Traffic noise levels for Existing conditions (2017) and for the No Build and Build Alternatives in the design year (2040) were predicted for the Southbound Auxiliary Lane Project area. As a result of this traffic noise analysis, the following conclusions are presented:

- The results of the noise analysis indicate that worst-case hour traffic noise levels at exterior activity areas under Existing conditions are predicted to range from 54 to 75 A-weighted decibel (dBA), exceeding the Oregon Department of Transportation (ODOT) noise abatement approach criteria (NAAC) at 51 receptors. The worst-case hour existing traffic noise level at an interior Category D Land Use is 44 dBA.
- The results of the noise analysis indicate that worst-case hour traffic noise levels at exterior activity areas under the No Build condition are predicted to range from 55 to 76 dBA, exceeding the NAAC at 61 receptors. The worst-case hour No Build traffic noise level at an interior Category D Land Use is 45 dBA.
- The results of the noise analysis indicate that worst-case hour traffic noise levels at exterior activity areas under the Build condition are predicted to range from 55 to 76 dBA, resulting in impacts at 55 receptors. The worst-case hour Build traffic noise level at an interior Category D Land Use is 45 dBA.

- The calculated noise levels show that future increases above existing noise levels would be up to 3 dBA under the Build condition, below the ODOT substantial increase threshold of 10 dBA.

The differences in noise levels from Existing to No Build conditions result from projected increases in traffic volumes on OR 217. Changes in noise levels predicted under the Build conditions when compared to the Existing conditions are only predicted to increase by up to 3 dBA. Between the No Build and Build Alternatives sound level changes are predicted to range from a decrease of 1 dBA up to an increase of 2 dBA, with the majority of receivers experiencing no change in sound levels between Build and No Build conditions. Changes in sound levels between No Build and Build conditions result from changes in OR 217 travel lane locations and the other roadway alignment changes associated with the Southbound Project.

Noise impacts are predicted at 53 residences located along OR 217 in the Southbound Auxiliary Lane Project area between SW Greenberg Road and the SW Hall Boulevard overcrossing. Mitigation in the form of a noise barrier was evaluated for the impacts to residential receptors. The barrier meets ODOT reasonable and feasible criteria, and the barrier is recommended. The barrier was also modeled with a break for the wetland area, but this barrier configuration does not meet ODOT feasible and reasonable criteria. The exact northern terminus of the barrier needs to be determined through the right-of-way and design process, and the terminus will affect the numbers and locations of benefitted receptors. The viewpoints of the residents that benefit from the abatement will be solicited during final design of the barrier. Mitigation in the form of a noise barrier was not recommended for impacts to two restaurant outdoor seating areas.

Construction noise levels for the improvements to OR 217 would result from normal construction activities. Noise levels for these activities can be expected to range from 70-100 dBA at sites 50 feet from the activities. Standard construction noise abatement measures will be included in the project specifications.

The distance to the 65 dBA NAAC for property on OR 217 within the project area is approximately 230 feet to 410 feet, depending on the topography. The distance to the 70 dBA NAAC is approximately 215 feet from the OR 217 centerline. The findings of this report will be shared with local governments so that they can consider these sound levels in approving any land use redevelopment in the future. Copies of this noise study will be provided by ODOT to the City of Beaverton and the City of Tigard so that local government officials may consider the information in this noise analysis.

1. INTRODUCTION

The OR 217 Auxiliary Lane Project consists of two separate sub-projects in the same project area.

The OR 217: OR 10 – OR 99W Auxiliary Lane Project area is located on Highway 217 in the southwest portion of the Portland metro area in the cities of Beaverton and Tigard. Refer to Figure 1 for the project vicinity map. The project includes the extension of the Southbound Auxiliary Lane from just south of the Beaverton Hillsdale Highway (OR 10)/SPRR overcrossing structure to OR 99W and creation of a barrier-separated collector/distributor road between Allen Boulevard and Denney Road in the southbound direction. The project will involve widening to the west and will require reconfiguration of six exit ramps – including the southbound exit ramp to OR 99W - and five entrance ramps. This is referred to as the "Southbound Auxiliary Lane Project."

The OR 217: Progress (Scholls Ferry Road) Interchange – Tigard (OR 99W) Interchange Northbound Auxiliary Lane Project will extend the Northbound Auxiliary Lane from the OR 99W exit to the Scholls Ferry Road Exit. An additional auxiliary lane will be created from the northbound OR 99W loop entrance ramp to the Greenburg Road exit ramp. Work on the northbound side will also include reconnecting the mainline to the entrance and exit ramps to the interchanges at OR 99W, Greenberg Road, and Scholls Ferry Road. This is referred to as the "Northbound Auxiliary Lane Project."

The Northbound Project will also replace the SW Hall Boulevard structure. The Hall overpass structure replacement is part of the Northbound Auxiliary Lane portion of the project.

This NTR addresses the project description, methodology, and model validation for both the southbound and northbound project improvements. Due to the timing of project design development, the modeling and mitigation results for the Existing, No Build, and Build scenarios are presented only for the Southbound Project improvements in this NTR. The Northbound Project improvements noise analysis will be presented in an addendum to this NTR.

1.1 PROJECT DESCRIPTION

The purpose of this project is to provide operational and safety improvements that are cost efficient and respond to constrained revenue forecasts. Currently, short weaving distances contribute to high crash rates on OR 217, with approximately 70 percent of crashes as rear end collisions. Afternoon peak travel times on OR 217 are unpredictable and unreliable, varying from less than 10 minutes to more than 30 minutes. The closely spaced interchanges cause significant bottlenecks, leading to high crash rates. Crashes increase congestion, causing more delay.

OR 217 has 10 interchanges in just over seven miles of highway, with some of the shortest interchange spacing in the region. ODOT together with Washington County, the cities of Beaverton, Tigard, Hillsboro, Lake Oswego and Tualatin and Metro has extensive planning studies and recommendations for OR 217 that would enhance mobility, but have high costs in the range of $500 million to $1 billion.

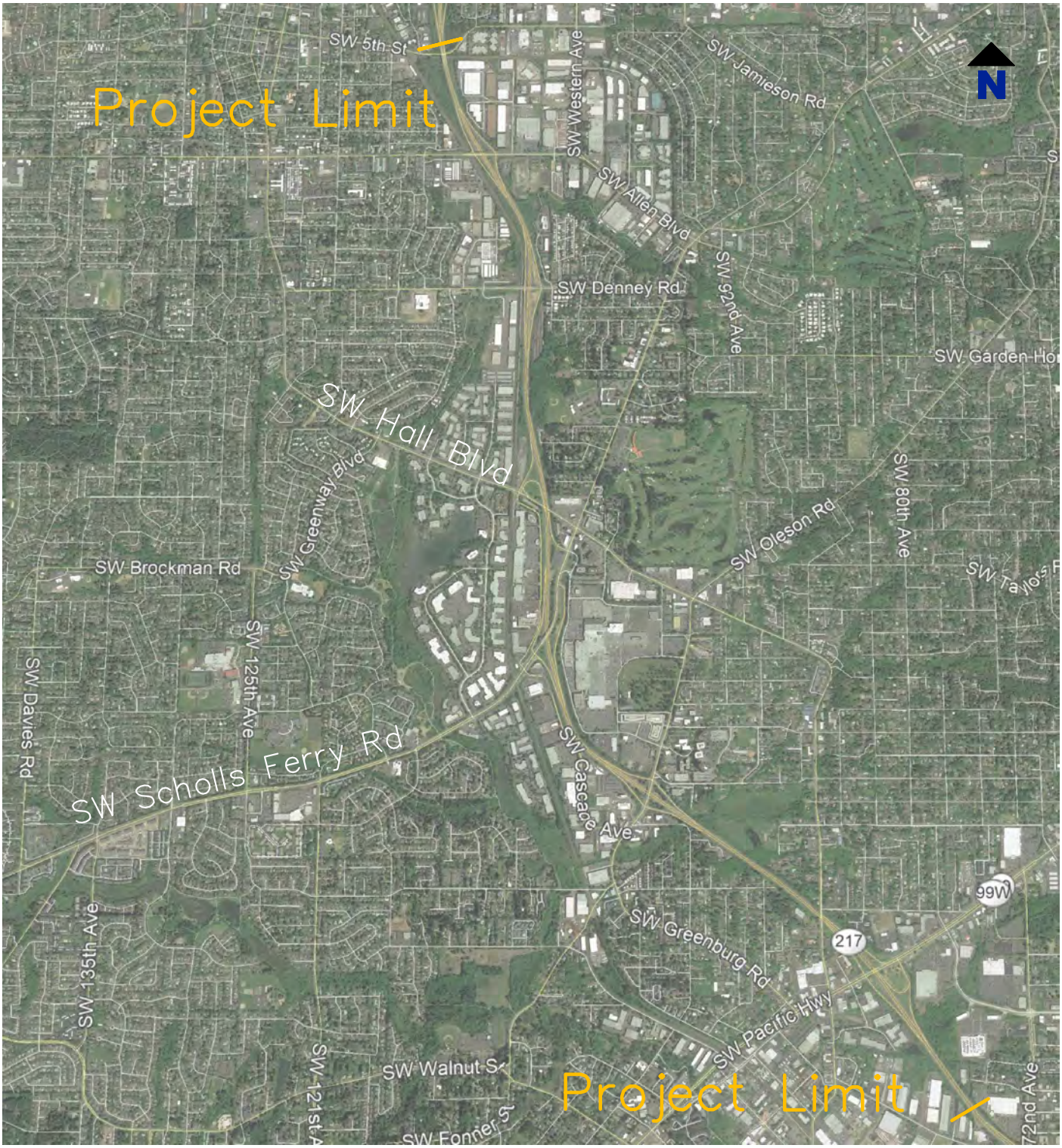
To address regional mobility needs, ODOT focused on low-cost, effective and immediate solutions to improve specific bottleneck locations. Auxiliary lanes build on this cost-effective approach to improve and effectively manage the existing freeway. These types of improvements work to reduce congestion, reduce crashes, address recurring bottlenecks, and improve reliability.

These improvements are not intended to address capacity-related congestion problems, but rather to provide immediate and long-term safety improvements at bottleneck locations.

The proposed project will extend auxiliary lanes south from Beaverton-Hillsdale Highway to OR 99W and north from OR 99W to Scholls Ferry Road to reduce recurring bottlenecks. The auxiliary lane will provide a direct connection from one interchange ramp to the next and allow for more stable traffic flow at OR 217 interchanges, and it will remove short weaving movements from the highway to improve safety and reliability.

The project will create one continuous auxiliary lane on OR 217 southbound between Canyon Road (also known as OR 10, the Beaverton-Hillsdale Highway) down to the OR 99W exit. A frontage road will be created to connect Allen Boulevard with Denny Road. On the northbound side of OR 217, a continuous auxiliary lane will be created from OR 99W to the Scholls Ferry Road exit. Refer to Figure 2 for a graphical representation of the proposed lane improvements. The analysis area for the southbound improvements extends from OR 10 to the SW Hall Boulevard overcrossing. The analysis for the northbound improvements extends from the Scholls Ferry Road exit south to OR 99W, and also includes the SW Hall Boulevard overcrossing improvements.

Refer to Figures 3 through 11 for the Existing and Build Alternative lane configurations in the project area.



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Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Vicinity Map

Date	August 7, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

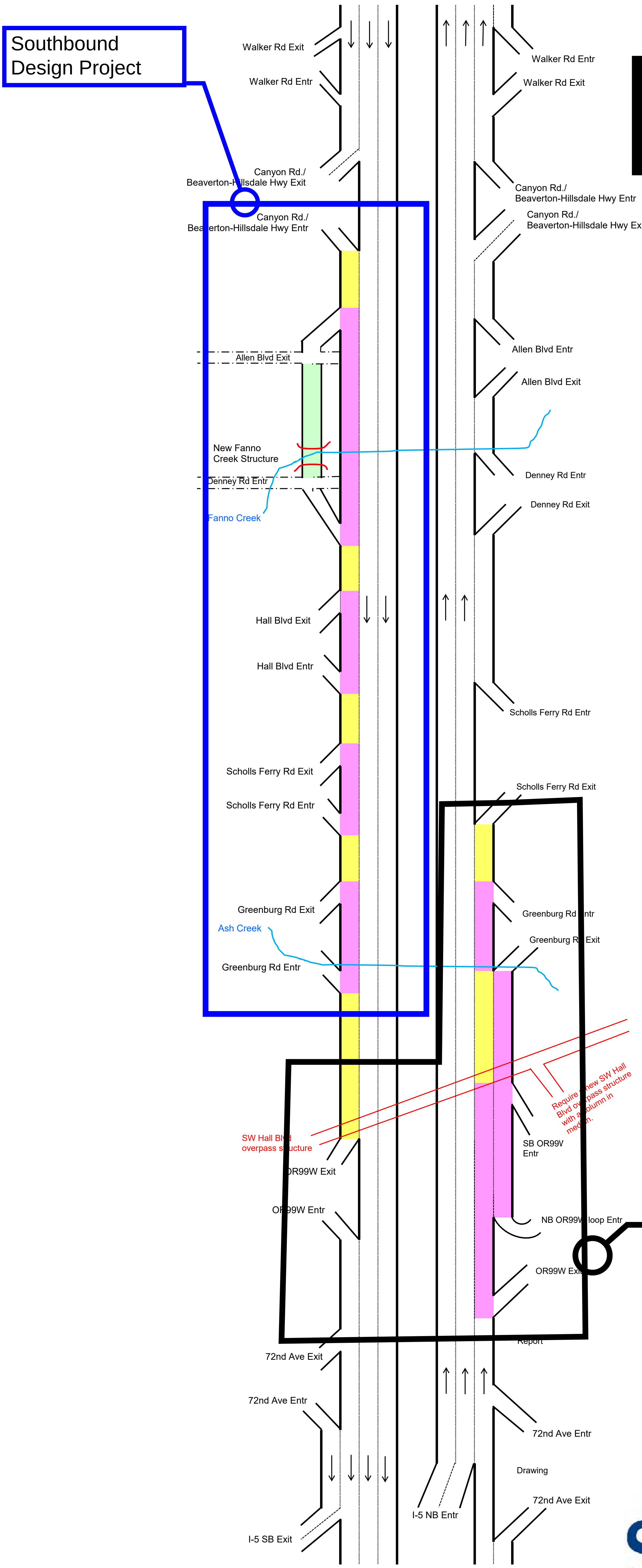
Fig. No. 1

OR 217 SB and NB Auxiliary Lanes
K18841

9/19/2017

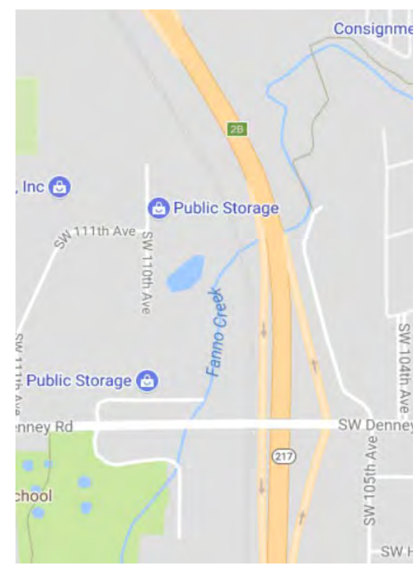
N

DESIGN PHASE



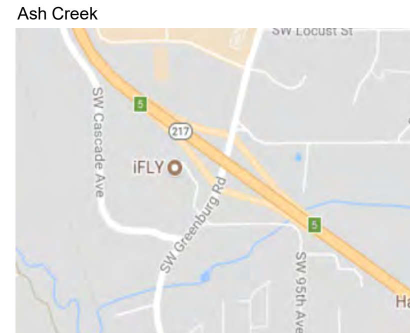
Northbound Design Project

Fanno Creek



🟨	Existing Aux Lane
🟪	Build Aux Lane Extension by widening
🟩	New Allen - Denney CD Road

Ash Creek



Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

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Drawring

Graphic of Lane Configurations

Fig. No. 2

OR 217 SB and NB Auxiliary Lanes
K18841

9/19/2017

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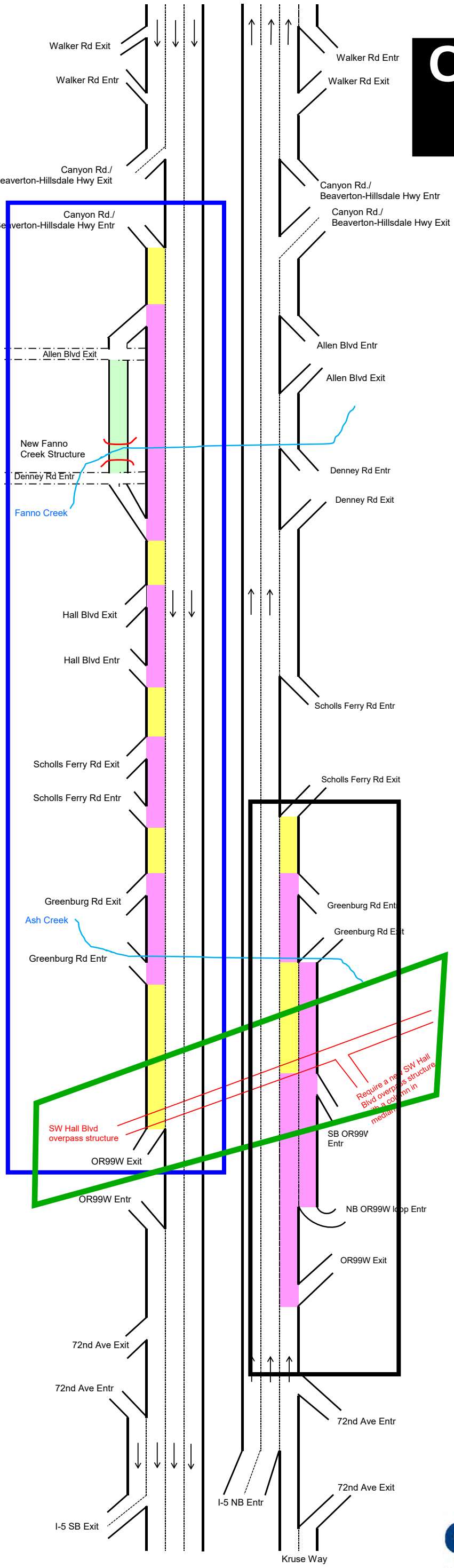
CONSTRUCTION PHASE

STAGE 1 - SB

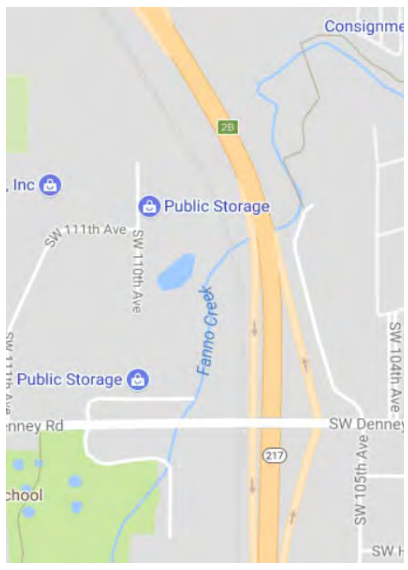
>Construct all SB including 99 Off

>One mobilization for SB

>Provides widened SB for bridge construction traffic handling



Fanno Creek

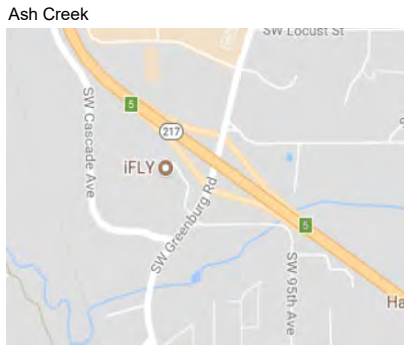


Existing Aux Lane

Build Aux Lane Extension by widening

New Allen - Denney CD Road

Ash Creek



STAGE 2

>Construct Hall Bridge using widening SB

>New bridge provides width/opening for NB Aux

>Can be constructed separately and before SB with inefficiencies in mobilization, temporary pavement and negative public perception.

STAGE 3

>Existing bridge columns conflict

>Construct bridge first

>Construct NB Aux

Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

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Drawring

Graphic of Lane Configurations

Fig. No. 2

0 400 800 1200 feet

Proposed Build Alternative Lane Lines

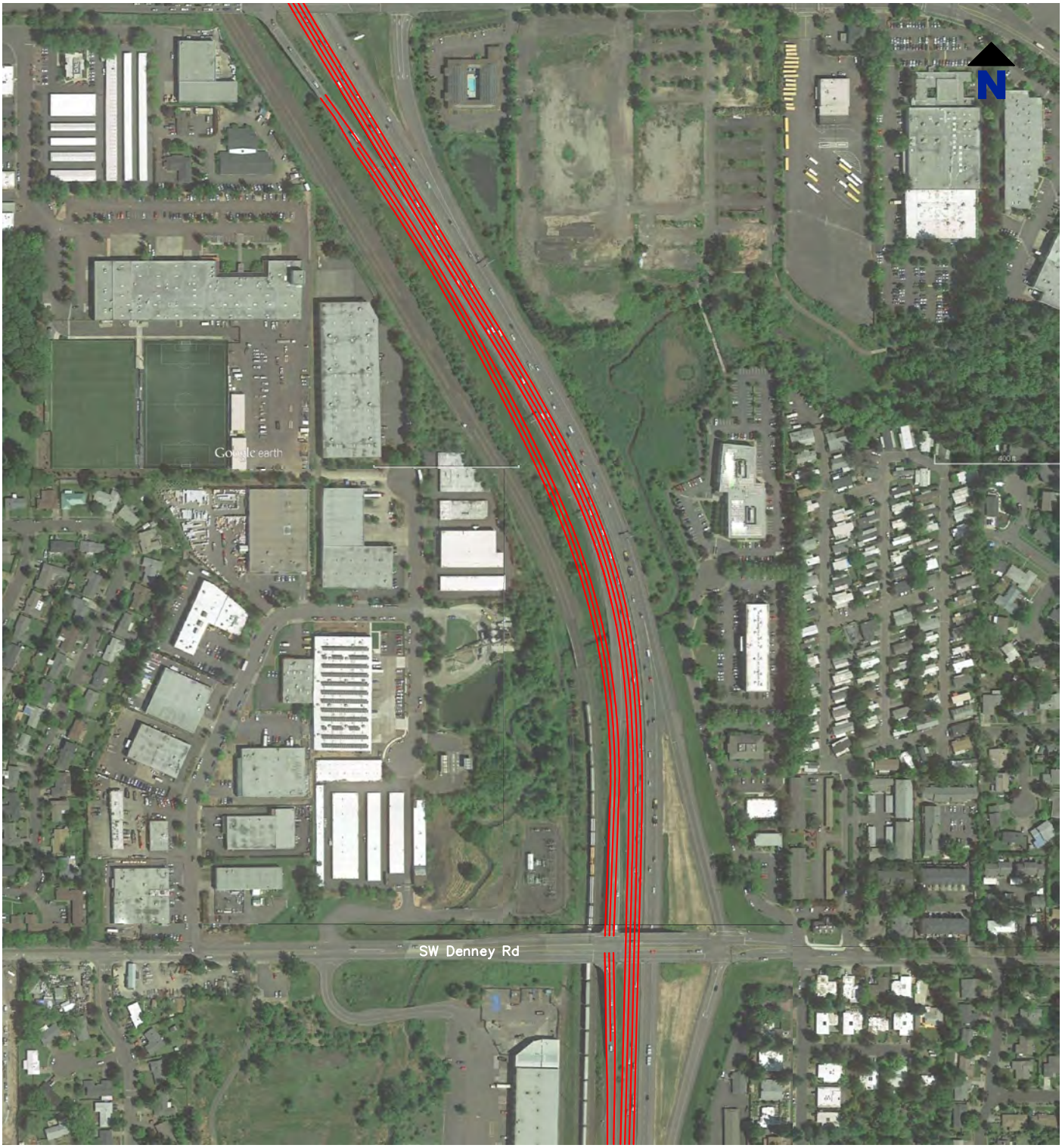
Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

South Project Area Build Alignment - A

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 3
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	



0 400 800 1200 feet

Proposed Build Alternative Lane Lines

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

South Project Area Build Alignment - B

Date	August 23, 2018	Scale	AS SHOWN	Fig. No.	4
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012		

0 400 800 1200 feet

Proposed Build Alternative Lane Lines

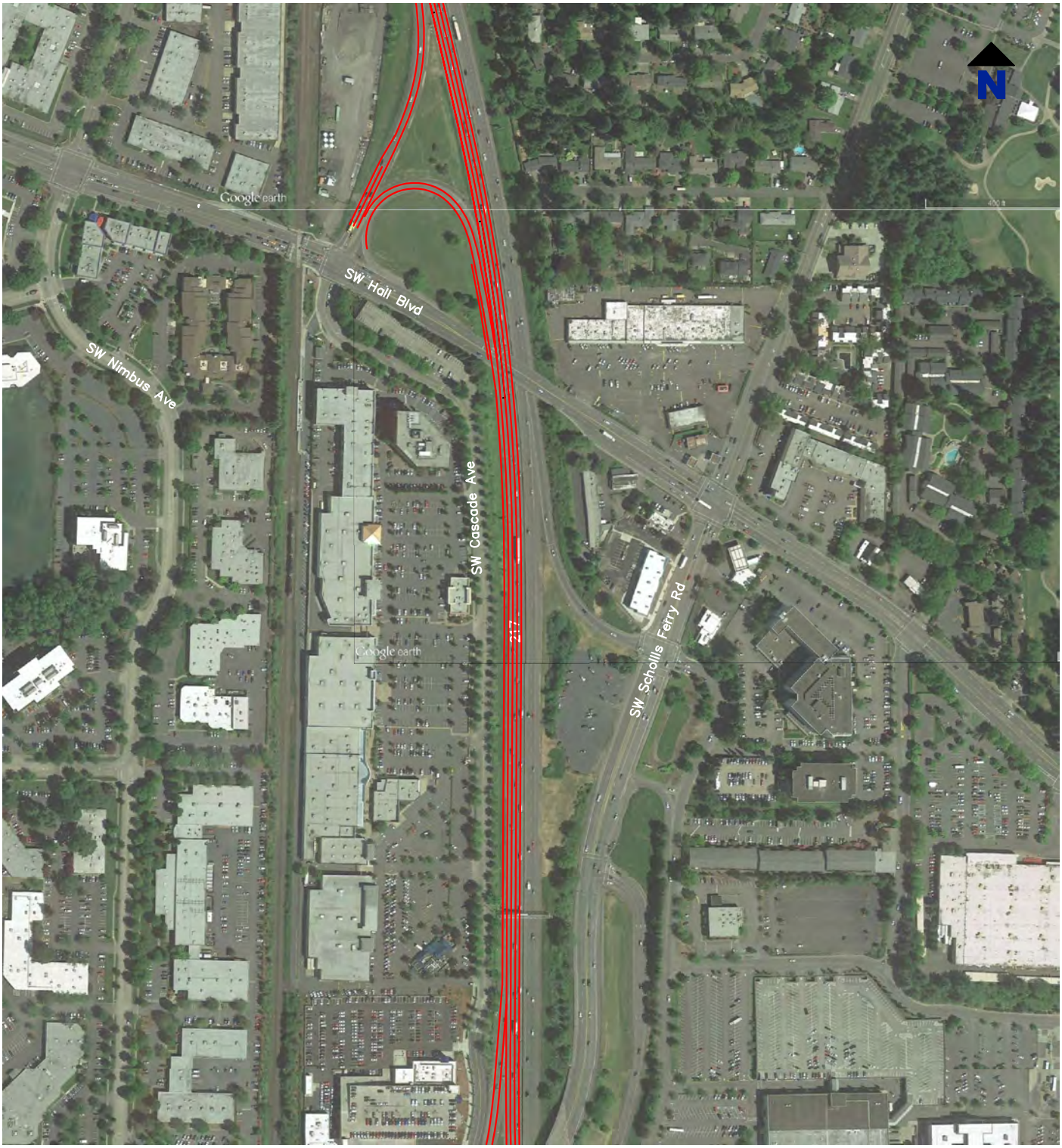
Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

South Project Area Build Alignment - C

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 5
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	



0 400 800 1200 feet

Proposed Build Alternative Lane Lines

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

South Project Area Build Alignment - D

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 6
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

0 400 800 1200 feet

Proposed Build Alternative Lane Lines

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

South Project Area Build Alignment - E

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 7
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

0 400 800 1200 feet

Proposed Build Alternative Lane Lines

Existing Masonry Wall

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

South Project Area Build Alignment - F

SLR

Date	August 23, 2018	Scale	AS SHOWN	Fig. No.	8
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012		

0 400 800 1200 feet

Proposed Build Alternative Lane Lines

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

South Project Area Build Alignment - G

SLR

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 9
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

0 400 800 1200 feet

Proposed Build Alternative Lane Lines

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

South Project Area Build Alignment - H

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 10
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

0 400 800 1200 feet

Proposed Build Alternative Lane Lines

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

South Project Area Build Alignment - I

Date	August 23, 2018	Scale	AS SHOWN	Fig. No.	11
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012		

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2. METHODOLOGY

This technical report has been prepared to meet the Federal Highway Administration (FHWA) Noise Standards (23 CFR 772), following the guidance contained in the ODOT Noise Manual (July 2011) and FHWA TNM Traffic Noise Model: Frequently Asked Questions (July 2011). All noise levels referred to in this report are stated as hourly equivalent sound pressure levels (Leq) in terms of A-weighted decibels (dBA). Noise levels stated in terms of dBA approximate the response of the human ear by filtering out some of the noise in the low and high frequency ranges that the human ear does not detect well. A-weighting is used in most environmental ordinances and standards. The equivalent sound pressure level is defined as the average noise level, on an energy basis, for a stated period of time (e.g., hourly).

2.1 AREA OF POTENTIAL EFFECT

The area of potential effect is the project area surrounding the proposed auxiliary lanes and frontage road improvements. Noise receivers were selected for this project based on a preliminary review of the traffic data and a survey of land uses in the project area. Noise modeling was used to determine the number of noise impacts resulting from the project.

2.2 REGULATIONS AND STANDARDS

This section summarizes federal, state, and local laws and regulations relevant to the noise analysis.

2.2.1 FEDERAL AND STATE

> *23 Code of Federal Regulations (CFR) 772. Federal Highway Administration, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." U.S. Code of Federal Regulations.*

These procedures specify FHWA noise abatement criteria (NAC) and are summarized in Table 1. A noise impact occurs if predicted noise levels approach the levels listed in Table 1 or substantially exceed existing noise levels. Each state defines quantitative levels considered to approach or substantially exceed existing noise levels. Construction of new highways, including auxiliary lanes or reconstruction of existing highways that substantially changes either the horizontal or vertical alignment or increases the number of through traffic lanes are highway projects that are considered Type I, according to FHWA traffic noise standards and require a traffic noise impact analysis and consideration of noise abatement. A substantial horizontal alteration halves the distance between the traffic noise source and the closest receptor between the Existing condition and the future Build condition. A substantial vertical alteration is a project that removes shielding therefore exposing the line-of-sight between the receptor and the traffic noise source. This can be done by either altering the vertical alignment of the highway or altering the topography between the highway noise source and the receptor.

Oregon Department of Transportation (ODOT). 2011. Noise Manual.

The ODOT Noise Manual states that noise studies must be prepared for all federal-aid and state-funded highway projects that meet the definition of a Type I project. The OR 217 Southbound and Northbound Auxiliary Lanes Project is creating or extending auxiliary lanes greater than 1,500 feet, therefore a traffic noise impact and abatement analyses are required.

Under ODOT policy, a traffic noise impact occurs if predicted noise levels approach (are 2 dBA less than) the FHWA criteria. A 10 dBA increase in noise levels from existing to future build is considered a substantial increase impact. The criteria are applied to the peak noise impact hour. Table 1 also shows the noise abatement approach criteria (NAAC) used for highway projects in Oregon.

Table 1
FHWA Noise Abatement Criteria and ODOT Noise Abatement Approach Criteria
Hourly A-Weighted Sound Level Decibels (dBA)

Activity Category	Activity Criteria[a] Leq(h)		Evaluation Location	Land Use Activity Description
	FHWA NAC[b]	ODOT NAAC[c]		
A	57	55	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[d]	67	65	Exterior	Residential
C[d]	67	65	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio stations, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	50	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools and television studios.
E[d]	72	70	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A-D or F.
F	--	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	--	Undeveloped lands that are not permitted.

Source: ODOT Noise Manual.

[a] The Leq(h) Activity Criteria values are for impact determination only and are not design standards for noise abatement measures.

[b] Federal Highway Administration Noise Abatement Criteria.

[c] Oregon Department of Transportation noise abatement approach criteria.

[d] Includes undeveloped lands permitted for this activity category.

Oregon Administrative Rule (OAR) 340 Division 35. Oregon Department of Environmental Quality (DEQ). "Noise Control Regulations." Oregon Administrative Rules.

This regulation sets allowable noise levels for individual vehicles and for industrial and commercial uses. Maximum allowable noise levels for in-use vehicles in Oregon are determined by vehicle type, operating conditions, and model year.

2.2.2 LOCAL

City of Beaverton City Code. Chapter 15.5: Noise

This noise ordinance exempts noise from motor vehicles operating on highways or premises open to the public. It also exempts repairs or excavations of bridges, streets, or highways between the hours of 7:00 pm and 7:00 am when public welfare and convenience renders it impractical to perform the work between 7:00 am and 7:00 pm. Construction of the 217 auxiliary lane improvements will likely occur 24 hours per day to minimize the traffic disruptions resulting from the construction activities.

City of Tigard Chapter 6.02, Article V. Noise Nuisances

The City of Tigard noise ordinance exempts sounds caused by construction activities during the hours of 7:00 am to 8:00 pm, seven days a week. Sounds caused by regular vehicular traffic upon premises open to the public in compliance with state law are also exempted. Sounds originating from construction projects for public facilities within rights-of-way pursuant to a noise mitigation plan approved by the city manager are also exempted. The city manager may approve the plan only if the plan will prevent unreasonable noise impacts. The noise mitigation plan must:

- Map the project noise impacts and explain how the impacts will be mitigated,
- Provide special consideration and mitigation efforts for noise sensitive units,
- Outline public notification plans, and
- Provide a 24-hour telephone contact number for information and complaints about a project.

Notwithstanding the exceptions noted above, creation of any noise in excess of 85 dB measured on property with a noise sensitive use, for more than five minutes in any calendar day, is a violation of the noise ordinance.

Washington County Code. Chapter 8.24: Noise

Washington County has a noise ordinance which prohibits construction noise related to public improvement projects from 7:00 pm to 7:00 am the following morning, and from 7:00 pm Saturday to 7:00 am the following Monday, and on legal holidays, except by variance or for reasons of emergency. Noise variance applications are a Type I for sound sources lasting sixty (60) days or less or Type II for sound sources lasting more than 60 days.

2.3 MEASUREMENT PROCEDURES AND EQUIPMENT

Field measurements were taken according to the guidelines in the FHWA manual Measurement of Highway Related Noise. A Rion NL-32 Type 1 sound level meter was used to collect noise level data. Field calibrations were performed and ambient sound levels were monitored for 15 minutes in each location. Equipment was lab-calibrated July 6, 2017. Meteorological conditions including temperature, humidity and wind speed were recorded during each sample. Traffic counts, including vehicle class identification, on OR 217 were also taken during the sampling period. Field measurements were used to validate the TNM model for existing conditions including roadway alignment.

2.4 TRAFFIC DATA

The traffic data provided by the ODOT Region 1 Traffic Unit included peak hour traffic volumes, peak truck hour traffic volumes and vehicle classifications (i.e., percent automobile, medium trucks, and heavy trucks) for Existing conditions (2017) and the future year (2040) Build and No Build conditions. The peak truck hour for the project area was 9:00-10:00 am. The peak traffic hour in the project areas is 7:00-8:00 am. The ODOT traffic data for the Existing conditions, No Build Alternative, and the Build Alternative are included in Appendix A.

2.5 MODELING METHODS

Traffic noise levels for the proposed project were calculated using the FHWA Traffic Noise Model (FHWA TNM® Version 2.5). TNM computes highway traffic noise at nearby noise prediction sites (receivers) and aids in the design of mitigation measures. Inputs to the model include three-dimensional descriptions of road alignments; vehicle volumes in defined vehicle classes; posted vehicle speeds; traffic control devices; and data on the characteristics and locations of specific ground types, topographical features, building shielding, and other features likely to influence the propagation of vehicle noise between the roadway and the noise prediction sites. The TNM model can also account for existing noise mitigation including previously constructed noise walls and berms.

The peak truck hour was found to be the peak noise hour through a comparison of model results for both the peak volume and peak truck hours under Existing conditions. The peak truck traffic data were used to assess the noise impacts from the project. A comparison of peak vehicle volume hour and peak truck hour noise levels for existing conditions can be found in Appendix E.

3. PROJECT AREA EXISTING CONDITIONS

3.1 EXISTING LAND USE

Land use in the project area varies from industrial to suburban residential development. City of Beaverton and City of Tigard zoning maps are included in Appendix B. Land uses are consistent with the current zoning along OR 217 in the project area.

In the City of Beaverton project area the primary land uses on the southbound side of OR 217 include Regional Centers (mixed use areas), industrial uses, and a commercial zone. A pocket of residential land uses zoned urban standard density, urban median density, and urban high density is located adjacent to OR 217, north of Allen Boulevard. This neighborhood consists of single family residences and a condominium complex. The commercial properties within the project area do not have outdoor use areas.

Current applications for proposed development projects were researched on the City of Beaverton website on May 18, 2018. There are no significant open spaces in the project area that would allow for future additional development adjacent to OR 217 in the City of Beaverton.

In the City of Tigard portion of the project area, the primary land uses adjacent to southbound OR 217 include mixed use commercial, residential land uses between SW Greenberg Road and the SW Hall Boulevard overpass, and professional commercial zoning and uses. The northbound side of OR 217 is zoned for and contains commercial uses at SW Scholls Ferry Road, mixed use commercial zoning, mixed use residential zoning, residential land uses and zoning, and professional commercial or mixed use employment zoning and uses at OR 99W.

Current applications for proposed development projects were researched on the City of Tigard website on May 18, 2018. It appears there are locations in the City of Tigard portion of the project area where future additional development could occur immediately adjacent to OR 217. To the north and south of the SW Hall Boulevard overpass are two empty lots. Receptors on adjacent properties represent the sound levels for the empty lots. This area immediately adjacent to the ramps is zoned for commercial professional development and information available in the interactive zoning and building permits application indicates the single family residences currently located south of Hall will be developed as commercial properties. On the east side of OR 217, in the Northbound Auxiliary Lane Project area, a large apartment complex is being developed north of Ash Creek in an area zoned for mixed use employment. Although this parcel of land is set back from OR 217, there is a direct line of sight from the travel lanes, and the development will be included in the noise analysis.

3.2 EXISTING NOISE LEVELS

Existing noise levels were monitored at five locations within the project area for use in validating the noise model using a Rion NL-32 Type 1 sound level meter. Field calibrations were performed and ambient sound levels were monitored for 15 minutes in each location. Equipment was lab-calibrated

July 6, 2017. Concurrent traffic counts on OR 217 were taken during the monitoring periods for use in model validation.

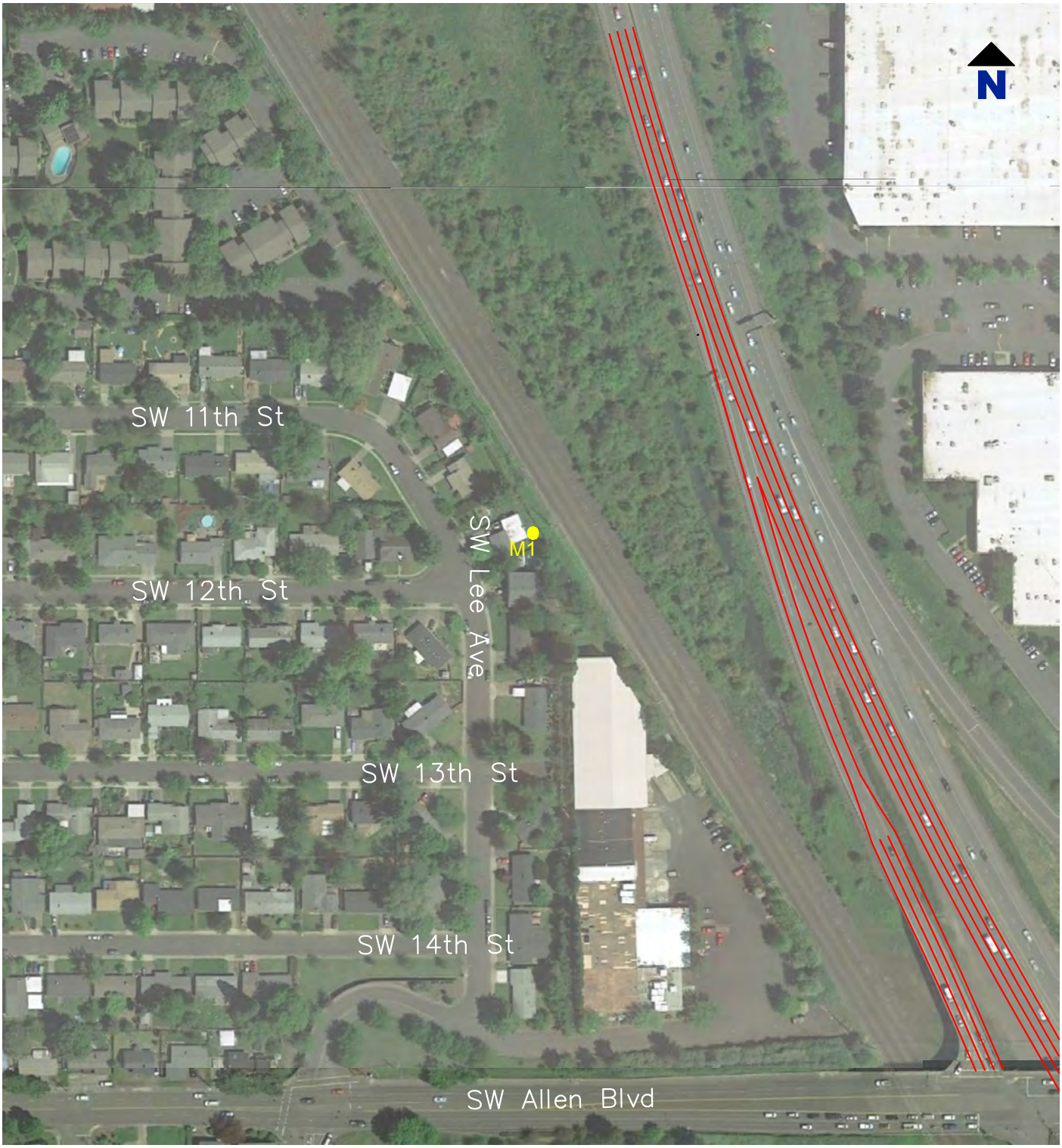
The monitoring locations are shown in Figures 12-14. Monitoring sites 1-5 are located at residences on the west and east sides of OR 217. The criteria for monitoring site selection included land use, proximity of sensitive noise receivers to the proposed construction, and level of potential impact. Traffic on OR 217 was the dominant noise source during all of the monitoring periods, except one period which had a siren. The traffic counts were used as input to the traffic noise model for validation. The validation analyses included modeling of shielding from existing topography and masonry walls located along OR 217.

The Westside Express Service (WES) commuter rail track is located along the west side of OR 217 in the project area between SW 5th Street and SW Hall Boulevard, adjacent to the residential area north of SW Allen Boulevard. The train operates every 30 minutes during the morning and afternoon commute periods on Mondays, Tuesdays, Thursdays, and Fridays from approximately 5 am until 7 pm, for a total of 14 trains per day. Train passbys were noted during the monitoring session in that neighborhood, but did not occur during the M1 monitoring period. The train noise is notable above the ambient traffic noise during train passbys.

A comparison of noise levels predicted for the project area receivers using the noise model and noise levels measured in the field is shown in Table 2. If the monitored and modeled results are within 3 dBA, the model is considered to reasonably predict noise levels. Monitoring data and equipment calibration certificates are included in Appendix C. Validation run TNM output files are included in Appendix D.

Table 2
Monitored and Predicted Noise Levels in the OR 217 Auxiliary Lanes Project Area (Leq - dBA)

Monitoring Site	Location	Date/Start Time	Duration	Measured Noise Level	Predicted Noise Level (model validation)	Difference
M1	5670 SW Lee Avenue	03/29/18 1:26 pm	15 min	54	57	3
M2	10620 SW 95th Avenue	12/14/17 11:44 am	15 min	66	67	1
M3	9378 SW Mandamus Court	12/07/17 1:15 pm	15 min	71	70	1
M4	11155 SW Hall Boulevard	12/08/17 10:30 am	15 min	70	72	2
M5	8410 SW Pfaffle Street	12/14/17 12:17 pm	15 min	63	63	0



0 200 400 600 feet

Proposed Build Alternative Lane Lines

Monitoring Location

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Monitoring Locations - A

SLR

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 12
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

Proposed Build Alternative Lane Lines
Existing Masonry Wall
Monitoring Location

0 200 400 600 feet

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Monitoring Locations - B

SLR

Date	August 23, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. 13

Proposed Build Alternative Lane Lines

Monitoring Location

0 200 400 600 feet

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Monitoring Locations - C

SLR

Date	August 23, 2018	Scale	AS SHOWN	Fig. No.	14
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012		

Following validation, existing sound levels were predicted at 81 receivers (representing 197 receptors) in the Southbound Auxiliary Lane Project area. The monitoring location M3 is modeled as a receiver in the southbound analysis area. The monitoring location M1 is located adjacent to the receiver R7, so was not modeled as a receiver. Locations M2, M4, and M5 will be modeled as receivers in the northbound analysis area.

Sound levels were predicted at 5 feet above ground level for first floor residences and 15 feet for second floor residences. Existing terrain and an existing masonry wall were included in the model and provided shielding for the receivers. Building rows were also added to the model in areas where large buildings or dense residences provide shielding for residences located behind them. Predicted existing peak noise hour sound levels at receivers located within the project area are listed in Table 3. The TNM model files are included in electronic format in Appendix D. A project-wide view of area receiver locations is shown in Figures 15 through 22.

Under Existing peak noise hour conditions, 32 receivers (representing 51 residences) are predicted to have sound levels exceeding the NAAC.

Proposed Build Alternative Lane Lines

Receiver Location

0 200 400 600 feet

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Receiver Locations - A

SLR

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 15
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

Proposed Build Alternative Lane Lines

Receiver Location

0 200 400 600 feet

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Receiver Locations - B

SLR

Date	August 23, 2018	Scale	AS SHOWN	Fig. No.	16
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012		

0 200 400 600 feet

Proposed Build Alternative Lane Lines

Receiver Location

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Receiver Locations - C

SLR

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 17
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

Proposed Build Alternative Lane Lines

Receiver Location

0 200 400 600 feet

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Receiver Locations - D

SLR

Date	August 23, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. 18

0 200 400 600 feet

Proposed Build Alternative Lane Lines

Monitoring Location

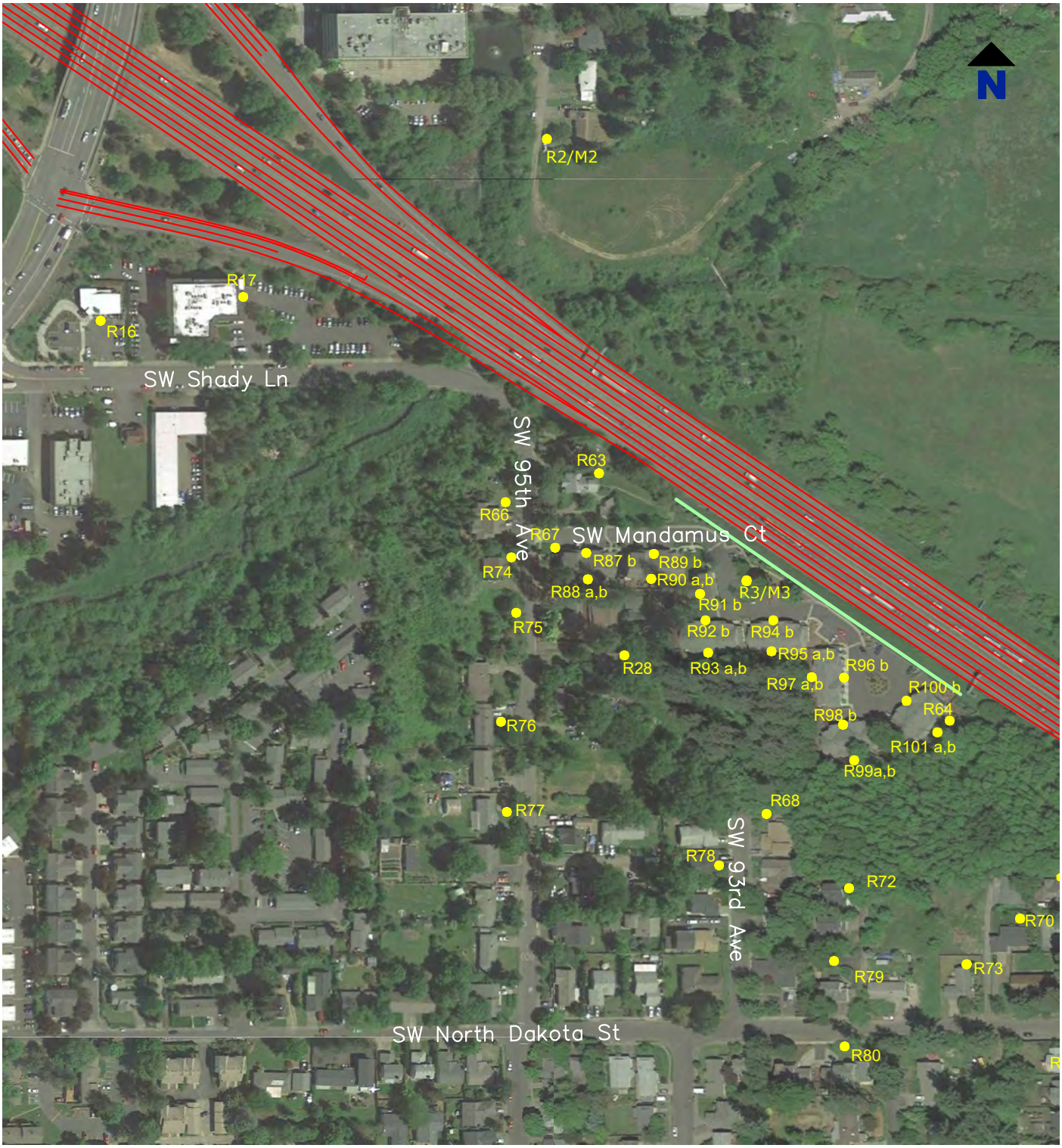
Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Receiver Locations - E

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 19
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	



Proposed Build Alternative Lane Lines
Existing Masonry Wall
Monitoring Location

0 200 400 600 feet

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

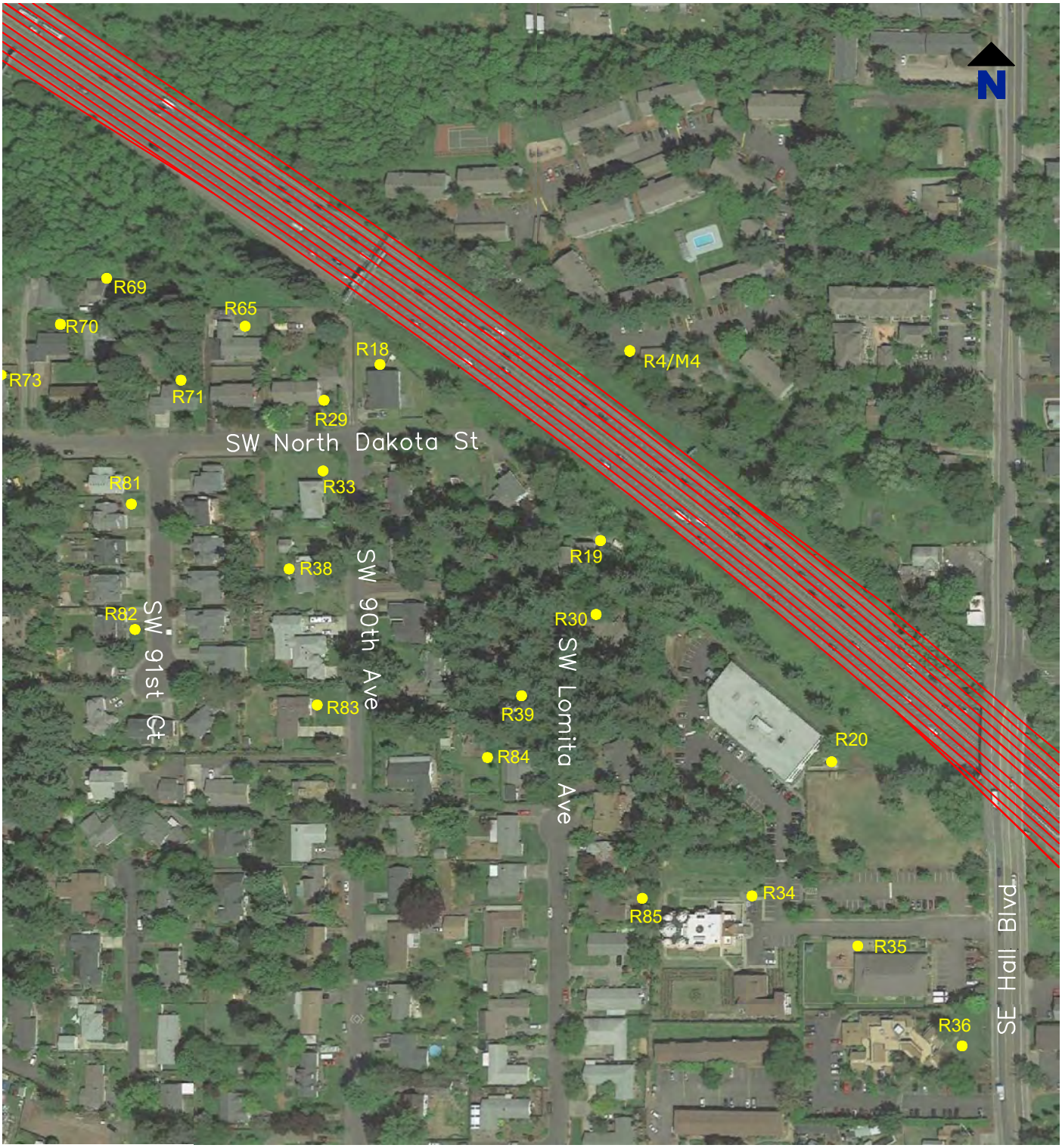
Drawing

Receiver Locations - F

SLR

Date	August 23, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. 20



0 200 400 600 feet

Proposed Build Alternative Lane Lines

Monitoring Location

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Receiver Locations - G

SLR

Date	August 23, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. 21

Proposed Build Alternative Lane Lines

Monitoring Location

0 200 400 600 feet

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Receiver Locations - H

SLR

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. 22
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

Table 3
Predicted Existing Peak Noise Hour Sound Levels in the Project Area

Receiver	Location	Activity Category	Oregon NAAC	Number of Receptors	TNM Noise Level (Leq – dBA)*
R1	1st Row Condominium on SW Alger Ave. North of SW 11th St. [SE corner]	B	65	9	59
R2/M2	1st Row House on SW 95th Ave.	B	65	NB	**66**
R3/M3	1st Row Apartment Complex on SW Mandamus Ct.	B	65	Info	**69**
R4/M4	1st Row Apartment Complex on SW Hall Blvd. North of SW Pfaffle St. [SW corner]	B	65	NB	**72**
R5/M5	1st Row Apartment Complex on SW 83rd Ave. [SW corner]	B	65	NB	62
R6	1st Row Condominium on SW Alger Ave. North of SW 11th St. [NE corner]	B	65	8	57
R7	1st Row House on SW Lee Ave. North of SW 12th St.	B	65	4	60
R8	1st Row House on SW Lee Ave. North of SW 13th St.	B	65	4	56
R9	1st Row House on SW Allen Frontage Rd. East of SW Lee Ave and South of SW 14th St.	B	65	2	59
R10	1st Row Business Center on SW Nimbus Ave. North of SW Cirrus Dr.	Info	--	1	63
R11	1st Row Business Center on SW Nimbus Ave. South of SW Cirrus Dr. [N side]	Info	--	1	62
R12	1st Row Business Center on SW Nimbus Ave. South of SW Cirrus Dr. [S side]	Info	--	1	61
R13	1st Row Hotel on SW Nimbus Ave. North of SW Marriott St.[1]	E	70	1	60
R14	Restaurant Outdoor Seating on SW Cascade Ave. South of SW Hall Blvd.[2]	E	70	2	69
R15	1st Row Mall on SW Cascade Ave. South of SW Scholls Ferry Rd.	Info	--	1	64
R16	1st Row Coffee Shop on SW Shady Ln.[3]	E	70	1	60
R17	1st Row Medical Facility on SW Shady Ln.	D	50	1	44 (64)
R18	1st Row House at the NE corner of SW North Dakota St. and SW 90th Ave.	B	65	1	**75**
R19	1st Row House on SW North Dakota St. East of SW 90th Ave and North of SW Lomita Ave.	B	65	2	**73**

[1] The primary outdoor use area for the hotel is a courtyard within the building interior. R13 represents an outdoor bench by the lobby. There are also balconies on exterior rooms.
[2] Benihana and Fresh Grill outdoor seating areas.
[3] Starbucks outdoor seating area is on the south side of the building.

Table 3
Predicted Existing Peak Noise Hour Sound Levels in the Project Area

Receiver	Location	Activity Category	Oregon NAAC	Number of Receptors	TNM Noise Level (Leq – dBA)*
R20	1st Row Office Building on SW Hall Blvd. North of SW 88th Ave.[4]	E	70	1	64
R24	2nd Row Condominium on SW Alger Ave. North of SW 11th St. [by the pool]	B	65	24	54
R25	2nd Row House at the corner of SW Lee Ave. and SW 12th St.	B	65	4	58
R26	2nd Row House at the corner of SW Lee Ave. and SW 14th St.	B	65	2	56
R27	2nd Row Retail at the SE corner of SW Nimbus Ave. and SW Hall Blvd.[5]	E	70	1	61
R28	2nd Row House on SW Longstaff St.	B	65	4	61
R29	2nd Row House at the NW corner of SW North Dakota St. and SW 90th Ave.	B	65	2	**69**
R30	2nd Row House on SW 90th Ave. North of SW Lomita Ave.	B	65	2	**66**
R31	3rd Row House on SW 13th St. West of SW Lee Ave.	B	65	8	57
R32	3rd Row House on SW 14th St. East of SW Alger Ave.	B	65	2	56
R33	3rd Row House at the SW corner of SW North Dakota St. and SW 90th Ave.	B	65	3	**66**
R34	3rd Row Temple on SW Hall Blvd. East of SW Lomita Ave.	C	65	1	58
R35	1st Row Day Care Center on SW Hall Blvd. North of Pacific Hwy and East of SW 88th Ave.	C	65	1	60
R36	2nd Row Offices on SW Hall Blvd. North of Pacific Hwy and East of SW 88th Ave.	Info	--	1	61
R38	4th Row House on SW 91st Ct.	B	65	5	62
R39	4th Row House on SW Lomita Ave.	B	65	4	60
R40	3rd Row Park on Fanno Creek Trail. South of SW Fanno St.	C	65	--	54
R63	1st Row House on SW 95th Ave. North of SW Mandamus Ct.	B	65	2	**75**
R64	1st Row Apartment Complex on SW Mandamus Ct. [at the end of the street, on	B	65	Info	**72**

[4] Office building has an outdoor picnic table seating area.
[5] Retail building has outdoor seating for food service businesses.

Table 3
Predicted Existing Peak Noise Hour Sound Levels in the Project Area

Receiver	Location	Activity Category	Oregon NAAC	Number of Receptors	TNM Noise Level (Leq – dBA)*
	the E side]				
R65	1st Row House on SW North Dakota St. West of SW 90th Ave and East of SW 93rd Ave.	B	65	1	**72**
R66	2nd Row House on SW 95th Ave. [across SW Mandamus Ct]	B	65	2	**68**
R67	2nd Row Apartment Complex at the corner of SW Mandamus Ct and SW 95th Ave.	B	65	Info	**67**
R68	2nd Row House on SW 93rd Ave. [at the end of the street, on the E side]	B	65	1	61
R69	1st Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	**69**
R70	2nd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	**65**
R71	2nd Row House on SW North Dakota St. [across SW 91st Ct.]	B	65	2	**66**
R72	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	61
R73	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	62
R74	2nd Row Property Currently under Residential Development	B	65	1	**66**
R75	3rd Row Property Currently under Residential Development	B	65	4	64
R76	4th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	2	60
R77	5th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	4	57
R78	3rd Row House on SW 93rd Ave. [at the end of the street, on the W side]	B	65	3	59
R79	4th Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	3	59
R80	5th Row House on SW North Dakota St. East of SW 94th Ave and West of SW 92nd Ave.	B	65	3	58
R81	5th Row House on SW 91st Ct. East of SW 92nd Ave.	B	65	3	62
R82	6th Row House on SW 91st Ct. [at the end of the street, on the W side]	B	65	4	59
R83	6th Row House on SW 90th Ave. South of SW North Dakota St and East of SW 91st Ct.	B	65	3	59
R84	5th Row House on SW Lomita Ave. [at the	B	65	2	58

Table 3
Predicted Existing Peak Noise Hour Sound Levels in the Project Area

Receiver	Location	Activity Category	Oregon NAAC	Number of Receptors	TNM Noise Level (Leq – dBA)*
	end of the street, on the W side]				
R85	5th Row House on SW Lomita Ave. [at the end of the street, on the E side]	B	65	2	56
R87b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**70**
R88a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	62
R88b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**65**
R89b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**72**
R90a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63
R90b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**
R91b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	1	**67**
R92b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**68**
R93a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	60
R93b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	64
R94b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**73**
R95a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63
R95b	1st Row Apartment Complex on SW	B	65	2	**67**

Table 3
Predicted Existing Peak Noise Hour Sound Levels in the Project Area

Receiver	Location	Activity Category	Oregon NAAC	Number of Receptors	TNM Noise Level (Leq – dBA)*
	Mandamus Ct. Back of Building 2nd Floor Balcony				
R96b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**72**
R97a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63
R97b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**
R98b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**68**
R99a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	64
R99b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**
R100b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**73**
R101a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	**70**
R101b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**73**
Total number of receptors with sound levels exceeding the NAAC under Existing conditions:					**51**

Receivers predicted to exceed the NAAC are shown in bold type.

4. TRAFFIC NOISE ANALYSIS AND NOISE IMPACTS

4.1 EXISTING AND FUTURE LAND USE

The City of Beaverton Comprehensive Plan Land Use Map and City of Tigard Comprehensive Plan Map were reviewed and there are no proposed changes to the existing zoning in the project area. New sensitive noise receivers being developed adjacent to OR 217 have been incorporated into the analysis where building permit information is available.

4.2 FUTURE SOUND LEVELS AND TRAFFIC NOISE IMPACTS

Future noise levels (2040) were predicted at the 81 receiver sites (at 5 or 15 feet above ground level) for the No Build and Build Alternatives. Predicted peak noise hour sound levels are shown in Table 4 for No Build conditions and Table 5 for Build conditions. TNM model files are included in electronic format in Appendix D. Noise impacts occur under Build conditions when the NAAC is exceeded or when predicted future levels for the Build Alternative increase by 10 dBA or more over Existing conditions. Predicted noise levels that exceed the NAAC are shown in bold in Tables 4 and 5. No substantial noise increases are predicted. Receiver locations are shown in Figures 15 through 22 for the project area. Appendix E also includes a summary table of the model results for all analysis alternatives.

Table 4
Predicted Peak Noise Hour Sound Levels for Existing and No Build Conditions in the Project Area

Receiver	Activity Category	Oregon NAAC	Number of Receptors	Existing (Leq – dBA)	No Build 2040 (Leq – dBA)	Increase Over Existing (dBA)
R1	B	65	9	59	60	1
R2/M2	B	65	NB	**66**	**67**	1
R3/M3	B	65	Info	**69**	**70**	1
R4/M4	B	65	NB	**72**	**73**	1
R5/M5	B	65	NB	62	63	1
R6	B	65	8	57	58	1
R7	B	65	4	60	61	1
R8	B	65	4	56	57	1
R9	B	65	2	59	60	1
R10	Info	--	1	63	64	1
R11	Info	--	1	62	63	1
R12	Info	--	1	61	62	1
R13	E	70	1	60	61	1
R14	E	70	2	69	**70**	1
R15	Info	--	1	64	65	1

Table 4
Predicted Peak Noise Hour Sound Levels for Existing and No Build Conditions in the Project Area

Receiver	Activity Category	Oregon NAAC	Number of Receptors	Existing (Leq – dBA)	No Build 2040 (Leq – dBA)	Increase Over Existing (dBA)
R16	E	70	1	60	61	1
R17	D	50	1	44 (64)	45 (65)	1
R18	B	65	1	**75**	**76**	1
R19	B	65	2	**73**	**74**	1
R20	E	70	1	64	66	2
R24	B	65	24	54	55	1
R25	B	65	4	58	59	1
R26	B	65	2	56	57	1
R27	E	70	1	61	61	0
R28	B	65	4	61	62	1
R29	B	65	2	**69**	**70**	1
R30	B	65	2	**66**	**67**	1
R31	B	65	8	57	58	1
R32	B	65	2	56	57	1
R33	B	65	3	**66**	**67**	1
R34	C	65	1	58	59	1
R35	C	65	1	60	61	1
R36	Info	--	1	61	62	1
R38	B	65	5	62	64	2
R39	B	65	4	60	61	1
R40	C	65	--	54	55	1
R63	B	65	2	**75**	**76**	1
R64	B	65	Info	**72**	**73**	1
R65	B	65	1	**72**	**73**	1
R66	B	65	2	**68**	**69**	1
R67	B	65	Info	**67**	**68**	1
R68	B	65	1	61	62	1
R69	B	65	2	**69**	**70**	1
R70	B	65	2	**65**	**66**	1
R71	B	65	2	**66**	**68**	2
R72	B	65	2	61	62	1
R73	B	65	2	62	63	1
R74	B	65	1	**66**	**67**	1

Table 4
Predicted Peak Noise Hour Sound Levels for Existing and No Build Conditions in the Project Area

Receiver	Activity Category	Oregon NAAC	Number of Receptors	Existing (Leq – dBA)	No Build 2040 (Leq – dBA)	Increase Over Existing (dBA)
R75	B	65	4	64	**65**	1
R76	B	65	2	60	61	1
R77	B	65	4	57	59	2
R78	B	65	3	59	60	1
R79	B	65	3	59	60	1
R80	B	65	3	58	59	1
R81	B	65	3	62	63	1
R82	B	65	4	59	60	1
R83	B	65	3	59	60	1
R84	B	65	2	58	59	1
R85	B	65	2	56	57	1
R87b	B	65	2	**70**	**71**	1
R88a	B	65	2	62	63	1
R88b	B	65	2	**65**	**66**	1
R89b	B	65	2	**72**	**73**	1
R90a	B	65	2	63	64	1
R90b	B	65	2	**66**	**67**	1
R91b	B	65	1	**67**	**68**	1
R92b	B	65	2	**68**	**69**	1
R93a	B	65	2	60	61	1
R93b	B	65	2	64	**65**	1
R94b	B	65	2	**73**	**74**	1
R95a	B	65	2	63	64	1
R95b	B	65	2	**67**	**68**	1
R96b	B	65	2	**72**	**73**	1
R97a	B	65	2	63	64	1
R97b	B	65	2	**66**	**67**	1
R98b	B	65	2	**68**	**69**	1
R99a	B	65	2	64	**65**	1
R99b	B	65	2	**66**	**67**	1
R100b	B	65	2	**73**	**74**	1
R101a	B	65	2	**70**	**71**	1
R101b	B	65	2	**73**	**74**	1

Table 4
Predicted Peak Noise Hour Sound Levels for Existing and No Build Conditions in the Project Area

Receiver	Activity Category	Oregon NAAC	Number of Receptors	Existing (Leq – dBA)	No Build 2040 (Leq – dBA)	Increase Over Existing (dBA)
Total number of receptors with sound levels exceeding the NAAC under No Build conditions:				**61** (59 residences and 2 restaurants)		

4.2.1 NO BUILD ALTERNATIVE NOISE LEVELS

The same existing masonry wall and topographical shielding was used in the No Build modeling that was used in the validation and Existing model runs. The No Build sound levels range from 55 dBA to 76 dBA at the receivers. The No Build Alternative shows increases in sound levels of up to 2 dBA over existing sound levels as a result of traffic volume increases between 2017 and 2040. A 3 dBA change in sound levels is perceptible to most people. Thirty six receivers representing 59 residences and two restaurants are predicted to have sound levels approaching or exceeding the NAAC under the No Build Alternative. No Build sound levels are shown for each receiver in the figures in Appendix E.

4.2.2 BUILD ALTERATIVE IMPACTS

The same existing masonry wall and topographical shielding was used in the Build modeling as was used in the validation and Existing model runs. The Build sound levels range from 55 dBA to 76 dBA. The Build Alternative shows increases in sound levels of up to 2 dBA at the modeled receivers as a result of traffic volume increases between 2017 and 2040. Sound levels were predicted to decrease by 1 dBA from the No Build to Build Alternatives at 29 receivers indicating that the project will slightly improve future sound levels in many locations. Except for one receiver, R7, the Build sound levels will not be perceptibly different than current sound levels in the Southbound Auxiliary Lane Project area.

Table 5
Predicted Peak Noise Hour Sound Levels for Existing and Build Conditions in the Project Area

Receiver	Activity Category	Oregon NAAC	Number of Receptors	Existing (Leq – dBA)	Build 2040 (Leq – dBA)	Increase Over Existing (dBA)
R1	B	65	9	59	61	2
R2/M2	B	65	NB	**66**	**66**	0
R3/M3	B	65	Info	**69**	**69**	0
R4/M4	B	65	NB	**72**	**72**	0
R5/M5	B	65	NB	62	63	1
R6	B	65	8	57	59	2
R7	B	65	4	60	63	3

Table 5
Predicted Peak Noise Hour Sound Levels for Existing and Build Conditions in the Project Area

Receiver	Activity Category	Oregon NAAC	Number of Receptors	Existing (Leq – dBA)	Build 2040 (Leq – dBA)	Increase Over Existing (dBA)
R8	B	65	4	56	57	1
R9	B	65	2	59	61	2
R10	Info	--	1	63	65	2
R11	Info	--	1	62	62	0
R12	Info	--	1	61	62	1
R13	E	70	1	60	61	1
R14	E	70	2	69	**70**	1
R15	Info	--	1	64	64	0
R16	E	70	1	60	61	1
R17	D	50	1	44 (64)	45 (65)	1
R18	B	65	1	**75**	**76**	1
R19	B	65	2	**73**	**74**	1
R20	E	70	1	64	66	2
R24	B	65	24	54	55	1
R25	B	65	4	58	59	1
R26	B	65	2	56	57	1
R27	E	70	1	61	61	0
R28	B	65	4	61	62	1
R29	B	65	2	**69**	**70**	1
R30	B	65	2	**66**	**67**	1
R31	B	65	8	57	57	0
R32	B	65	2	56	58	2
R33	B	65	3	**66**	**66**	0
R34	C	65	1	58	58	0
R35	C	65	1	60	60	0
R36	Info	--	1	61	62	1
R38	B	65	5	62	63	1
R39	B	65	4	60	61	1
R40	C	65	--	54	55	1
R63	B	65	2	**75**	**75**	0
R64	B	65	Info	**72**	**72**	0
R65	B	65	1	**72**	**72**	0
R66	B	65	2	**68**	**69**	1

Table 5
Predicted Peak Noise Hour Sound Levels for Existing and Build Conditions in the Project Area

Receiver	Activity Category	Oregon NAAC	Number of Receptors	Existing (Leq – dBA)	Build 2040 (Leq – dBA)	Increase Over Existing (dBA)
R67	B	65	Info	**67**	**68**	1
R68	B	65	1	61	61	0
R69	B	65	2	**69**	**69**	0
R70	B	65	2	**65**	**65**	0
R71	B	65	2	**66**	**67**	1
R72	B	65	2	61	61	0
R73	B	65	2	62	63	1
R74	B	65	1	**66**	**66**	0
R75	B	65	4	64	64	0
R76	B	65	2	60	60	0
R77	B	65	4	57	58	1
R78	B	65	3	59	60	1
R79	B	65	3	59	60	1
R80	B	65	3	58	59	1
R81	B	65	3	62	62	0
R82	B	65	4	59	60	1
R83	B	65	3	59	59	0
R84	B	65	2	58	59	1
R85	B	65	2	56	57	1
R87b	B	65	2	**70**	**71**	1
R88a	B	65	2	62	63	1
R88b	B	65	2	**65**	**65**	0
R89b	B	65	2	**72**	**73**	1
R90a	B	65	2	63	64	1
R90b	B	65	2	**66**	**67**	1
R91b	B	65	1	**67**	**67**	0
R92b	B	65	2	**68**	**69**	1
R93a	B	65	2	60	61	1
R93b	B	65	2	64	**65**	1
R94b	B	65	2	**73**	**74**	1
R95a	B	65	2	63	64	1
R95b	B	65	2	**67**	**67**	0
R96b	B	65	2	**72**	**73**	1

Table 5
Predicted Peak Noise Hour Sound Levels for Existing and Build Conditions in the Project Area

Receiver	Activity Category	Oregon NAAC	Number of Receptors	Existing (Leq – dBA)	Build 2040 (Leq – dBA)	Increase Over Existing (dBA)
R97a	B	65	2	63	64	1
R97b	B	65	2	**66**	**67**	1
R98b	B	65	2	**68**	**69**	1
R99a	B	65	2	64	64	0
R99b	B	65	2	**66**	**67**	1
R100b	B	65	2	**73**	**74**	1
R101a	B	65	2	**70**	**71**	1
R101b	B	65	2	**73**	**73**	0
Total number of receptors with sound levels exceeding the NAAC under Build conditions:					**55** (53 residences and 2 restaurants)	

Thirty four receivers representing 53 residences and two restaurants are predicted to be noise impacted under Build conditions. No substantial increase noise impacts are expected. Build sound levels are shown for each receiver in the figures in Appendix E. All receivers predicted to be impacted under Build conditions are also predicted to exceed the NAAC under No Build conditions, with the exception of R75, which is impacted under the No Build scenario but not the Build scenario. The movement of the auxiliary lane closer to the existing masonry wall of the condominium complex is likely providing the 1 dBA reduction in sound levels for R75.

4.2.3 SUMMARY OF RESULTS

Table 6 is a summary of total numbers of properties where sound levels are predicted to exceed the NAAC under Existing and No Build conditions and the total number of noise impacts predicted for Build conditions. Between No Build and Build conditions, there is a difference of 6 in the total number of locations of properties with noise levels that will exceed the NAAC. The primary source of noise in the project area is the traffic on OR 217. Changes to the southbound lane alignments with the addition of the auxiliary lane will not result in notable changes to the ambient noise environment. A full summary of all modeling results are available in Appendix E.

Table 6
Summary of Results for Southbound Auxiliary Lane Project Area

Alternative	Existing Conditions (2017)	No Build Alternative (2040)	Build Alternative (2040)
Sound Levels > NAAC Activity B	51	59	53
Sound Levels > NAAC Activity C	0	0	0
Sound Levels > NAAC Activity D	0	0	0
Sound Levels > NAAC Activity E	0	2	2
Substantial Increase Impacts	N/A	N/A	0

4.3 CONSTRUCTION IMPACTS

Construction of the Build Alternative may cause localized, short-duration noise impacts. Construction equipment will generate noise on a temporary basis for the duration of project construction. A list of typical construction noise levels is included in Appendix G. Using standard ODOT specifications for control of noise sources during construction can minimize construction impacts. The ODOT specifications are described in the Construction Noise Mitigation section of this report.

4.4 CUMULATIVE IMPACTS

The modeling analysis used for this project accounts for cumulative impacts because it is based on cumulative traffic data that include projected development in the area.

4.5 INDIRECT IMPACTS

No significant indirect noise impacts are expected.

5. RANGE OF POTENTIAL MITIGATION MEASURES

Predicted future noise levels exceed noise impact levels and an analysis of mitigation has been completed for the Build Alternative in the project areas.

5.1 TRAFFIC NOISE ABATEMENT

Mitigation was considered for this noise analysis where noise impacts from the Build Alternative have been identified. Noise impacts result when the ODOT NAACs are exceeded, or when a substantial noise increase (10 dBA or greater) over Existing conditions is predicted.

The following noise abatement selection criteria are used when considering potential noise mitigation for noise impacts:

- Noise abatement benefits
- Opinions of impacted property owners
- Land use and zoning
- Controlled and uncontrolled access
- Cost of abatement
- Environmental impacts
- Absolute noise levels
- Non-traffic noise

Several options were considered for traffic noise abatement for the impacts to the Southbound Auxiliary Lane Project area. These include truck restrictions, speed restrictions, and alignment changes. Truck restrictions are infeasible because OR 217 is a major route for freight movement. The posted speed limit on OR 217 is 55 miles per hour, resulting in high levels of traffic noise. Reducing posted speed limits is unlikely to reduce actual travel speeds and would defeat the goal of efficient traffic movement through the project area.

Changes in alignment can be considered to prevent traffic noise impacts but generally, changes in alignment shift impacts to other properties. The prevention of impacts is an important part of noise control. In this project area the most substantial contribution of traffic noise to the nearby sensitive receptors comes from the OR 217 mainline traffic volumes. The addition of the auxiliary lane in the Southbound Project area results in a maximum increase over No Build sound levels of 2 dBA, indicating that the project will have an imperceptible effect on sound levels. Many receivers are predicted to have a 1 dBA decrease in sound levels.

Noise barriers are common considerations in project areas like the OR 217 corridor. ODOT guidance states a noise barrier must meet feasibility and reasonableness criteria to be recommended for construction. Feasibility or constructability of an abatement measure includes acoustical and engineering factors. For the abatement to be feasible, ODOT requires that a simple majority of impacted receptors achieve at least a 5 dBA reduction in noise levels. ODOT also considers engineering factors such as barrier height, safety, topography, drainage, utilities, and access issues when determining feasibility. ODOT considers barriers of all heights but those exceeding 25 feet would likely exceed the reasonable criteria for cost-effectiveness.

ODOT considers three factors to determine whether a noise barrier is reasonable. These three factors include the viewpoints of the residents and property owners that benefit from the proposed abatement, the cost-effectiveness of the abatement measure, and the ODOT noise reduction design goal for abatement. All three criteria must be met to satisfy the reasonableness criteria.

If a barrier meets the criteria for recommendation, ODOT distributes a survey by mail to benefitted residents to determine the residents' desire for abatement. If a majority (>50%) of those property owners and renters responding to the survey do not want the noise barrier, it would not be recommended for construction. A 'no' decision means that federal funds would not be available for future abatement at that location unless there was a project near the location that was defined as Type I (as defined by 23 CFR 772 and the ODOT Noise Manual).

The second reasonableness criterion is the cost-effectiveness of the proposed abatement. All benefitted residences are considered in the calculation of cost-effectiveness. A benefitted residence is any impacted or non-impacted residence that receives a noise reduction of 5 dBA or more. A reasonable cost is considered to be a maximum of $25,000 per benefitted residence. A cost of $20 per square foot for post and panel walls is used for walls up to and including 16 feet in height.

Noise barriers typically only meet this criterion of $25,000 maximum per benefited residence where residences are located close together such that several benefit from the noise barrier. Single residences or sparsely distributed residences on large lots seldom meet the cost-effectiveness criteria. If the cost of the proposed noise mitigation exceeds allowable limits, a noise barrier would not be recommended.

Under special circumstances the typical maximum for reasonable cost of $25,000 per benefitted residence can be increased to a maximum of $35,000 per benefitted residence. To exceed the $25,000 limit, one of the following optional reasonableness criteria must be met:

- Large increases of 10 dBA or more in noise with the future Build condition over the existing condition;
- High noise levels, Leq 70 dBA or higher;
- Areas of mixed land use zoning may not be recommended for mitigation because land use may change and long-term land use may be uncertain.

The third reasonableness criterion is the ODOT design goal. At least one benefited receptor must achieve the noise reduction goal of 7 dBA.

ODOT will place noise barriers in the right-of-way near noise-impacted residences if the barriers are predicted to meet both the feasible and reasonableness criteria.

Mitigation was considered for all residential impacts identified for the OR 217 Southbound Auxiliary Lane Project where noise impacts from the Build Alternative were identified. Mitigation for the impacted residential receivers was analyzed in the form of a noise barrier.

A noise barrier was not modeled for the two noise-impacted restaurant outdoor use areas represented by R14. The patios of Benihana and Fresh Grill Burgers and Fries are both located adjacent to SW Cascade Avenue. The restaurants are approximately 900 feet apart and a noise barrier long enough to

mitigate the noise impacts to both locations would exceed the cost-effectiveness criteria. In addition the primary hours of patio use will not coincide with the peak noise hour, and patio use is restricted seasonally.

5.1.1 GREENBERG TO HALL BARRIER

A sound wall was analyzed to mitigate the predicted noise impacts to the residential receptors located between SW 95th Avenue and the office building represented by R20 north of the SW Hall Boulevard overpass.

A barrier approximately 2,400 feet long was modeled along the west edge of ROW and analyzed to mitigate the sound levels to the impacted residences. The barrier was analyzed at a height of 16 feet. The full length barrier would benefit 90 percent of impacted residences. The barrier would meet the design goal of a 7 dBA noise reduction for several receptors. In addition the barrier would meet the cost reasonableness criteria.

Table 7 shows the barrier information for the Greenberg to Hall Barrier. Detailed barrier analysis data are included in Appendix F. Electronic barrier TNM files are included in Appendix D. The barrier location is shown in Figure 23.

Two potential issues were identified which required separate analysis iterations of the proposed Greenberg to Hall barrier.

ODOT determined that the wooded area located between the condominium complex 'The Reserve at Ashbrook' and the residence represented by R65 on SW North Dakota Street is a wetland area. Because the wetland could pose constructability issues, the barrier was modeled with a break for the wetland area. With a break for the wetland the barriers do not meet the ODOT feasible and reasonable criteria.

The second issue requiring additional barrier modeling is the location of the northern terminus of the barrier in the vicinity of the two residences represented by R63. ODOT will require enough right of way width to access the barrier for maintenance. The full length Greenberg to Hall barrier was modeled without the first and second northern sections, located at the two tax lot property lines, to determine whether the wall would still meet ODOT feasible and reasonable criteria if it is shortened for maintenance access. Without the first section, the barrier would still meet the ODOT criteria for recommendation at both 14 and 16 feet in height. Without the first two sections, the barrier would meet the ODOT criteria at 16 feet in height.

The data presented in Table 7 are for the full length wall. Data for the other barrier configurations modeled are available in Appendix F.

Table 7
Barrier Analysis Results - Greenberg to Hall Overpass Barrier

Barrier Name	Barrier Length (ft.)	Barrier Height (ft.)	Barrier Cost ($)	Number of Benefitted Residences (5 dB)	Percent Feasible (%)	Meets Design Goal?	Cost Per Benefitted Residence ($)
Greenberg to Hall	2,392	16	$765,440	56	91	Yes	$13,669/res

Proposed Build Alternative Lane Lines
Barrier

0 300 600 900 feet

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Barrier Location Modeled

SLR

Date	August 23, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. 23

5.2 SUMMARY OF IMPACTS

Noise mitigation was considered for all impacted receivers in the Southbound Auxiliary Lane Project area.

If ODOT determines that it will be feasible to construct the Greenberg to Hall Barrier, this sound wall would provide abatement for 53 impacted residences. Forty eight (48) of the impacted receptors located behind the Greenberg to Hall Barrier would be benefitted by the barrier. Five (5) of the predicted noise impacted residences at this location would not receive a 5 dBA insertion loss. These impacts would receive some noise reduction but would not be fully abated. This means that no residential noise impacts would remain for which no noise abatement measures are reasonable and feasible.

Mitigation in the form of a sound wall is not recommended to mitigate the predicted noise impacts to two restaurant outdoor use areas. No noise abatement measures are reasonable and feasible for these two impacts.

5.3 CONSTRUCTION MITIGATION

Construction noise levels for the auxiliary lanes would result from normal construction activities. Noise levels for these activities can be expected to range from 70 to 100 dBA at sites 50 feet from the activities. These noise levels, although temporary in nature, can be annoying. The following standard construction noise abatement measures will be included in the project specifications.

- No construction shall be performed within 1,000 feet of an occupied dwelling unit on Sundays, legal holidays, or between the hours of 10 p.m. and 6 a.m. on other days, without the approval of the ODOT Project Engineer.
- All equipment used shall have sound-control devices no less effective than those provided on the original equipment. No equipment shall have un-muffled exhaust.
- All equipment shall comply with pertinent equipment noise standards of the U.S. Environmental Protection Agency.
- No pile driving or blasting operations shall be performed within 3,000 feet of an occupied dwelling unit on Sundays, legal holidays, or between the hours of 8 p.m. and 8 a.m. on other days, without the approval of the ODOT Project Engineer.
- The noise from rock crushing or screening operations performed within 3,000 feet of any occupied dwelling shall be mitigated by strategic placement of material stockpiles between the operation and the affected dwelling or by other means approved by the ODOT Project Engineer.

Should a specific noise impact complaint occur during the construction of the proposed project, one or more of the following potential noise mitigations may be required at the contractor's expense, as directed by the ODOT Project Engineer.

- Locate stationary construction equipment as far from nearby noise-sensitive properties as feasible.
- Shut off idling equipment.
- Reschedule construction operations to avoid periods of noise annoyance identified in the complaint.
- Notify nearby residents whenever extremely noisy work will be occurring.
- Install temporary or portable acoustic barriers around stationary construction noise sources.
- Operate electrically powered equipment using line voltage power or solar power.

6. COORDINATION WITH LOCAL GOVERNMENT OFFICIALS

One of the requirements of the FHWA regulations in Title 23 Part 772.15 and of the ODOT Noise Manual is to supply information to local governments on noise impacts and potential noise impacts so the information can be used in guiding local land use decisions. Copies of this noise study will be provided by ODOT to the City of Beaverton and the City of Tigard so that local government officials may consider the information in this noise analysis. Some land uses in the project area may not be compatible with the projected noise environment unless noise is considered in the plans and designs for development of the properties. Areas immediately adjacent to OR 217 or the ramps have sound levels which exceed, and will continue to exceed in the future, the residential noise impact criterion of 65 dBA.

The TNM analysis results were used to evaluate the distance from the OR 217 centerline to the Activity Category B NAACs of 65 dBA. Depending on the topography of residential receivers in relation to the roadway elevation, the approximate distance to the noise impact contour varies from 230 feet to 410 feet from OR 217 centerline. Provision of noise abatement measures for new developments becomes the responsibility of local governments, developers, and land owners, after the date of public knowledge of the project.

7. STATEMENT OF LIKELIHOOD

Based on the noise technical report for this project, ODOT intends to install highway traffic noise abatement measures in the form of a barrier for the residences located between SW Greenberg Road and SW Hall Boulevard. The possibility of the likely abatement measure is based upon preliminary design work for a barrier cost of approximately $765,440 that will reduce the noise level by up to 13 dBA for 48 residences. If during ODOT's final design process these conditions have substantially changed, the abatement measure might not be provided. A final decision of the installation of the abatement measure will be made upon completion of the project's final design, a cost estimating process, and the public involvement process.

The noise impacts from the Northbound Auxiliary Lane Project improvements will be evaluated separately.

8. REFERENCES

City of Beaverton. June 13, 2017. City Code, Chapter 5.15: Noise.

City of Tigard. 2018. Municipal Code, Chapter 6.02 Nuisances Affecting Public Health, Safety, and Peace, Article V, Noise Nuisances.

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U.S. Department of Transportation. January 1998. FHWA Traffic Noise Model User's Guide. Federal Highway Administration. FHWA-PD-96-009.

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9. REPORT AUTHOR AND REVIEWER

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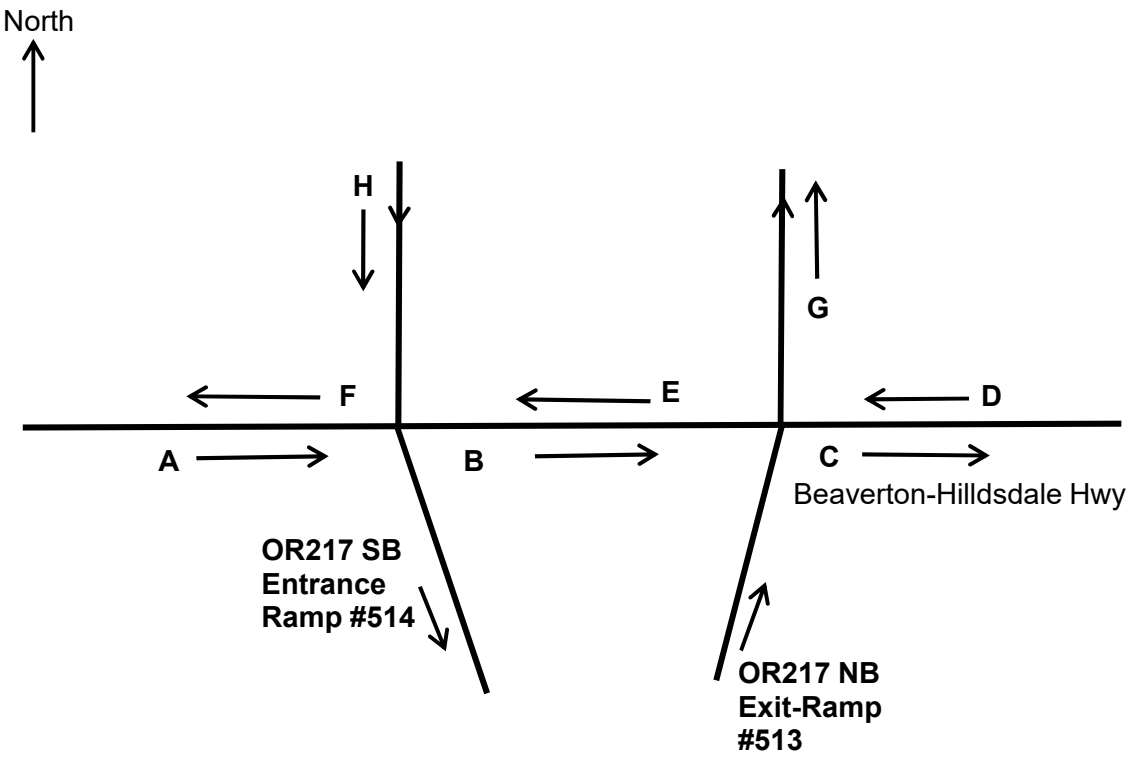
APPENDIX A

TRAFFIC DATA

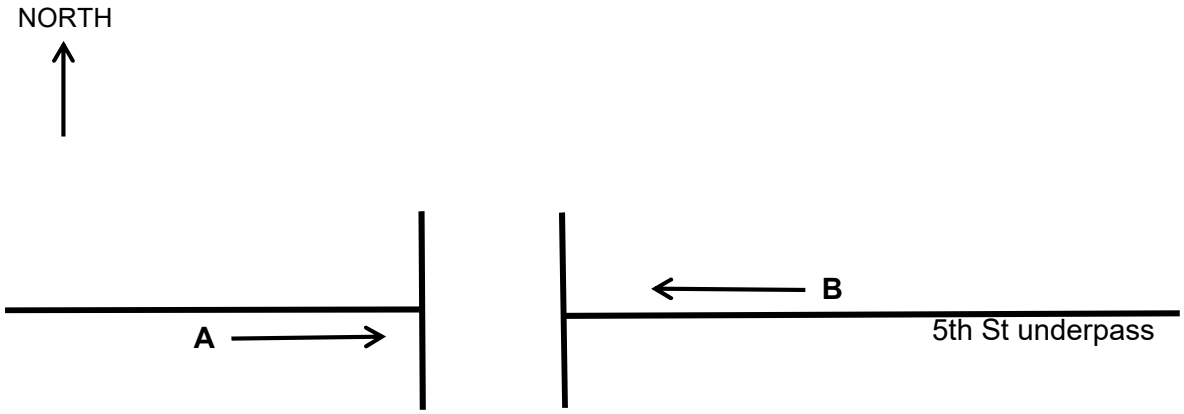
Noise Technical Report

Oregon Department of Transportation
123 NW Flanders Street
Portland, OR 97209

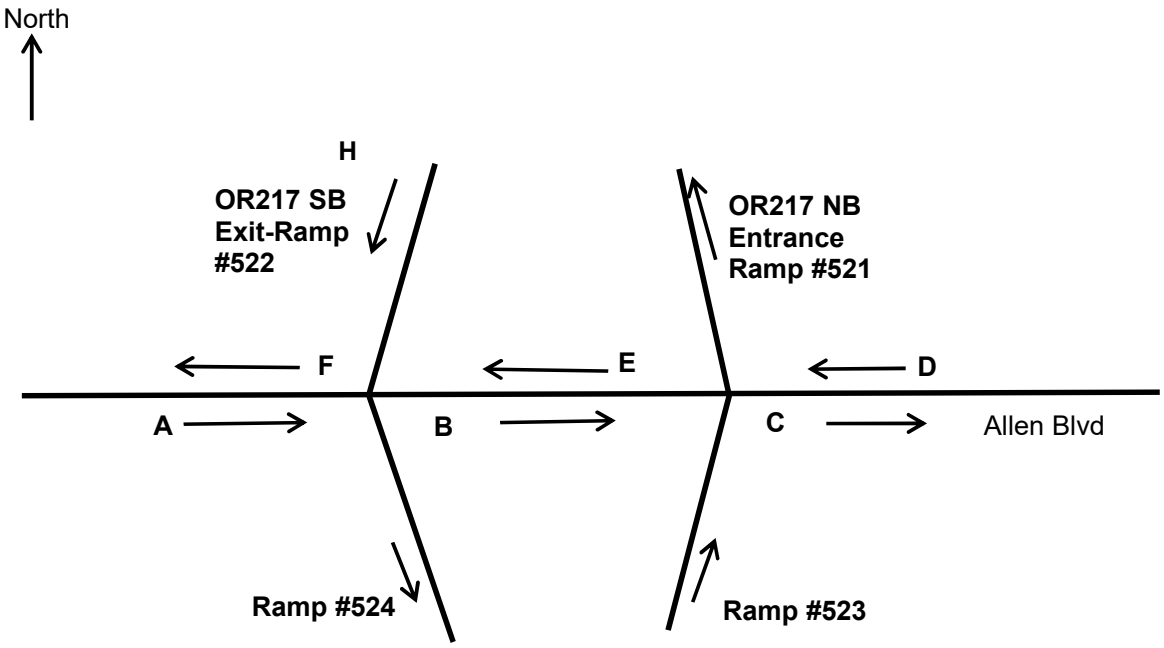
August 2018



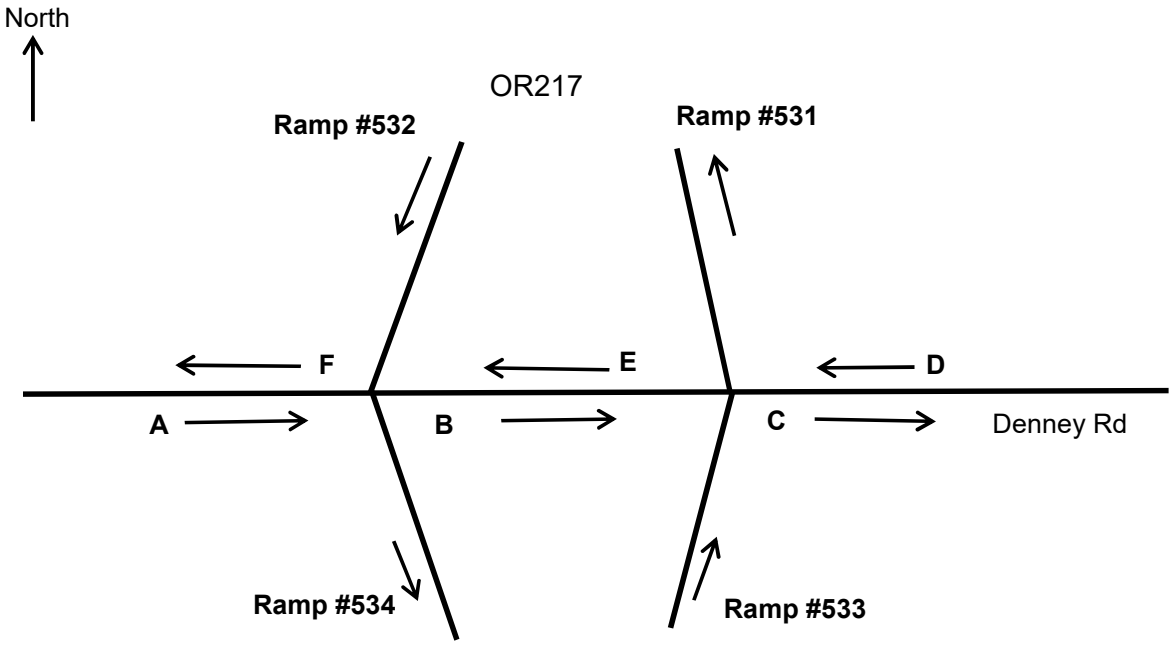
Beaverton-Hillsdale Highway - Existing 2017 Peak Traffic Hour (7-8 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	1231	1195	29	7	1	9	30
B	1313	1277	30	6	1	11	30
C	1283	1246	28	9	1	10	30
D	858	829	19	10	2	5	30
E	858	830	18	10	2	4	30
F	966	935	20	11	2	4	30
G	990	953	23	14	0	4	45
H	880	848	22	10	0	6	45
Ramp 513	960	923	20	17	0	2	40
Ramp 514	690	661	19	10	0	4	45



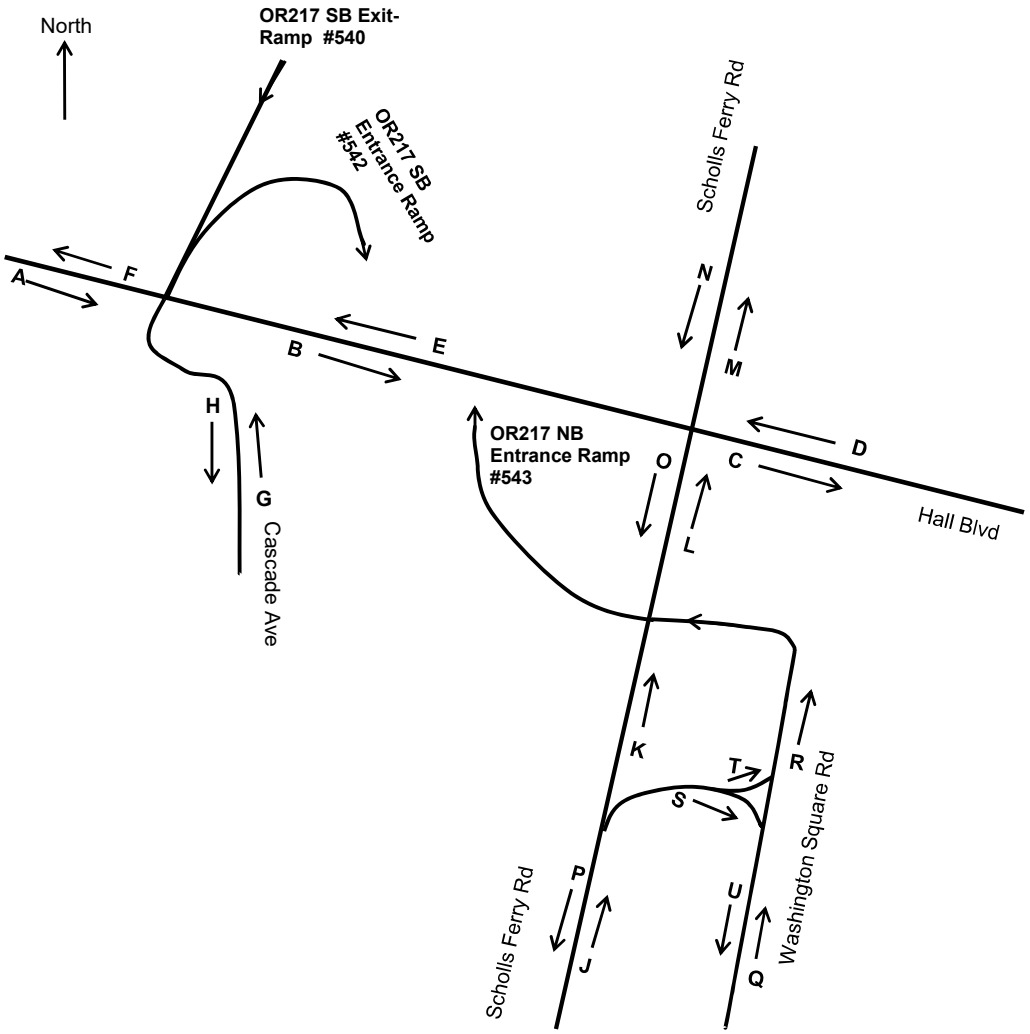
5th Street Underpass - Existing 2017 Peak Traffic Hour (7-8 AM)							
Link	All Vehicles	Autos	Medium Trucks	Heavy Trucks	Motorcycles	Buses	Posted Speed (mph)
A	256	249	6	1	0	6	30
B	159	146	11	2	0	10	30



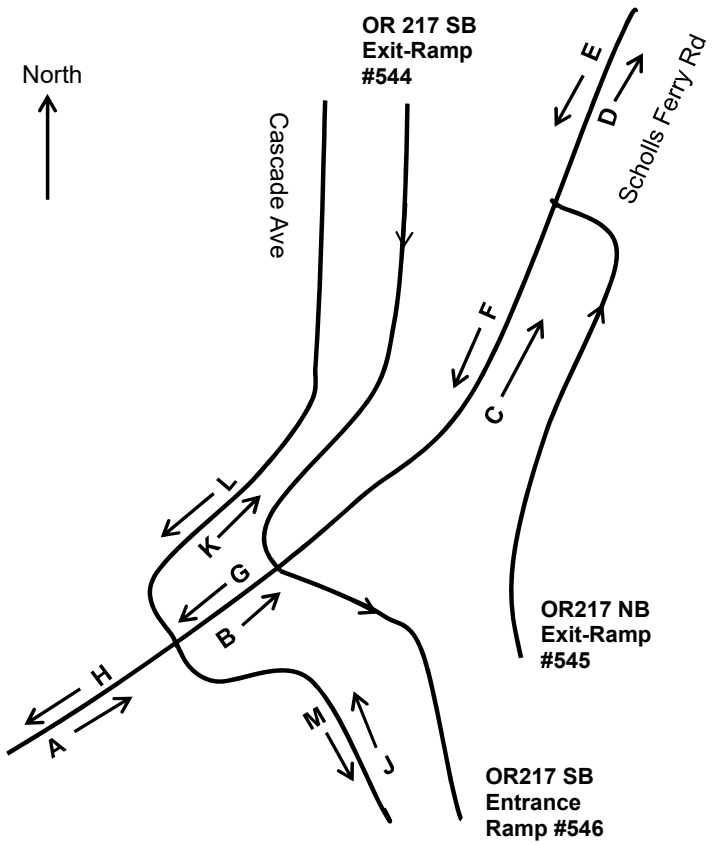
Allen Blvd - Existing 2017 Peak Traffic Hour (7-8 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	1638	1609	26	3	1	11	30
B	1456	1424	20	12	1	8	30
C	1138	1101	22	15	1	7	30
D	611	560	38	13	0	19	30
E	359	317	36	6	0	21	30
F	451	413	31	7	1	16	30
Ramp 521	920	900	9	11	0	1	45
Ramp 522	420	394	11	15	1	3	45
Ramp 523	350	334	9	7	0	2	45
Ramp 524	510	483	22	5	0	11	45



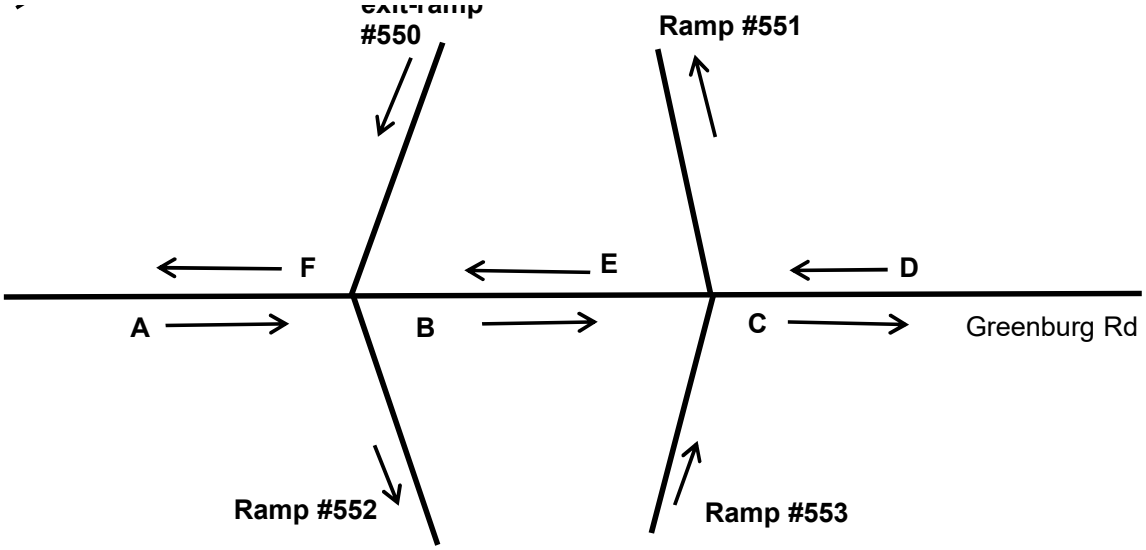
Denney Rd - Existing 2017 Peak Traffic Hour (7-8 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	921	901	16	4	0	1	35
B	701	694	7	0	0	2	35
C	333	328	5	0	0	2	35
D	301	286	15	0	0	5	35
E	269	244	20	5	0	4	35
F	219	189	22	8	0	7	35
Ramp 531	550	545	5	0	0	1	45
Ramp 532	130	120	7	3	0	4	45
Ramp 533	150	137	8	5	0	0	45
Ramp 534	400	382	14	4	0	0	45



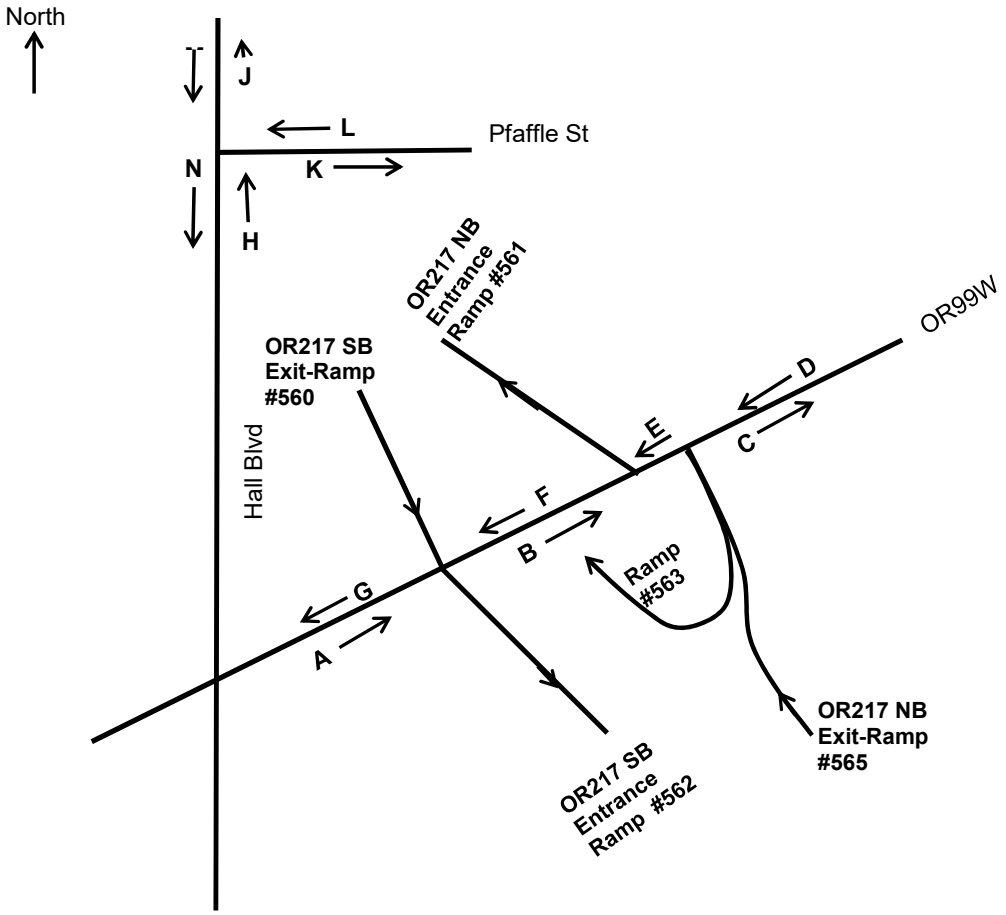
Hall Blvd & Scholls Ferry Rd - Existing 2017 Peak Traffic Hour (7-8 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	1199	1180	16	3	2	11	40
B	1019	995	21	3	2	14	40
C	1221	1190	28	3	2	18	40
D	774	759	14	1	2	9	40
E	660	650	9	1	1	7	40
F	869	852	14	3	1	10	40
G	70	69	0	1	0	0	30
H	161	159	2	0	0	2	30
J	1386	1362	19	5	0	11	35
K	1270	1255	14	1	0	6	35
L	718	705	12	1	0	7	35
M	531	518	13	0	1	9	35
N	410	401	7	2	0	5	35
O	509	502	4	3	0	1	35
P	327	320	6	1	0	4	35
Q	106	101	5	0	0	5	25
R	106	101	5	0	0	5	25
S	116	107	5	4	0	5	25
T	0	0	0	0	0	0	25
U	116	107	5	4	0	5	25
Ramp 540	440	426	12	2	0	8	40
Ramp 542	320	319	0	1	0	0	35
Ramp 543	840	833	5	2	0	1	45



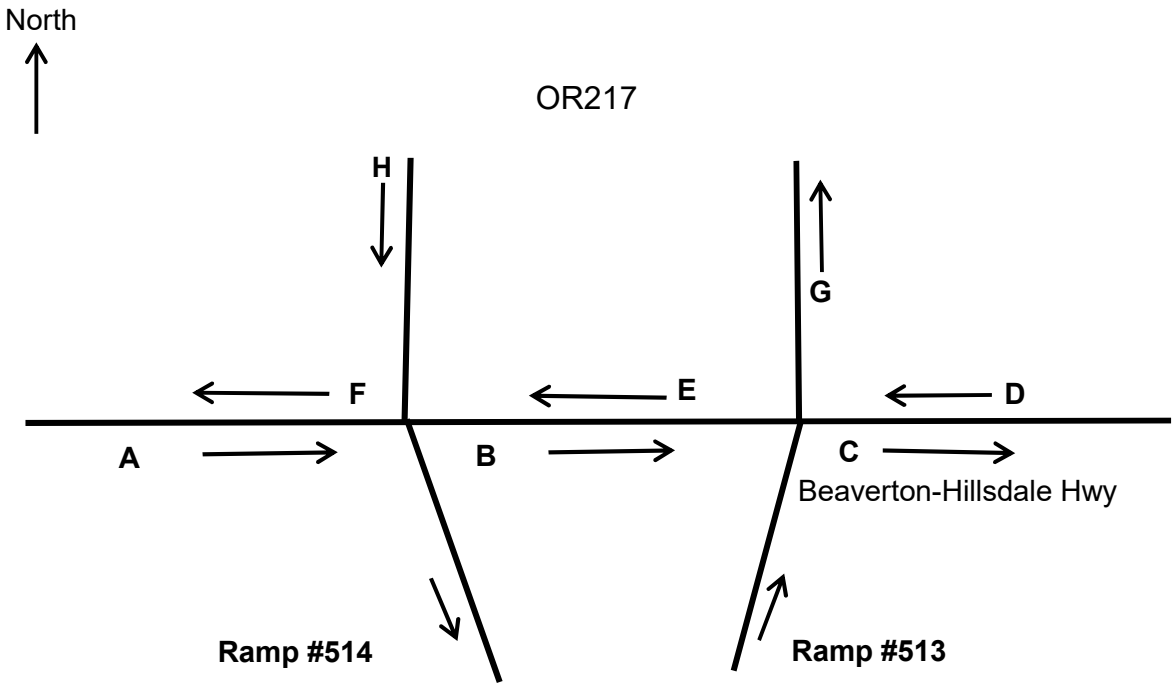
Scholls Ferry Rd - Existing 2017 Peak Traffic Hour (7-8 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	2091	2069	16	6	0	9	35
B	1972	1949	18	5	0	9	35
C	1193	1175	14	4	0	9	35
D	1386	1362	19	5	0	11	35
E	327	320	6	1	0	4	35
F	734	717	13	4	0	4	35
G	803	770	25	8	0	14	35
H	894	861	25	8	0	14	35
J	148	143	4	1	0	0	30
K	41	40	1	0	0	0	30
L	85	83	2	0	0	2	30
M	220	215	3	2	0	2	30
Ramp 544	170	153	13	4	0	10	35
Ramp 545	600	584	12	4	0	2	45
Ramp 546	880	874	5	1	0	0	45



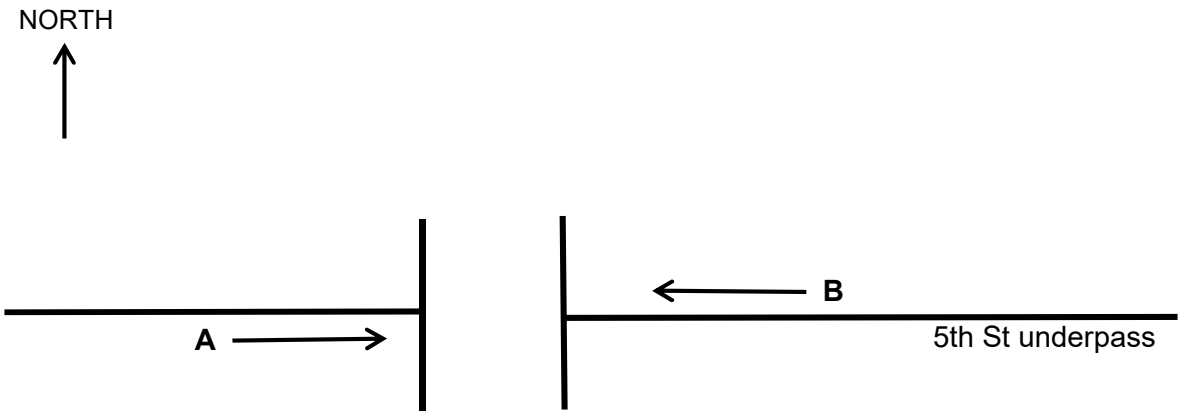
Greenburg Rd - Existing 2017 Peak Traffic Hour (7-8 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	1153	1110	35	8	1	10	35
B	947	917	23	7	1	10	35
C	1003	975	21	7	1	7	35
D	508	489	14	5	1	8	35
E	582	560	16	6	1	8	35
F	578	555	20	3	0	9	35
Ramp 551	380	363	14	3	0	4	45
Ramp 550	360	345	12	3	0	1	45
Ramp 553	510	492	14	4	0	1	45
Ramp 552	570	543	20	7	1	0	45



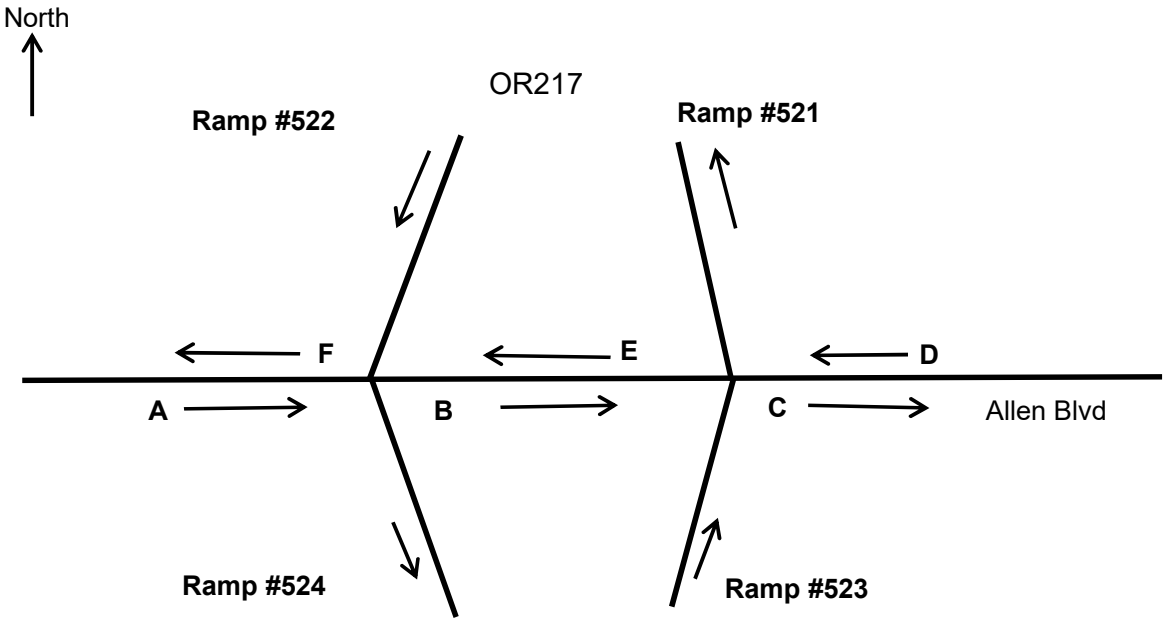
OR99W - Existing 2017 Peak Traffic Hour (7-8 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	2295	2190	89	16	2	14	35
B	2337	2239	83	15	2	13	35
C	2100	2025	63	12	2	13	35
D	1313	1256	39	18	0	12	35
E	1470	1407	42	21	0	12	35
F	930	878	32	20	0	10	35
G	1138	1077	40	21	0	11	35
H	340	313	27	0	0	13	30
J	419	391	28	0	0	14	30
K	197	192	5	0	1	2	25
L	170	163	7	0	0	4	25
M	510	499	10	1	1	7	30
N	404	392	11	1	0	8	30
Ramp 560	660	641	16	3	0	2	40
Ramp 561	540	529	10	1	0	2	45
Ramp 562	410	393	14	3	0	2	45
Ramp 563	320	292	24	4	0	0	35
Ramp 565	240	229	7	4	0	0	40



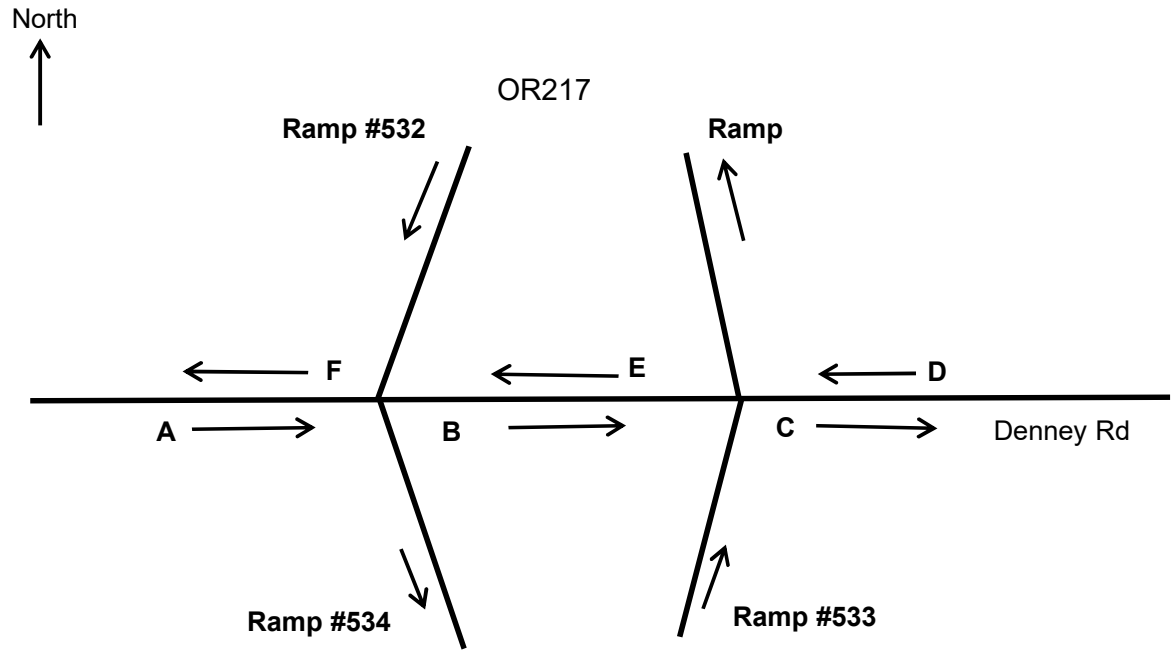
Beaverton-Hillsdale Hwy - Existing 2017 Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	1019	983	30	6	1	7	30
B	1010	958	42	10	1	28	30
C	1060	1002	45	13	1	28	30
D	917	879	33	5	2	7	30
E	1007	962	34	11	3	7	30
F	1056	1012	34	10	2	7	30
G	930	882	36	12	2	5	45
H	860	784	57	19	1	30	45
Ramp 513	1070	1009	40	21	3	5	40
Ramp 514	820	759	45	16	2	9	45



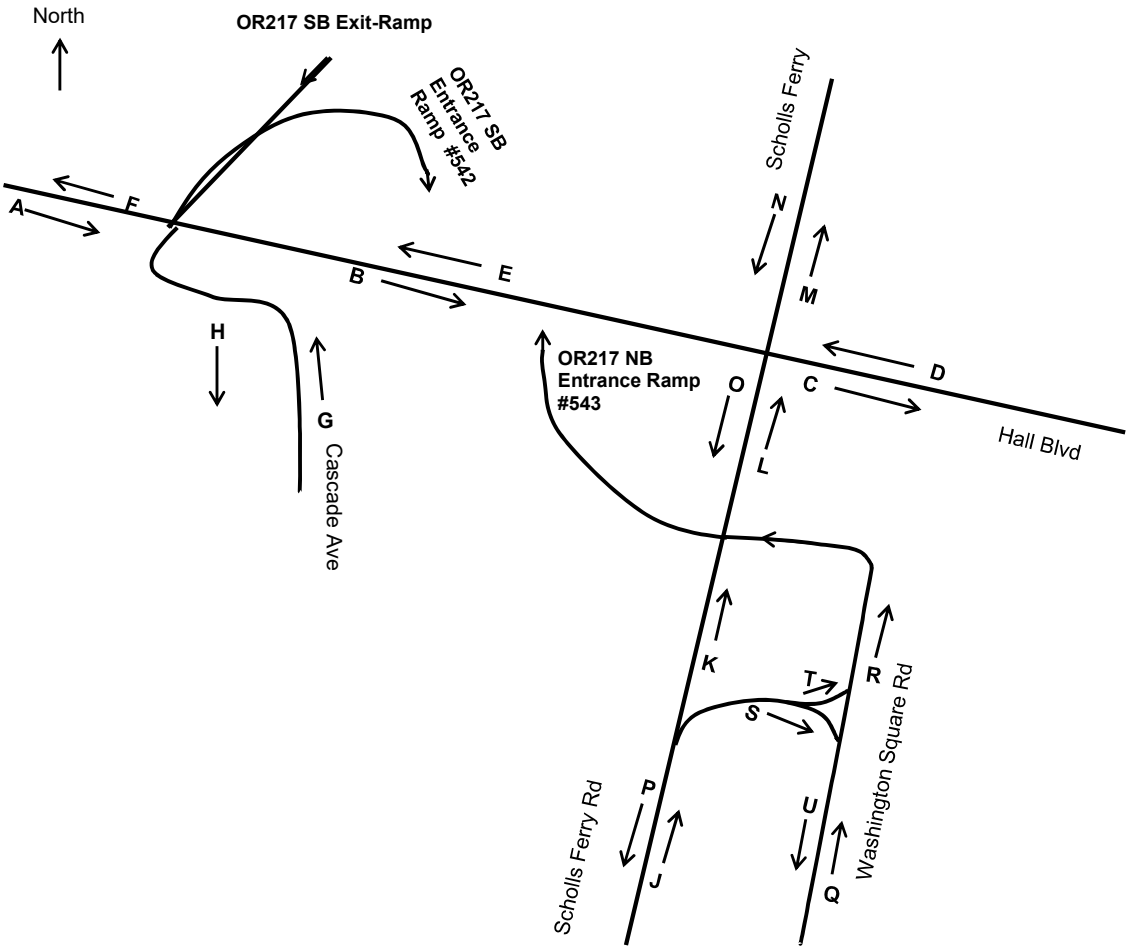
5th Street Underpass - Existing 2017 Peak Truck Hour (9-10 AM)							
Link	All Vehicles	Autos	Medium Trucks	Heavy Trucks	Motorcycles	Buses	Posted Speed (mph)
A	144	118	25	1	0	21	30
B	141	135	5	1	1	1	30



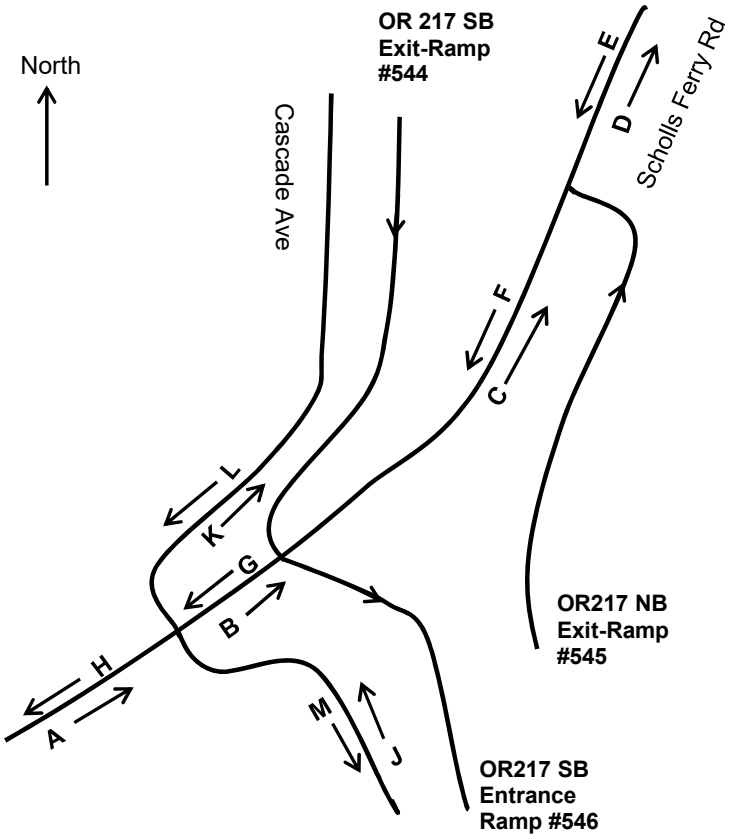
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	902	875	23	4	3	14	30
B	908	857	29	22	1	16	30
C	794	721	41	32	1	23	30
D	565	500	39	26	0	7	30
E	399	363	24	12	1	7	30
F	483	453	28	2	1	7	30
Ramp 521	630	584	29	17	1	7	45
Ramp 522	470	428	22	20	0	2	45
Ramp 523	350	311	26	13	2	14	45
Ramp 524	380	356	12	12	2	0	45



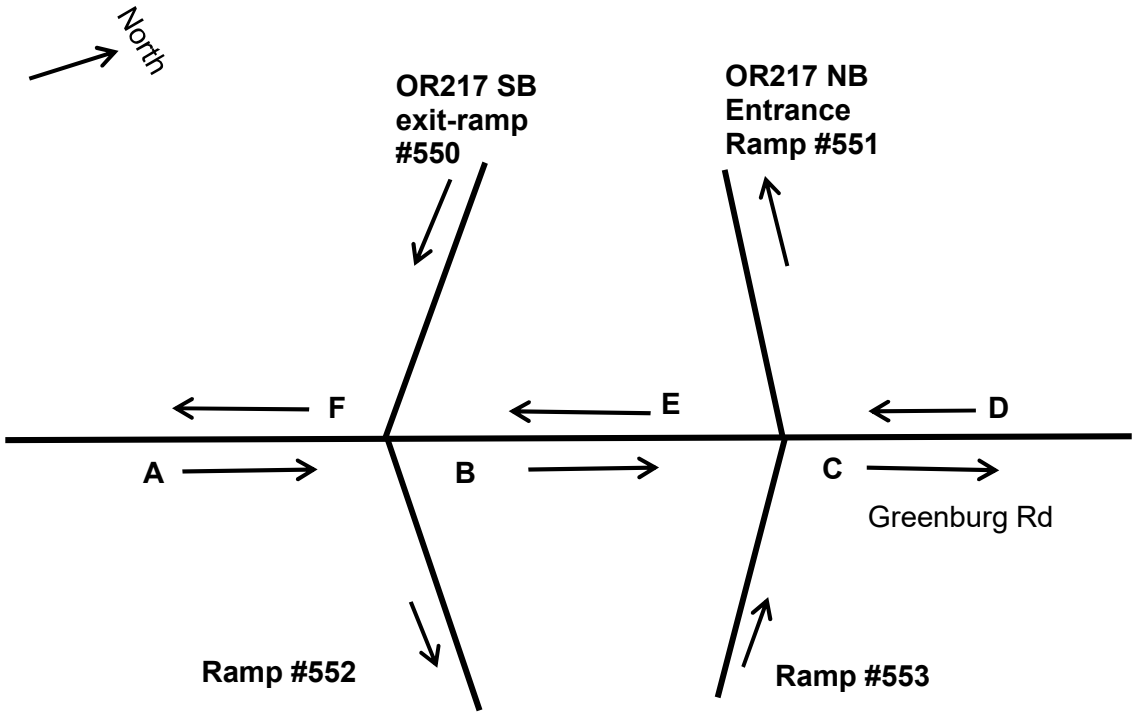
Denney Blvd - Existing 2017 Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	464	439	17	8	2	2	35
B	412	391	16	5	1	3	35
C	253	239	13	1	0	2	35
D	271	262	9	0	0	6	35
E	270	255	11	4	0	1	35
F	232	214	14	4	1	3	35
Ramp 531	330	313	13	4	1	6	45
Ramp 532	160	151	9	0	1	3	45
Ramp 533	170	154	12	4	0	0	45
Ramp 534	250	240	7	3	1	0	45



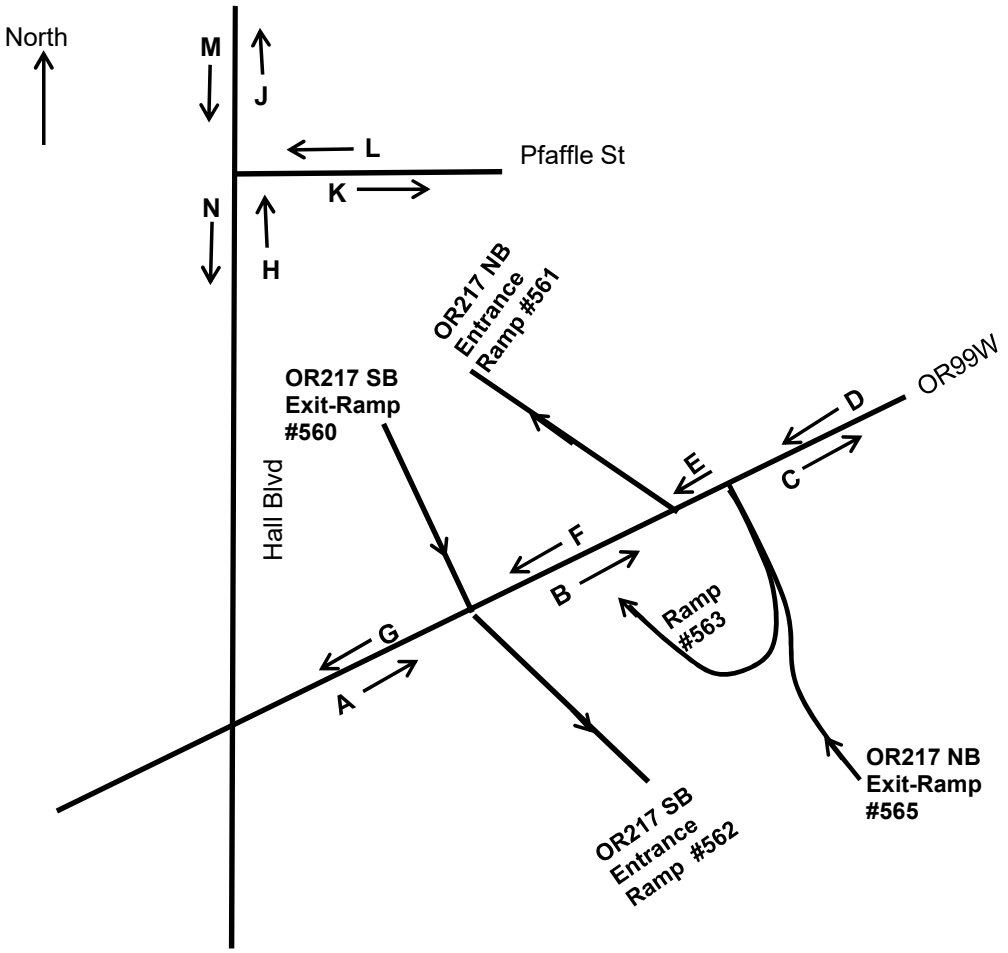
Hall Blvd & Scholls Ferry Rd - Existing 2017 Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	884	872	9	3	0	4	40
B	872	844	24	4	0	4	40
C	992	966	20	6	0	7	40
D	660	628	30	2	0	7	40
E	607	577	24	6	0	7	40
F	789	752	29	8	0	11	40
G	91	90	0	1	0	0	30
H	211	206	2	3	0	0	30
J	1158	1110	35	13	0	18	35
K	958	917	32	9	0	13	35
L	561	544	13	4	0	2	35
M	363	340	22	1	0	4	35
N	405	371	24	10	0	12	35
O	536	504	25	7	0	7	35
P	358	332	20	6	0	5	35
Q	135	126	8	1	0	2	25
R	135	126	8	1	0	2	25
S	200	193	3	4	0	5	25
T	0	0	0	0	0	0	25
U	200	193	3	4	0	5	25
Ramp 540	540	505	28	7	0	6	40
Ramp 542	250	242	6	2	0	2	35
Ramp 543	710	671	32	7	0	15	45



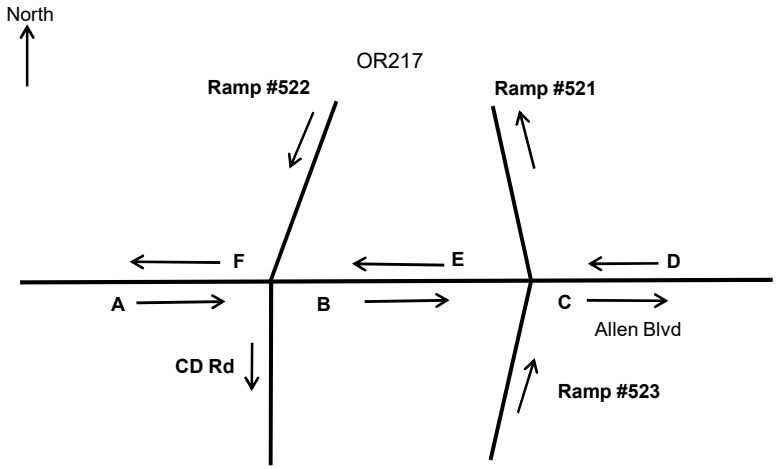
Scholls Ferry Rd - Existing 2017 Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	1539	1493	37	9	0	17	35
B	1454	1404	39	11	0	17	35
C	916	882	28	6	0	17	35
D	1158	1110	35	13	0	18	35
E	358	332	20	6	0	5	35
F	776	719	43	14	0	8	35
G	964	892	54	18	0	11	35
H	986	917	52	17	0	11	35
J	133	127	4	2	0	0	30
K	102	98	3	1	0	0	30
L	75	73	1	1	0	0	30
M	169	166	2	1	0	0	30
Ramp 544	350	330	16	4	0	4	35
Ramp 545	660	615	30	15	0	4	45
Ramp 546	700	679	16	5	0	1	45



Greenburg Blvd - Existing 2017 Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	739	709	21	9	1	8	35
B	695	674	14	7	0	7	35
C	951	922	17	12	0	7	35
D	462	437	17	8	0	6	35
E	586	553	21	12	2	7	35
F	670	637	20	13	3	8	35
Ramp 551	280	267	8	5	0	1	45
Ramp 550	440	426	6	8	1	1	45
Ramp 553	660	631	15	14	2	2	45
Ramp 552	400	377	14	9	1	1	45

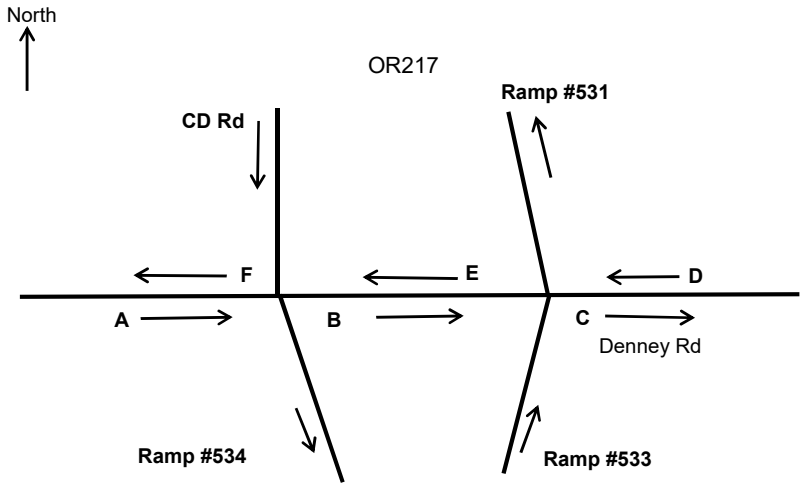


OR99W - Existing 2017 Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	1700	1601	72	27	7	13	35
B	1881	1791	66	24	6	13	35
C	1731	1651	57	23	6	10	35
D	1320	1233	54	33	4	14	35
E	1550	1451	62	37	6	14	35
F	1070	998	42	30	6	8	35
G	1269	1181	49	39	7	9	35
H	310	296	13	1	3	2	30
J	399	379	19	1	3	3	30
K	156	153	2	1	1	0	25
L	160	154	6	0	0	1	25
M	400	393	5	2	2	2	30
N	315	311	3	1	1	2	30
Ramp 560	720	687	18	15	1	4	40
Ramp 561	480	453	20	7	0	6	45
Ramp 562	340	314	17	9	1	3	45
Ramp 563	290	270	15	5	1	3	35
Ramp 565	370	348	14	8	3	0	40



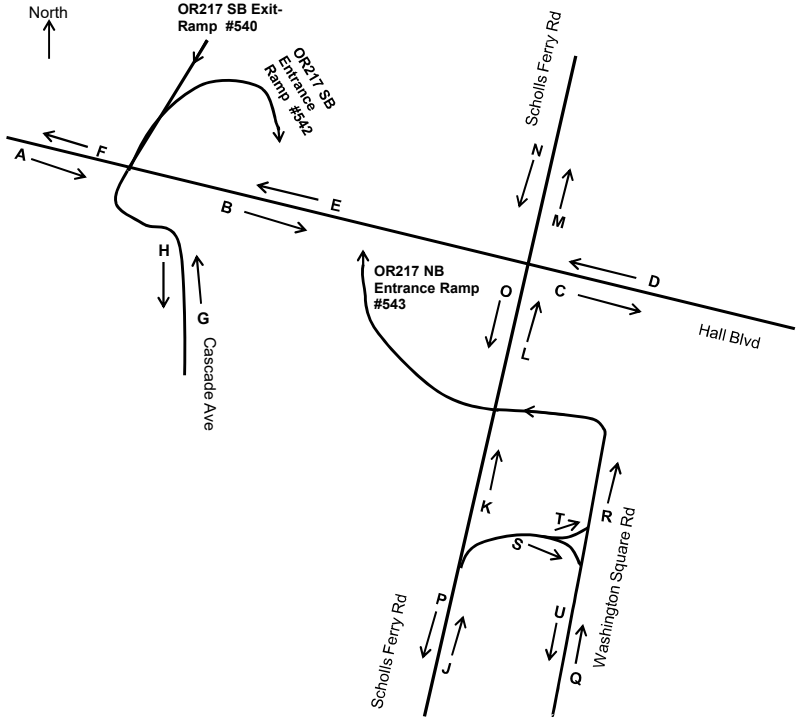
Allen Blvd - 2040 Build Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	1067	1035	27	5	3	16	30
B	1013	958	32	23	1	18	30
C	934	851	48	35	1	27	30
D	745	665	50	30	0	10	30
E	554	507	33	14	1	10	30
F	638	597	37	4	1	10	30
Ramp 521	680	629	32	19	1	7	45
Ramp 522	640	589	31	20	1	5	45
Ramp 523	410	364	31	15	2	16	45
CD Rd	610	576	22	12	3	3	45

Link	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	2	518	14	3	2	8	30
B	3	319	11	8	0	6	30
C	2	426	24	18	0.5	14	30
D	2	333	25	15	0.0	5	30
E	3	169	11	5	0.3	3	30
F	2	299	12	1	0.3	3	30



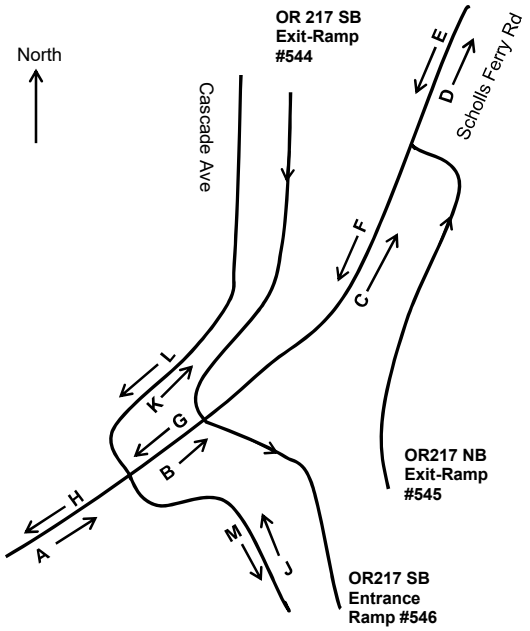
Denney Blvd - 2040 Build Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	548	518	20	10	2	2	35
B	481	457	18	6	1	3	35
C	312	295	15	2	0	2	35
D	446	429	17	0	0	7	35
E	545	505	27	13	0	1	35
F	502	459	30	13	1	3	35
Ramp 531	480	455	21	4	1	7	45
CD Rd	610	576	22	12	3	3	45
Ramp 533	410	369	28	13	0	0	45
Ramp 534	720	683	21	16	3	0	45

Link	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	2	259	10	5	1	1	35
B	2	229	9	3	1	2	35
CD rd	2	288	11	6	2	2	35



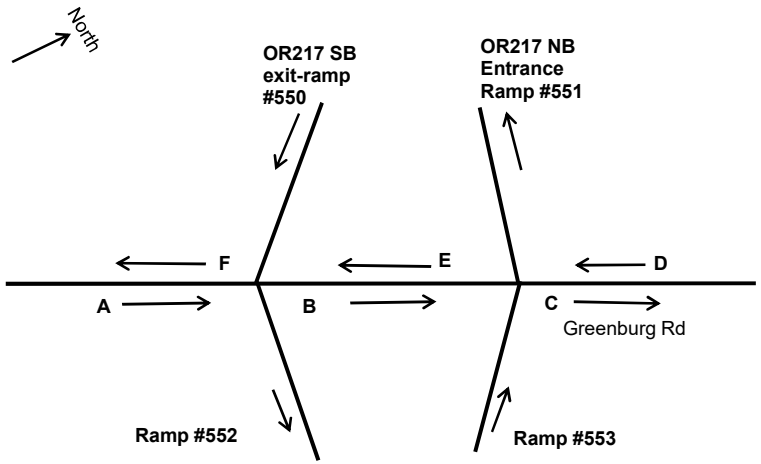
Hall Blvd & Scholls Ferry Rd - 2040 Build Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	999	986	10	3	0	4	40
B	1210	1169	36	5	0	5	40
C	1259	1223	27	9	0	11	40
D	954	903	49	2	0	11	40
E	727	691	29	7	0	8	40
F	925	883	33	9	0	12	40
G	260	257	2	1	0	0	30
H	261	256	2	3	0	0	30
J	1348	1293	40	15	0	19	35
K	986	941	35	10	0	14	35
L	628	607	16	5	0	3	35
M	652	607	44	1	0	7	35
N	611	562	34	15	0	16	35
O	765	720	35	10	0	9	35
P	587	545	32	10	0	7	35
Q	264	247	15	2	0	4	25
R	264	247	15	2	0	4	25
S	362	352	5	5	0	5	25
T	0	0	0	0	0	0	25
U	362	352	5	5	0	5	25
Ramp 540	670	625	37	8	0	7	40
Ramp 542	260	251	7	2	0	2	35
Ramp 543	800	756	37	7	0	17	45

Hall Blvd & Scholls Ferry Rd - 2040 Build Peak Truck Hour (9-10 AM)							
Link	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	4	247	3	1	0	1	40
B	4	292	9	1	0	1	40
C							
D							
E	4	173	7	2	0	2	40
F	2	442	17	5	0	6	40
G							
H							
J	2	647	20	8	0	10	35
K	3	314	12	3	0	5	35
L	3	202	5	2	0	1	35
M							
N							
O	2	360	18	5	0	5	35
P	2	273	16	5	0	4	35
Q							
R							
S							
T							
U							
Ramp 540	670	625	37	8	0	7	40
Ramp 542	260	251	7	2	0	2	35
Ramp 543	800	756	37	7	0	17	45



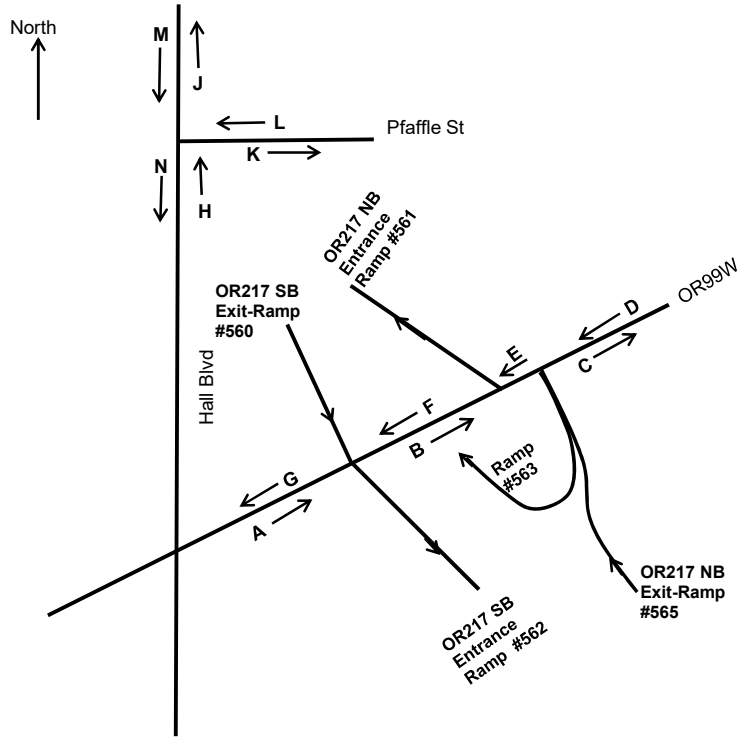
Scholls Ferry Rd - 2040 Build Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	1741	1695	37	9	0	18	35
B	1594	1539	43	12	0	18	35
C	1056	1017	32	7	0	18	35
D	1348	1293	40	15	0	19	35
E	587	545	32	10	0	7	35
F	1005	932	55	18	0	10	35
G	1173	1086	65	22	0	13	35
H	1186	1105	61	20	0	13	35
J	325	312	10	3	0	0	30
K	277	273	3	1	0	0	30
L	106	102	2	2	0	0	30
M	288	278	7	3	0	0	30
Ramp 544	350	330	16	4	0	4	35
Ramp 545	710	663	31	16	0	4	45
Ramp 546	720	698	17	5	0	1	45

Scholls Ferry Rd - 2040 Build Peak Truck Hour (9-10 AM)							
Link	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	3	565	12	3	0	6	35
B	3	513	14	4	0	6	35
C	2	509	16	4	0	9	35
D							35
E	2	273	16	5	0	4	35
F	2	466	28	9	0	5	35
G	4	272	16	6	0	3	35
H	2	553	31	10	0	7	35
J							30
K							30
L							30
M							30



Greenburg Blvd - 2040 Build Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	863	829	24	10	1	9	35
B	819	794	17	8	0	8	35
C	1131	1096	21	14	0	8	35
D	548	517	21	10	0	7	35
E	916	861	33	22	4	9	35
F	980	927	31	22	5	10	35
Ramp 551	330	314	10	6	0	1	45
Ramp 550	440	426	6	8	1	1	45
Ramp 553	1010	960	26	24	4	3	45
Ramp 552	420	395	15	10	1	1	45

Greenburg Blvd - 2040 Build Peak Truck Hour (9-10 AM)							
Link	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	3	276	8	3	0	3	35
B	3	265	6	3	0	3	35
C	3	365	7	5	0	3	35
D	2	259	11	5	0	4	35
E	4	215	8	6	1	2	35
F	3	309	10	7	2	3	35
Ramp 551							45
Ramp 550							45
Ramp 553							45
Ramp 552							45



OR99W - 2040 Build Peak Truck Hour (9-10 AM)							
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	1884	1775	79	30	7	14	35
B	2035	1937	72	26	6	14	35
C	1865	1780	61	24	6	11	35
D	1727	1615	70	42	5	17	35
E	2097	1968	83	46	8	17	35
F	1447	1354	56	37	8	10	35
G	1736	1620	67	49	9	11	35
H	484	464	19	1	4	3	30
J	618	588	29	1	4	5	30
K	266	261	3	2	2	0	25
L	250	240	10	0	0	2	25
M	550	540	7	3	3	3	30
N	400	395	4	1	1	3	30
Ramp 560	810	770	22	18	1	4	40
Ramp 561	650	614	27	9	0	7	45
Ramp 562	370	342	18	10	1	3	45
Ramp 563	320	297	17	6	1	3	35
Ramp 565	520	493	19	8	4	0	40

OR99W - 2040 Build Peak Truck Hour (9-10 AM)							
Link	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
A	3	592	26	10	2	5	35
B	2	969	36	13	3	7	35
C	4	445	15	6	2	3	35
D	3	538	23	14	2	6	35
E							35
F	2	677	28	19	4	5	35
G	4	405	17	12	2	3	35
H							30
J							30
K							25
L							25
M							30
N							30

2017 7-8 AM Peak Traffic Hour

OR217 SB, OR10 - OR99W

SB ↓

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy SB CD Road	880	848	22	10	0	6	40							
Mainline north of Ramp# 514	3180	3099	30	51	5	16	55	2	1550	15	26	3	8	55
Mainline south of Ramp# 514	3870	3760	49	61	5	20	55	3	1253	16	20	2	7	55
Mainline south of Ramp# 522	3450	3366	38	46	4	17	55	2	1683	19	23	2	9	55
Mainline south of Ramp# 524	3960	3849	60	51	4	28	55	3	1283	20	17	1	9	55
Mainline south of Ramp# 532	3830	3729	53	48	4	24	55	2	1865	27	24	2	12	55
Mainline south of Ramp# 534	4230	4111	67	52	4	24	55	3	1370	22	17	1	8	55
Mainline south of Ramp# 540	3790	3685	55	50	4	16	55	2	1843	28	25	2	8	55
Mainline south of Ramp# 542	4110	4004	55	51	4	16	55	3	1335	18	17	1	5	55
Mainline south of Ramp# 544	3940	3851	42	47	4	6	55	2	1926	21	24	2	3	55
Mainline south of Ramp# 546	4820	4725	47	48	4	6	55	3	1575	16	16	1	2	55
Mainline south of Ramp# 550	4460	4380	35	45	4	5	55	2	2190	18	23	2	3	55
Mainline south of Ramp# 552	5030	4923	55	52	5	5	55	3	1641	18	17	2	2	55
Mainline south of Ramp# 560	4370	4282	39	49	5	3	55	2	2141	20	25	3	2	55
Mainline south of Ramp# 562	4780	4675	53	52	5	5	55	3	1558	18	17	2	2	55

Ramps

SB	Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
B-H Hwy on-ramp	Ramp # 514 (Hwy. 10 On Ramp)	690	661	19	10	0	4	45	2	330.5	9.5	5	0	2	45
Allen Blvd exit-ramp	Ramp# 522 (Allen Off Ramp)	420	394	11	15	1	3	45	2	197	5.5	7.5	0.5	1.5	45
Allen Blvd on-ramp	Ramp# 524 (Allen On Ramp)	510	483	22	5	0	11	45	1	483	22	5	0	11	45
Denney Rd exit-ramp	Ramp# 532 (Denney Off Ramp)	130	120	7	3	0	4	45	2	60	3.5	1.5	0	2	45
Denney Rd on-ramp	Ramp# 534 (Denney On Ramp)	400	382	14	4	0	0	45	1	382	14	4	0	0	45
Hall Blvd exit-ramp	Ramp# 540 (Hall Off Ramp)	440	426	12	2	0	8	40	2	213	6	1	0	4	40
Hall Blvd loop on-ramp	Ramp# 542 (Hall On Ramp)	320	319	0	1	0	0	35	1	319	0	1	0	0	35
Scholls Ferry Rd exit-ramp	Ramp# 544 (Scholls Off Ramp)	170	153	13	4	0	10	35	2	76.5	6.5	2	0	5	35
Scholls Ferry Rd on-ramp	Ramp# 546 (Scholls On Ramp)	880	874	5	1	0	0	45	2	437	2.5	0.5	0	0	45
Greenburg Rd exit-ramp	Ramp# 550 (Greenburg Off Ramp)	360	345	12	3	0	1	45	2	172.5	6	1.5	0	0.5	45
Greenburg Rd on-ramp	Ramp# 552 (Greenburg On Ramp)	570	543	20	7	1	0	45	2	271.5	10	3.5	0.5	0	45
OR99W exit-ramp	Ramp# 560 (Hwy 99W Off Ramp)	660	641	16	3	0	2	40	3	213.7	5.333	1	0	0.667	40
↓ OR99W on-ramp	Ramp# 562 (Hwy 99W On Ramp)	410	393	14	3	0	2	45	1	393	14	3	0	2	45

SB ↓

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
	2040 No-Build 7-8 AM Peak Traffic Hour OR217 SB, OR10 - OR99W													
Beaverton-Hillsdale Hwy SB CD Road	950	916	23	11	0	6	40							
Mainline north of Ramp# 514	3500	3411	33	56	6	18	55	2	1706	17	28	3	9	55
Mainline south of Ramp# 514	4320	4194	55	71	6	22	55	3	1398	18	24	2	7	55
Mainline south of Ramp# 522	3900	3800	44	56	5	19	55	2	1900	22	28	3	10	55
Mainline south of Ramp# 524	4460	4332	67	61	5	30	55	3	1444	22	20	2	10	55
Mainline south of Ramp# 532	4320	4202	60	58	5	26	55	2	2101	30	29	3	13	55
Mainline south of Ramp# 534	4760	4622	75	63	5	26	55	3	1541	25	21	2	9	55
Mainline south of Ramp# 540	4180	4062	57	61	5	14	55	2	2031	29	31	3	7	55
Mainline south of Ramp# 542	4510	4391	57	62	5	14	55	3	1464	19	21	2	5	55
Mainline south of Ramp# 544	4340	4238	44	58	5	4	55	2	2119	22	29	3	2	55
Mainline south of Ramp# 546	5240	5132	49	59	5	4	55	3	1711	16	20	2	1	55
Mainline south of Ramp# 550	4880	4787	37	56	5	3	55	2	2394	19	28	3	2	55
Mainline south of Ramp# 552	5470	5350	57	63	6	3	55	3	1783	19	21	2	1	55
Mainline south of Ramp# 560	4770	4671	39	60	6	1	55	2	2336	20	30	3	1	55
Mainline south of Ramp# 562	5220	5103	54	63	6	3	55	3	1701	18	21	2	1	55

SB ↓

	Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
	Beaverton-Hillsdale Hwy SB CD Road	950	916	23	11	0	6	40							
B-H Hwy on-ramp	Ramp # 514	820	783	22	15	0	4	45	2	392	11	8	0	2	45
Allen Blvd exit-ramp	Ramp# 522	420	394	11	15	1	3	45	2	197	6	8	1	2	45
Allen Blvd on-ramp	Ramp# 524	560	532	23	5	0	11	45	1	532	23	5	0	11	45
Denney Rd exit-ramp	Ramp# 532	140	130	7	3	0	4	45	2	65	4	2	0	2	45
Denney Rd on-ramp	Ramp# 534	440	420	15	5	0	0	45	1	420	15	5	0	0	45
Hall Blvd exit-ramp	Ramp# 540	580	560	18	2	0	12	40	2	280	9	1	0	6	40
Hall Blvd loop on-ramp	Ramp# 542	330	329	0	1	0	0	35	1	329	0	1	0	0	35
Scholls Ferry Rd exit-ramp	Ramp# 544	170	153	13	4	0	10	35	2	77	7	2	0	5	35
Scholls Ferry Rd on-ramp	Ramp# 546	900	894	5	1	0	0	45	2	447	3	1	0	0	45
Greenburg Rd exit-ramp	Ramp# 550	360	345	12	3	0	1	45	2	173	6	2	0	1	45
Greenburg Rd on-ramp	Ramp# 552	590	563	20	7	1	0	45	2	282	10	4	1	0	45
OR99W exit-ramp	Ramp# 560	700	679	18	3	0	2	40	3	226	6	1	0	1	40
↓ OR99W on-ramp	Ramp# 562	450	432	15	3	0	2	45	1	432	15	3	0	2	45

SB

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Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
	2040 Build 7-8 AM Peak Traffic Hour OR217 SB, OR10 - OR99W						
Beaverton-Hillsdale Hwy SB CD Road	950	916	23	11	0	6	40
Mainline north of Ramp# 514	3560	3469	34	57	6	18	55
Mainline south of Ramp# 514	4380	4252	56	72	6	22	55
Mainline south of Ramp# 522	3820	3728	38	54	5	15	55
Mainline south of Ramp# 524	3820	3728	38	54	5	15	55
Mainline south of Ramp# 532	3820	3728	38	54	5	15	55
Mainline south of Ramp# 534	4870	4726	79	65	5	28	55
Mainline south of Ramp# 540	4320	4195	62	63	5	16	55
Mainline south of Ramp# 542	4650	4524	62	64	5	16	55
Mainline south of Ramp# 544	4480	4371	49	60	5	6	55
Mainline south of Ramp# 546	5380	5265	54	61	5	6	55
Mainline south of Ramp# 550	5020	4920	42	58	5	5	55
Mainline south of Ramp# 552	5610	5483	62	65	6	5	55
Mainline south of Ramp# 560	4860	4756	43	61	6	3	55
Mainline south of Ramp# 562	5310	5188	58	64	6	5	55

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2017 7-8 AM Peak Traffic Hour
OR217 NB, OR10 - OR99W

NB ↑

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy NB CD Road	990	953	23	14	0	4	40							
Mainline north of Ramp# 513	3550	3429	78	43	1	3	55	2	1715	39	22	1	2	55
Mainline north of Ramp# 521	4510	4352	98	60	1	5	55	3	1451	33	20	0	2	55
Mainline north of Ramp# 523	3590	3452	89	49	1	4	55	2	1726	45	25	1	2	55
Mainline north of Ramp# 531	3940	3786	98	56	1	6	55	3	1262	33	19	0	2	55
Mainline north of Ramp# 533	3390	3241	93	56	1	5	55	2	1621	47	28	1	3	55
Mainline north of Ramp# 543	3540	3378	101	61	1	5	55	3	1126	34	20	0	2	55
Mainline north of Ramp# 545	2700	2545	96	59	1	4	55	2	1273	48	30	1	2	55
Mainline north of Ramp# 551	3300	3129	108	63	1	6	55	3	1043	36	21	0	2	55
Mainline north of Ramp# 553	2920	2766	94	60	1	2	55	2	1383	47	30	1	1	55
Mainline north of Ramp# 561	3430	3258	108	64	1	3	55	3	1086	36	21	0	1	55
Mainline north of Ramp# 563	2890	2729	98	63	1	1	55	2	1365	49	32	1	1	55
↑ Mainline north of Ramp# 565	2570	2437	74	59	1	1	55	2	1219	37	30	1	1	55
Mainline south of Ramp# 565	2810	2666	81	63	1	1	55	3	889	27	21	0	0	55

Ramps

NB ↑

	Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy NB CD Road		990	953	23	14	0	4	40														
B-H Hwy exit-ramp	Ramp # 513	960	923	20	17	0	2	40	2	462	10	9	0	1	40	4	231	5	4	0	1	40
Allen Blvd on-ramp	Ramp# 521	920	900	9	11	0	1	45	1	900	9	11	0	1	45							
Allen Blvd exit-ramp	Ramp# 523	350	334	9	7	0	2	45	3	111	3	2	0	1	45							
Denney Rd on-ramp	Ramp# 531	550	545	5	0	0	1	45	1	545	5	0	0	1	45							
Denney Rd exit-ramp	Ramp# 533	150	137	8	5	0	0	45	2	69	4	3	0	0	45							
Scholls Ferry Rd on-ramp	Ramp# 543	840	833	5	2	0	1	45	1	833	5	2	0	1	45							
Scholls Ferry Rd exit-ramp	Ramp# 545	600	584	12	4	0	2	45	3	195	4	1	0	1	45							
Greenburg Rd on-ramp	Ramp# 551	380	363	14	3	0	4	45	2	182	7	2	0	2	45							
Greenburg Rd exit-ramp	Ramp# 553	510	492	14	4	0	1	45	3	164	5	1	0	0	45							
OR99W on-ramp	Ramp# 561	540	529	10	1	0	2	45	1	529	10	1	0	2	45							
OR99W loop on-ramp	Ramp# 563	320	292	24	4	0	0	35	1	292	24	4	0	0	35							
↑ OR99W exit-ramp	Ramp# 565	240	229	7	4	0	0	40	2	115	4	2	0	0	40							

NB ↑

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
	2040 No-Build 7-8 AM Peak Traffic Hour OR217 NB, OR10 - OR99W													
Beaverton-Hillsdale Hwy NB CD Road	1120	1078	27	15	0	5	40							
Mainline north of Ramp# 513	3890	4095	94	51	1	3	55	2	2048	47	26	1	2	55
Mainline north of Ramp# 521	4950	5114	116	70	1	5	55	3	1705	39	23	0	2	55
Mainline north of Ramp# 523	3970	4156	106	58	1	4	55	2	2078	53	29	1	2	55
Mainline north of Ramp# 531	4380	4548	116	66	1	6	55	3	1516	39	22	0	2	55
Mainline north of Ramp# 533	3650	3826	108	66	1	4	55	2	1913	54	33	1	2	55
Mainline north of Ramp# 543	3990	4130	132	78	1	4	55	3	1377	44	26	0	1	55
Mainline north of Ramp# 545	3070	3217	127	76	1	3	55	2	1609	64	38	1	2	55
Mainline north of Ramp# 551	3710	3840	140	80	1	5	55	3	1280	47	27	0	2	55
Mainline north of Ramp# 553	3260	3410	124	76	1	0	55	2	1705	62	38	1	0	55
Mainline north of Ramp# 561	3970	4096	143	81	1	2	55	3	1365	48	27	0	1	55
Mainline north of Ramp# 563	3360	3498	132	80	1	0	55	2	1749	66	40	1	0	55
Mainline north of Ramp# 565	3010	3179	106	75	1	0	55	2	1590	53	38	1	0	55
Mainline south of Ramp# 565	3370	3523	116	81	1	0	55	3	1174	39	27	0	0	55

Ramps

NB ↑

	Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy NB CD Road		1120	1078	27	15	0	5	40							
B-H Hwy exit-ramp	Ramp # 513	1060	1019	22	19	0	2	40	2	510	11	10	0	1	40
Allen Blvd on-ramp	Ramp# 521	980	958	10	12	0	1	45	1	958	10	12	0	1	45
Allen Blvd exit-ramp	Ramp# 523	410	392	10	8	0	2	45	3	131	3	3	0	1	45
Denney Rd on-ramp	Ramp# 531	730	722	8	0	0	2	45	1	722	8	0	0	2	45
Denney Rd exit-ramp	Ramp# 533	340	304	24	12	0	0	45	2	152	12	6	0	0	45
Scholls Ferry Rd on-ramp	Ramp# 543	920	913	5	2	0	1	45	1	913	5	2	0	1	45
Scholls Ferry Rd exit-ramp	Ramp# 545	640	623	13	4	0	2	45	3	208	4	1	0	1	45
Greenburg Rd on-ramp	Ramp# 551	450	430	16	4	0	5	45	2	215	8	2	0	3	45
Greenburg Rd exit-ramp	Ramp# 553	710	686	19	5	0	2	45	3	229	6	2	0	1	45
OR99W on-ramp	Ramp# 561	610	598	11	1	0	2	45	1	598	11	1	0	2	45
OR99W loop on-ramp	Ramp# 563	350	319	26	5	0	0	35	1	319	26	5	0	0	35
↑ OR99W exit-ramp	Ramp# 565	360	344	10	6	0	0	40	2	172	5	3	0	0	40

	2040 Build 7-8 AM Peak Traffic Hour OR217 NB, OR10 - OR99W						
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
NB ↑ Beaverton-Hillsdale Hwy NB CD Road	1130	1088	27	15	0	5	40
Mainline north of Ramp# 513	3900	3767	86	47	1	3	55
Mainline north of Ramp# 521	4960	4786	108	66	1	5	55
Mainline north of Ramp# 523	3980	3828	98	54	1	4	55
Mainline north of Ramp# 531	4390	4220	108	62	1	6	55
Mainline north of Ramp# 533	3660	3498	100	62	1	4	55
Mainline north of Ramp# 543	4010	3811	125	74	1	4	55
Mainline north of Ramp# 545	3090	2898	120	72	1	3	55
Mainline north of Ramp# 551	3730	3521	133	76	1	5	55
Mainline north of Ramp# 553	3280	3091	117	72	1	0	55
Mainline north of Ramp# 561	4080	3863	139	78	1	2	55
Mainline north of Ramp# 563	3360	3158	126	76	1	0	55
↑ Mainline north of Ramp# 565	3010	2839	100	71	1	0	55
Mainline south of Ramp# 565	3370	3183	110	77	1	0	55

Ramps

	Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
NB ↑	Beaverton-Hillsdale Hwy NB CD Road	1130	1088	27	15	0	5	40
B-H Hwy exit-ramp	Ramp # 513	1060	1019	22	19	0	2	40
Allen Blvd on-ramp	Ramp# 521	980	958	10	12	0	1	45
Allen Blvd exit-ramp	Ramp# 523	410	392	10	8	0	2	45
Denney Rd on-ramp	Ramp# 531	730	722	8	0	0	2	45
Denney Rd exit-ramp	Ramp# 533	350	313	25	12	0	0	45
Scholls Ferry Rd on-ramp	Ramp# 543	920	913	5	2	0	1	45
Scholls Ferry Rd exit-ramp	Ramp# 545	640	623	13	4	0	2	45
Greenburg Rd on-ramp	Ramp# 551	450	430	16	4	0	5	45
Greenburg Rd exit-ramp	Ramp# 553	800	772	22	6	0	2	45
OR99W on-ramp	Ramp# 561	720	705	13	2	0	2	45
OR99W loop on-ramp	Ramp# 563	350	319	26	5	0	0	35
↑ OR99W exit-ramp	Ramp# 565	360	344	10	6	0	0	40

2017 9-10 AM Peak Truck Hour

OR217 SB, OR10 - OR99W

SB ↓

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy SB CD Road	860	784	57	19	1	30	40							
Mainline north of Ramp# 514	2840	2669	112	59	0	13	55	2	1334.5	56	29.5	0	6.5	55
Mainline south of Ramp# 514	3660	3428	157	75	2	22	55	3	1142.667	52.33333333	25	0.666666667	7.333333	55
Mainline south of Ramp# 522	3190	3000	135	55	2	20	55	2	1500	67.5	27.5	1	10	55
Mainline south of Ramp# 524	3570	3356	147	67	4	20	55	3	1118.667	49	22.33333333	1.333333333	6.666667	55
Mainline south of Ramp# 532	3410	3205	138	67	3	17	55	2	1602.5	69	33.5	1.5	8.5	55
Mainline south of Ramp# 534	3660	3445	145	70	4	17	55	3	1148.333	48.33333333	23.33333333	1.333333333	5.666667	55
Mainline south of Ramp# 540	3120	2940	117	63	4	11	55	2	1470	58.5	31.5	2	5.5	55
Mainline south of Ramp# 542	3370	3182	123	65	4	13	55	3	1060.667	41	21.66666667	1.333333333	4.333333	55
Mainline south of Ramp# 544	3020	2852	107	61	4	9	55	2	1426	53.5	30.5	2	4.5	55
Mainline south of Ramp# 546	3720	3531	123	66	4	10	55	3	1177	41	22	1.333333333	3.333333	55
Mainline south of Ramp# 550	3280	3105	117	58	3	9	55	2	1552.5	58.5	29	1.5	4.5	55
Mainline south of Ramp# 552	3680	3482	131	67	4	10	55	3	1160.667	43.66666667	22.33333333	1.333333333	3.333333	55
Mainline south of Ramp# 560	2960	2795	113	52	3	6	55	2	1397.5	56.5	26	1.5	3	55
↓ Mainline south of Ramp# 562	3300	3109	130	61	4	9	55	3	1036.333	43.33333333	20.33333333	1.333333333	3	55

Ramps

SB ↓

	Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
	Beaverton-Hillsdale Hwy SB CD Road	860	784	57	19	1	30	40														
B-H Hwy on-ramp	Ramp # 514	820	759	45	16	2	9	45	2	379.5	22.5	8	1	4.5	45							
Allen Blvd exit-ramp	Ramp# 522	470	428	22	20	0	2	45	2	214	11	10	0	1	45							
Allen Blvd on-ramp	Ramp# 524	380	356	12	12	2	0	45	1	356	12	12	2	0	45							
Denney Rd exit-ramp	Ramp# 532	160	151	9	0	1	3	45	1	151	9	0	1	3	45	2	75.5	4.5	0.0	0.0	1.5	45
Denney Rd on-ramp	Ramp# 534	250	240	7	3	1	0	45	1	240	7	3	1	0	45							
Hall Blvd exit-ramp	Ramp# 540	540	505	28	7	0	6	40	1	505	28	7	0	6	40	2	252.5	14	3.5	0	3	40
Hall Blvd Loop on-ramp	Ramp# 542	250	242	6	2	0	2	35	2	121	3	1	0	1	35	1	242	6	2	0	2	35
Scholls Ferry Rd exit-ramp	Ramp# 544	350	330	16	4	0	4	35	2	165	8	2	0	2	35	1	330	16	4	0	4	35
Scholls Ferry Rd on-ramp	Ramp# 546	700	679	16	5	0	1	45	2	339.5	8	2.5	0	0.5	45	3	226.3333	5.33	1.67	0.00	0.33	45
Greenburg Rd exit-ramp	Ramp# 550	440	426	6	8	1	1	45	2	213	3	4	0.5	0.5	45	1	426	6	8	1	1	45
Greenburg Rd on-ramp	Ramp# 552	400	377	14	9	1	1	45	1	377	14	9	1	1	45							
OR99W exit-ramp	Ramp# 560	720	687	18	15	1	4	40	1	687	18	15	1	4	40	3	229	6	5	0.33333	1.3333	40
↓ OR99W on-ramp	Ramp# 562	340	314	17	9	1	3	45	1	314	17	9	1	3	45							

2040 No-Build 9-10 AM Peak Truck Hour

OR217 SB, OR10 - OR99W

SB ↓

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy SB CD Road	930	852	59	19	1	30	40							
Mainline north of Ramp# 514	3160	3317	139	74	0	16	55	2	1659	70	37	0	8	55
Mainline south of Ramp# 514	4130	4221	188	91	2	25	55	3	1407	63	30	1	8	55
Mainline south of Ramp# 522	3660	3793	166	71	2	23	55	2	1897	83	36	1	12	55
Mainline south of Ramp# 524	4070	4178	179	83	4	23	55	3	1393	60	28	1	8	55
Mainline south of Ramp# 532	3900	4017	170	83	3	20	55	2	2009	85	42	2	10	55
Mainline south of Ramp# 534	4180	4285	178	87	4	20	55	3	1428	59	29	1	7	55
Mainline south of Ramp# 540	3480	3631	140	79	4	13	55	2	1816	70	40	2	7	55
Mainline south of Ramp# 542	3740	3882	147	81	4	15	55	3	1294	49	27	1	5	55
Mainline south of Ramp# 544	3390	3552	131	77	4	11	55	2	1776	66	39	2	6	55
Mainline south of Ramp# 546	4110	4250	148	82	4	12	55	3	1417	49	27	1	4	55
Mainline south of Ramp# 550	3670	3824	142	74	3	11	55	2	1912	71	37	2	6	55
Mainline south of Ramp# 552	4090	4219	157	84	4	12	55	3	1406	52	28	1	4	55
Mainline south of Ramp# 560	3330	3495	137	68	3	8	55	2	1748	69	34	2	4	55
Mainline south of Ramp# 562	3700	3837	155	78	4	11	55	3	1279	52	26	1	4	55

↓

Ramps

SB ↓

	Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy SB CD Road		930	852	59	19	1	30	40							
									2	0	0	0	0	0	0
B-H Hwy on-ramp	Ramp # 514	970	904	49	17	2	9	45	2	452	24.5	8.5	1	4.5	45
Allen Blvd exit-ramp	Ramp# 522	470	428	22	20	0	2	45	1	428	22	20	0	2	45
Allen Blvd on-ramp	Ramp# 524	410	385	13	12	2	0	45	2	192.5	6.5	6	1	0	45
Denney Rd exit-ramp	Ramp# 532	170	161	9	0	1	3	45	1	161	9	0	1	3	45
Denney Rd on-ramp	Ramp# 534	280	268	8	4	1	0	45	2	134	4	2	0.5	0	45
Hall Blvd exit-ramp	Ramp# 540	700	654	38	8	0	7	40	1	654	38	8	0	7	40
Hall Blvd Loop on-ramp	Ramp# 542	260	251	7	2	0	2	35	2	125.5	3.5	1	0	1	35
Scholls Ferry Rd exit-ramp	Ramp# 544	350	330	16	4	0	4	35	2	165	8	2	0	2	35
Scholls Ferry Rd on-ramp	Ramp# 546	720	698	17	5	0	1	45	2	349	8.5	2.5	0	0.5	45
Greenburg Rd exit-ramp	Ramp# 550	440	426	6	8	1	1	45	2	213	3	4	0.5	0.5	45
Greenburg Rd on-ramp	Ramp# 552	420	395	15	10	1	1	45	3	131.67	5	3.33	0.33	0.33	45
OR99W exit-ramp	Ramp# 560	760	724	20	16	1	4	40	1	724	20	16	1	4	40
↓ OR99W on-ramp	Ramp# 562	370	342	18	10	1	3	45							

SB ↓

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
	2040 Build 9-10 AM Peak Truck Hour OR217 SB, OR10 - OR99W													
Beaverton-Hillsdale Hwy SB CD Road	930	852	59	19	1	30	40							
Mainline south of Ramp# 514	4180	3921	175	84	2	24	55	3	1307	58	28	1	8	55
Mainline south of Ramp# 522	3540	3332	144	64	1	19	55	3	1111	48	21	0.3	6	55
Mainline south of Ramp# 534	4260	4015	165	80	4	19	55	3	1338	55	27	1	6	55
Mainline south of Ramp# 540	3590	3390	128	72	4	12	55	3	1130	43	24	1	4	55
Mainline south of Ramp# 542	3850	3641	135	74	4	14	55	4	910	34	19	1	4	55
Mainline south of Ramp# 544	3500	3311	119	70	4	10	55	3	1104	40	23	1	3	55
Mainline south of Ramp# 546	4220	4009	136	75	4	11	55	3	1336	45	25	1	4	55
Mainline south of Ramp# 550	3780	3583	130	67	3	10	55	3	1194	43	22	1	3	55
Mainline south of Ramp# 552	4200	3978	145	77	4	11	55	3	1326	48	26	1	4	55
Mainline south of Ramp# 560	3390	3208	123	59	3	7	55	3	1069	41	20	1	2	55
Mainline south of Ramp# 562	3760	3550	141	69	4	10	55	3	1183	47	23	1	3	55

↓

Ramps

SB ↓

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy SB CD Road	930	852	59	19	1	30	40							
Allen Blvd exit-ramp Ramp# 522	640	589	31	20	1	5	45	3	196	10	7	0.3	2	45
Denney Rd on-ramp Ramp# 534	720	683	21	16	3	0	45	2	342	11	8	2	0	45
Hall Blvd exit-ramp Ramp# 540	670	625	37	8	0	7	40	2	313	19	4	0	4	40
Hall Blvd Loop on-ramp Ramp# 542	260	251	7	2	0	2	35	2	126	4	1	0	1	35
Scholls Ferry Rd exit-ramp Ramp# 544	350	330	16	4	0	4	35	2	165	8	2	0	2	35
Scholls Ferry Rd on-ramp Ramp# 546	720	698	17	5	0	1	45	3	233	6	2	0	0.3	45
Greenburg Rd exit-ramp Ramp# 550	440	426	6	8	1	1	45	2	213	3	4	1	1	45
Greenburg Rd on-ramp Ramp# 552	420	395	15	10	1	1	45	2	198	8	5	1	1	45
OR99W exit-ramp Ramp# 560	810	770	22	18	1	4	40	3	257	7	6	0	1	40
↓ OR99W on-ramp Ramp# 562	370	342	18	10	1	3	45	1	342	18	10	1	3	45

2017 9-10 AM Peak Truck Hour

OR217 NB, OR10 - OR99W

NB ↑

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy NB CD Road	930	882	36	12	2	5	40							
Mainline north of Ramp# 521	3680	3400	189	91	3	22	55	3	1133	63	30	1	7	55
Mainline north of Ramp# 523	3050	2816	160	74	2	15	55	2	1408	80	37	1	8	55
Mainline north of Ramp# 531	3400	3127	186	87	4	29	55	3	1042	62	29	1	10	55
Mainline north of Ramp# 533	3070	2814	173	83	3	23	55	2	1407	87	42	2	12	55
Mainline north of Ramp# 543	3240	2968	185	87	3	23	55	3	989	62	29	1	8	55
Mainline north of Ramp# 545	2530	2297	153	80	3	8	55	2	1149	77	40	2	4	55
Mainline north of Ramp# 551	3190	2912	183	95	3	12	55	3	971	61	32	1	4	55
Mainline north of Ramp# 553	2910	2645	175	90	3	11	55	2	1323	88	45	2	6	55
Mainline north of Ramp# 561	3570	3276	190	104	5	13	55	3	1092	63	35	2	4	55
Mainline north of Ramp# 563	3090	2823	170	97	5	7	55	2	1412	85	49	3	4	55
Mainline north of Ramp# 565	2800	2553	155	92	4	4	55	2	1277	78	46	2	2	55
Mainline south of Ramp# 565	3170	2901	169	100	7	4	55	3	967	56	33	2	1	55

Ramps

NB ↑

	Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
	Beaverton-Hillsdale Hwy NB CD Road	930	882	36	12	2	5	40							
Allen Blvd on-ramp	Ramp# 521	630	584	29	17	1	7	45	1	584	29	17	1	7	45
Allen Blvd exit-ramp	Ramp# 523	350	311	26	13	2	14	45	3	104	9	4	1	5	45
Denney Rd on-ramp	Ramp# 531	330	313	13	4	1	6	45	1	313	13	4	1	6	45
Denney Rd exit-ramp	Ramp# 533	170	154	12	4	0	0	45	2	77	6	2	0	0	45
Scholls Ferry Rd on-ramp	Ramp# 543	710	671	32	7	0	15	45	1	671	32	7	0	15	45
Scholls Ferry Rd exit-ramp	Ramp# 545	660	615	30	15	0	4	45	3	205	10	5	0	1	45
Greenburg Rd on-ramp	Ramp# 551	280	267	8	5	0	1	45	1	267	8	5	0	1	45
Greenburg Rd exit-ramp	Ramp# 553	660	631	15	14	2	2	45	3	210	5	5	1	1	45
OR99W on-ramp	Ramp# 561	480	453	20	7	0	6	45	1	453	20	7	0	6	45
OR99W loop on-ramp	Ramp# 563	290	270	15	5	1	3	35	1	270	15	5	1	3	35
↑ OR99W exit-ramp	Ramp# 565	370	348	14	8	3	0	40	2	174	7	4	2	0	40

2040 No-Build 9-10 AM Peak Truck Hour
OR217 NB, OR10 - OR99W

NB ↑

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy NB CD Road	1049	998	39	12	2	6	40							
Mainline north of Ramp# 513	2950	3023	189	88	0	21	55	2	1512	95	44	0	11	55
Mainline north of Ramp# 521	4140	4145	234	111	3	26	55	3	1382	78	37	1	9	55
Mainline north of Ramp# 523	3460	3516	202	92	2	19	55	2	1758	101	46	1	10	55
Mainline north of Ramp# 531	3870	3880	233	107	4	35	55	3	1293	78	36	1	12	55
Mainline north of Ramp# 533	3390	3425	212	103	3	28	55	2	1713	106	52	2	14	55
Mainline north of Ramp# 543	3790	3786	239	115	3	28	55	3	1262	80	38	1	9	55
Mainline north of Ramp# 545	2990	3030	202	108	3	11	55	2	1515	101	54	2	6	55
Mainline north of Ramp# 551	3700	3693	233	124	3	15	55	3	1231	78	41	1	5	55
Mainline north of Ramp# 553	3370	3379	223	118	3	14	55	2	1690	112	59	2	7	55
Mainline north of Ramp# 561	4290	4252	247	141	7	17	55	3	1417	82	47	2	6	55
Mainline north of Ramp# 563	3750	3743	224	133	7	10	55	2	1872	112	67	4	5	55
Mainline north of Ramp# 565	3430	3446	207	127	6	7	55	2	1723	104	64	3	4	55
Mainline south of Ramp# 565	3950	3939	226	135	10	7	55	3	1313	75	45	3	2	55

↑

Ramps

NB ↑

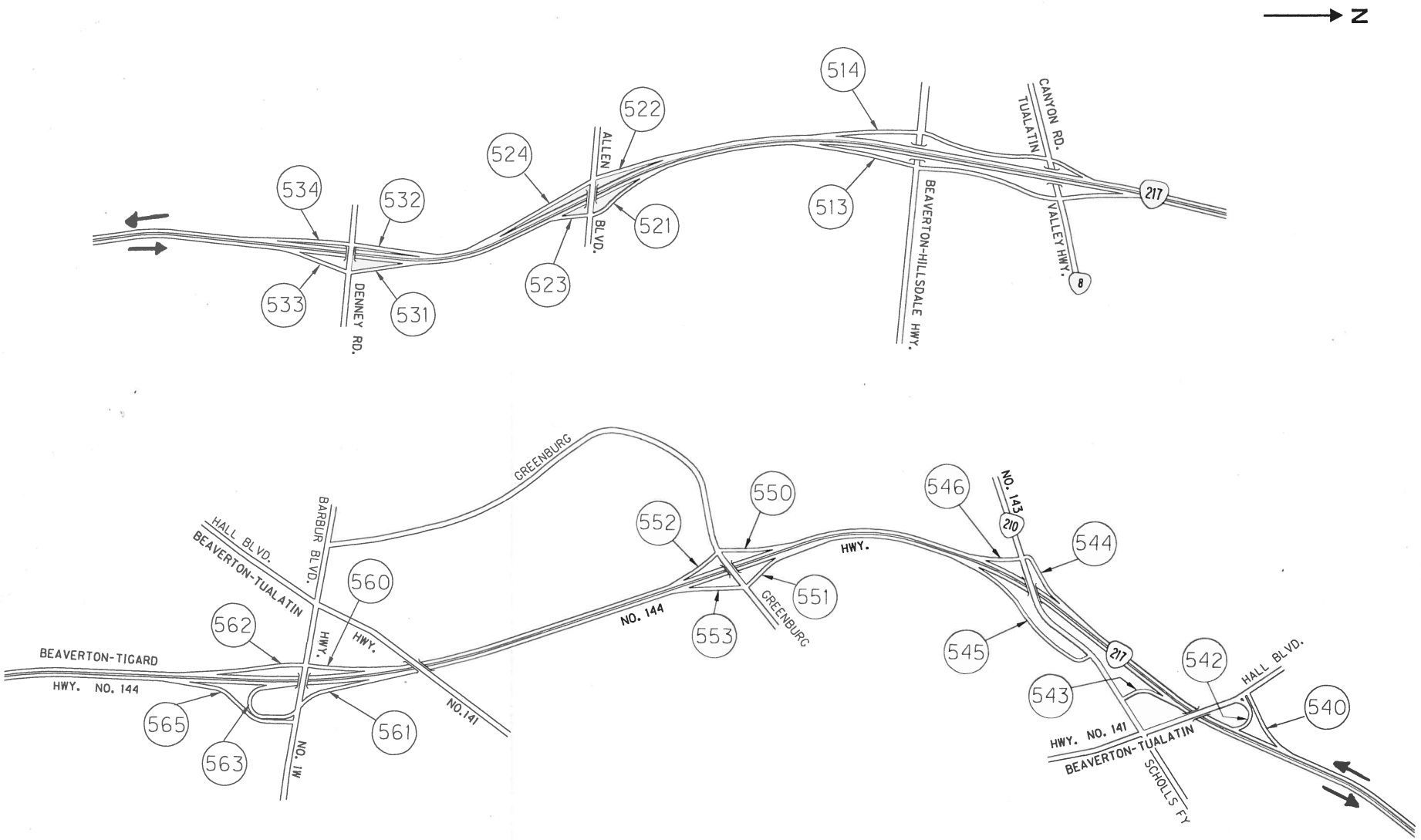
	Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)	Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
	Beaverton-Hillsdale Hwy NB CD Road	1049	998	39	12	2	6	40														
B-H Hwy exit-ramp	Ramp # 513	1190	1122	45	23	3	5	40	2	561	23	12	2	3	40	4	281	11.3	5.75	0.75	1.25	40
Allen Blvd on-ramp	Ramp# 521	680	629	32	19	1	7	45	1	629	32	19	1	7	45							
Allen Blvd exit-ramp	Ramp# 523	410	364	31	15	2	16	45	3	121	10	5	1	5	45							
Denney Rd on-ramp	Ramp# 531	480	455	21	4	1	7	45	1	455	21	4	1	7	45							
Denney Rd exit-ramp	Ramp# 533	400	361	27	12	0	0	45	2	181	14	6	0	0	45							
Scholls Ferry Rd on-ramp	Ramp# 543	800	756	37	7	0	17	45	1	756	37	7	0	17	45							
Scholls Ferry Rd exit-ramp	Ramp# 545	710	663	31	16	0	4	45	3	221	10	5	0	1	45							
Greenburg Rd on-ramp	Ramp# 551	330	314	10	6	0	1	45	2	157	5	3	0	1	45							
Greenburg Rd exit-ramp	Ramp# 553	920	873	24	23	4	3	45	3	291	8	8	1	1	45							
OR99W on-ramp	Ramp# 561	540	509	23	8	0	7	45	1	509	23	8	0	7	45							
OR99W loop on-ramp	Ramp# 563	320	297	17	6	1	3	35	1	297	17	6	1	3	35							
↑ OR99W exit-ramp	Ramp# 565	520	493	19	8	4	0	40	2	247	10	4	2	0	40							

	2040 Build 9-10 AM Peak Truck Hour OR217 NB, OR10 - OR99W						
Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy NB CD Road	1059	1008	39	12	2	6	40
Mainline north of Ramp# 521	4150	3834	214	102	3	24	55
Mainline north of Ramp# 523	3470	3205	182	83	2	17	55
Mainline north of Ramp# 531	3880	3569	213	98	4	33	55
Mainline north of Ramp# 533	3400	3114	192	94	3	26	55
Mainline north of Ramp# 543	3810	3483	220	107	3	26	55
Mainline north of Ramp# 545	3010	2727	183	100	3	9	55
Mainline north of Ramp# 551	3720	3390	214	116	3	13	55
Mainline north of Ramp# 553	3390	3076	204	110	3	12	55
Mainline north of Ramp# 561	4400	4036	230	134	7	15	55
Mainline north of Ramp# 563	3750	3422	203	125	7	8	55
Mainline north of Ramp# 565	3430	3125	186	119	6	5	55
Mainline south of Ramp# 565	3950	3618	205	127	10	5	55

Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
3	1278	71	34	1	8	55
2	1603	91	42	1	9	55
3	1190	71	33	1	11	55
2	1557	96	47	2	13	55
3	1161	73	36	1	9	55
2	1364	92	50	2	5	55
3	1130	71	39	1	4	55
3	1025	68	37	1	4	55
4	1009	58	34	2	4	55
4	856	51	31	2	2	55
3	1042	62	40	2	2	55
3	1206	68	42	3	2	55

Link	All Vehicles (vph)	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
Beaverton-Hillsdale Hwy NB CD Road	1059	1008	39	12	2	6	40
Ramp # 513	1190	1122	45	23	3	5	40
Ramp# 521	680	629	32	19	1	7	45
Ramp# 523	410	364	31	15	2	16	45
Ramp# 531	480	455	21	4	1	7	45
Ramp# 533	410	369	28	13	0	0	45
Ramp# 543	800	756	37	7	0	17	45
Ramp# 545	710	663	31	16	0	4	45
Ramp# 551	330	314	10	6	0	1	45
Ramp# 553	1010	960	26	24	4	3	45
Ramp# 561	650	614	27	9	0	7	45
Ramp# 563	320	297	17	6	1	3	35
Ramp# 565	520	493	19	8	4	0	40

Lanes	Autos	Medium Trucks	Heavy Trucks	Motor-cycles	Buses	Posted Speed (mph)
2	561	23	12	2	3	40
1	629	32	19	1	7	45
3	121	10	5	1	5	45
1	455	21	4	1	7	45
2	185	14	7	0	0	45
1	756	37	7	0	17	45
3	221	10	5	0	1	45
2	157	5	3	0	1	45
3	320	9	8	1	1	45
1	614	27	9	0	7	45
1	297	17	6	1	3	35
2	247	10	4	2	0	40



OR217, OR10 - OR99W

Figure 1 - Interchange Ramp Numbers

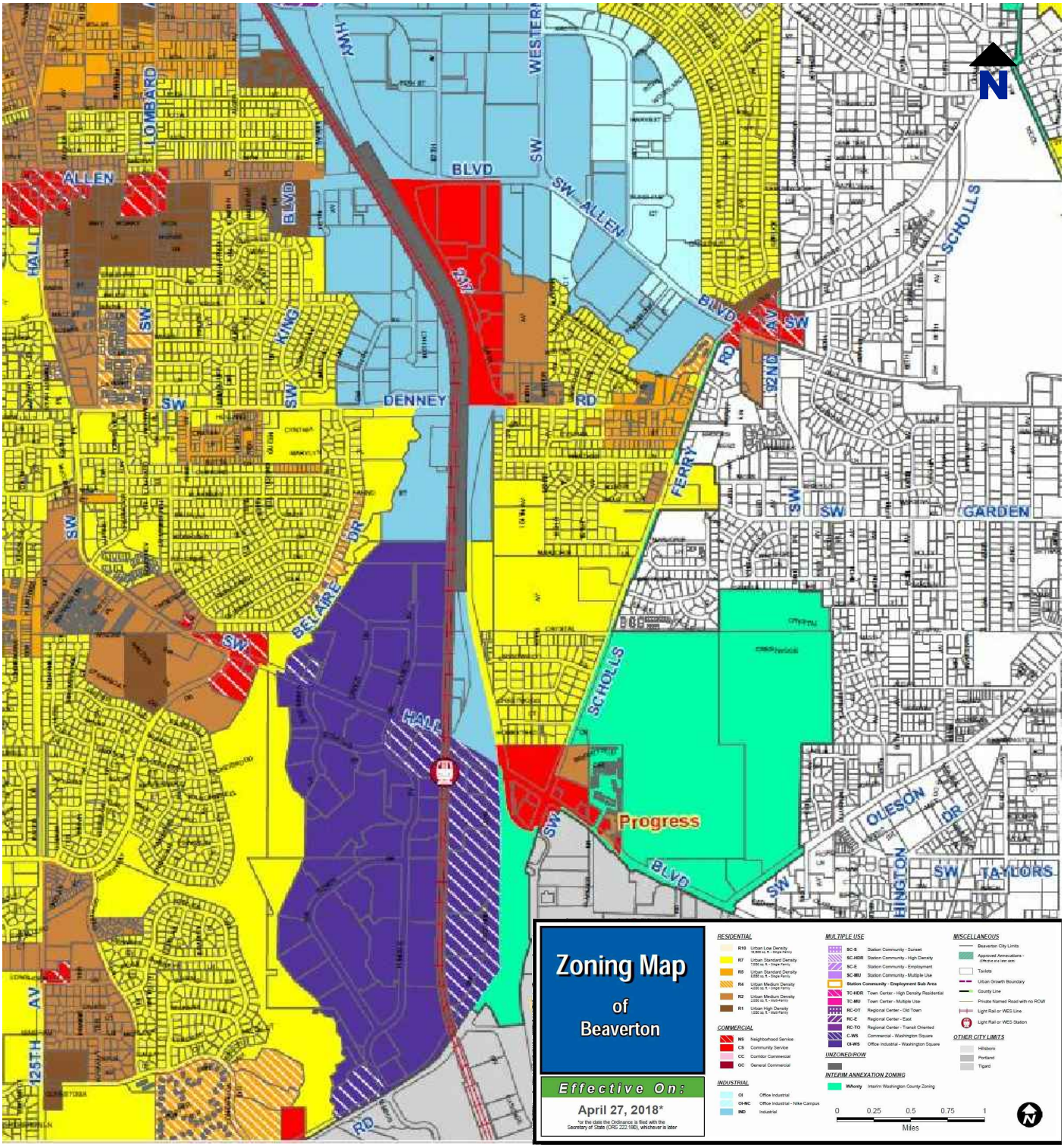
APPENDIX B

LAND USE ZONING MAPS

Noise Technical Report

Oregon Department of Transportation
123 NW Flanders Street
Portland, OR 97209

August 2018



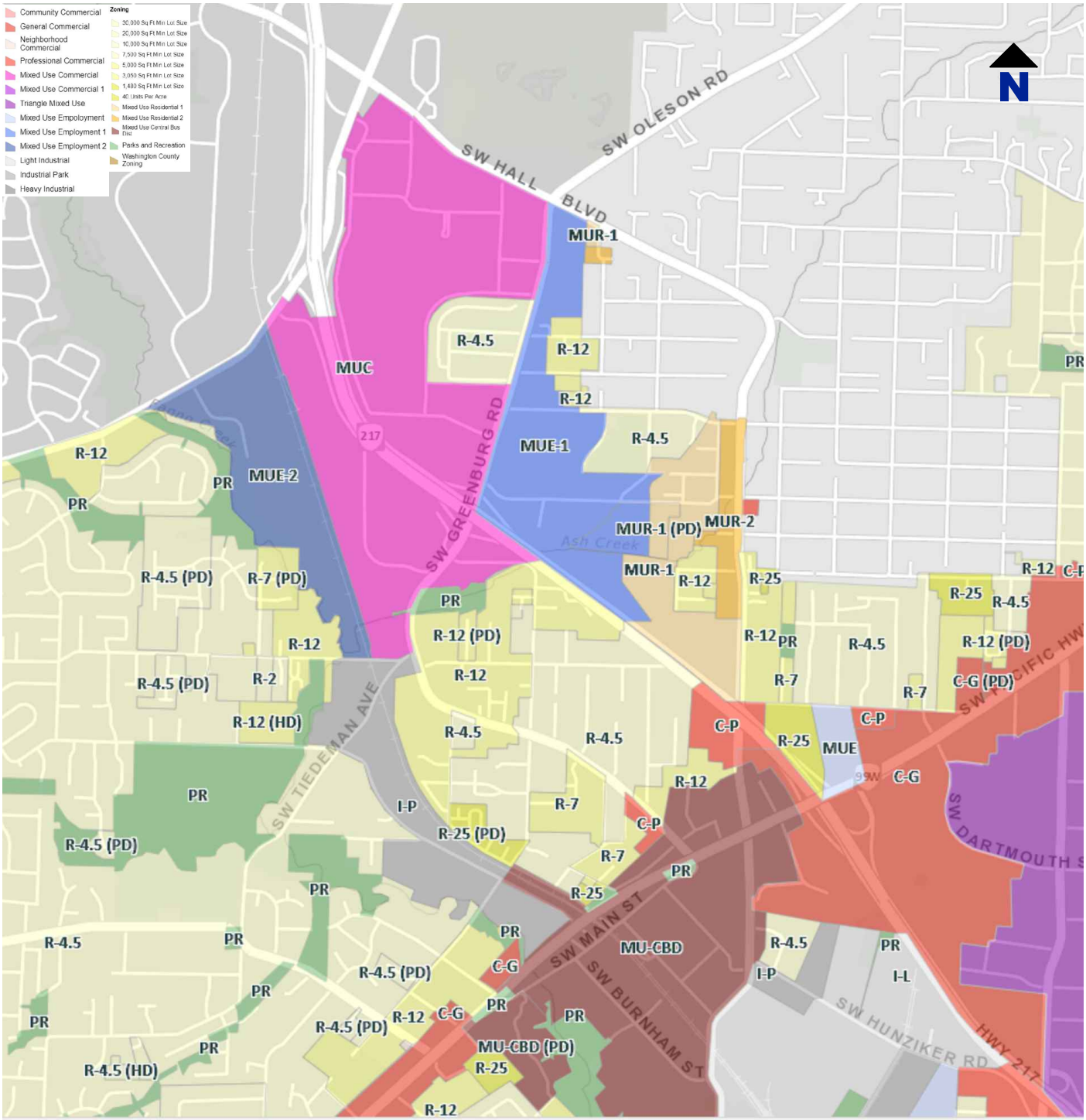
Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Beaverton Zoning Map

Date August 7, 2018	Scale AS SHOWN	Fig. No. B-1
File Name 217 Working File SB FINAL-1	Project No. 108.00494.00012	



SLR

Report	OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W
Drawing	Tigard Zoning Map
Date	August 7, 2018
Scale	AS SHOWN
Fig. No.	B-2
File Name	217 Working File SB FINAL-1
Project No.	108.00494.00012

APPENDIX C

MONITORING DATA

Noise Technical Report

Oregon Department of Transportation
123 NW Flanders Street
Portland, OR 97209

August 2018

OR217: OR10 - OR99W Auxiliary Lane project
Key 18841
Appendix C - Monitoring Data Summary

Location	Address	Date	Project Area	Counts	Cars	MT	HT	Bus	MC	File	Measured Noise Level	Modeled Noise Level	Difference
	5670 SW Lee Avenue	3/29/2018	Southbound	217 NB	4064	100	80	0	28	1210	54	57	3
			Aux Lane	Each Lane NB	2032	50	40	0	14				
M1				217 SB	3508	104	52	4	8				
				Each Lane SB	1754	52	26	2	4				
	10620 SW 95th Avenue	12/14/2017	Northbound	217 NB	4316	60	88	8	12	3008	66	67	1
			Aux Lane	Each Lane NB	2158	30	44	4	6				
M2				217 SB	3852	28	68	8	4				
				Each Lane SB	1926	14	34	4	2				
	9378 SW Mandamus Court	12/7/2017	Southbound	217 NB	4036	96	52	12	12	3003	71	70	1
			Aux Lane	Each Lane NB	2018	48	26	6	6				
M3				217 SB	4244	76	76	16	4				
				Each Lane SB	2122	38	38	8	2				
	11155 SW Hall	12/8/2017	Northbound	217 NB	3528	136	36	12	4	3006	70	72	3
			Aux Lane	Each Lane NB	1764	68	18	6	2				
M4				217 SB	4252	76	128	0	8				
				Each Lane SB	2126	38	64	0	4				
	8410 SW Pfaffle Street	12/14/2017	Northbound	217 NB	4184	28	84	0	0	3009	63	63	0
			Aux Lane	Each Lane NB	2092	14	42	0	0				
M5				217 SB	3864	96	64	4	4				
				Each Lane SB	1932	48	32	2	2				

SLR International Corporation
1800 Blankenship Road, Suite 440
West Linn, OR 97068

Noise Measurement Record

Measurement Number: 1210 Date: 3/29/18
Project Name: 217 Auxiliary Lanes
Address: 5670 SW Lee Ave, Beaverton, OR
Weather Conditions: Sunny Wind Speed: 6.7mph
Wind Direction: ~~160°F~~ Southwest
Temperature: 106°F Relative Humidity: 41.5%
Other:
Instrument: Rion NL-32 Serial # 00851427
Calibrator: B&K 4231 Serial # 2240964
Start Time: 13:26 Stop Time: 13:41
Calibration Tone ____ dB ____ Hz

Length of Measurement: 15 mins LEQ Range: 30-120
Microphone Height: 5 feet

LEQ @ 5 min:		LEQ @ 35 min:	
LEQ @ 10 min:		LEQ @ 40 min:	
LEQ @ 15 min:		LEQ @ 45 min:	
LEQ @ 20 min:		LEQ @ 50 min:	
LEQ @ 25 min:		LEQ @ 55 min:	
LEQ @ 30 min:		LEQ @ 60 min:	

LEQ:	54	L_{50}	53.1
L_{min}:	48.2	L_{10}	56.3
L_{max}:	69.4	L_1	58.6

Traffic Counted:

	Roadway: NB-217 HR. Equiv.		Counted	Roadway: SB-217 HR. Equiv.		Counted
Autos:	4064	=	1016	3508	=	877
Medium Trucks:	100	=	25	104	=	26
Heavy Trucks:	80	=	20	52	=	13
Buses:	0	=	0	4	=	1
Motorcycle:	28	=	7	8	=	2

siren
backup alarm
car horn

SLR International Corporation
1800 Blankenship Road, Suite 440
West Linn, OR 97068

Noise Measurement Record

Traffic Counted:	Roadway:		
	HR. Equiv.		Counted
Autos:		=	
Medium Trucks:		=	
Heavy Trucks:		=	
Buses:		=	
Motorcycle:		=	

Distance to Centerline: 407 feet

Number of Travel Lanes: 2NB & 2SB

Median Width and Type: MAX TRACK & 200 feet grass

Barriers: berm

Noise Sources Other Than Traffic Noise: siren

Relationship to Nearby Structures:

Are overhead powerlines or underground utilities apparent that would interfere with mitigation?

____ Yes X No

Elevation of roadway in relation to elevation of ground at measurement site: 10 ft above

Notes:

Redesignated: Monitoring Site M2 (not M8)

SLR International Corp
1800 Blankenship Road, Suite 440
West Linn, OR 97068

Noise Measurement Record

Measurement Number: 3008 (M8) Date: 12/14/17
Project Name: 217 Auxiliary Lanes
Address: 10620 SW 95th Ave, Tigard, OR
Weather Conditions: slightly cloudy Wind Speed: 2-7 mph
Wind Direction: E
Temperature: 43.3°F Relative Humidity: 48.5%
Other:
Instrument: RION NL-32 Serial # 00851428
Calibrator: Bruel & Kjaer Type 4231 Serial # 2240964
Start Time: 11:44 am Stop Time: 11:59 am
Calibration Tone -0.1 dB ____ Hz

Length of Measurement: 15 min LEQ Range: 40-130 dBA
Microphone Height: 5 ft.

LEQ: 65.7 L_{50} 65.5
L_{min}: 61.6 L_{10} 67.3
L_{max}: 71.7 L_1 68.4

Traffic Counted:	Roadway: 217 NB			Roadway: 217 SB		
	HR. Equiv.		Counted	HR. Equiv.		Counted
Autos:	4316	=	1079	3852	=	963
Medium Trucks:	60	=	15	28	=	7
Heavy Trucks:	88	=	22	68	=	17
Buses:	8	=	2	8	=	2
Motorcycle:	12	=	3	4	=	1

Traffic Counted:	Roadway:			Roadway:		
	HR. Equiv.		Counted	HR. Equiv.		Counted
Autos:		=			=	
Medium Trucks:		=			=	
Heavy Trucks:		=			=	
Buses:		=			=	
Motorcycle:		=			=	

SLR International Corp
1800 Blankenship Road, Suite 440
West Linn, OR 97068

Noise Measurement Record

Distance to Centerline: 30 ft

Number of Travel Lanes: 2 lanes NB + 2 lanes SB

Median Width and Type: 12 ft asphalt + cement barrier

Barriers: none

Noise Sources Other Than Traffic Noise: ducks, faint train horn

Relationship to Nearby Structures: 30 ft west of house

Are overhead powerlines or underground utilities apparent that would interfere with mitigation?

X Yes _____ No

Elevation of roadway in relation to elevation of ground at measurement site: 3-5 ft higher

Notes/ Sketch:

SLR International Corp
1800 Blankenship Road, Suite 440
West Linn, OR 97068

Noise Measurement Record

Measurement Number: M3 (3003 & 4003) Date: 12/7/2017
Project Name: Noise Study: OR217 OR10-OR99W NB SB
Address: 9378 SW Maudamus, Beaverton, OR
Weather Conditions: Sunny Wind Speed: 5.2 mph
Wind Direction:
Temperature: 47.3 °F Relative Humidity: 47
Other:
Instrument: Rion NL-32 Serial # 00851488 & 00851427
Calibrator: Brüel & Kjaer Type 4231 Serial # 2240964
Start Time: 13:15 Stop Time: 13:30
Calibration Tone 94/94.1 dB ____ Hz

Length of Measurement: 15 mins. LEQ Range: 30-120
Microphone Height: 5 ft

	3003	4003			
LEQ:	70.9	74.6	L_{50}	70.8	74.5
L_{min}:	67.3	70.5	L_{10}	72.3	75.9
L_{max}:	75.8	79.4	L_1	73.5	77.3

Traffic Counted:

	Roadway: 217 NB			Roadway: 217 SB		
	HR. Equiv.		Counted	HR. Equiv.		Counted
Autos:	4036	=	1009	4244	=	1061
Medium Trucks:	96	=	24	76	=	19
Heavy Trucks:	52	=	13	76	=	19
Buses:	12	=	3	16	=	4
Motorcycle:	12	=	3	4	=	1

Traffic Counted:

	Roadway:			Roadway:		
	HR. Equiv.		Counted	HR. Equiv.		Counted
Autos:		=			=	
Medium Trucks:		=			=	
Heavy Trucks:		=			=	
Buses:		=			=	
Motorcycle:		=			=	

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1800 Blankenship Road, Suite 440
West Linn, OR 97068

Noise Measurement Record

Distance to Centerline: 115 ft

Number of Travel Lanes: 3SB & 3NB.

Median Width and Type: 21 ft grass

Barriers: noise wall.

Noise Sources Other Than Traffic Noise: /

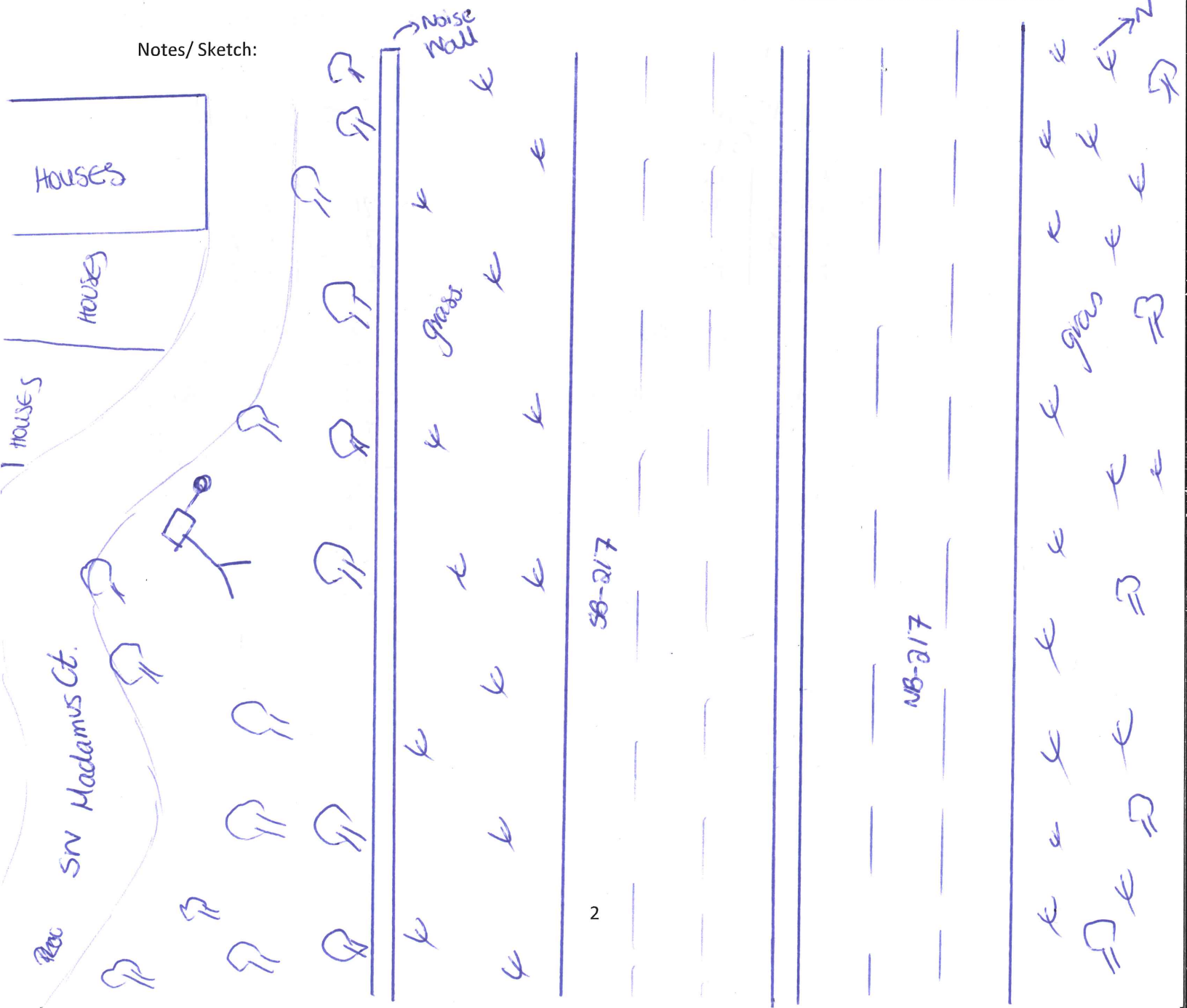
Relationship to Nearby Structures: _____

Are overhead powerlines or underground utilities apparent that would interfere with mitigation?

_____ Yes _____ No

Elevation of roadway in relation to elevation of ground at measurement site: _____

Notes/ Sketch:



Redesignated: Monitoring Site M4 (Not M6)

SLR International Corp
1800 Blankenship Road, Suite 440
West Linn, OR 97068

Noise Measurement Record

Measurement Number: M6 (3006 and 4006) Date: 12/08/2017
Project Name: Noise Study: OR217 OR10 - ORCAN NB SB
Address: 11155 SW 9th Hall, Beaverton, OR
Weather Conditions: partly cloudy Wind Speed: 4.5
Wind Direction:
Temperature: 41.5 Relative Humidity: 51.4
Other:
Instrument: Rion NL-32 Serial # 00851428 and 00851427
Calibrator: Brüel & Kjaer Type 4231 Serial # 2240964
Start Time: 10:30 Stop Time: 10:45
Calibration Tone 94/94.1 dB ____ Hz

Length of Measurement: 15 mins LEQ Range: 30-120
Microphone Height: 5 ft

	3006	4006		3006	4006
LEQ:	70.2	71.7	L_{50}	70.2	71.6
L_{min}:	65.3	66.7	L_{10}	71.7	73.2
L_{max}:	76.9	77.3	L_1	73.1	74.6

Traffic Counted:	Roadway: 217-NB			Roadway: 217-SB		
	HR. Equiv.		Counted	HR. Equiv.		Counted
Autos:	3528	=	882	4252	=	1063
Medium Trucks:	136	=	34	76	=	19
Heavy Trucks:	36	=	9	128	=	32
Buses:	12	=	3	0	=	0
Motorcycle:	4	=	1	8	=	2

Traffic Counted:	Roadway:			Roadway:		
	HR. Equiv.		Counted	HR. Equiv.		Counted
Autos:		=			=	
Medium Trucks:		=			=	
Heavy Trucks:		=			=	
Buses:		=			=	
Motorcycle:		=			=	

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West Linn, OR 97068

Noise Measurement Record

Distance to Centerline: 115 ft

Number of Travel Lanes: 3SB and 3NB

Median Width and Type: 68 ft grass.

Barriers: wood fence.

Noise Sources Other Than Traffic Noise: Birds chirping

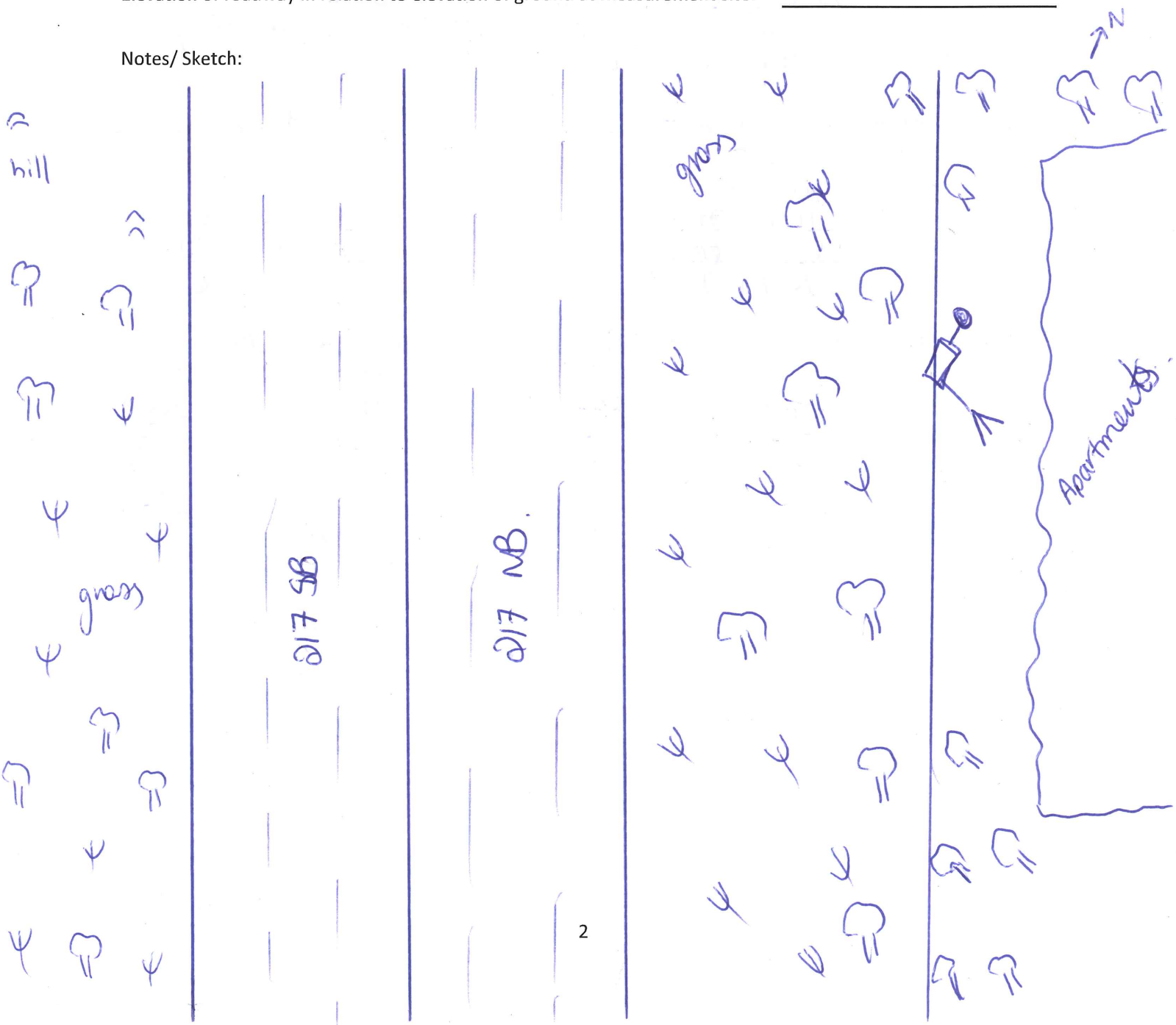
Relationship to Nearby Structures: _____

Are overhead powerlines or underground utilities apparent that would interfere with mitigation?

_____ Yes _____ No

Elevation of roadway in relation to elevation of ground at measurement site: _____

Notes/ Sketch:



Redesignated: Monitoring Site M5 (not M7)

SLR International Corp
1800 Blankenship Road, Suite 440
West Linn, OR 97068

Noise Measurement Record

Measurement Number: 3009 (M7) Date: 12/14/17
Project Name: 217 Auxiliary Lanes
Address: 8410 SW Pfaffle St., Portland, OR 97223
Weather Conditions: Cloudy Wind Speed: 1-5 mph
Wind Direction: E
Temperature: 44.5° F Relative Humidity: 44%
Other:
Instrument: RION NL-32 Serial # 00851428
Calibrator: Bruel & Kjaer Type 4231 Serial # 2240964
Start Time: 12:17 pM Stop Time: 12:32 pM
Calibration Tone -0.1 dB ____ Hz

Length of Measurement: 15 Min. LEQ Range: 40-130 dBA
Microphone Height: 5 ft

LEQ:	63.1	L_{50}	63.2
L_{min}:	59.7	L_{10}	64.2
L_{max}:	69	L_1	65.1

Traffic Counted:	Roadway: 217 SB			Roadway: 217 NB		
	HR. Equiv.		Counted	HR. Equiv.		Counted
Autos:	3864	=	966	4184	=	1046
Medium Trucks:	96	=	24	28	=	7
Heavy Trucks:	64	=	16	84	=	21
Buses:	4	=	1	0	=	0
Motorcycle:	4	=	1	0	=	0

Traffic Counted:	Roadway:			Roadway:		
	HR. Equiv.		Counted	HR. Equiv.		Counted
Autos:		=			=	
Medium Trucks:		=			=	
Heavy Trucks:		=			=	
Buses:		=			=	
Motorcycle:		=			=	

SLR International Corp
1800 Blankenship Road, Suite 440
West Linn, OR 97068

Noise Measurement Record

Distance to Centerline: ~200 ft

Number of Travel Lanes: 2 lanes SB, 2 lanes NB

Median Width and Type: 10 ft asphalt, cement barrier

Barriers: none, fence

Noise Sources Other Than Traffic Noise: none

Relationship to Nearby Structures: 30 ft south of apartment building

Are overhead powerlines or underground utilities apparent that would interfere with mitigation?

____ Yes X No

Elevation of roadway in relation to elevation of ground at measurement site: 30 ft lower

Notes/ Sketch:

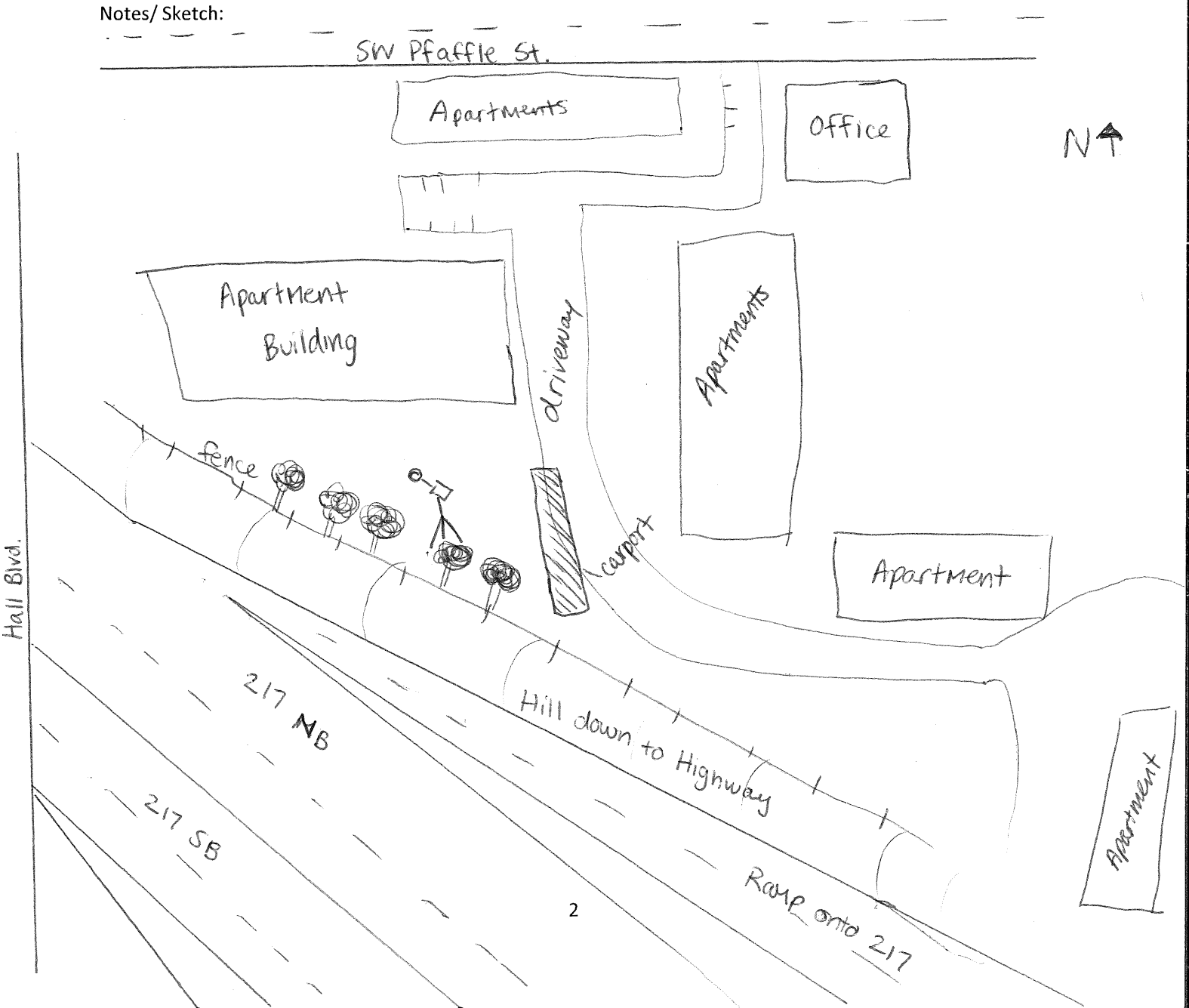


Photo 1: M1 Monitoring Location at 5670 SW Lee Avenue (Facing East towards 217)

Photo 2: M1 Monitoring Location at 5670 SW Lee Avenue (Facing North towards Residence)

Photo 3: M3 Monitoring Location at 9378 SW Mandamus Court (Facing North towards 217)

Photo 4: M3 Monitoring Location at 9378 SW Mandamus Court (Facing Northwest towards Residence)

Photo 5: M4 Monitoring Location at 11155 SW Hall Boulevard (Facing Southwest towards 217)

Photo 6: M4 Monitoring Location at 11155 SW Hall Boulevard (Facing South towards Residence)

Photo 7: M5 Monitoring Location at 8410 SW Pfaffle Street (Facing Southwest towards 217)

Photo 8: M5 Monitoring Location at 8410 SW Pfaffle Street (Facing Northwest towards Residence)

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.38936

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **7/6/2017**	*Cal Due:*
Model:	**4231**	*Status:*	**Received** / **Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	X / X
Serial number:	**2240964**	*Out of tolerance:*	
Class (IEC 60942):	**1**	*See comments:*	
Barometer type:		*Contains non-accredited tests:*	**__Yes _X_ No**
Barometer s/n:			
Customer:	**SLR International Corporation**	*Address:*	**1800 Blankenship Road, Suite 440**
Tel/Fax:	**503-905-3206 / 503-723-4436**		**West Linn, OR 97068**

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
140-Norsonic	Real Time Analyzer	1403978	Mar 22, 2017	Scantek, Inc. / NVLAP	Mar 22, 2018
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4192-Brüel&Kjær	Microphone	2854675	Nov 11, 2016	Scantek, Inc. / NVLAP	Nov 11, 2017
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature		Signature	
Date	7/6/17	Date	7/6/2017

Results summary: Device was tested and complies with following clauses of mentioned specifications:

CLAUSES[1] FROM STANDARDS REFERENCED IN PROCEDURES:	MET[2]	NOT MET	COMMENTS
Manufacturer specifications			
Manufacturer specifications: Sound pressure level	X		
Manufacturer specifications: Frequency	X		
Manufacturer specifications: Total harmonic distortion	X		
Current standards			
ANSI S1.40:2006 B.3 / IEC 60942: 2003 B.2 - Preliminary inspection	X		
ANSI S1.40:2006 B.4.4 / IEC 60942: 2003 B.3.4 - Sound pressure level	X		
ANSI S1.40:2006 A.5.4 / IEC 60942: 2003 A.4.4 - Sound pressure level stability	X		
ANSI S1.40:2006 B.4.5 / IEC 60942: 2003 B.3.5 - Frequency	X		
ANSI S1.40:2006 B.4.6 / IEC 60942: 2003 B.3.6 - Total harmonic distortion	X		

1 The results of this calibration apply only to the instrument type with serial number identified in this report.

2 The tests marked with (*) are not covered by the current NVLAP accreditation.

Main measured parameters [3]:

Measured[4]/Acceptable[5] Tone frequency (Hz):	Measured[4]/Acceptable[5] Total Harmonic Distortion (%):	Measured [4]/Acceptable Level[5] (dB):
999.97 ± 1.0/1000.0 ± 10.0	0.32 ± 0.10/ < 3	93.89 ± 0.12/94.0 ± 0.4
999.97 ± 1.0/1000.0 ± 10.0	0.23 ± 0.10/ < 3	113.90 ± 0.12/114.0 ± 0.4

3 The stated level is valid at reference conditions.

4 The above expanded uncertainties for frequency and distortion are calculated with a coverage factor k=2; for level k=2.00

5 Acceptable parameters values are from the current standards

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.5 ± 1.0	100.27 ± 0.000	59.9 ± 2.0

Tests made with following attachments to instrument:

Calibrator ½" Adaptor Type: B&K UC0210
Other:

Adjustments: Unit was not adjusted.
Comments: The instrument was tested and met all specifications found in the referenced procedures.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Measured Data: in Acoustical Calibrator Test Report # 38936 of two pages.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Test Report No.:38936

Manufacturer:	**Brüel and Kjær**
Type:	**4231**
Serial no:	**2240964**

Customer:	**SLR International Corporation**
Department:	
Address:	**1800 Blankenship Road, Suite 440, West Linn, OR 97068**
Order No:	
Contact Person:	**Kellye Larsen**
Phone No.:	**503-905-3206**
Fax No.:	**503-723-4436**
eMail:	**klarsen@slrconsuting.com**

Measurement Results:

	Level: (dB)	P. Stab : (dB)	Frequency: (Hz)	F. Stab : (%)	Distortion: (% TD)
1:	93.89	0.03	999.97	0.00	0.32
2:	93.88	0.03	999.97	0.00	0.32
3:	93.89	0.03	999.96	0.00	0.32
Result (Average):	**93.89**	**0.03**	**999.97**	**0.00**	**0.32**
Expanded Uncertainty:	0.12	0.02	1.00	0.01	0.10
Degree of Freedom:	>100	>100	>100	>100	>100
Coverage Factor:	2.00	2.00	2.00	2.00	2.00

The stated levels are relative to 20µPa.

The following correction factors have been applied during the measurement:
Pressure:0.0008 dB/kPa Temperature: None Relative humidity:0.001 dB/%RH
Reference microphone: 4192-2854675. Volume correction: 0.000 dB
Records:Z:\Calibration Lab\Cal 2017\BNK4231_2240964_M1.nmf

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EA-4/02.

Environmental conditions:

Pressure:	Temperature:	Relative humidity:
100.270 ± 0.020 kPa	22.5 ± 1.0 °C	59.9 ± 2.0 %RH

Date of calibration: 7/6/2017
Date of issue: 7/6/2017

Supervisor : Steven E. Marshall
Measurements performed by:

Jeremy Gotwalt
Software version: 6.1T

Scantek, Inc.
6430 Dobbin Rd., Suite C, Columbia, MD 21045
Ph: 410-290-7726 eMail: callab@scantekinc.com

Test Report No.:38936

Manufacturer:	**Brüel and Kjær**
Type:	**4231**
Serial no:	**2240964**

Customer:	**SLR International Corporation**
Department:	
Address:	**1800 Blankenship Road, Suite 440, West Linn, OR 97068**
Order No:	
Contact Person:	**Kellye Larsen**
Phone No.:	**503-905-3206**
Fax No.:	**503-723-4436**
eMail:	**klarsen@slrconsuting.com**

Measurement Results:

	Level: (dB)	P. Stab : (dB)	Frequency: (Hz)	F. Stab : (%)	Distortion: (% TD)
1:	113.90	0.01	999.97	0.00	0.23
2:	113.90	0.01	999.97	0.00	0.23
3:	113.90	0.01	999.97	0.00	0.23
Result (Average):	**113.90**	**0.01**	**999.97**	**0.00**	**0.23**
Expanded Uncertainty:	0.12	0.02	1.00	0.01	0.10
Degree of Freedom:	>100	>100	>100	>100	>100
Coverage Factor:	2.00	2.00	2.00	2.00	2.00

The stated levels are relative to 20µPa.

The following correction factors have been applied during the measurement:
Pressure:0.0008 dB/kPa Temperature: None Relative humidity:0.001 dB/%RH
Reference microphone: 4192-2854675. Volume correction: 0.000 dB
Records:Z:\Calibration Lab\Cal 2017\BNK4231_2240964_M2.nmf

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EA-4/02.

Environmental conditions:

Pressure:	Temperature:	Relative humidity:
100.200 ± 0.020 kPa	22.2 ± 1.0 °C	57.9 ± 2.0 %RH

Date of calibration: 7/6/2017
Date of issue: 7/6/2017

Supervisor : Steven E. Marshall
Measurements performed by:

Jeremy Gotwalt
Software version: 6.1T

Scantek, Inc.
6430 Dobbin Rd., Suite C, Columbia, MD 21045
Ph: 410-290-7726 eMail: callab@scantekinc.com

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.38937

Instrument: **Sound Level Meter**
Model: **NL32**
Manufacturer: **Rion**
Serial number: **00851427**
Tested with: **Microphone UC53A s/n 308891**
Preamplifier NH21 s/n 16845
Type (class): **1**
Customer: **SLR International Corporation**
Tel/Fax: **503-905-3206 / 503-723-4436**

Date Calibrated: **7/6/2017** *Cal Due:*

Status:	**Received**	**Sent**
In tolerance:	**X**	**X**
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No
Calibration service: __ Basic _X_ Standard
Address: **1800 Blankenship Road, Suite 440**
West Linn, OR 97068

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.5	100.09	60.7

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature		Signature	
Date	7/6/17	Date	7/7/2017

Results summary: Device complies with following clauses of mentioned specifications:

CLAUSES [1] FROM IEC/ANSI STANDARDS REFERENCED IN PROCEDURES:	RESULT[2,3]	EXPANDED UNCERTAINTY (coverage factor 2) [dB]
INDICATION AT THE CALIBRATION CHECK FREQUENCY - IEC61672-3 ED.2 CLAUSE 10	Passed	0.15
SELF-GENERATED NOISE - IEC 61672-3 ED.2 CLAUSE 11	For Info	0.3
FREQUENCY WEIGHTINGS: A NETWORK - IEC 61672-3 ED.2.0 CLAUSE 13	Passed	0.2
FREQUENCY WEIGHTINGS: C NETWORK - IEC 61672-3 ED.2.0 CLAUSE 13	Passed	0.2
FREQUENCY WEIGHTINGS: Z NETWORK - IEC 61672-3 ED.2.0 CLAUSE 13	Passed	0.2
FREQUENCY AND TIME WEIGHTINGS AT 1 KHZ IEC 61672-3 ED.2.0 CLAUSE 14	Passed	0.2
LEVEL LINEARITY ON THE REFERENCE LEVEL RANGE - IEC 61672-3 ED.2 CLAUSE 16	Passed	0.25
LEVEL LINEARITY INCLUDING THE LEVEL RANGE CONTROL - IEC 61672-3 ED.2.0 CLAUSE 17	Passed	0.25
TONEBURST RESPONSE - IEC 61672-3 ED.2.0 CLAUSE 18	Passed	0.3
PEAK C SOUND LEVEL - IEC 61672-3 ED.2.0 CLAUSE 19	Passed	0.35
OVERLOAD INDICATION - IEC 61672-3 ED.2.0 CLAUSE 20	Passed	0.25
HIGH LEVEL STABILITY TEST - IEC 61672-3 ED.2.0 CLAUSE 21	Passed	0.1
LONG TERM STABILITY TEST - IEC 61672-3 ED.2.0 CLAUSE 15	Passed	0.1
COMBINED ELECTRICAL AND ACOUSTICAL TEST - IEC 61672-3 ED.2.0 CLAUSE 13	Passed	See test report

1 The results of this calibration apply only to the instrument type with serial number identified in this report.

2 Parameters are certified at actual environmental conditions.

3 The tests marked with (*) are not covered by the current NVLAP accreditation.

Comments: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2, to demonstrate that the model of sound level meter fully conforms to the requirements in the IEC 61672-2, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Tests made with the following attachments to the instrument:

Microphone: Rion UC53A s/n 308891 for acoustical test
Preamplifier: Rion NH21 s/n 2240964 for all tests
Other: line adaptor ADP005 (18pF) for electrical tests
Accompanying acoustical calibrator: Brüel and Kjær 4231 s/n 2240964
Windscreen: Rion WS-10

Measured Data: in Test Report # 38937 of 7+1 pages.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Summary of Test Report No.:38937

Rion Type: NL32 Serial no: 00851427

Customer:	**SLR International Corporation**
Address:	**1800 Blankenship Road, Suite 440, West Linn, OR 97068**
Contact Person:	**Kellye Larsen**
Phone No.:	**503-905-3206**
Fax No.:	**503-723-4436**
eMail:	**klarsen@slrconsuting.com**

Measurement Results:

Indication at the calibration check frequency - IEC61672-3 Ed.2 Clause 10	Passed
Self-generated noise - IEC 61672-3 Ed.2 Clause 11	Passed
Frequency weightings: A Network - IEC 61672-3 Ed.2.0 Clause 13	Passed
Frequency weightings: C Network - IEC 61672-3 Ed.2.0 Clause 13	Passed
Frequency weightings: Z Network - IEC 61672-3 Ed.2.0 Clause 13	Passed
Frequency and time weightings at 1 kHz IEC 61672-3 Ed.2.0 Clause 14	Passed
Level linearity on the reference level range - IEC 61672-3 Ed.2 Clause 16	Passed
Level linearity including the level range control - IEC 61672-3 Ed.2.0 Clause 17	Passed
Toneburst response - IEC 61672-3 Ed.2.0 Clause 18	Passed
Peak C sound level - IEC 61672-3 Ed.2.0 Clause 19	Passed
Overload indication - IEC 61672-3 Ed.2.0 Clause 20	Passed
High level stability test - IEC 61672-3 Ed.2.0 Clause 21	Passed
Long term stability test - IEC 61672-3 Ed.2.0 Clause 15	Passed
Combined electrical and acoustical test - IEC 61672-3 Ed.2.0 Clause 13	Passed

Environmental conditions:

Pressure:	Temperature:	Relative humidity:
100.09	22.5	60.7

Date of calibration: 7/6/2017
Date of issue: 7/6/2017
Supervisor: Steven E. Marshall
Measurements performed by:

Jeremy Gotwalt

Software version: 6.1 T

Scantek, Inc.
6430 Dobbin Rd., Suite C, Columbia, MD 21045
Ph: 410-290-7726 eMail: callab@scantekinc.com

Test Report No.:38937

Manufacturer:	Rion
Instrument type:	NL32
Serial no:	00851427
Customer:	SLR International Corporation
Department:	
Order No:	
Contact Person:	Kellye Larsen
Address:	1800 Blankenship Road, Suite 440, West Linn, OR 97068

Environmental conditions:

Pressure:	100.09
Temperature:	22.5
Relative humidity:	60.7

Supervisor	Steven E. Marshall
Engineer	Jeremy Gotwalt
Date:	7/6/2017

Measurement Results:

Indication at the calibration check frequency - IEC61672-3 Ed.2 Clause 10

```
Reference Calibrator: WSC4 - NOR1251-30878
Reference calibrator level: 114.00
Before calibration:
  Environmental corrections: 0.00
  Other corrections: 0.00
  Notional level: 114.00
Reference calibrator level before calibration: 114.2
After calibration:
  Environmental corrections: 0.00
  Other corrections: 0.00
  Notional level: 114.00
Reference calibrator level after calibration: 114.0
Associated Calibrator: Brüel and Kjær - 4231 - 2240964
Associated calibrator level: 93.89
Initial level check:
  Environmental corrections: 0.01
  Other corrections: 0.00
  Notional level: 93.90
Indicated level: 94.1
Final level statement:
  Environmental corrections after calibration: 0.01
  Other corrections: 0.00
  Notional level: 93.90
Indicated level after calibration: 93.9
This value shall be used for adjusting the sound level meter in the future.
Test Passed
```

Self-generated noise - IEC 61672-3 Ed.2 Clause 11

Network	Level (dB)	Max (dB)	Uncert. (dB)	Result	Comment
A	8.2	20.0	0.3	P	Equivalent capacity
C	12.2	25.0	0.3	P	Equivalent capacity

Test Passed

Frequency weightings: A Network - IEC 61672-3 Ed.2.0 Clause 13

Freq (Hz)	Ref. (dB)	Meas. (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
63.1	83.0	82.8	1.0	-1.0	0.2	-0.2	P
125.9	83.0	82.8	1.0	-1.0	0.2	-0.2	P
251.2	83.0	82.8	1.0	-1.0	0.2	-0.2	P
501.2	83.0	82.9	1.0	-1.0	0.2	-0.1	P
1000.0	83.0	83.0	0.7	-0.7	0.2	0.0	P
1995.3	83.0	83.0	1.0	-1.0	0.2	0.0	P
3981.1	83.0	83.1	1.0	-1.0	0.2	0.1	P

Frequency weightings: A Network - IEC 61672-3 Ed.2.0 Clause 13

Freq (Hz)	Ref. (dB)	Meas. (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
7943.3	83.0	83.0	1.5	-2.5	0.2	0.0	P
15848.9	83.0	83.3	2.5	-16.0	0.2	0.3	P

Test Passed

Frequency weightings: C Network - IEC 61672-3 Ed.2.0 Clause 13

Freq (Hz)	Ref. Level (dB)	Meas. Value (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
63.1	83.0	82.9	1.0	-1.0	0.2	-0.1	P
125.9	83.0	82.9	1.0	-1.0	0.2	-0.1	P
251.2	83.0	82.9	1.0	-1.0	0.2	-0.1	P
501.2	83.0	82.9	1.0	-1.0	0.2	-0.1	P
1000.0	83.0	83.0	0.7	-0.7	0.2	0.0	P
1995.3	83.0	83.0	1.0	-1.0	0.2	0.0	P
3981.1	83.0	83.0	1.0	-1.0	0.2	0.0	P
7943.3	83.0	83.0	1.5	-2.5	0.2	0.0	P
15848.9	83.0	83.3	2.5	-16.0	0.2	0.3	P

Test Passed

Frequency weightings: Z Network - IEC 61672-3 Ed.2.0 Clause 13

Freq (Hz)	Ref. Level (dB)	Meas. Value (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
63.1	83.0	82.9	1.0	-1.0	0.2	-0.1	P
125.9	83.0	82.9	1.0	-1.0	0.2	-0.1	P
251.2	83.0	82.9	1.0	-1.0	0.2	-0.1	P
501.2	83.0	82.9	1.0	-1.0	0.2	-0.1	P
1000.0	83.0	83.0	0.7	-0.7	0.2	0.0	P
1995.3	83.0	83.0	1.0	-1.0	0.2	0.0	P
3981.1	83.0	83.1	1.0	-1.0	0.2	0.1	P
7943.3	83.0	82.9	1.5	-2.5	0.2	-0.1	P
15848.9	83.0	82.5	2.5	-16.0	0.2	-0.5	P

Test Passed

Frequency and time weightings at 1 kHz IEC 61672-3 Ed.2.0 Clause 14

Weightings Time	Netw	Ref. (dB)	Measured (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
Fast	A	94.0	94.0	0.1	-0.1	0.2	0.0	P
Fast	C	94.0	94.0	0.1	-0.1	0.2	0.0	P
Fast	Z	94.0	94.1	0.1	-0.1	0.2	0.1	P
Fast	Flat	94.0	94.1	0.1	-0.1	0.2	0.1	P
Slow	A	94.0	94.0	0.1	-0.1	0.2	0.0	P
Leq	A	94.0	94.0	0.1	-0.1	0.2	0.0	P
SEL	A	104.0	104.0	0.1	-0.1	0.2	0.0	P

Test Passed

Frequency and time weightings at 1 kHz IEC 61672-3 Ed.2.0 Clause 14

Weightings Time	Netw	Ref. (dB)	Measured (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result

Level linearity on the reference level range - IEC 61672-3 Ed.2 Clause 16

Ref. (dB)	Measured (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
Full scale setting: 120dB						
The following measurements are SPL measurements						
Measured at 31.5 Hz						
74.0	74.0	0.8	-0.8	0.25	0.0	P
79.0	79.0	0.8	-0.8	0.25	0.0	P
84.6	84.6	0.8	-0.8	0.25	0.0	P
85.6	85.6	0.8	-0.8	0.25	0.0	P
86.6	86.6	0.8	-0.8	0.25	0.0	P
87.6	87.6	0.8	-0.8	0.25	0.0	P
88.6	88.6	0.8	-0.8	0.25	0.0	P
74.0	74.6	0.8	-0.8	0.25	0.6	P
69.0	69.1	0.8	-0.8	0.25	0.1	P
64.0	64.1	0.8	-0.8	0.25	0.1	P
59.0	59.1	0.8	-0.8	0.25	0.1	P
54.0	54.1	0.8	-0.8	0.25	0.1	P
49.0	49.1	0.8	-0.8	0.25	0.1	P
44.0	44.1	0.8	-0.8	0.25	0.1	P
39.0	39.0	0.8	-0.8	0.25	0.0	P
34.0	34.0	0.8	-0.8	0.25	0.0	P
33.0	33.0	0.8	-0.8	0.25	0.0	P
32.0	32.1	0.8	-0.8	0.25	0.1	P
31.0	31.0	0.8	-0.8	0.25	0.0	P
30.0	30.0	0.8	-0.8	0.25	0.0	P
Measured at 1 kHz						
94.0	94.0	0.8	-0.8	0.25	0.0	P
99.0	99.0	0.8	-0.8	0.25	0.0	P
104.0	104.0	0.8	-0.8	0.25	0.0	P
109.0	109.0	0.8	-0.8	0.25	0.0	P
114.0	114.0	0.8	-0.8	0.25	0.0	P
119.0	119.1	0.8	-0.8	0.25	0.1	P
124.0	124.1	0.8	-0.8	0.25	0.1	P
125.0	125.1	0.8	-0.8	0.25	0.1	P
126.0	126.1	0.8	-0.8	0.25	0.1	P
127.0	127.1	0.8	-0.8	0.25	0.1	P
128.0	128.1	0.8	-0.8	0.25	0.1	P
94.0	94.0	0.8	-0.8	0.25	0.0	P
89.0	89.0	0.8	-0.8	0.25	0.0	P
84.0	84.1	0.8	-0.8	0.25	0.1	P
79.0	79.1	0.8	-0.8	0.25	0.1	P
74.0	74.0	0.8	-0.8	0.25	0.0	P
69.0	69.0	0.8	-0.8	0.25	0.0	P
64.0	64.0	0.8	-0.8	0.25	0.0	P
59.0	59.1	0.8	-0.8	0.25	0.1	P
54.0	54.0	0.8	-0.8	0.25	0.0	P
49.0	49.0	0.8	-0.8	0.25	0.0	P
44.0	44.0	0.8	-0.8	0.25	0.0	P
39.0	39.1	0.8	-0.8	0.25	0.1	P
34.0	34.0	0.8	-0.8	0.25	0.0	P
33.0	33.1	0.8	-0.8	0.25	0.1	P

Level linearity on the reference level range - IEC 61672-3 Ed.2 Clause 16

Ref. (dB)	Measured (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
32.0	32.1	0.8	-0.8	0.25	0.1	P
31.0	31.1	0.8	-0.8	0.25	0.1	P
30.0	30.1	0.8	-0.8	0.25	0.1	P
Measured at 8 kHz						
94.0	94.0	0.8	-0.8	0.25	0.0	P
99.0	99.0	0.8	-0.8	0.25	0.0	P
104.0	104.0	0.8	-0.8	0.25	0.0	P
109.0	109.0	0.8	-0.8	0.25	0.0	P
114.0	114.0	0.8	-0.8	0.25	0.0	P
119.0	119.0	0.8	-0.8	0.25	0.0	P
122.9	122.9	0.8	-0.8	0.25	0.0	P
123.9	123.9	0.8	-0.8	0.25	0.0	P
124.9	124.9	0.8	-0.8	0.25	0.0	P
125.9	125.9	0.8	-0.8	0.25	0.0	P
94.0	94.0	0.8	-0.8	0.25	0.0	P
89.0	89.0	0.8	-0.8	0.25	0.0	P
84.0	84.1	0.8	-0.8	0.25	0.1	P
79.0	79.0	0.8	-0.8	0.25	0.0	P
74.0	74.1	0.8	-0.8	0.25	0.1	P
69.0	69.0	0.8	-0.8	0.25	0.0	P
64.0	64.0	0.8	-0.8	0.25	0.0	P
59.0	59.0	0.8	-0.8	0.25	0.0	P
54.0	54.0	0.8	-0.8	0.25	0.0	P
49.0	49.0	0.8	-0.8	0.25	0.0	P
44.0	44.0	0.8	-0.8	0.25	0.0	P
39.0	39.1	0.8	-0.8	0.25	0.1	P
34.0	34.0	0.8	-0.8	0.25	0.0	P
33.0	33.0	0.8	-0.8	0.25	0.0	P
32.0	32.1	0.8	-0.8	0.25	0.1	P
31.0	31.0	0.8	-0.8	0.25	0.0	P
30.0	30.1	0.8	-0.8	0.25	0.1	P

Test Passed

Level linearity including the level range control - IEC 61672-3 Ed.2.0 Clause 17

Full Scale (dB)	Ref. Value (dB)	Measured Value (dB)	Tol. Value (dB)	Uncert. (dB)	Dev. (dB)	Result
Measured at 1 kHz						
The following measurements are SPL measurements						
Measuring the reference level on the available ranges.						
130	94.0	94.1	0.8	0.25	0.1	P
120	94.0	94.0	0.8	0.25	0.0	P
110	94.0	94.1	0.8	0.25	0.1	P
100	94.0	94.1	0.8	0.25	0.1	P
Measuring 5 dB below full scale on all available ranges.						
130	125.0	125.1	0.8	0.25	0.1	P
120	115.0	115.1	0.8	0.25	0.1	P
110	105.0	105.1	0.8	0.25	0.1	P
100	95.0	95.1	0.8	0.25	0.1	P
90	85.0	85.1	0.8	0.25	0.1	P
80	75.0	75.1	0.8	0.25	0.1	P

Test Passed

Toneburst response - IEC 61672-3 Ed.2.0 Clause 18

Burst type	Ref. (dB)	Measured (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
Fast 200 mSec	125.0	125.0	0.5	-0.5	0.3	0.0	P
Fast 2.0 mSec	108.0	108.0	1.0	-1.5	0.3	0.0	P
Fast 0.25 mSec	99.0	98.9	1.0	-3.0	0.3	-0.1	P
Slow 200 mSec	118.6	118.6	0.5	-0.5	0.3	0.0	P
Slow 2.0 mSec	99.0	98.9	1.0	-3.0	0.3	-0.1	P
SEL 200 mSec	119.0	119.0	0.5	-0.5	0.3	0.0	P
SEL 2.0 mSec	99.0	99.0	1.0	-1.5	0.3	0.0	P
SEL 0.25 mSec	90.0	89.9	1.0	-3.0	0.3	-0.1	P

Test Passed

Peak C sound level - IEC 61672-3 Ed.2.0 Clause 19

Pulse Type	Pulse Freq. (Hz)	Ref. RMS (dB)	Ref. Peak (dB)	Measured Value (dB)	Tol. (+/-dB)	Uncert. (dB)	Dev. (dB)	Result
1 cycle	8k	127.0	130.4	130.2	2.0	0.35	-0.2	P
Pos 1/2 cycle	500	130.0	132.4	132.0	1.0	0.35	-0.4	P
Neg 1/2 cycle	500	130.0	132.4	132.0	1.0	0.35	-0.4	P

Test Passed

Overload indication - IEC 61672-3 Ed.2.0 Clause 20

	Measured (dB)	Tol. (+/-dB)	Uncert. (dB)	Result
Level difference of positive and negative pulses:	0.2	1.5	0.25	P
Positive 1/2 cycle 4 kHz. Overload occurred at:	139.4			
Negative 1/2 cycle 4 kHz. Overload occurred at:	139.2			

Test Passed

High level stability test - IEC 61672-3 Ed.2.0 Clause 21

Test signal: Sine wave at 1 kHz

Initial level (dB)	Final level (dB)	Diff. (dB)	Tol. value (dB)	Uncert. (dB)	Result
137.0	137.0	0.0	0.1	0.1	P

Test Passed

Long term stability test - IEC 61672-3 Ed.2.0 Clause 15

Test signal: Sine wave at 1 kHz

Time inteval (mm:SS)	StartLevel (dB)	StopLevel (dB)	Difference (dB)	Tolerence (dB)	Result
25:13	94.0	94.0	0.0	0.1	P

Test Passed

Combined electrical and acoustical test - IEC 61672-3 Ed.2.0 Clause 13

A-Weighted results: Free field

Frequency	SLM Val (dB)	SLM U (dB)	Microphone Val (dB)	Microphone U (dB)	Case Refl. Val (dB)	Case Refl. U (dB)	Wind Screen Val (dB)	Wind Screen U (dB)	Uncert (dB)	Tol (dB)	Result (dB)	
63 Hz	-0.2	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.2	P
125 Hz	-0.2	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.2	P
250 Hz	-0.2	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.2	P
500 Hz	-0.1	0.2	-0.1	0.1			0.0	0.1	0.2	+-1.0	-0.2	P
1 kHz	0.0	0.2	-0.1	0.1			0.1	0.1	0.2	+-0.7	0.0	P
2 kHz	0.0	0.2	-0.2	0.2			0.3	0.2	0.4	+-1.0	0.1	P
4 kHz	0.1	0.2	0.1	0.2			0.3	0.2	0.4	+-1.0	0.5	P
8 kHz	0.0	0.2	0.1	0.4			0.0	0.3	0.5	+1.5/-2.5	0.1	P
16 kHz	0.3	0.2	-0.6	0.7			-0.7	0.4	0.8	+2.5/-16.0	-1.0	P

C-Weighted results: Free field

Frequency	SLM Val (dB)	SLM U (dB)	Microphone Val (dB)	Microphone U (dB)	Case Refl. Val (dB)	Case Refl. U (dB)	Wind Screen Val (dB)	Wind Screen U (dB)	Uncert (dB)	Tol (dB)	Result (dB)	
63 Hz	-0.1	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
125 Hz	-0.1	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
250 Hz	-0.1	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
500 Hz	-0.1	0.2	-0.1	0.1			0.0	0.1	0.2	+-1.0	-0.2	P
1 kHz	0.0	0.2	-0.1	0.1			0.1	0.1	0.2	+-0.7	0.0	P
2 kHz	0.0	0.2	-0.2	0.2			0.3	0.2	0.4	+-1.0	0.1	P
4 kHz	0.0	0.2	0.1	0.2			0.3	0.2	0.4	+-1.0	0.4	P
8 kHz	0.0	0.2	0.1	0.4			0.0	0.3	0.5	+1.5/-2.5	0.1	P
16 kHz	0.3	0.2	-0.6	0.7			-0.7	0.4	0.8	+2.5/-16.0	-1.0	P

Z-Weighted results: Free field

Frequency	SLM Val (dB)	SLM U (dB)	Microphone Val (dB)	Microphone U (dB)	Case Refl. Val (dB)	Case Refl. U (dB)	Wind Screen Val (dB)	Wind Screen U (dB)	Uncert (dB)	Tol (dB)	Result (dB)	
63 Hz	-0.1	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
125 Hz	-0.1	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
250 Hz	-0.1	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
500 Hz	-0.1	0.2	-0.1	0.1			0.0	0.1	0.2	+-1.0	-0.2	P
1 kHz	0.0	0.2	-0.1	0.1			0.1	0.1	0.2	+-0.7	0.0	P
2 kHz	0.0	0.2	-0.2	0.2			0.3	0.2	0.4	+-1.0	0.1	P
4 kHz	0.1	0.2	0.1	0.2			0.3	0.2	0.4	+-1.0	0.5	P
8 kHz	-0.1	0.2	0.1	0.4			0.0	0.3	0.5	+1.5/-2.5	0.0	P
16 kHz	-0.5	0.2	-0.6	0.7			-0.7	0.4	0.8	+2.5/-16.0	-1.8	P

The actual frequency response of Rion / UC53A 308891 has been used for the calculations.

Test Passed

The overall frequency response of the sound level meter, typical wind screen response and microphone response has shown to conform with the requirements in IEC 61672-3 for a class 1 sound level meter.

JDG

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.38938

Instrument: **Microphone**
Model: **UC53A**
Manufacturer: **Rion**
Serial number: **308891**
Composed of:

Date Calibrated: **7/6/2017** *Cal Due:*

Status:	**Received**	**Sent**
In tolerance:	**X**	**X**
Out of tolerance:		
See comments:		

Contains non-accredited tests: __**Yes** _**X**_ **No**

Customer: **SLR International Corporation**
Tel/Fax: **503-905-3206/503-723-4436**

Address: **1800 Blankenship Road, Suite 440**
West Linn, OR 97068

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017
4180-Brüel&Kjær	Microphone	2246115	Oct 26, 2015	NPL-UK / UKAS	Oct 26, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature		Signature	
Date	7/6/17	Date	7/6/2017

Document stored as: Z:\Calibration Lab\Mic 2017\Rion53A_308891_M1.doc

Results summary: Device was tested and complies with following clauses of mentioned specifications:

CLAUSES / METHODS[1] FROM PROCEDURES		MET[2,3]	NOT MET	NOT TESTED	MEASUREMENT EXPANDED UNCERTAINTY (coverage factor 2)
Open circuit sensitivity (insert voltage method, 250 Hz)		X			See below
Frequency response	Actuator response	X			63 – 200Hz: 0.3 dB 200 – 8000 Hz: 0.2 dB 8 – 10 kHz: 0.5 dB 10 – 20 kHz: 0.7 dB 20 – 50 kHz: 0.9 dB 50 – 100 kHz: 1.2 dB
	FF/Diffuse field responses	X			63 – 200Hz: 0.3 dB 200 – 4000 Hz: 0.2 dB 4 – 10 kHz: 0.6 dB 10 – 20 kHz: 0.9 dB 20 – 50 kHz: 2.2 dB 50 – 100 kHz: 4.4 dB
	Scantek, Inc. acoustical method			X	31.5 – 125 Hz: 0.16 dB 250, 1000 Hz: 0.12 dB 2 – 8 kHz: 0.8 dB 12.5 – 16 kHz: 2.4 dB

[1] The results of this calibration apply only to the instrument type with serial number identified in this report.

[2] Results are normalized to the reference conditions.

[3] The tests marked with (*) are not covered by the current NVLAP accreditation.

Note: The free field/diffuse field characteristics were calculated based on the measured actuator response and adjustment coefficients as provided by the manufacturer. The uncertainties reported for these characteristics may include assumed uncertainty components for the adjustment coefficients.

Comments:	The instrument was tested and met all specifications found in the referenced procedures.

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
21.8 ± 1.0	100.24 ± 0.020	66.3 ± 2.0

Main measured parameters:

Tone frequency (Hz)	Measured[4] /Acceptable Open circuit sensitivity (dB re 1V/Pa)	Sensitivity (mV/Pa)
250	-26.61 ± 0.12/ -28.0 +3.0/-1.0	46.72

[4] The reported expanded uncertainty is calculated with a coverage factor k=2.00

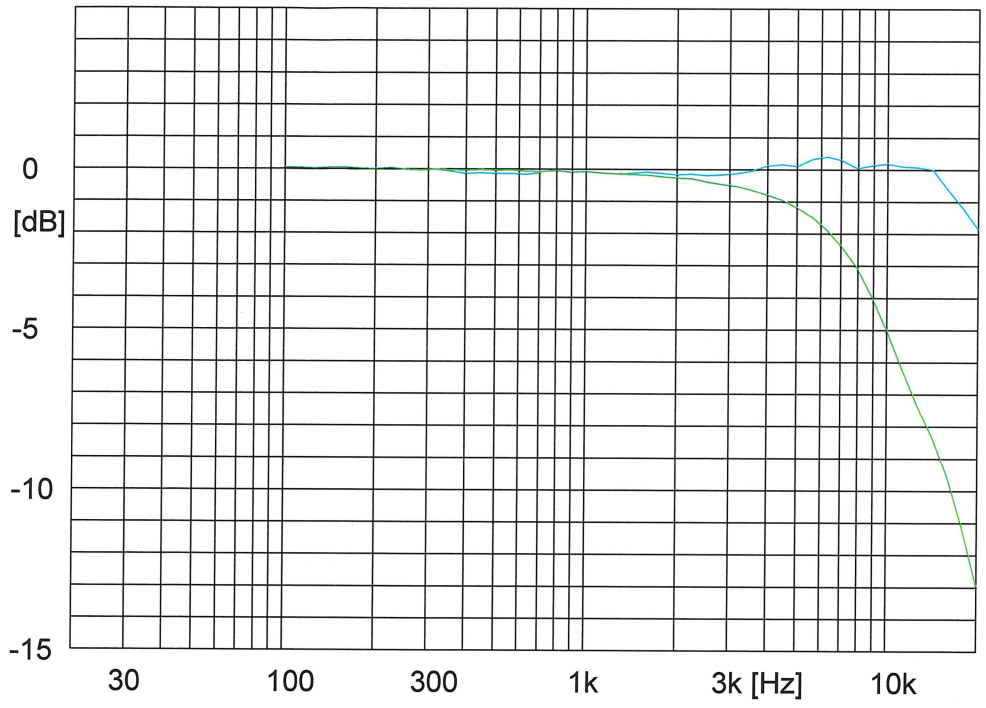
Tests made with following attachments to instrument and auxiliary devices:

Protection grid mounted for sensitivity measurements
Actuator type: G.R.A.S. RA0014

Measured Data: Found on Microphone Test Report # 38938 of one page.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Microphone Test Report No.:38938



Rion
Type: UC53A

Serial no: 308891

Sensitivity: 46.72 mV/Pa
-26.61 ±0.12 dB re. 1 V/Pa

Date: 7/6/2017

Signature:

Measurement conditions:

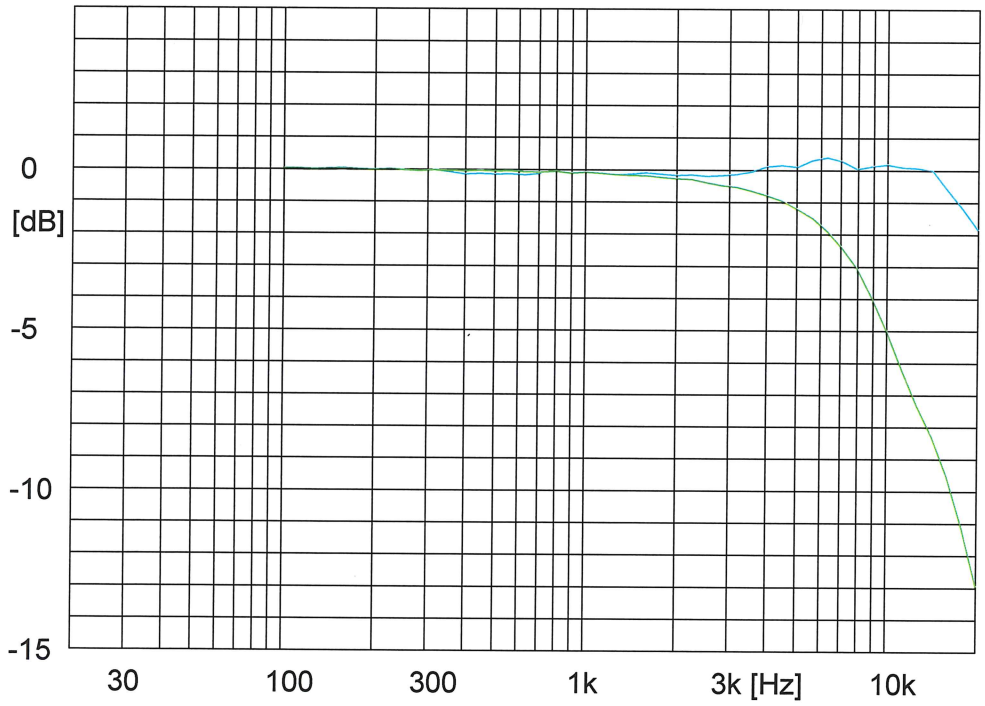
Polarisation voltage:	0.0 V
Pressure:	100.24 ±0.02 kPa
Temperature:	21.8 ±1.0 °C
Relative humidity:	66.3 ±2.0 %RH

Results are normalized to the reference conditions.

Free field response
Actuator response

Scantek, Inc.
6430 Dobbin Rd., Suite C, Columbia, MD 21045
Ph: 410-290-7726 eMail: callab@scantekinc.com

Microphone Test Report No.:38938



Rion
Type: UC53A

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Sensitivity: 46.72 mV/Pa
-26.61 ±0.12 dB re. 1 V/Pa

Date: 7/6/2017

Signature:

Measurement conditions:

Polarisation voltage:	0.0 V
Pressure:	100.24 ±0.02 kPa
Temperature:	21.8 ±1.0 °C
Relative humidity:	66.3 ±2.0 %RH

Results are normalized to the reference conditions.

Free field response
Actuator response

Scantek, Inc.
6430 Dobbin Rd., Suite C, Columbia, MD 21045
Ph: 410-290-7726 eMail: callab@scantekinc.com

Comment:
(Z:\Calibration Lab\Mic 2017\Rion53A_308891_M1.nmf)

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.38939

Instrument: **Sound Level Meter**
Model: **NL32**
Manufacturer: **Rion**
Serial number: **00851428**
Tested with: **Microphone UC53A s/n 308892**
Preamplifier NH21 s/n 16846
Type (class): **1**
Customer: **SLR International Corporation**
Tel/Fax: **503-905-3206 / 503-723-4436**

Date Calibrated: **7/6/2017** *Cal Due:*

	Received	Sent
Status:		
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No
Calibration service: __ Basic _X_ Standard
Address: **1800 Blankenship Road, Suite 440**
West Linn, OR 97068

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
21.3	100.12	54.6

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature		Signature	
Date	7/6/17	Date	7/6/2017

Results summary: Device complies with following clauses of mentioned specifications:

CLAUSES[1] FROM IEC/ANSI STANDARDS REFERENCED IN PROCEDURES:	RESULT[2,3]	EXPANDED UNCERTAINTY (coverage factor 2) [dB]
INDICATION AT THE CALIBRATION CHECK FREQUENCY - IEC61672-3 ED.2 CLAUSE 10	Passed	0.15
SELF-GENERATED NOISE - IEC 61672-3 ED.2 CLAUSE 11	Passed	0.3
FREQUENCY WEIGHTINGS: A NETWORK - IEC 61672-3 ED.2.0 CLAUSE 13	Passed	0.2
FREQUENCY WEIGHTINGS: C NETWORK - IEC 61672-3 ED.2.0 CLAUSE 13	Passed	0.2
FREQUENCY WEIGHTINGS: Z NETWORK - IEC 61672-3 ED.2.0 CLAUSE 13	Passed	0.2
FREQUENCY AND TIME WEIGHTINGS AT 1 KHZ IEC 61672-3 ED.2.0 CLAUSE 14	Passed	0.2
LEVEL LINEARITY ON THE REFERENCE LEVEL RANGE - IEC 61672-3 ED.2 CLAUSE 16	Passed	0.25
LEVEL LINEARITY INCLUDING THE LEVEL RANGE CONTROL - IEC 61672-3 ED.2.0 CLAUSE 17	Passed	0.25
TONEBURST RESPONSE - IEC 61672-3 ED.2.0 CLAUSE 18	Passed	0.3
PEAK C SOUND LEVEL - IEC 61672-3 ED.2.0 CLAUSE 19	Passed	0.35
OVERLOAD INDICATION - IEC 61672-3 ED.2.0 CLAUSE 20	Passed	0.25
HIGH LEVEL STABILITY TEST - IEC 61672-3 ED.2.0 CLAUSE 21	Passed	0.1
LONG TERM STABILITY TEST - IEC 61672-3 ED.2.0 CLAUSE 15	Passed	0.1
COMBINED ELECTRICAL AND ACOUSTICAL TEST - IEC 61672-3 ED.2.0 CLAUSE 13	Passed	See test report

1 The results of this calibration apply only to the instrument type with serial number identified in this report.

2 Parameters are certified at actual environmental conditions.

3 The tests marked with (*) are not covered by the current NVLAP accreditation.

Comments: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2, to demonstrate that the model of sound level meter fully conforms to the requirements in the IEC 61672-2, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Tests made with the following attachments to the instrument:

Microphone:	Rion UC53A s/n 308892 for acoustical test
Preamplifier:	Rion NH21 s/n 16846 for all tests
Other: line adaptor ADP005 (18pF) for electrical tests	
Accompanying acoustical calibrator:	Brüel and Kjær 4231 s/n 2240964
Windscreen:	Rion WS-10

Measured Data: in Test Report # 38939 of 7+1 pages.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Summary of Test Report No.:38939

Rion Type: NL32 Serial no: 00851428

Customer:	**SLR International Corporation**
Address:	**1800 Blankenship Road, Suite 440, West Linn, OR 97068**
Contact Person:	**Kellye Larsen**
Phone No.:	**503-905-3206**
Fax No.:	**503-723-4436**
eMail:	**klarsen@slrconsuting.com**

Microphone:	Rion	Type: UC53A	Serial no: 308892	Sens:-27.22dB
Preamplifier	Rion	Type: NH21	Serial no: 16846	
Calibrator:	Brüel and Kjær	Type: 4231	Serial no: 2240964	Level:93.89dB
Wind screen	Rion	Type: WS-10		

Measurement Results:

Indication at the calibration check frequency - IEC61672-3 Ed.2 Clause 10	Passed
Self-generated noise - IEC 61672-3 Ed.2 Clause 11	Passed
Frequency weightings: A Network - IEC 61672-3 Ed.2.0 Clause 13	Passed
Frequency weightings: C Network - IEC 61672-3 Ed.2.0 Clause 13	Passed
Frequency weightings: Z Network - IEC 61672-3 Ed.2.0 Clause 13	Passed
Frequency and time weightings at 1 kHz IEC 61672-3 Ed.2.0 Clause 14	Passed
Level linearity on the reference level range - IEC 61672-3 Ed.2 Clause 16	Passed
Level linearity including the level range control - IEC 61672-3 Ed.2.0 Clause 17	Passed
Toneburst response - IEC 61672-3 Ed.2.0 Clause 18	Passed
Peak C sound level - IEC 61672-3 Ed.2.0 Clause 19	Passed
Overload indication - IEC 61672-3 Ed.2.0 Clause 20	Passed
High level stability test - IEC 61672-3 Ed.2.0 Clause 21	Passed
Long term stability test - IEC 61672-3 Ed.2.0 Clause 15	Passed
Combined electrical and acoustical test - IEC 61672-3 Ed.2.0 Clause 13	Passed

Environmental conditions:

Pressure:	Temperature:	Relative humidity:
100.12	21.3	54.6

Date of calibration: 7/6/2017
Date of issue: 7/6/2017
Supervisor: Steven E. Marshall
Measurements performed by:

Jeremy Gotwalt

Software version: 6.1 T

Scantek, Inc.
6430 Dobbin Rd., Suite C, Columbia, MD 21045
Ph: 410-290-7726 eMail: callab@scantekinc.com

Test Report No.:38939

Manufacturer:	Rion
Instrument type:	NL32
Serial no:	00851428
Customer:	SLR International Corporation
Department:	
Order No:	
Contact Person:	Kellye Larsen
Address:	1800 Blankenship Road, Suite 440, West Linn, OR 97068

Environmental conditions:

Pressure:	100.12
Temperature:	21.3
Relative humidity:	54.6

Supervisor	Steven E. Marshall
Engineer	Jeremy Gotwalt
Date:	7/6/2017

Measurement Results:

Indication at the calibration check frequency - IEC61672-3 Ed.2 Clause 10

```
Reference Calibrator: WSC4 - NOR1251-30878
Reference calibrator level: 114.00
Before calibration:
  Environmental corrections: 0.00
  Other corrections: 0.00
  Notional level: 114.00
Reference calibrator level before calibration: 113.9
After calibration:
  Environmental corrections: 0.00
  Other corrections: 0.00
  Notional level: 114.00
Reference calibrator level after calibration: 114.0
Associated Calibrator: Brüel and Kjær - 4231 - 2240964
Associated calibrator level: 93.89
Initial level check:
  Environmental corrections: 0.00
  Other corrections: 0.00
  Notional level: 93.89
Indicated level: 93.8
Final level statement:
  Environmental corrections after calibration: 0.00
  Other corrections: 0.00
  Notional level: 93.89
Indicated level after calibration: 93.9
This value shall be used for adjusting the sound level meter in the future.
Test Passed
```

Self-generated noise - IEC 61672-3 Ed.2 Clause 11

Network	Level (dB)	Max (dB)	Uncert. (dB)	Result	Comment
A	10.6	20.0	0.3	P	Equivalent capacity
C	13.3	25.0	0.3	P	Equivalent capacity

Test Passed

Frequency weightings: A Network - IEC 61672-3 Ed.2.0 Clause 13

Freq (Hz)	Ref. (dB)	Meas. (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
63.1	83.0	82.8	1.0	-1.0	0.2	-0.2	P
125.9	83.0	82.9	1.0	-1.0	0.2	-0.1	P
251.2	83.0	82.8	1.0	-1.0	0.2	-0.2	P
501.2	83.0	82.9	1.0	-1.0	0.2	-0.1	P
1000.0	83.0	83.0	0.7	-0.7	0.2	0.0	P
1995.3	83.0	83.0	1.0	-1.0	0.2	0.0	P
3981.1	83.0	83.1	1.0	-1.0	0.2	0.1	P

Frequency weightings: A Network - IEC 61672-3 Ed.2.0 Clause 13

Freq (Hz)	Ref. (dB)	Meas. (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
7943.3	83.0	83.1	1.5	-2.5	0.2	0.1	P
15848.9	83.0	83.3	2.5	-16.0	0.2	0.3	P

Test Passed

Frequency weightings: C Network - IEC 61672-3 Ed.2.0 Clause 13

Freq (Hz)	Ref. (dB)	Meas. (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
63.1	83.0	82.8	1.0	-1.0	0.2	-0.2	P
125.9	83.0	82.9	1.0	-1.0	0.2	-0.1	P
251.2	83.0	82.9	1.0	-1.0	0.2	-0.1	P
501.2	83.0	83.0	1.0	-1.0	0.2	0.0	P
1000.0	83.0	83.0	0.7	-0.7	0.2	0.0	P
1995.3	83.0	83.0	1.0	-1.0	0.2	0.0	P
3981.1	83.0	83.1	1.0	-1.0	0.2	0.1	P
7943.3	83.0	83.1	1.5	-2.5	0.2	0.1	P
15848.9	83.0	83.3	2.5	-16.0	0.2	0.3	P

Test Passed

Frequency weightings: Z Network - IEC 61672-3 Ed.2.0 Clause 13

Freq (Hz)	Ref. Level (dB)	Meas. Value (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
63.1	83.0	82.9	1.0	-1.0	0.2	-0.1	P
125.9	83.0	82.9	1.0	-1.0	0.2	-0.1	P
251.2	83.0	82.9	1.0	-1.0	0.2	-0.1	P
501.2	83.0	83.0	1.0	-1.0	0.2	0.0	P
1000.0	83.0	83.0	0.7	-0.7	0.2	0.0	P
1995.3	83.0	83.0	1.0	-1.0	0.2	0.0	P
3981.1	83.0	83.1	1.0	-1.0	0.2	0.1	P
7943.3	83.0	82.9	1.5	-2.5	0.2	-0.1	P
15848.9	83.0	82.5	2.5	-16.0	0.2	-0.5	P

Test Passed

Frequency and time weightings at 1 kHz IEC 61672-3 Ed.2.0 Clause 14

Weightings Time	Netw	Ref. (dB)	Measured (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
Fast	A	94.0	94.0	0.1	-0.1	0.2	0.0	P
Fast	C	94.0	94.0	0.1	-0.1	0.2	0.0	P
Fast	Z	94.0	94.0	0.1	-0.1	0.2	0.0	P
Fast	Flat	94.0	94.0	0.1	-0.1	0.2	0.0	P
Slow	A	94.0	93.9	0.1	-0.1	0.2	-0.1	P
Leq	A	94.0	94.0	0.1	-0.1	0.2	0.0	P
SEL	A	104.0	104.0	0.1	-0.1	0.2	0.0	P

Test Passed

Level linearity on the reference level range - IEC 61672-3 Ed.2 Clause 16

Ref. (dB)	Measured (dB)	Tol. (dB)	(dB)	Uncert. (dB)	Dev. (dB)	Result
Full scale setting: 120dB						
The following measurements are SPL measurements						
Measured at 31.5 Hz						
74.0	74.0	0.8	-0.8	0.25	0.0	P
79.0	79.0	0.8	-0.8	0.25	0.0	P
84.6	84.6	0.8	-0.8	0.25	0.0	P
85.6	85.6	0.8	-0.8	0.25	0.0	P
86.6	86.6	0.8	-0.8	0.25	0.0	P
87.6	87.6	0.8	-0.8	0.25	0.0	P
88.6	88.6	0.8	-0.8	0.25	0.0	P
74.0	74.8	0.8	-0.8	0.25	0.8	P
69.0	69.1	0.8	-0.8	0.25	0.1	P
64.0	64.1	0.8	-0.8	0.25	0.1	P
59.0	59.1	0.8	-0.8	0.25	0.1	P
54.0	54.1	0.8	-0.8	0.25	0.1	P
49.0	49.1	0.8	-0.8	0.25	0.1	P
44.0	44.1	0.8	-0.8	0.25	0.1	P
39.0	39.0	0.8	-0.8	0.25	0.0	P
34.0	34.1	0.8	-0.8	0.25	0.1	P
33.0	33.0	0.8	-0.8	0.25	0.0	P
32.0	32.1	0.8	-0.8	0.25	0.1	P
31.0	31.0	0.8	-0.8	0.25	0.0	P
30.0	30.1	0.8	-0.8	0.25	0.1	P
Measured at 1 kHz						
94.0	94.0	0.8	-0.8	0.25	0.0	P
99.0	99.0	0.8	-0.8	0.25	0.0	P
104.0	104.0	0.8	-0.8	0.25	0.0	P
109.0	109.0	0.8	-0.8	0.25	0.0	P
114.0	114.0	0.8	-0.8	0.25	0.0	P
119.0	119.0	0.8	-0.8	0.25	0.0	P
124.0	124.0	0.8	-0.8	0.25	0.0	P
125.0	125.0	0.8	-0.8	0.25	0.0	P
126.0	126.0	0.8	-0.8	0.25	0.0	P
127.0	127.0	0.8	-0.8	0.25	0.0	P
128.0	128.0	0.8	-0.8	0.25	0.0	P
94.0	94.0	0.8	-0.8	0.25	0.0	P
89.0	89.0	0.8	-0.8	0.25	0.0	P
84.0	84.0	0.8	-0.8	0.25	0.0	P
79.0	79.0	0.8	-0.8	0.25	0.0	P
74.0	74.0	0.8	-0.8	0.25	0.0	P
69.0	69.0	0.8	-0.8	0.25	0.0	P
64.0	64.0	0.8	-0.8	0.25	0.0	P
59.0	59.0	0.8	-0.8	0.25	0.0	P
54.0	54.0	0.8	-0.8	0.25	0.0	P
49.0	49.0	0.8	-0.8	0.25	0.0	P
44.0	44.0	0.8	-0.8	0.25	0.0	P
39.0	39.0	0.8	-0.8	0.25	0.0	P
34.0	34.0	0.8	-0.8	0.25	0.0	P
33.0	33.0	0.8	-0.8	0.25	0.0	P
32.0	32.0	0.8	-0.8	0.25	0.0	P
31.0	31.0	0.8	-0.8	0.25	0.0	P
30.0	30.0	0.8	-0.8	0.25	0.0	P
Measured at 8 kHz						
94.0	94.0	0.8	-0.8	0.25	0.0	P
99.0	98.9	0.8	-0.8	0.25	-0.1	P

Level linearity on the reference level range - IEC 61672-3 Ed.2 Clause 16

Ref. (dB)	Measured (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
104.0	104.0	0.8	-0.8	0.25	0.0	P
109.0	108.9	0.8	-0.8	0.25	-0.1	P
114.0	114.0	0.8	-0.8	0.25	0.0	P
119.0	119.0	0.8	-0.8	0.25	0.0	P
122.9	122.9	0.8	-0.8	0.25	0.0	P
123.9	123.9	0.8	-0.8	0.25	0.0	P
124.9	124.9	0.8	-0.8	0.25	0.0	P
125.9	125.9	0.8	-0.8	0.25	0.0	P
94.0	94.0	0.8	-0.8	0.25	0.0	P
89.0	89.0	0.8	-0.8	0.25	0.0	P
84.0	84.0	0.8	-0.8	0.25	0.0	P
79.0	79.0	0.8	-0.8	0.25	0.0	P
74.0	74.0	0.8	-0.8	0.25	0.0	P
69.0	69.0	0.8	-0.8	0.25	0.0	P
64.0	64.0	0.8	-0.8	0.25	0.0	P
59.0	59.0	0.8	-0.8	0.25	0.0	P
54.0	54.0	0.8	-0.8	0.25	0.0	P
49.0	49.0	0.8	-0.8	0.25	0.0	P
44.0	44.0	0.8	-0.8	0.25	0.0	P
39.0	39.0	0.8	-0.8	0.25	0.0	P
34.0	34.0	0.8	-0.8	0.25	0.0	P
33.0	33.0	0.8	-0.8	0.25	0.0	P
32.0	32.0	0.8	-0.8	0.25	0.0	P
31.0	31.0	0.8	-0.8	0.25	0.0	P
30.0	30.0	0.8	-0.8	0.25	0.0	P

Test Passed

Level linearity including the level range control - IEC 61672-3 Ed.2.0 Clause 17

Full Scale (dB)	Ref. Value (dB)	Measured Value (dB)	Tol. Value (dB)	Uncert. (dB)	Dev. (dB)	Result
Measured at 1 kHz						
The following measurements are SPL measurements						
Measuring the reference level on the available ranges.						
130	94.0	94.0	0.8	0.25	0.0	P
120	94.0	94.0	0.8	0.25	0.0	P
110	94.0	94.0	0.8	0.25	0.0	P
100	94.0	94.0	0.8	0.25	0.0	P
Measuring 5 dB below full scale on all available ranges.						
130	125.0	125.0	0.8	0.25	0.0	P
120	115.0	115.0	0.8	0.25	0.0	P
110	105.0	105.0	0.8	0.25	0.0	P
100	95.0	95.0	0.8	0.25	0.0	P
90	85.0	85.0	0.8	0.25	0.0	P
80	75.0	75.1	0.8	0.25	0.1	P

Test Passed

Toneburst response - IEC 61672-3 Ed.2.0 Clause 18

Burst type	Ref. (dB)	Measured (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
Fast 200 mSec	125.0	125.0	0.5	-0.5	0.3	0.0	P
Fast 2.0 mSec	108.0	107.9	1.0	-1.5	0.3	-0.1	P
Fast 0.25 mSec	99.0	98.8	1.0	-3.0	0.3	-0.2	P
Slow 200 mSec	118.6	118.5	0.5	-0.5	0.3	-0.1	P
Slow 2.0 mSec	99.0	98.9	1.0	-3.0	0.3	-0.1	P
SEL 200 mSec	119.0	119.0	0.5	-0.5	0.3	0.0	P
SEL 2.0 mSec	99.0	98.9	1.0	-1.5	0.3	-0.1	P
SEL 0.25 mSec	90.0	89.8	1.0	-3.0	0.3	-0.2	P

Test Passed

Peak C sound level - IEC 61672-3 Ed.2.0 Clause 19

Pulse Type	Pulse Freq. (Hz)	Ref. RMS (dB)	Ref. Peak (dB)	Measured Value (dB)	Tol. (+/-dB)	Uncert. (dB)	Dev. (dB)	Result
1 cycle	8k	127.0	130.4	129.4	2.0	0.35	-1.0	P
Pos 1/2 cycle	500	130.0	132.4	132.1	1.0	0.35	-0.3	P
Neg 1/2 cycle	500	130.0	132.4	132.1	1.0	0.35	-0.3	P

Test Passed

Overload indication - IEC 61672-3 Ed.2.0 Clause 20

	Measured (dB)	Tol. (+/-dB)	Uncert. (dB)	Result
Level difference of positive and negative pulses:	0.1	1.5	0.25	P
Positive 1/2 cycle 4 kHz. Overload occurred at:	139.4			
Negative 1/2 cycle 4 kHz. Overload occurred at:	139.3			

Test Passed

High level stability test - IEC 61672-3 Ed.2.0 Clause 21

Test signal: Sine wave at 1 kHz

Initial level (dB)	Final level (dB)	Diff. (dB)	Tol. value (dB)	Uncert. (dB)	Result
137.0	137.0	0.0	0.1	0.1	P

Test Passed

Long term stability test - IEC 61672-3 Ed.2.0 Clause 15

Test signal: Sine wave at 1 kHz

Time inteval (mm:SS)	StartLevel (dB)	StopLevel (dB)	Difference (dB)	Tolerence (dB)	Result
31:05	94.0	94.0	0.0	0.1	P

Test Passed

Combined electrical and acoustical test - IEC 61672-3 Ed.2.0 Clause 13

A-Weighted results: Free field

Frequency	SLM Val (dB)	SLM U (dB)	Microphone Val (dB)	Microphone U (dB)	Case Refl. Val (dB)	Case Refl. U (dB)	Wind Screen Val (dB)	Wind Screen U (dB)	Uncert (dB)	Tol (dB)	Result (dB)	
63 Hz	-0.2	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.2	P
125 Hz	-0.1	0.2	0.1	0.1			0.0	0.1	0.2	+-1.0	0.0	P
250 Hz	-0.2	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.2	P
500 Hz	-0.1	0.2	-0.1	0.1			0.0	0.1	0.2	+-1.0	-0.2	P
1 kHz	0.0	0.2	-0.1	0.1			0.1	0.1	0.2	+-0.7	0.0	P
2 kHz	0.0	0.2	-0.1	0.2			0.3	0.2	0.4	+-1.0	0.2	P
4 kHz	0.1	0.2	0.4	0.2			0.3	0.2	0.4	+-1.0	0.8	P
8 kHz	0.1	0.2	0.7	0.4			0.0	0.3	0.5	+1.5/-2.5	0.8	P
16 kHz	0.3	0.2	0.3	0.7			-0.7	0.4	0.8	+2.5/-16.0	-0.1	P

C-Weighted results: Free field

Frequency	SLM Val (dB)	SLM U (dB)	Microphone Val (dB)	Microphone U (dB)	Case Refl. Val (dB)	Case Refl. U (dB)	Wind Screen Val (dB)	Wind Screen U (dB)	Uncert (dB)	Tol (dB)	Result (dB)	
63 Hz	-0.2	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.2	P
125 Hz	-0.1	0.2	0.1	0.1			0.0	0.1	0.2	+-1.0	0.0	P
250 Hz	-0.1	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
500 Hz	0.0	0.2	-0.1	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
1 kHz	0.0	0.2	-0.1	0.1			0.1	0.1	0.2	+-0.7	0.0	P
2 kHz	0.0	0.2	-0.1	0.2			0.3	0.2	0.4	+-1.0	0.2	P
4 kHz	0.1	0.2	0.4	0.2			0.3	0.2	0.4	+-1.0	0.8	P
8 kHz	0.1	0.2	0.7	0.4			0.0	0.3	0.5	+1.5/-2.5	0.8	P
16 kHz	0.3	0.2	0.3	0.7			-0.7	0.4	0.8	+2.5/-16.0	-0.1	P

Z-Weighted results: Free field

Frequency	SLM Val (dB)	SLM U (dB)	Microphone Val (dB)	Microphone U (dB)	Case Refl. Val (dB)	Case Refl. U (dB)	Wind Screen Val (dB)	Wind Screen U (dB)	Uncert (dB)	Tol (dB)	Result (dB)	
63 Hz	-0.1	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
125 Hz	-0.1	0.2	0.1	0.1			0.0	0.1	0.2	+-1.0	0.0	P
250 Hz	-0.1	0.2	0.0	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
500 Hz	0.0	0.2	-0.1	0.1			0.0	0.1	0.2	+-1.0	-0.1	P
1 kHz	0.0	0.2	-0.1	0.1			0.1	0.1	0.2	+-0.7	0.0	P
2 kHz	0.0	0.2	-0.1	0.2			0.3	0.2	0.4	+-1.0	0.2	P
4 kHz	0.1	0.2	0.4	0.2			0.3	0.2	0.4	+-1.0	0.8	P
8 kHz	-0.1	0.2	0.7	0.4			0.0	0.3	0.5	+1.5/-2.5	0.6	P
16 kHz	-0.5	0.2	0.3	0.7			-0.7	0.4	0.8	+2.5/-16.0	-0.9	P

The actual frequency response of Rion / UC53A 308892 has been used for the calculations.

Test Passed

The overall frequency response of the sound level meter, typical wind screen response and microphone response has shown to conform with the requirements in IEC 61672-3 for a class 1 sound level meter.

JDG

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.38940

Instrument: **Microphone**
Model: **UC53A**
Manufacturer: **Rion**
Serial number: **308892**
Composed of:

Date Calibrated: **7/6/2017** *Cal Due:*

Status:	**Received**	**Sent**
In tolerance:	**X**	**X**
Out of tolerance:		
See comments:		

Contains non-accredited tests: ___**Yes** _**X**_ **No**

Customer: **SLR International Corporation**
Tel/Fax: **503-905-3206/503-723-4436**

Address: **1800 Blankenship Road, Suite 440**
West Linn, OR 97068

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017
4180-Brüel&Kjær	Microphone	2246115	Oct 26, 2015	NPL-UK / UKAS	Oct 26, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature		Signature	
Date	7/6/17	Date	7/6/2017

Results summary: Device was tested and complies with following clauses of mentioned specifications:

CLAUSES / METHODS[1] FROM PROCEDURES		MET[2,3]	NOT MET	NOT TESTED	MEASUREMENT EXPANDED UNCERTAINTY (coverage factor 2)
Open circuit sensitivity (insert voltage method, 250 Hz)		X			See below
Frequency response	Actuator response	X			63 – 200Hz: 0.3 dB 200 – 8000 Hz: 0.2 dB 8 – 10 kHz: 0.5 dB 10 – 20 kHz: 0.7 dB 20 – 50 kHz: 0.9 dB 50 – 100 kHz: 1.2 dB
	FF/Diffuse field responses	X			63 – 200Hz: 0.3 dB 200 – 4000 Hz: 0.2 dB 4 – 10 kHz: 0.6 dB 10 – 20 kHz: 0.9 dB 20 – 50 kHz: 2.2 dB 50 – 100 kHz: 4.4 dB
	Scantek, Inc. acoustical method			X	31.5 – 125 Hz: 0.16 dB 250, 1000 Hz: 0.12 dB 2 – 8 kHz: 0.8 dB 12.5 – 16 kHz: 2.4 dB

[1] The results of this calibration apply only to the instrument type with serial number identified in this report.

[2] Results are normalized to the reference conditions.

[3] The tests marked with (*) are not covered by the current NVLAP accreditation.

Note: The free field/diffuse field characteristics were calculated based on the measured actuator response and adjustment coefficients as provided by the manufacturer. The uncertainties reported for these characteristics may include assumed uncertainty components for the adjustment coefficients.

Comments:	The instrument was tested and met all specifications found in the referenced procedures.

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
21.5 ± 1.0	100.17 ± 0.020	68.4 ± 2.0

Main measured parameters:

Tone frequency (Hz)	Measured[4] /Acceptable Open circuit sensitivity (dB re 1V/Pa)	Sensitivity (mV/Pa)
250	-27.22 ± 0.12/ -28.0 +3.0/-1.0	43.57

[4] The reported expanded uncertainty is calculated with a coverage factor k=2.00

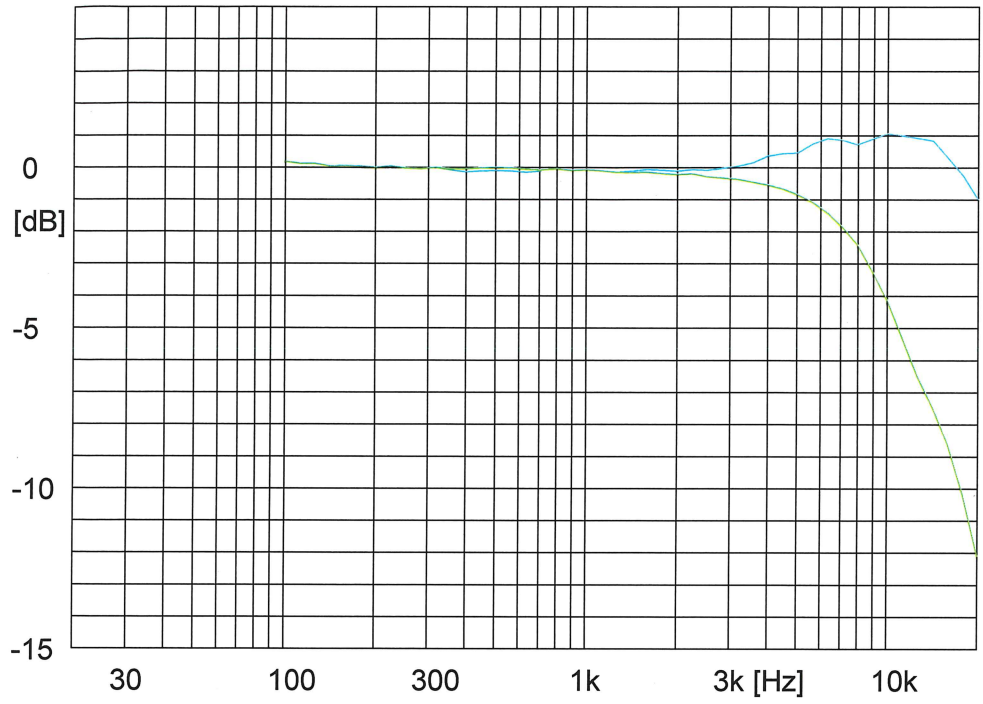
Tests made with following attachments to instrument and auxiliary devices:

Protection grid mounted for sensitivity measurements
Actuator type: G.R.A.S. RA0014

Measured Data: Found on Microphone Test Report # 38940 of one page.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Microphone Test Report No.:38940



Rion
Type: UC53A

Serial no: 308892

Sensitivity: 43.57 mV/Pa
-27.22 ±0.12 dB re. 1 V/Pa

Date: 7/6/2017

Signature:

Measurement conditions:

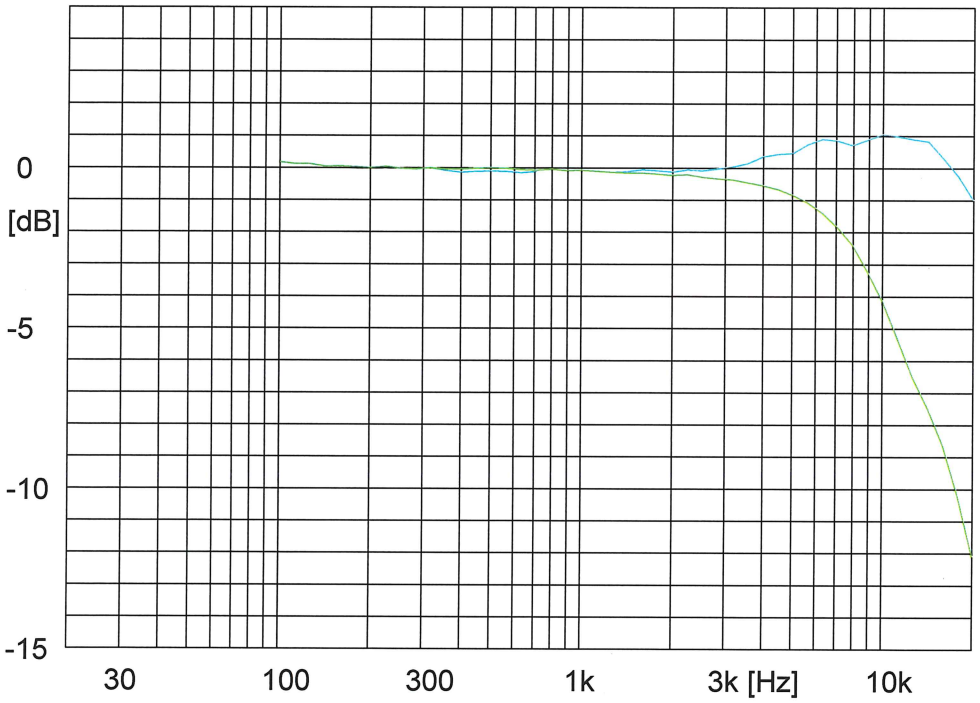
Polarisation voltage:	0.0 V
Pressure:	100.17 ±0.02 kPa
Temperature:	21.5 ±1.0 °C
Relative humidity:	68.4 ±2.0 %RH

Results are normalized to the reference conditions.

Free field response
Actuator response

Scantek, Inc.
6430 Dobbin Rd., Suite C, Columbia, MD 21045
Ph: 410-290-7726 eMail: callab@scantekinc.com

Microphone Test Report No.:38940



Rion
Type: UC53A

Serial no: 308892

Sensitivity: 43.57 mV/Pa
-27.22 ±0.12 dB re. 1 V/Pa

Date: 7/6/2017

Signature:

Measurement conditions:

Polarisation voltage:	0.0 V
Pressure:	100.17 ±0.02 kPa
Temperature:	21.5 ±1.0 °C
Relative humidity:	68.4 ±2.0 %RH

Results are normalized to the reference conditions.

Free field response
Actuator response

Scantek, Inc.
6430 Dobbin Rd., Suite C, Columbia, MD 21045
Ph: 410-290-7726 eMail: callab@scantekinc.com

Comment:
(Z:\Calibration Lab\Mic 2017\Rion53A_308892_M1.nmf)

APPENDIX D

ELECTRONIC TNM FILES

Noise Technical Report

Oregon Department of Transportation
123 NW Flanders Street
Portland, OR 97209

August 2018

APPENDIX E

MODEL RESULTS AND RECEIVER LOCATION FIGURES

Noise Technical Report

Oregon Department of Transportation
123 NW Flanders Street
Portland, OR 97209

August 2018

Noise Technical Report
Existing Peak Hour vs. Peak Truck Analysis
OR 217 Southbound Auxiliary Lane

Receiver	Receiver Description	Activity Category	Oregon NAAC	Number of Receptors	Existing Peak Hour (2017)	Existing Peak Truck (2017)	Peak Hour vs. Peak Truck
					TNM Noise Level	TNM Noise Level	
R1	1st Row Condominium on SW Alger Ave. North of SW 11th St. [SE corner]	B	65	9	58	59	-1
R2/M2	1st Row House on SW 95th Ave.	B	65	NB	**66**	**66**	0
R3/M3	1st Row Apartment Complex on SW Mandamus Ct.	B	65	Info	**69**	**69**	0
R4/M4	1st Row Apartment Complex on SW Hall Blvd. North of SW Pfaffle St. [SW corner]	B	65	NB	**72**	**72**	0
R5/M5	1st Row Apartment Complex on SW 83rd Ave. [SW corner]	B	65	NB	62	62	0
R6	1st Row Condominium on SW Alger Ave. North of SW 11th St. [NE corner]	B	65	8	56	57	-1
R7	1st Row House on SW Lee Ave. North of SW 12th St.	B	65	4	60	60	0
R8	1st Row House on SW Lee Ave. North of SW 13th St.	B	65	4	56	56	0
R9	1st Row House on SW Allen Frontage Rd. East of SW Lee Ave and South of SW 14th St.	B	65	2	60	59	1
R10	1st Row Business Center on SW Nimbus Ave. North of SW Cirrus Dr.	Info	--	1	63	63	0
R11	1st Row Business Center on SW Nimbus Ave. South of SW Cirrus Dr. [N side]	Info	--	1	61	62	-1
R12	1st Row Business Center on SW Nimbus Ave. South of SW Cirrus Dr. [S side]	Info	--	1	61	61	0
R13	1st Row Hotel on SW Nimbus Ave. North of SW Marriott St.	E	70	1	60	60	0
R14	Restaurant Outdoor Seating on SW Cascade Ave. South of SW Hall Blvd.	E	70	2	69	69	0
R15	1st Row Mall on SW Cascade Ave. South of SW Scholls Ferry Rd.	Info	--	1	64	64	0
R16	1st Row Coffee Shop on SW Shady Ln.	E	70	1	60	60	0
R17	1st Row Medical Facility on SW Shady Ln.	D	50	1	45 (65)	44 (64)	1
R18	1st Row House at the NE corner of SW North Dakota St. and SW 90th Ave.	B	65	1	**75**	**75**	0
R19	1st Row House on SW North Dakota St. East of SW 90th Ave and North of SW Lomita Ave.	B	65	2	**73**	**73**	0
R20	1st Row Office Building on SW Hall Blvd. North of SW 88th Ave.	E	70	1	64	64	0
R24	2nd Row Condominium on SW Alger Ave. North of SW 11th St. [by the pool]	B	65	24	54	54	0
R25	2nd Row House at the corner of SW Lee Ave. and SW 12th St.	B	65	4	57	58	-1
R26	2nd Row House at the corner of SW Lee Ave. and SW 14th St.	B	65	2	57	56	1
R27	2nd Row Retail at the SE corner of SW Nimbus Ave. and SW Hall Blvd.	E	70	1	61	61	0
R28	2nd Row House on SW Longstaff St.	B	65	4	61	61	0
R29	2nd Row House at the NW corner of SW North Dakota St. and SW 90th Ave.	B	65	2	**69**	**69**	0
R30	2nd Row House on SW 90th Ave. North of SW Lomita Ave.	B	65	2	**65**	**66**	-1
R31	3rd Row House on SW 13th St. West of SW Lee Ave.	B	65	8	56	57	-1
R32	3rd Row House on SW 14th St. East of SW Alger Ave.	B	65	2	57	56	1
R33	3rd Row House at the SW corner of SW North Dakota St. and SW 90th Ave.	B	65	3	**66**	**66**	0
R34	3rd Row Temple on SW Hall Blvd. East of SW Lomita Ave.	C	65	1	58	58	0
R35	1st Row Day Care Center on SW Hall Blvd. North of Pacific Hwy and East of SW 88th Ave.	C	65	1	60	60	0
R36	2nd Row Offices on SW Hall Blvd. North of Pacific Hwy and East of SW 88th Ave.	Info	--	1	62	61	1
R38	4th Row House on SW 91st Ct.	B	65	5	62	62	0
R39	4th Row House on SW Lomita Ave.	B	65	4	60	60	0
R40	3rd Row Park on Fanno Creek Trail. South of SW Fanno St.	C	65	--	54	54	0
R63	1st Row House on SW 95th Ave. North of SW Mandamus Ct.	B	65	2	**75**	**75**	0
R64	1st Row Apartment Complex on SW Mandamus Ct. [at the end of the street, on the E side]	B	65	Info	**72**	**72**	0
R65	1st Row House on SW North Dakota St. West of SW 90th Ave and East of SW 93rd Ave.	B	65	1	**72**	**72**	0
R66	2nd Row House on SW 95th Ave. [across SW Mandamus Ct]	B	65	2	**68**	**68**	0
R67	2nd Row Apartment Complex at the corner of SW Mandamus Ct and SW 95th Ave.	B	65	Info	**67**	**67**	0
R68	2nd Row House on SW 93rd Ave. [at the end of the street, on the E side]	B	65	1	60	61	-1
R69	1st Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	**68**	**69**	-1
R70	2nd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	**65**	**65**	0
R71	2nd Row House on SW North Dakota St. [across SW 91st Ct.]	B	65	2	**66**	**66**	0
R72	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	61	61	0
R73	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	62	62	0
R74	2nd Row Property Currently under Residential Development	B	65	1	**66**	**66**	0
R75	3rd Row Property Currently under Residential Development	B	65	4	63	64	-1
R76	4th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	2	59	60	-1
R77	5th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	4	57	57	0
R78	3rd Row House on SW 93rd Ave. [at the end of the street, on the W side]	B	65	3	59	59	0
R79	4th Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	3	59	59	0
R80	5th Row House on SW North Dakota St. East of SW 94th Ave and West of SW 92nd Ave.	B	65	3	57	58	-1
R81	5th Row House on SW 91st Ct. East of SW 92nd Ave.	B	65	3	61	62	-1
R82	6th Row House on SW 91st Ct. [at the end of the street, on the W side]	B	65	4	59	59	0
R83	6th Row House on SW 90th Ave. South of SW North Dakota St and East of SW 91st Ct.	B	65	3	58	59	-1
R84	5th Row House on SW Lomita Ave. [at the end of the street, on the W side]	B	65	2	57	58	-1
R85	5th Row House on SW Lomita Ave. [at the end of the street, on the E side]	B	65	2	56	56	0
R87b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**71**	**70**	1
R88a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	62	62	0
R88b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**65**	**65**	0
R89b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**72**	**72**	0
R90a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	63	0
R90b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**	**66**	0
R91b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	1	**67**	**67**	0
R92b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**68**	**68**	0
R93a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	60	60	0
R93b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	64	64	0
R94b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**73**	**73**	0
R95a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	63	0
R95b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**67**	**67**	0
R96b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**72**	**72**	0
R97a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	63	0
R97b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**	**66**	0
R98b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**68**	**68**	0
R99a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	64	-1
R99b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**	**66**	0
R100b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**73**	**73**	0
R101a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	**70**	**70**	0
R101b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**73**	**73**	0

Color Key:

Impacted Receiver (≥ 65 dBA)

Receivers Louder During Peak Truck

Receivers Louder During Peak Hour

15 Receivers Louder During Peak Truck
6 Receivers Louder During Peak Hour

Noise Technical Report
Existing, No Build, and Build Alternative Noise Levels - Peak Truck Hour
OR 217 Southbound Auxiliary Lane

Receiver	Receiver Description	Activity Category	Oregon NAAC	Number of Receptors	Existing (2017)		No Build (2040)			Build Alternative (2040)				
					TNM Noise Level	Existing > NAAC	TNM Noise Level (dBA)	No Build > NAAC	Increase Over Existing	TNM Noise Level (dBA)	Increase over Existing	Change from No Build	Estimated Number of Impacts	Mitigation Analysis?
R1	1st Row Condominium on SW Alger Ave. North of SW 11th St. [SE corner]	B	65	9	59	0	60	0	1	61	2	1		No
R2/M2	1st Row House on SW 95th Ave.	B	65	NB	**66**	NB	**67**	NB	1	**66**	0	-1	NB	No
R3/M3	1st Row Apartment Complex on SW Mandamus Ct.	B	65	Info	**69**	Info	**70**	Info	1	**69**	0	-1	Info	Greenburg to Hall
R4/M4	1st Row Apartment Complex on SW Hall Blvd. North of SW Pfaffle St. [SW corner]	B	65	NB	**72**	NB	**73**	NB	1	**72**	0	-1	NB	No
R5/M5	1st Row Apartment Complex on SW 83rd Ave. [SW corner]	B	65	NB	62	0	63	0	1	63	1	0		No
R6	1st Row Condominium on SW Alger Ave. North of SW 11th St. [NE corner]	B	65	8	57	0	58	0	1	59	2	1		No
R7	1st Row House on SW Lee Ave. North of SW 12th St.	B	65	4	60	0	61	0	1	63	3	2		No
R8	1st Row House on SW Lee Ave. North of SW 13th St.	B	65	4	56	0	57	0	1	57	1	0		No
R9	1st Row House on SW Allen Frontage Rd. East of SW Lee Ave and South of SW 14th St.	B	65	2	59	0	60	0	1	61	2	1		No
R10	1st Row Business Center on SW Nimbus Ave. North of SW Cirrus Dr.	Info	--	1	63	0	64	0	1	65	2	1		No
R11	1st Row Business Center on SW Nimbus Ave. South of SW Cirrus Dr. [N side]	Info	--	1	62	0	63	0	1	62	0	-1		No
R12	1st Row Business Center on SW Nimbus Ave. South of SW Cirrus Dr. [S side]	Info	--	1	61	0	62	0	1	62	1	0		No
R13	1st Row Hotel on SW Nimbus Ave. North of SW Marriott St.	E	70	1	60	0	61	0	1	61	1	0		No
R14	Restaurant Outdoor Seating on SW Cascade Ave. South of SW Hall Blvd.	E	70	2	69	0	**70**	2	1	**70**	1	0	2	No, two restaurants
R15	1st Row Mall on SW Cascade Ave. South of SW Scholls Ferry Rd.	Info	--	1	64	0	65	0	1	64	0	-1		No
R16	1st Row Coffee Shop on SW Shady Ln.	E	70	1	60	0	61	0	1	61	1	0		No
R17	1st Row Medical Facility on SW Shady Ln.	D [1]	50	1	44 (64)	0	45 (65)	0	1	45 (65)	1	0		No
R18	1st Row House at the NE corner of SW North Dakota St. and SW 90th Ave.	B	65	1	**75**	1	**76**	1	1	**76**	1	0	1	Greenburg to Hall
R19	1st Row House on SW North Dakota St. East of SW 90th Ave and North of SW Lomita Ave.	B	65	2	**73**	2	**74**	2	1	**74**	1	0	2	Greenburg to Hall
R20	1st Row Office Building on SW Hall Blvd. North of SW 88th Ave.	E	70	1	64	0	66	0	2	66	2	0		No
R24	2nd Row Condominium on SW Alger Ave. North of SW 11th St. [by the pool]	B	65	24	54	0	55	0	1	55	1	0		No
R25	2nd Row House at the corner of SW Lee Ave. and SW 12th St.	B	65	4	58	0	59	0	1	59	1	0		No
R26	2nd Row House at the corner of SW Lee Ave. and SW 14th St.	B	65	2	56	0	57	0	1	57	1	0		No
R27	2nd Row Retail at the SE corner of SW Nimbus Ave. and SW Hall Blvd.	E	70	1	61	0	61	0	0	61	0	0		No
R28	2nd Row House on SW Longstaff St.	B	65	4	61	0	62	0	1	62	1	0		No
R29	2nd Row House at the NW corner of SW North Dakota St. and SW 90th Ave.	B	65	2	**69**	2	**70**	2	1	**70**	1	0	2	Greenburg to Hall
R30	2nd Row House on SW 90th Ave. North of SW Lomita Ave.	B	65	2	**66**	2	**67**	2	1	**67**	1	0	2	Greenburg to Hall
R31	3rd Row House on SW 13th St. West of SW Lee Ave.	B	65	8	57	0	58	0	1	57	0	-1		No
R32	3rd Row House on SW 14th St. East of SW Alger Ave.	B	65	2	56	0	57	0	1	58	2	1		No
R33	3rd Row House at the SW corner of SW North Dakota St. and SW 90th Ave.	B	65	3	**66**	3	**67**	3	1	**66**	0	-1	3	Greenburg to Hall
R34	3rd Row Temple on SW Hall Blvd. East of SW Lomita Ave.	C	65	1	58	0	59	0	1	58	0	-1		No
R35	1st Row Day Care Center on SW Hall Blvd. North of Pacific Hwy and East of SW 88th Ave.	C	65	1	60	0	61	0	1	60	0	-1		No
R36	2nd Row Offices on SW Hall Blvd. North of Pacific Hwy and East of SW 88th Ave.	Info	--	1	61	0	62	0	1	62	1	0		No
R38	4th Row House on SW 91st Ct.	B	65	5	62	0	64	0	2	63	1	-1		No
R39	4th Row House on SW Lomita Ave.	B	65	4	60	0	61	0	1	61	1	0		No
R40	3rd Row Park on Fanno Creek Trail. South of SW Fanno St.	C	65	--	54	0	55	0	1	55	1	0		No
R63	1st Row House on SW 95th Ave. North of SW Mandamus Ct.	B	65	2	**75**	2	**76**	2	1	**75**	0	-1	2	Greenburg to Hall
R64	1st Row Apartment Complex on SW Mandamus Ct. [at the end of the street, on the E side]	B	65	Info	**72**	Info	**73**	Info	1	**72**	0	-1	Info	Greenburg to Hall
R65	1st Row House on SW North Dakota St. West of SW 90th Ave and East of SW 93rd Ave.	B	65	1	**72**	1	**73**	1	1	**72**	0	-1	1	Greenburg to Hall
R66	2nd Row House on SW 95th Ave. [across SW Mandamus Ct]	B	65	2	**68**	2	**69**	2	1	**69**	1	0	2	Greenburg to Hall
R67	2nd Row Apartment Complex at the corner of SW Mandamus Ct and SW 95th Ave.	B	65	Info	**67**	Info	**68**	Info	1	**68**	1	0	Info	Greenburg to Hall
R68	2nd Row House on SW 93rd Ave. [at the end of the street, on the E side]	B	65	1	61	0	62	0	1	61	0	-1		No
R69	1st Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	**69**	2	**70**	2	1	**69**	0	-1	2	Greenburg to Hall
R70	2nd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	**65**	2	**66**	2	1	**65**	0	-1	2	Greenburg to Hall
R71	2nd Row House on SW North Dakota St. [across SW 91st Ct.]	B	65	2	**66**	2	**68**	2	2	**67**	1	-1	2	Greenburg to Hall
R72	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	61	0	62	0	1	61	0	-1		No
R73	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	62	0	63	0	1	63	1	0		No
R74	2nd Row Property Currently under Residential Development	B	65	1	**66**	1	**67**	1	1	**66**	0	-1	1	Greenburg to Hall
R75	3rd Row Property Currently under Residential Development	B	65	4	64	0	**65**	4	1	64	0	-1		No
R76	4th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	2	60	0	61	0	1	60	0	-1		No
R77	5th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	4	57	0	59	0	2	58	1	-1		No
R78	3rd Row House on SW 93rd Ave. [at the end of the street, on the W side]	B	65	3	59	0	60	0	1	60	1	0		No
R79	4th Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	3	59	0	60	0	1	60	1	0		No
R80	5th Row House on SW North Dakota St. East of SW 94th Ave and West of SW 92nd Ave.	B	65	3	58	0	59	0	1	59	1	0		No
R81	5th Row House on SW 91st Ct. East of SW 92nd Ave.	B	65	3	62	0	63	0	1	62	0	-1		No
R82	6th Row House on SW 91st Ct. [at the end of the street, on the W side]	B	65	4	59	0	60	0	1	60	1	0		No
R83	6th Row House on SW 90th Ave. South of SW North Dakota St and East of SW 91st Ct.	B	65	3	59	0	60	0	1	59	0	-1		No
R84	5th Row House on SW Lomita Ave. [at the end of the street, on the W side]	B	65	2	58	0	59	0	1	59	1	0		No
R85	5th Row House on SW Lomita Ave. [at the end of the street, on the E side]	B	65	2	56	0	57	0	1	57	1	0		No
R87b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**70**	2	**71**	2	1	**71**	1	0	2	Greenburg to Hall
R88a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	62	0	63	0	1	63	1	0		No
R88b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**65**	2	**66**	2	1	**65**	0	-1	2	Greenburg to Hall
R89b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**72**	2	**73**	2	1	**73**	1	0	2	Greenburg to Hall
R90a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	0	64	0	1	64	1	0		No
R90b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**	2	**67**	2	1	**67**	1	0	2	Greenburg to Hall
R91b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	1	**67**	1	**68**	1	1	**67**	0	-1	1	Greenburg to Hall
R92b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**68**	2	**69**	2	1	**69**	1	0	2	Greenburg to Hall
R93a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	60	0	61	0	1	61	1	0		No
R93b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	64	0	**65**	2	1	**65**	1	0	2	Greenburg to Hall
R94b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**73**	2	**74**	2	1	**74**	1	0	2	Greenburg to Hall
R95a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	0	64	0	1	64	1	0		No
R95b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**67**	2	**68**	2	1	**67**	0	-1	2	Greenburg to Hall
R96b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**72**	2	**73**	2	1	**73**	1	0	2	Greenburg to Hall
R97a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	0	64	0	1	64	1	0		No
R97b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**	2	**67**	2	1	**67**	1	0	2	Greenburg to Hall
R98b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**68**	2	**69**	2	1	**69**	1	0	2	Greenburg to Hall
R99a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	64	0	**65**	2	1	64	0	-1		No
R99b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**	2	**67**	2	1	**67**	1	0	2	Greenburg to Hall
R100b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**73**	2	**74**	2	1	**74**	1	0	2	Greenburg to Hall
R101a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	**70**	2	**71**	2	1	**71**	1	0	2	Greenburg to Hall
R101b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**73**	2	**74**	2	1	**73**	0	-1	2	Greenburg to Hall
				197		51 [2]		61 [3]					55 [4]	
				Max (dBA)	75		76			76				
				Min (dBA)	54		55			55				

Color Key:
Impacted Receiver (≥ 65 dBA)

Notes:
[1] Interior sound levels are calculated from exterior sound levels by subtracting 20 dB. Exterior predictions are shown in parentheses.
[2] 51 residences
[3] 59 residences and 2 restaurants
[4] 53 residences and 2 restaurants

RECEIVER LOCATION FIGURES

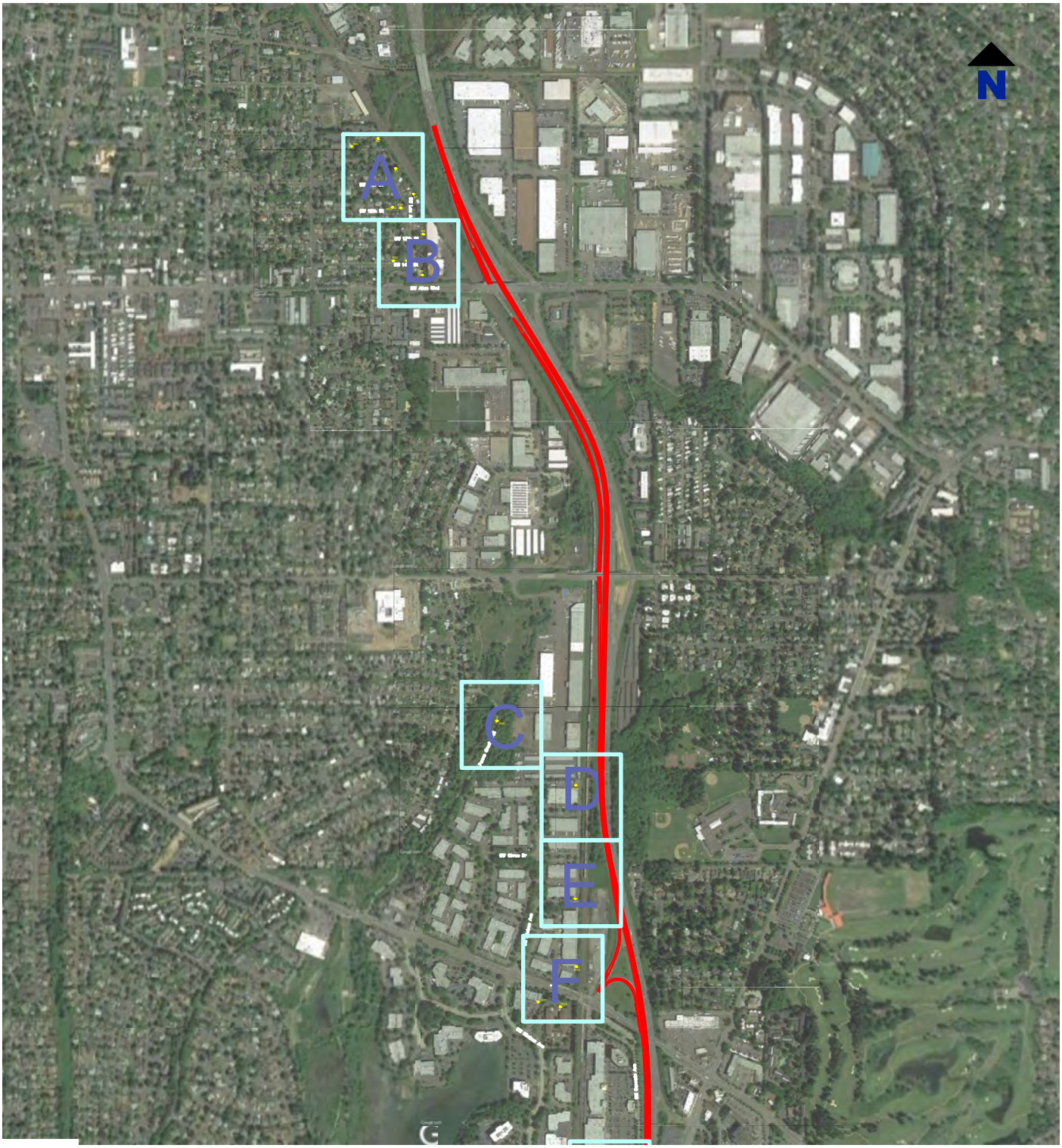
- All in 1:100 scale
- Grid figures provided to reference location of each figure within the area of potential effect.
- “a” represents receiver sites at 5 feet above ground level.
- “b” represents receiver sites at 15 feet above ground level.

Sound Level Key

Existing Sound Levels

No Build Alternative Sound Levels

Build Alternative Sound Levels



Proposed Build Alternative Lane Lines

Monitoring Location

0 1000 2000 3000 feet

SLR

Report

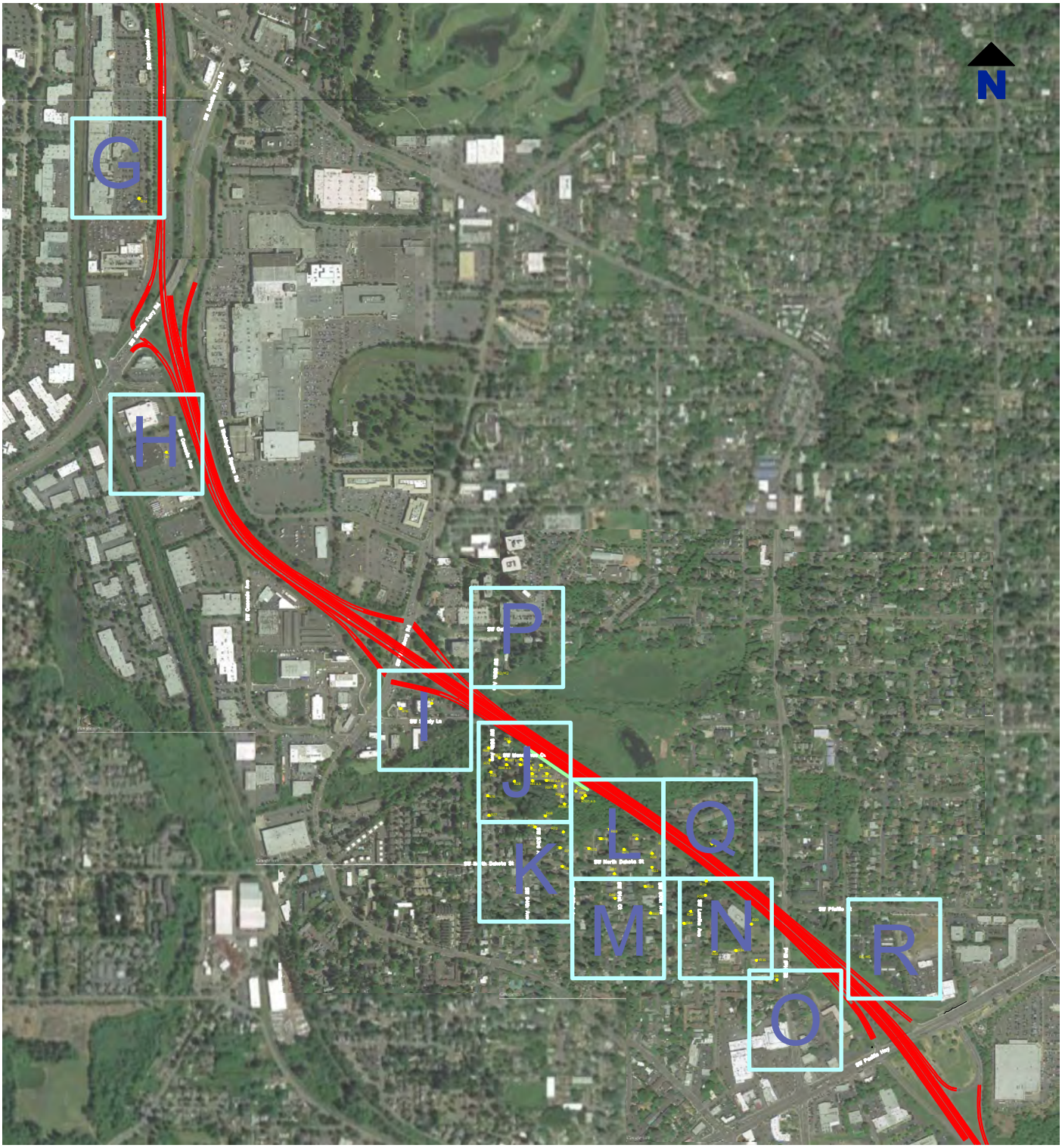
OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

Drawing

Receiver Locations - Noise Levels

Date	August 24, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. E - 1



Proposed Build Alternative Lane Lines

Monitoring Location

0 1000 2000 3000 feet

Report

OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W

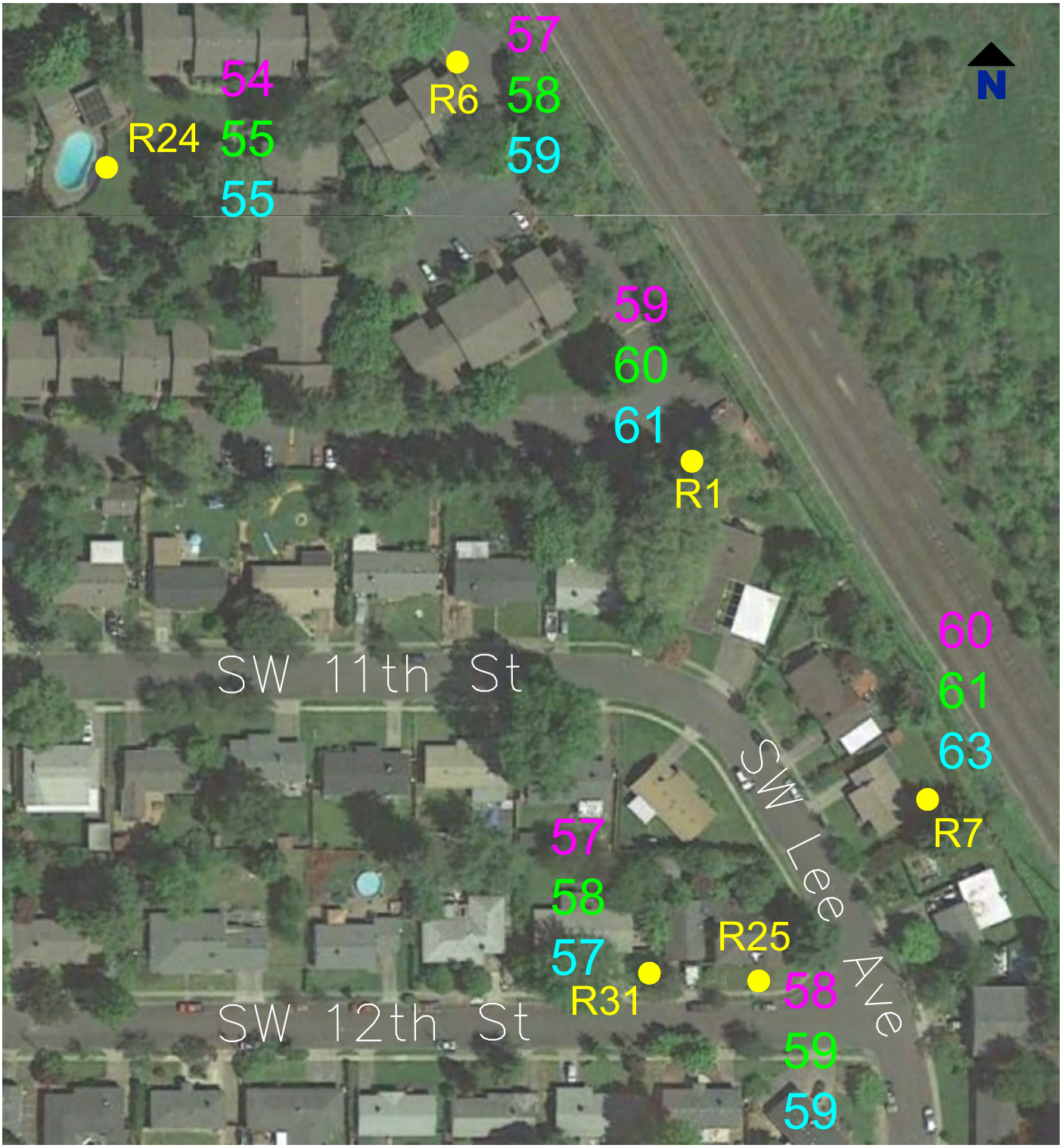
Drawing

Receiver Locations - Noise Levels

Date	August 24, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. E - 2

SLR



0 100 200 300 feet

Sound Level Key

- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

Receiver Location

Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

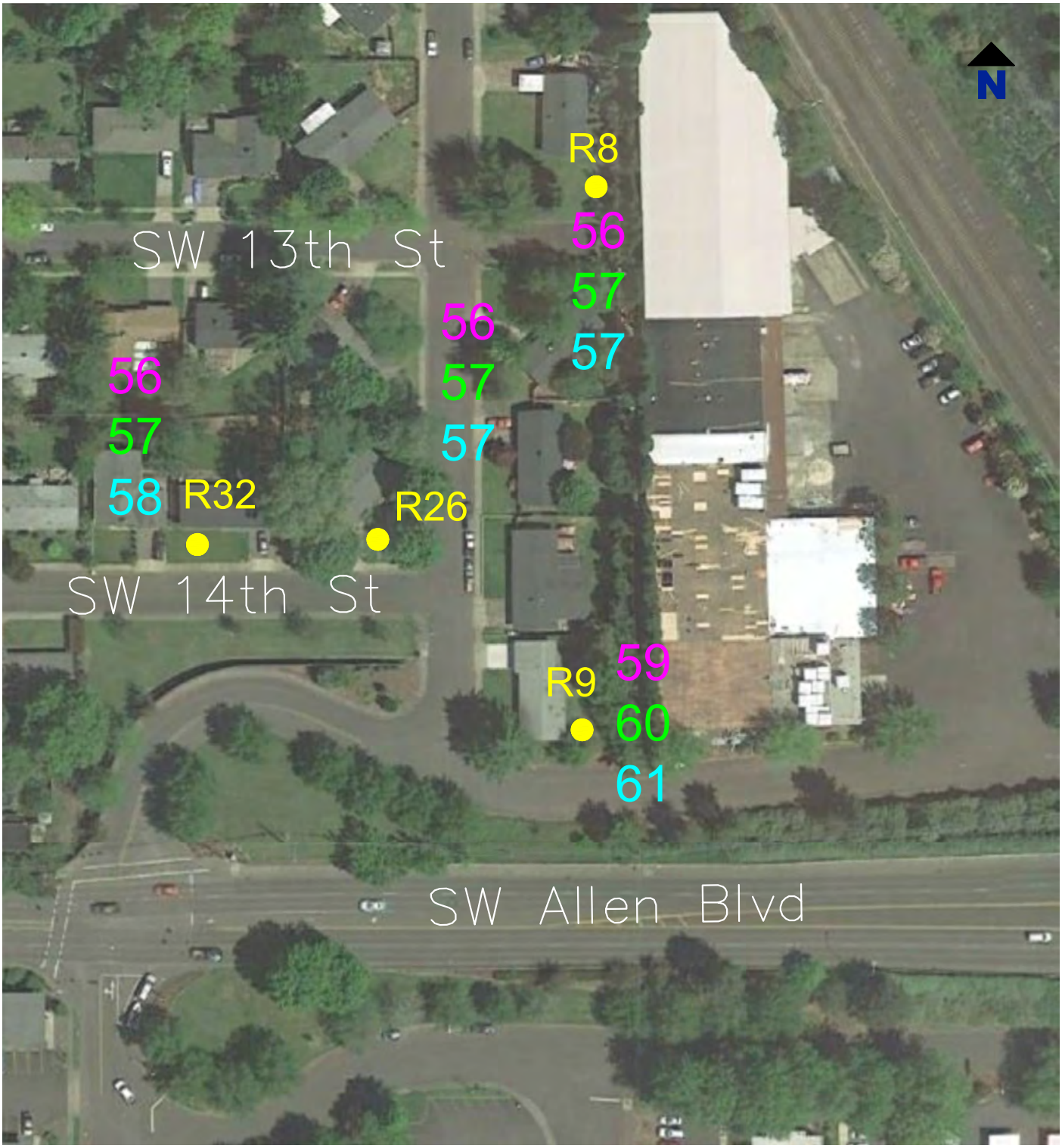
Drawing

Receiver Locations - Noise Levels (A)

Date	August 24, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. E - 3

SLR



0 100 200 300 feet

Receiver Location

Sound Level Key
- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

Report
OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing
Receiver Locations - Noise Levels (B)

Date	August 24, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. E - 4

SLR

0 100 200 300 feet

Sound Level Key

- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

Receiver Location

Report

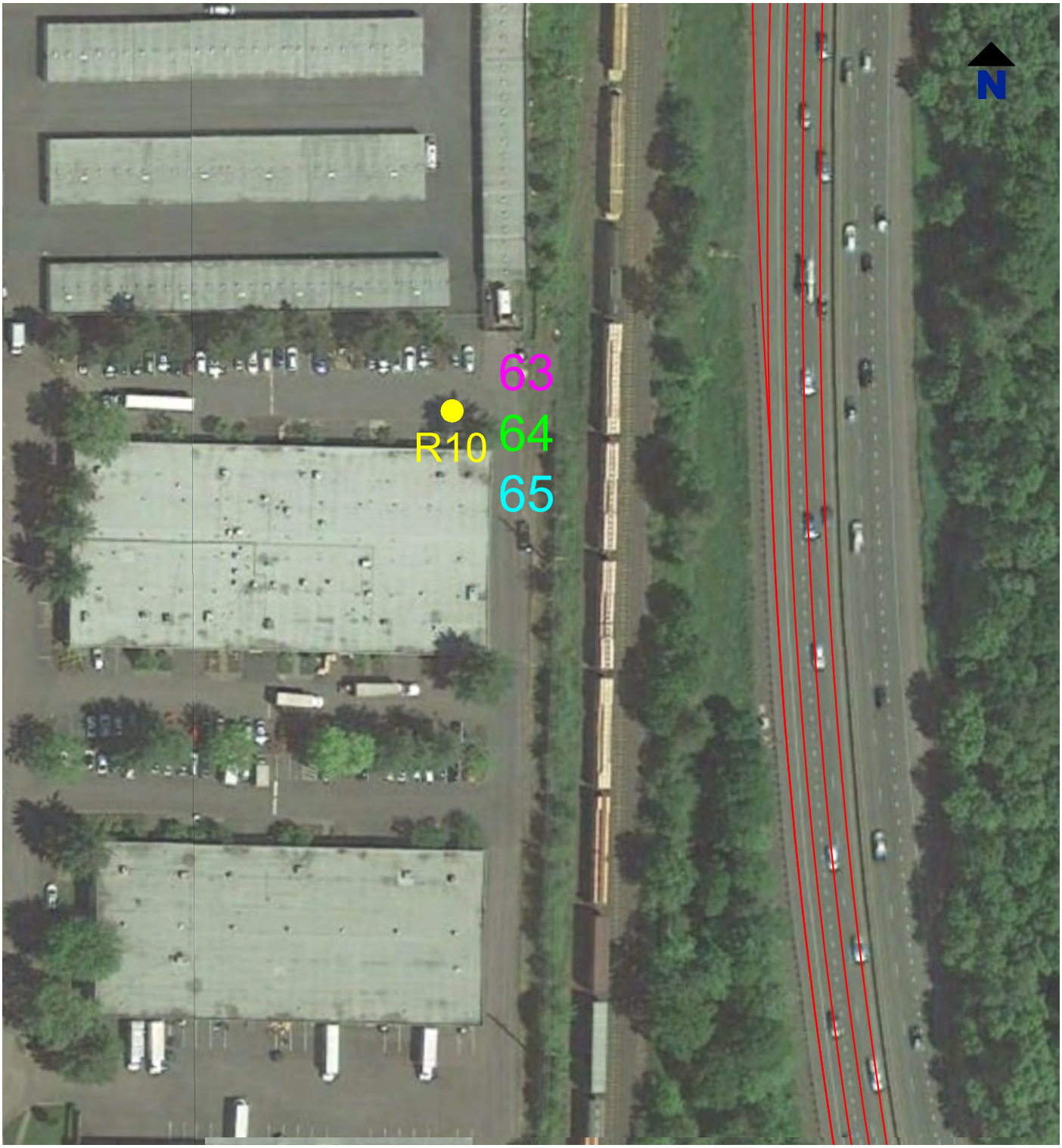
OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Receiver Locations - Noise Levels (C)

Date	August 24, 2018	Scale	AS SHOWN	Fig. No. E - 5
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

SLR



0 100 200 300 feet

Sound Level Key
- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

- Proposed Build Alternative Lane Lines
- Receiver Location

Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Receiver Locations - Noise Levels (D)

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. E - 6
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

SLR

0 100 200 300 feet

Sound Level Key

- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

Receiver Location

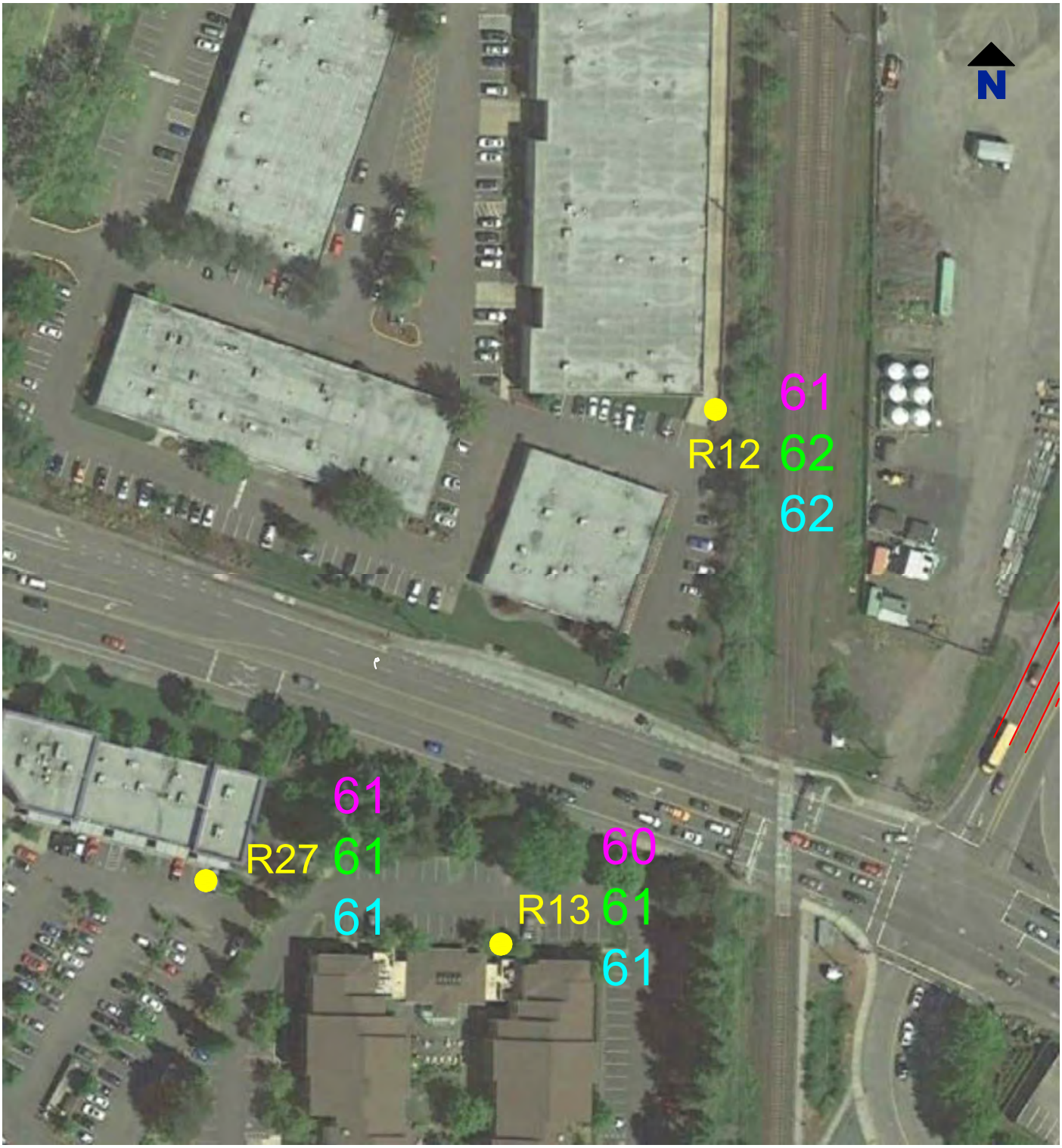
Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Receiver Locations - Noise Levels (E)

Date	August 24, 2018	Scale	AS SHOWN	Fig. No. E - 7
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	



0 100 200 300 feet

Receiver Location

Sound Level Key

- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

SLR

Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Receiver Locations - Noise Levels (F)

Date	August 24, 2018	Scale	AS SHOWN	Fig. No.	E - 8
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012		

0 100 200 300 feet

Sound Level Key

- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

- Proposed Build Alternative Lane Lines
- Receiver Location

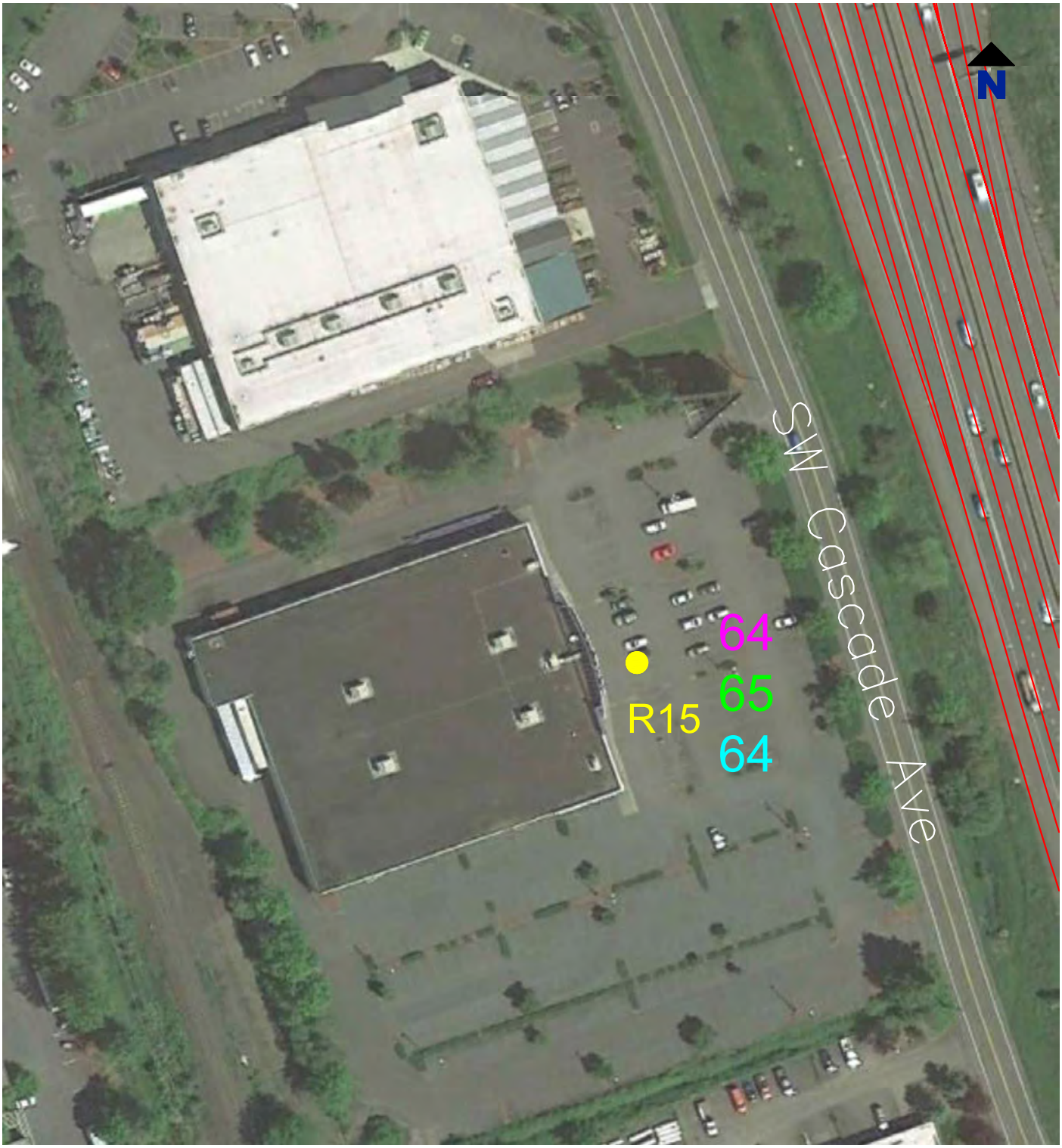
Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Receiver Locations - Noise Levels (G)

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. E - 9
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	



0 100 200 300 feet

Sound Level Key
- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

- Proposed Build Alternative Lane Lines
- Receiver Location

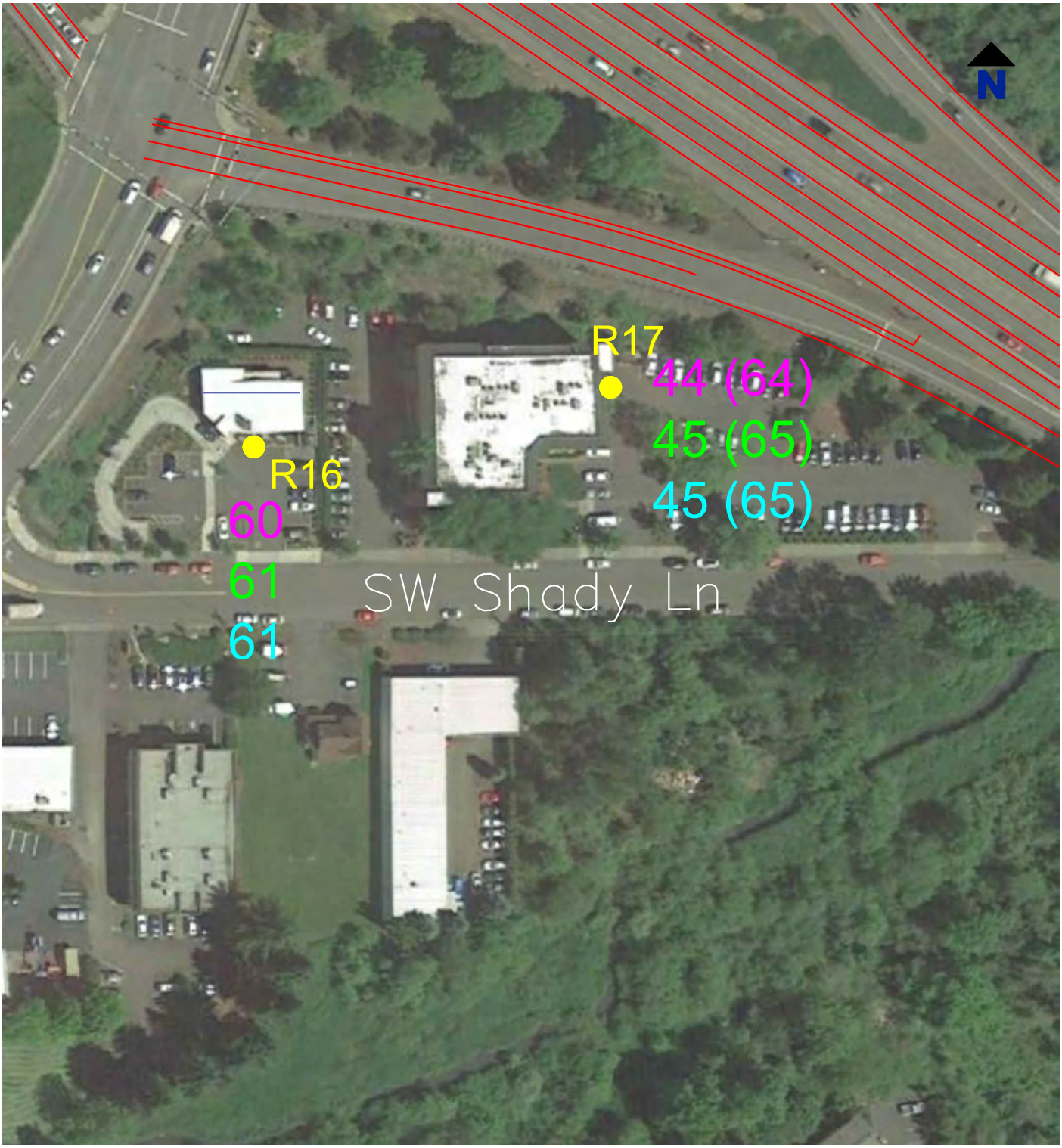
Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Receiver Locations - Noise Levels (H)

Date	August 23, 2018	Scale	AS SHOWN	Fig. No. E - 10
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	



0 100 200 300 feet

Sound Level Key
- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

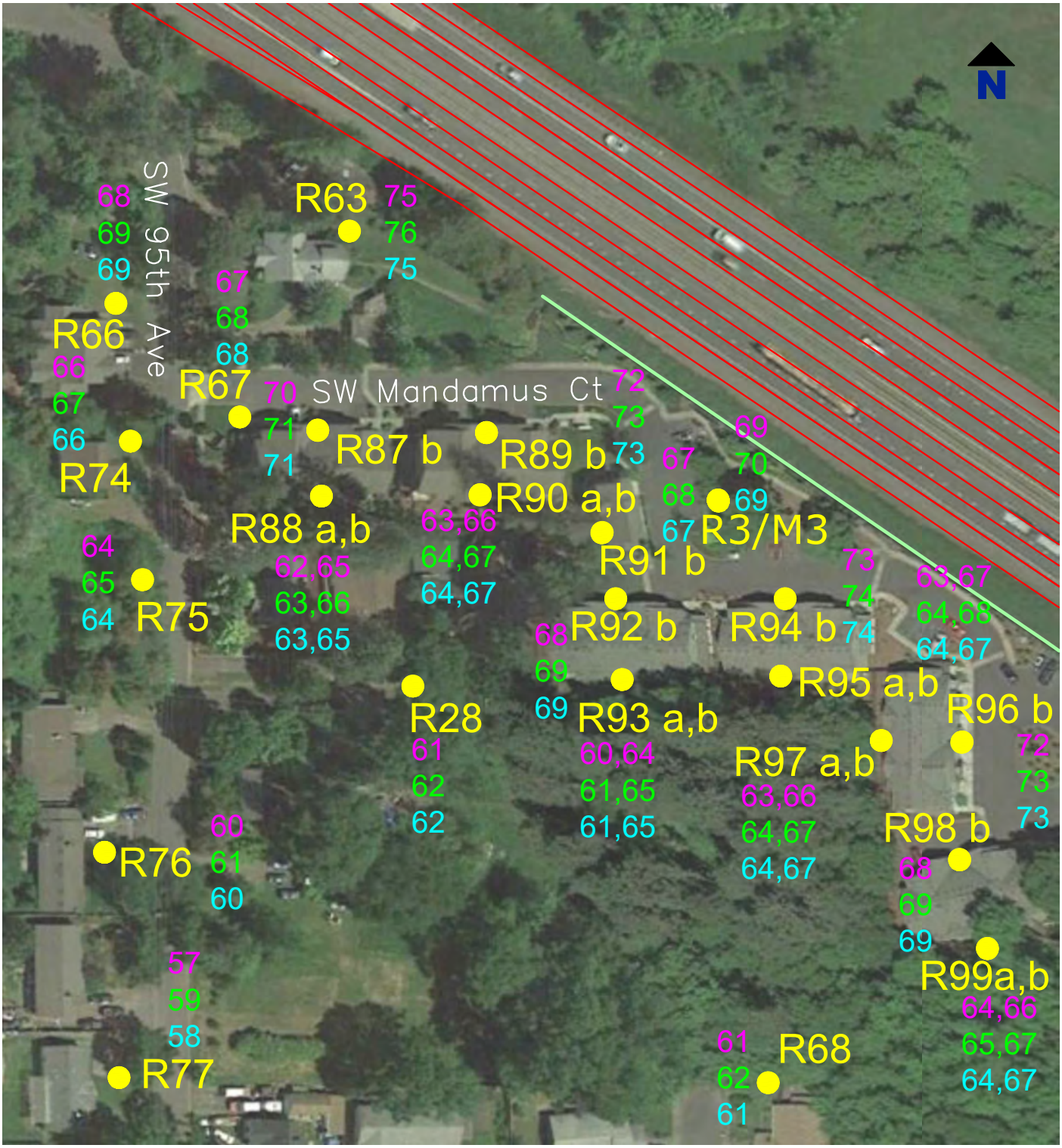
Proposed Build Alternative Lane Lines
Receiver Location

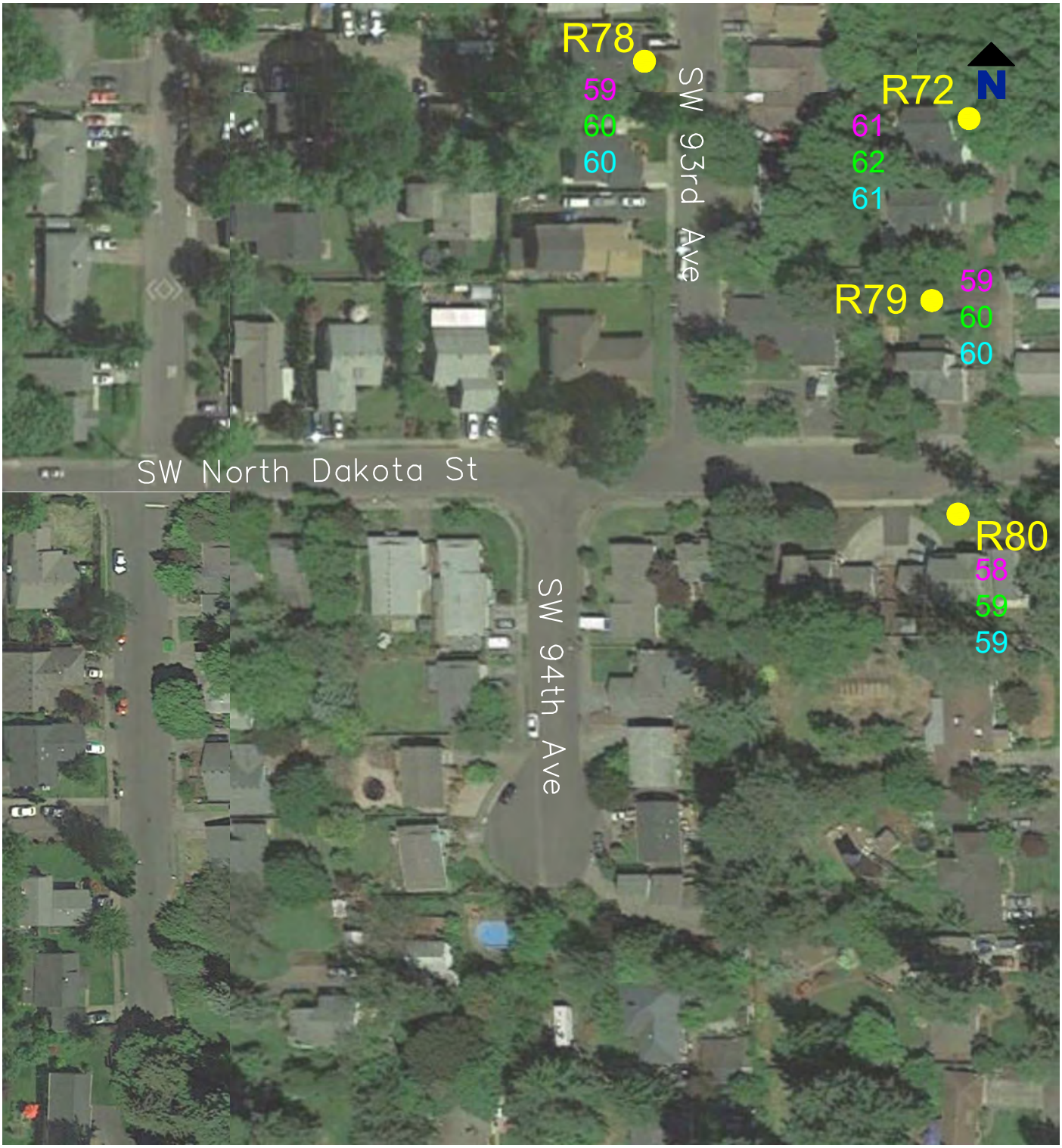
Report
OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing
Receiver Locations - Noise Levels (I)

Date	August 24, 2018	Scale	AS SHOWN	Fig. No. E - 11
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

SLR


N
SW 95th Ave
SW Mandamus Ct
R63
68 69 69
75 76 75
R66
67 68 68
R67
66 67 66
70 71 71
R74
R87 b
R89 b
72 73 73
R90 a,b
67 68 67
69 70 69
R3/M3
R88 a,b
63,66 64,67 64,67
62,65 63,66 63,65
64 65 64
R75
R91 b
R92 b
68 69 69
R94 b
73 74 74
63,67 64,68 64,67
R95 a,b
R96 b
72 73 73
R28
61 62 62
R93 a,b
60,64 61,65 61,65
R97 a,b
63,66 64,67 64,67
R98 b
68 69 69
R99a,b
64,66 65,67 64,67
60 61 60
R76
57 59 58
R77
61 62 61
R68
0 100 200 300 feet
Proposed Build Alternative Lane Lines
Existing Masonry Wall
Receiver Location
Sound Level Key
Existing Sound Levels
No Build Alternative Sound Levels
Build Alternative Sound Levels
Report
OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W
Drawing
Receiver Locations - Noise Levels (J)
SLR
Date August 24, 2018
Scale AS SHOWN
Fig. No. E - 12
File Name 217 Working File SB FINAL-1
Project No. 108.00494.00012



0 100 200 300 feet

Sound Level Key

- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

SLR

Receiver Location

Report

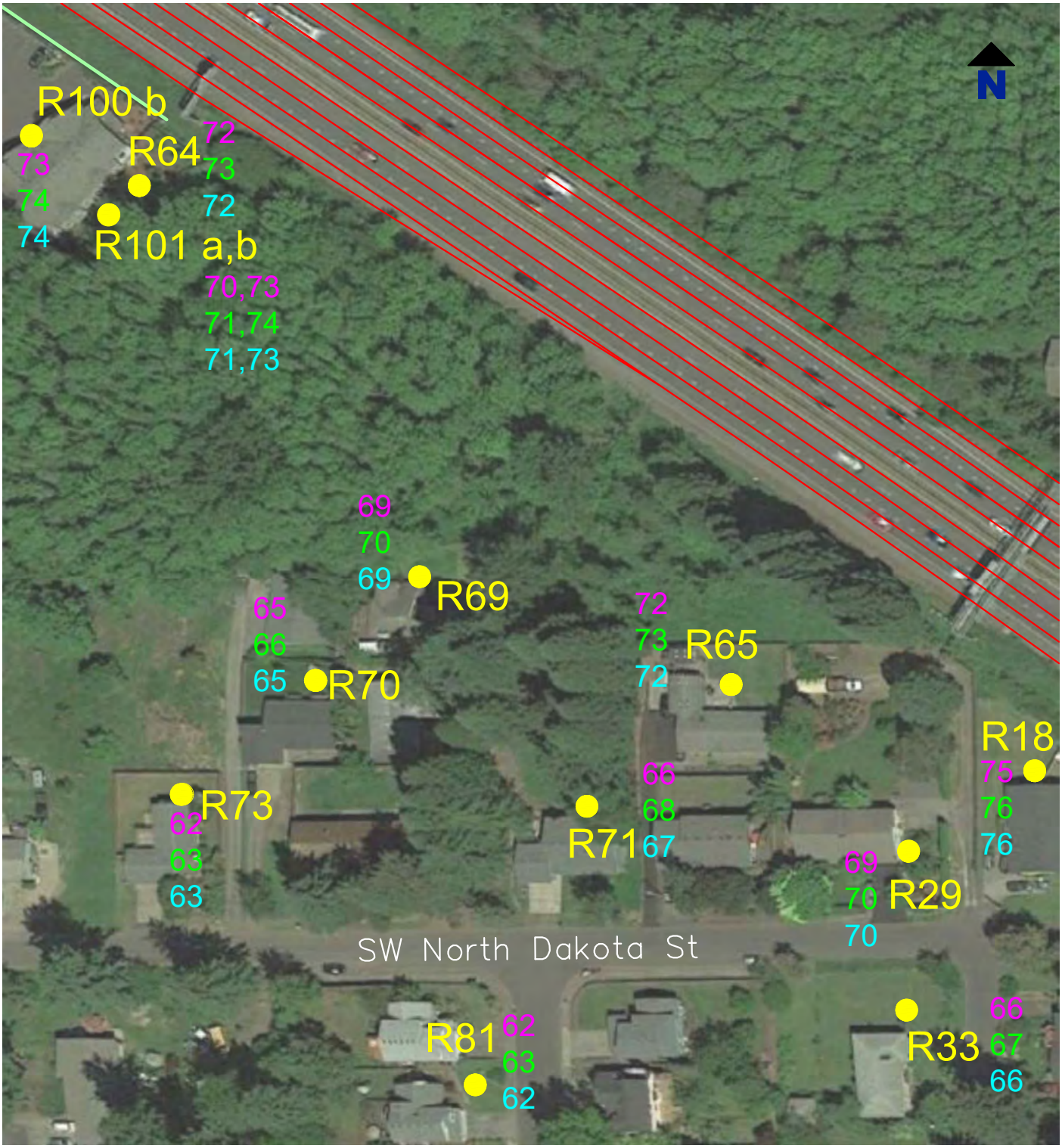
OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Receiver Locations - Noise Levels (K)

Date	August 24, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. E -13



0 100 200 300 feet

Proposed Build Alternative Lane Lines
Existing Masonry Wall
Receiver Location

Sound Level Key
- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

Report

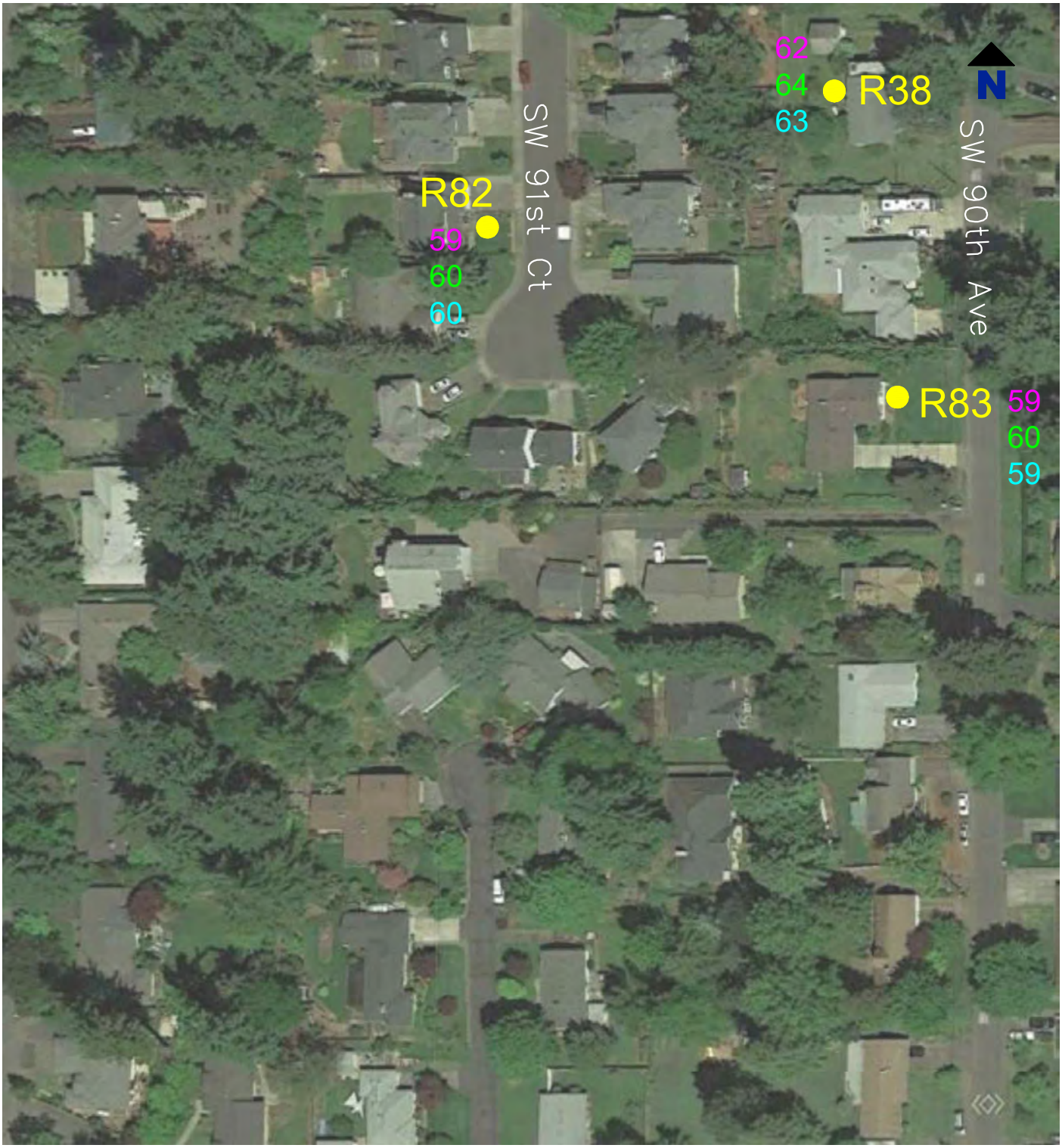
OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

SLR

Drawing

Receiver Locations - Noise Levels (L)

Date	August 24, 2018	Scale	AS SHOWN	Fig. No. E - 14
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	



0 100 200 300 feet

Sound Level Key

- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

Receiver Location

Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

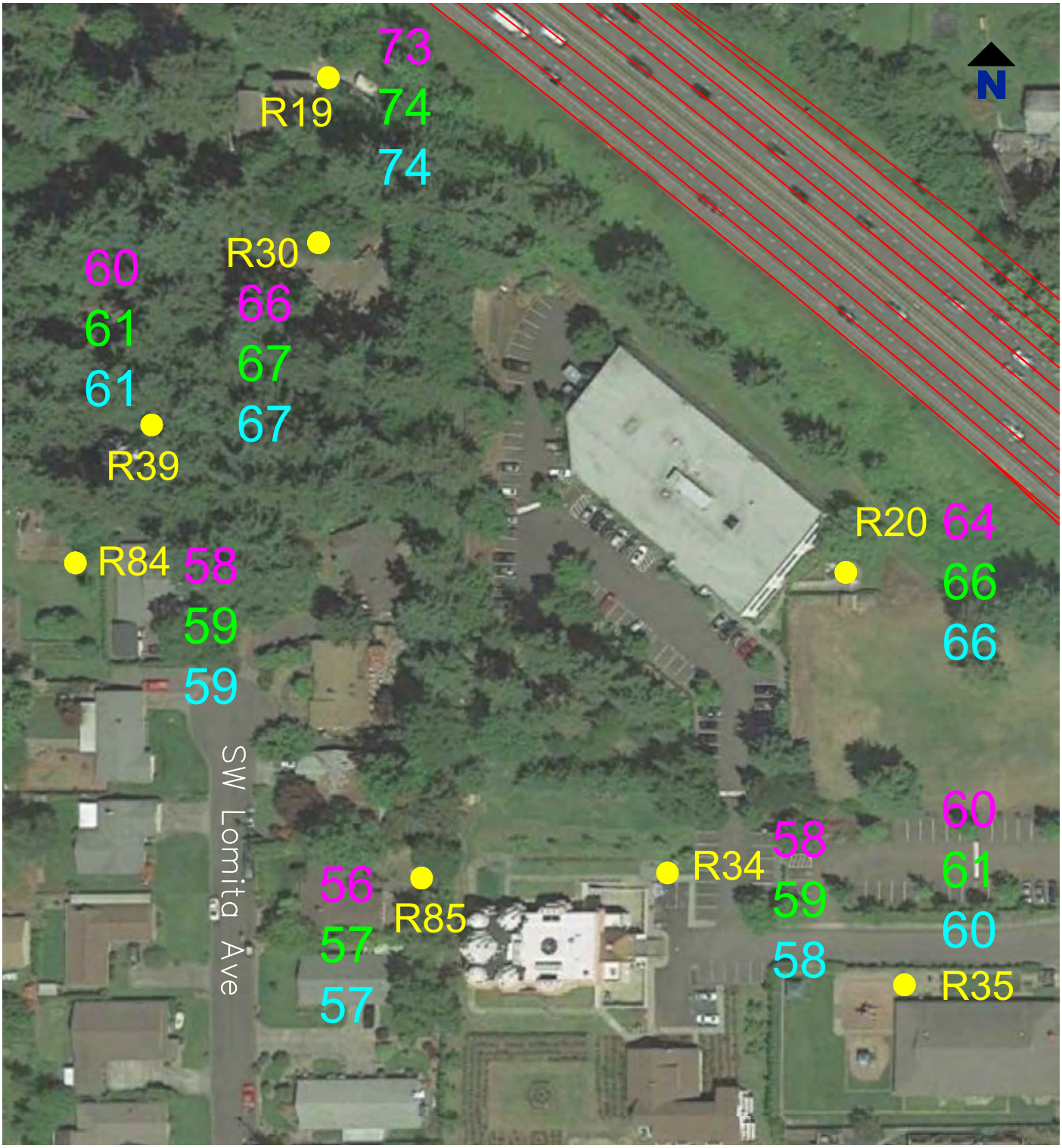
Drawing

Receiver Locations - Noise Levels (M)

Date	August 24, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. E - 15

SLR



0 100 200 300 feet

Sound Level Key
- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

Proposed Build Alternative Lane Lines
Receiver Location

Report
OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing
Receiver Locations - Noise Levels (N)

Date	August 24, 2018	Scale	AS SHOWN
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012

Fig. No. E - 16

0 100 200 300 feet

Sound Level Key
- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

SLR

- Proposed Build Alternative Lane Lines
- Receiver Location

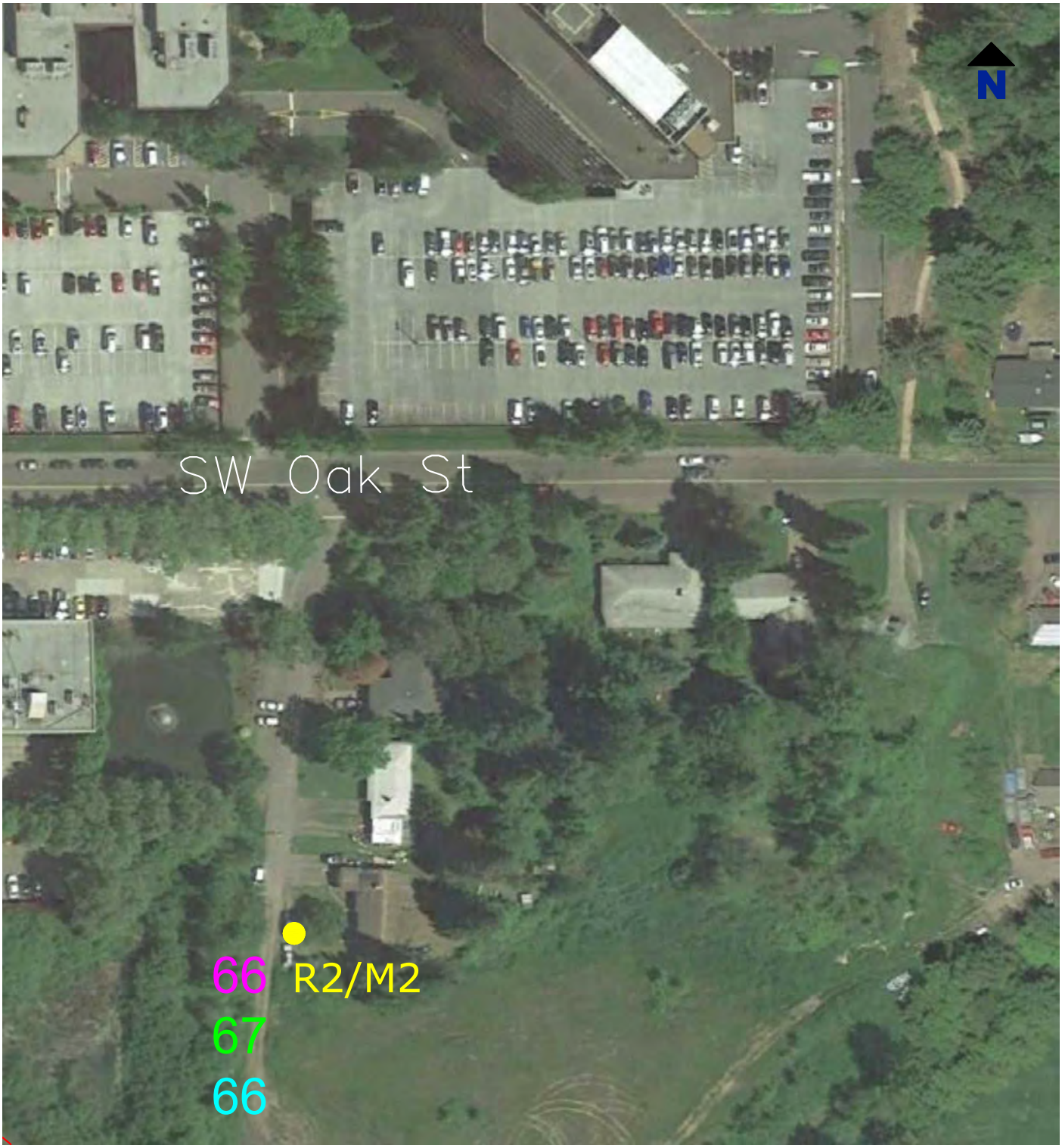
Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Receiver Locations - Noise Levels (O)

Date	August 24, 2018	Scale	AS SHOWN	Fig. No. E - 17
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	



0 100 200 300 feet

Sound Level Key
- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

Receiver Location

Report
OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing
Receiver Locations - Noise Levels (P)

Date	August 24, 2018	Scale	AS SHOWN	Fig. No. E - 18
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

0 100 200 300 feet

Sound Level Key
- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

- Proposed Build Alternative Lane Lines
- Receiver Location

Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Receiver Locations - Noise Levels (Q)

Date	August 24, 2018	Scale	AS SHOWN	Fig. No. E - 19
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

0 100 200 300 feet

Sound Level Key
- Existing Sound Levels
- No Build Alternative Sound Levels
- Build Alternative Sound Levels

- Proposed Build Alternative Lane Lines
- Receiver Location

Report

OR-217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR-99W

Drawing

Receiver Locations - Noise Levels (R)

Date	August 24, 2018	Scale	AS SHOWN	Fig. No. E - 20
File Name	217 Working File SB FINAL-1	Project No.	108.00494.00012	

APPENDIX F

BARRIER ANALYSIS RESULTS

Noise Technical Report

Oregon Department of Transportation
123 NW Flanders Street
Portland, OR 97209

August 2018

Noise Technical Report
Greenburg to Hall Barrier Analysis (Full Length) - 16 ft, Final Build and Barrier Configuration
OR 217 Southbound Auxiliary Lane

Receiver	Receiver Description	Activity Category	Oregon NAAC	Number of Receptors	Existing (2017)	Build Alternative (2040)		16 FT Barrier					
					TNM Noise Level (dBA)	TNM Noise Level (dBA)	Increase over Existing	TNM Noise Level (dBA)	Insertion Loss (dBA)	Receptors with IL ≥ 7 dBA	Benefitted Receptors (≥ 5 dBA)	Impacted Receptors Receiving 5 dBA IL	Impacted Receptors Not Benefitted
R3/M3	1st Row Apartment Complex on SW Mandamus Ct.	B	65	Info	69	69	0	63	6		Info	Info	
R18	1st Row House at the NE corner of SW North Dakota St. and SW 90th Ave.	B	65	1	75	76	1	63	13	1	1	1	
R19	1st Row House on SW North Dakota St. East of SW 90th Ave and North of SW Lomita Ave.	B	65	2	73	74	1	62	12	2	2	2	
R20	1st Row Office Building on SW Hall Blvd. North of SW 88th Ave.	C	65	1	64	66	2	66	0				
R28	2nd Row House on SW Longstaff St.	B	65	4	61	62	1	58	4				
R29	2nd Row House at the NW corner of SW North Dakota St. and SW 90th Ave.	B	65	2	69	70	1	62	8	2	2	2	
R30	2nd Row House on SW 90th Ave. North of SW Lomita Ave.	B	65	2	66	67	1	61	6		2	2	
R33	3rd Row House at the SW corner of SW North Dakota St. and SW 90th Ave.	B	65	3	66	66	0	61	5		3	3	
R34	3rd Row Temple on SW Hall Blvd. East of SW Lomita Ave.	C	65	1	58	58	0	58	0				
R38	4th Row House on SW 91st Ct.	B	65	5	62	63	1	60	3				
R39	4th Row House on SW Lomita Ave.	B	65	4	60	61	1	58	3				
R63	1st Row House on SW 95th Ave. North of SW Mandamus Ct.	B	65	2	75	75	0	64	11	2	2	2	
R64	1st Row Apartment Complex on SW Mandamus Ct. [at the end of the street, on the E side]	B	65	Info	72	72	0	63	9	Info	Info	Info	
R65	1st Row House on SW North Dakota St. West of SW 90th Ave and East of SW 93rd Ave.	B	65	1	72	72	0	63	9	1	1	1	
R66	2nd Row House on SW 95th Ave. [across SW Mandamus Ct]	B	65	2	68	69	1	64	5		2	2	
R67	2nd Row Apartment Complex at the corner of SW Mandamus Ct and SW 95th Ave.	B	65	Info	67	68	1	62	6		Info	Info	
R68	2nd Row House on SW 93rd Ave. [at the end of the street, on the E side]	B	65	1	61	61	0	58	3				
R69	1st Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	69	69	0	62	7	2	2	2	
R70	2nd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	65	65	0	60	5		2	2	
R71	2nd Row House on SW North Dakota St. [across SW 91st Ct.]	B	65	2	66	67	1	61	6		2	2	
R72	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	61	61	0	57	4				
R73	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	62	63	1	58	5		2		
R74	2nd Row Property Currently under Residential Development	B	65	1	66	66	0	62	4				1
R75	3rd Row Property Currently under Residential Development	B	65	4	64	64	0	60	4				
R76	4th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	2	60	60	0	58	2				
R77	5th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	4	57	58	1	56	2				
R78	3rd Row House on SW 93rd Ave. [at the end of the street, on the W side]	B	65	3	59	60	1	57	3				
R79	4th Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	3	59	60	1	56	4				
R80	5th Row House on SW North Dakota St. East of SW 94th Ave and West of SW 92nd Ave.	B	65	3	58	59	1	55	4				
R81	5th Row House on SW 91st Ct. East of SW 92nd Ave.	B	65	3	62	62	0	59	3				
R82	6th Row House on SW 91st Ct. [at the end of the street, on the W side]	B	65	4	59	60	1	57	3				
R83	6th Row House on SW 90th Ave. South of SW North Dakota St and East of SW 91st Ct.	B	65	3	59	59	0	57	2				
R84	5th Row House on SW Lomita Ave. [at the end of the street, on the W side]	B	65	2	58	59	1	56	3				
R85	5th Row House on SW Lomita Ave. [at the end of the street, on the E side]	B	65	2	56	57	1	55	2				
R87b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	70	71	1	65	6		2	2	
R88a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	62	63	1	60	3				
R88b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	65	65	0	61	4				2
R89b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	72	73	1	65	8	2	2	2	
R90a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	64	1	60	4				
R90b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	66	67	1	62	5		2	2	
R91b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	1	67	67	0	62	5		1	1	
R92b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	68	69	1	62	7	2	2	2	
R93a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	60	61	1	56	5		2		
R93b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	64	65	1	59	6		2	2	
R94b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	73	74	1	65	9	2	2	2	
R95a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	64	1	60	4				
R95b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	67	67	0	63	4				2
R96b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	72	73	1	65	8	2	2	2	
R97a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	64	1	59	5		2		
R97b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	66	67	1	62	5		2	2	
R98b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	68	69	1	62	7	2	2	2	
R99a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	64	64	0	58	6		2		
R99b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	66	67	1	61	6		2	2	
R100b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	73	74	1	65	9	2	2	2	
R101a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	70	71	1	63	8	2	2	2	
R101b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	73	73	0	66	7	2	2	2	
										26	56	48	5

Wall Height (ft):	16		
Length of Wall (ft):	2,392	Calculation of Feasible Abatement (a simple majority of impacted receptors receive a minimum of 5 dBA IL):	
Wall Area (sq. ft):	38,272		
Wall Cost ($/sq. ft):	$20		
Total Cost of Selected Wall ($):	$765,440	91 %	
Cost Effectiveness ($/Benefitted Residence):	$13,669		
Cost Reasonableness Criteria ($/Benefitted Residence):	$25,000	Feasible (>50%)?	**Yes**
Cost Effectiveness < Cost Reasonableness? (yes/no):	**Yes**	Design Goal (>7 dBA)?	**Yes**

Noise Abatement Evaluation and Recommendation Form

(A separate form is completed for each noise abatement measure being considered.)

Project OR 217: OR 10 to OR 99W Southbound Auxiliary Lane Project
Key Number 18841
Highway OR 217 County Washington
Barrier ID (from Noise Technical Report) Greenberg Road to Hall Boulevard
Noise Analyst (and Firm) Jessica Stark, SLR

FEASIBILITY			
Number of Impacted Receptors:	53		
Number of Impacted Receptors Receiving 5 dBA Noise Reduction	48	**(If not simple majority (a), evaluation stops here)**	
Site Constructability Issues (if any):			

Proposed Barrier Meets Feasibility Criteria	**Yes**	**No**	**If no, abatement evaluation stops**

REASONABLENESS				
1. NOISE REDUCTION DESIGN GOAL	Number of Benefited Receptors Meeting Noise Reduction Design Goal of 7 dBA:	26	**(if not at least one, evaluation stops here)**	
2. COST BENEFIT	Total Cost of Barrier:	$765,440	Cost per Benefited Receptor:	$13,669

(Cannot be greater than $25k/receptor or if one of the optional reasonableness criteria is met, cannot be greater than $35k/receptor) **(if not, evaluation stops here)**

Optional Reasonableness Criteria – used only to justify cost/benefited Receptor between $25K and $35K (Section 7.4.4 of the Noise Manual)

Absolute Highway Traffic Noise Levels for Build Condition (from modeling)		
Zoning	Current Use:	Future Use:
Changes in Noise Levels Between Existing and Future Build Conditions	Existing Noise Level:	Future Noise Level;
Date of Development (for Retrofit Abatement Projects only)		

Analyst's Signature & Date:		Date:
ODOT Noise Program Coordinator's Signature & Date (after Review)		Date:

Original to REC, or EPM and copies of signed form to PL, Noise Program Coordinator, and Consultant Noise Analyst

3. COMMUNITY SUPPORT (See Section 7.4.1 of the Noise Manual, *Viewpoints of the Property Owners and Residents*)

	Renters	Owners	
Total Number of Votes from returned surveys			
Total Number of Actual No Votes			
Total Number of Actual Yes Votes:			% Yes Vote (b):

Community Support for Abatement (% yes or no must be greater than 50%)	Yes	No	

Proposed Barrier Meets 3 Required Reasonableness Criteria (noise reduction design goal, cost benefit, support of community)	**Yes**	**No**

Barrier meets Feasible and Reasonable Criteria and will be part of Project Design (If yes, the abatement measure must be incorporated into the project design)	**Yes**	**No**

Signature of PM or PL, acknowledging the recommendation for abatement		Date:

Noise Technical Report
Greenburg to Hall Barrier Analysis (North and South Barriers)
OR 217 Southbound Auxiliary Lane

Receiver	Receiver Description	Barrier Area	Activity Category	Oregon NAAC	Number of Receptors	Existing (2017) TNM Noise Level (dBA)	Build Alternative (2040) TNM Noise Level (dBA)	Build Alternative (2040) Increase over Existing	14 FT Barrier (Split Barrier) TNM Noise Level (dBA)	14 FT Insertion Loss (dBA)	14 FT Receptors with IL ≥ 7 dBA	14 FT Benefitted Receptors (≥ 5 dBA)	14 FT Impacted Receptors Receiving 5 dBA IL	14 FT Impacted Receptors Not Benefitted	15 FT Barrier (Split Barrier) TNM Noise Level (dBA)	15 FT Insertion Loss (dBA)	15 FT Receptors with IL ≥ 7 dBA	15 FT Benefitted Receptors (≥ 5 dBA)	15 FT Impacted Receptors Receiving 5 dBA IL	15 FT Impacted Receptors Not Benefitted
R3/M3	1st Row Apartment Complex on SW Mandamus Ct.	North Barrier	B	65	Info	69	69	0	64	5		Info	Info		64	5		Info	Info	
R18	1st Row House at the NE corner of SW North Dakota St. and SW 90th Ave.	South Barrier	B	65	1	75	76	1	65	11	1	1	1		65	11	1	1	1	
R19	1st Row House on SW North Dakota St. East of SW 90th Ave and North of SW Lomita Ave.	South Barrier	B	65	2	73	74	1	63	11	2	2	2		62	12	2	2	2	
R28	2nd Row House on SW Longstaff St.	South Barrier	B	65	4	61	62	1	59	3					59	3				
R29	2nd Row House at the NW corner of SW North Dakota St. and SW 90th Ave.	South Barrier	B	65	2	69	70	1	66	4				2	66	4				2
R30	2nd Row House on SW 90th Ave. North of SW Lomita Ave.	South Barrier	B	65	2	66	67	1	61	6		2	2		61	6		2	2	
R33	3rd Row House at the SW corner of SW North Dakota St. and SW 90th Ave.	South Barrier	B	65	3	66	66	0	64	2				3	63	3				3
R34	3rd Row Temple on SW Hall Blvd. East of SW Lomita Ave.	South Barrier	C	65	1	58	58	0	58	0					58	0				
R35	1st Row Day Care Center on SW Hall Blvd. North of Pacific Hwy and East of SW 88th Ave.	South Barrier	C	65	1	60	60	0	60	0					60	0				
R36	2nd Row Offices on SW Hall Blvd. North of Pacific Hwy and East of SW 88th Ave.	South Barrier	C	65	1	61	62	1	62	0					62	0				
R38	4th Row House on SW 91st Ct.	South Barrier	B	65	5	62	63	1	61	2					61	2				
R39	4th Row House on SW Lomita Ave.	South Barrier	B	65	4	60	61	1	58	3					58	3				
R63	1st Row House on SW 95th Ave. North of SW Mandamus Ct.	North Barrier	B	65	2	75	75	0	64	11	2	2	2		64	11	2	2	2	
R64	1st Row Apartment Complex on SW Mandamus Ct. [at the end of the street, on the E side]	North Barrier	B	65	Info	72	72	0	72	0				Info	72	0				Info
R65	1st Row House on SW North Dakota St. West of SW 90th Ave and East of SW 93rd Ave.	North Barrier	B	65	1	72	72	0	71	1				1	71	1				1
R66	2nd Row House on SW 95th Ave. [across SW Mandamus Ct]	North Barrier	B	65	2	68	69	1	65	4				2	65	4				2
R67	2nd Row Apartment Complex at the corner of SW Mandamus Ct and SW 95th Ave.	North Barrier	B	65	Info	67	68	1	63	5		Info	Info		62	6		Info	Info	
R68	2nd Row House on SW 93rd Ave. [at the end of the street, on the E side]	North Barrier	B	65	1	61	61	0	60	1					60	1				
R69	1st Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	South Barrier	B	65	1	69	69	0	69	0				1	69	0				1
R70	2nd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	South Barrier	B	65	2	65	65	0	65	0				2	65	0				2
R71	2nd Row House on SW North Dakota St. [across SW 91st Ct.]	South Barrier	B	65	2	66	67	1	66	1				2	66	1				2
R72	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	North Barrier	B	65	2	61	61	0	61	0					61	0				
R73	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	South Barrier	B	65	2	62	63	1	62	1					62	1				
R74	2nd Row Property Currently under Residential Development	South Barrier	B	65	1	66	66	0	62	4				1	62	4				1
R75	3rd Row Property Currently under Residential Development	South Barrier	B	65	4	64	64	0	61	3					61	3				
R76	4th Row House on SW 95th Ave. North of SW North Dakota St.	North Barrier	B	65	2	60	60	0	58	2					58	2				
R77	5th Row House on SW 95th Ave. North of SW North Dakota St.	North Barrier	B	65	4	58	58	0	57	1					57	1				
R78	3rd Row House on SW 93rd Ave. [at the end of the street, on the W side]	North Barrier	B	65	3	59	60	1	59	1					59	1				
R79	4th Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	North Barrier	B	65	3	59	60	1	59	1					59	1				
R80	5th Row House on SW North Dakota St. East of SW 94th Ave and West of SW 92nd Ave.	South Barrier	B	65	3	58	59	1	58	1					58	1				
R81	5th Row House on SW 91st Ct. East of SW 92nd Ave.	South Barrier	B	65	3	62	62	0	61	1					61	1				
R82	6th Row House on SW 91st Ct. [at the end of the street, on the W side]	South Barrier	B	65	4	59	60	1	58	2					58	2				
R83	6th Row House on SW 90th Ave. South of SW North Dakota St and East of SW 91st Ct	South Barrier	B	65	3	59	59	0	58	1					57	2				
R84	5th Row House on SW Lomita Ave. [at the end of the street, on the W side]	South Barrier	B	65	2	58	59	1	57	2					57	2				
R85	5th Row House on SW Lomita Ave. [at the end of the street, on the E side]	South Barrier	B	65	2	56	57	1	56	1					56	1				
87b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	North Barrier	B	65	2	70	71	1	66	5		2	2		65	6		2	2	
R88a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	North Barrier	B	65	2	62	63	1	60	3					60	3				
R88b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	North Barrier	B	65	2	65	65	0	62	3				2	62	3				2
R89b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	North Barrier	B	65	2	72	73	1	67	6		2	2		66	7	2	2	2	
R90a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	North Barrier	B	65	2	63	64	1	61	3					60	4				
R90b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	North Barrier	B	65	2	66	67	1	64	3				2	63	4				2
R91b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	North Barrier	B	65	1	67	67	0	63	4				1	63	4				1
R92b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	North Barrier	B	65	2	68	69	1	64	5		2	2		63	6		2	2	
R93a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	North Barrier	B	65	2	60	61	1	58	3					58	3				
R93b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	North Barrier	B	65	2	64	65	1	62	3				2	61	4				2
R94b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	North Barrier	B	65	2	73	74	1	68	6		2	2		67	7	2	2	2	
R95a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	North Barrier	B	65	2	63	64	1	61	3					60	4				
R95b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	North Barrier	B	65	2	67	67	0	65	2				2	64	3				2
R96b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	North Barrier	B	65	2	72	73	1	68	5		2	2		67	6		2	2	
R97a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	North Barrier	B	65	2	63	64	1	61	3					60	4				
R97b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	North Barrier	B	65	2	66	67	1	64	3				2	63	4				2
R98b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	North Barrier	B	65	2	68	69	1	66	3				2	66	3				2
R99a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	North Barrier	B	65	2	64	64	0	64	0					64	0				
R99b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	North Barrier	B	65	2	66	67	1	66	1				2	66	1				2
R100b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	North Barrier	B	65	2	73	74	1	68	6		2	2		67	7	2	2	2	
R101a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	North Barrier	B	65	2	70	71	1	71	0				2	71	0				2
R101b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	North Barrier	B	65	2	73	73	0	72	1				2	72	1				2
									North Barrier		2	14	14	22	North Barrier		8	14	14	22
									South Barrier		3	5	5	11	South Barrier		3	5	5	11

14 FT Barrier (Split Barrier)

Calculation of Feasible Abatement (a simple majority of impacted receptors receive a minimum of 5 dBA IL):

North Barrier 39
Feasible (>50%)? **No**
Design Goal (>7 dBA)? **Yes**
South Barrier 31
Feasible (>50%)? **No**
Design Goal (>7 dBA)? **Yes**

15 FT Barrier (Split Barrier)

Calculation of Feasible Abatement (a simple majority of impacted receptors receive a minimum of 5 dBA IL):

North Barrier 39
Feasible (>50%)' **No**
Design Goal (>7 dBA)? **Yes**
South Barrier 31
Feasible (>50%)' **No**
Design Goal (>7 dBA)? **Yes**

14 FT Barrier

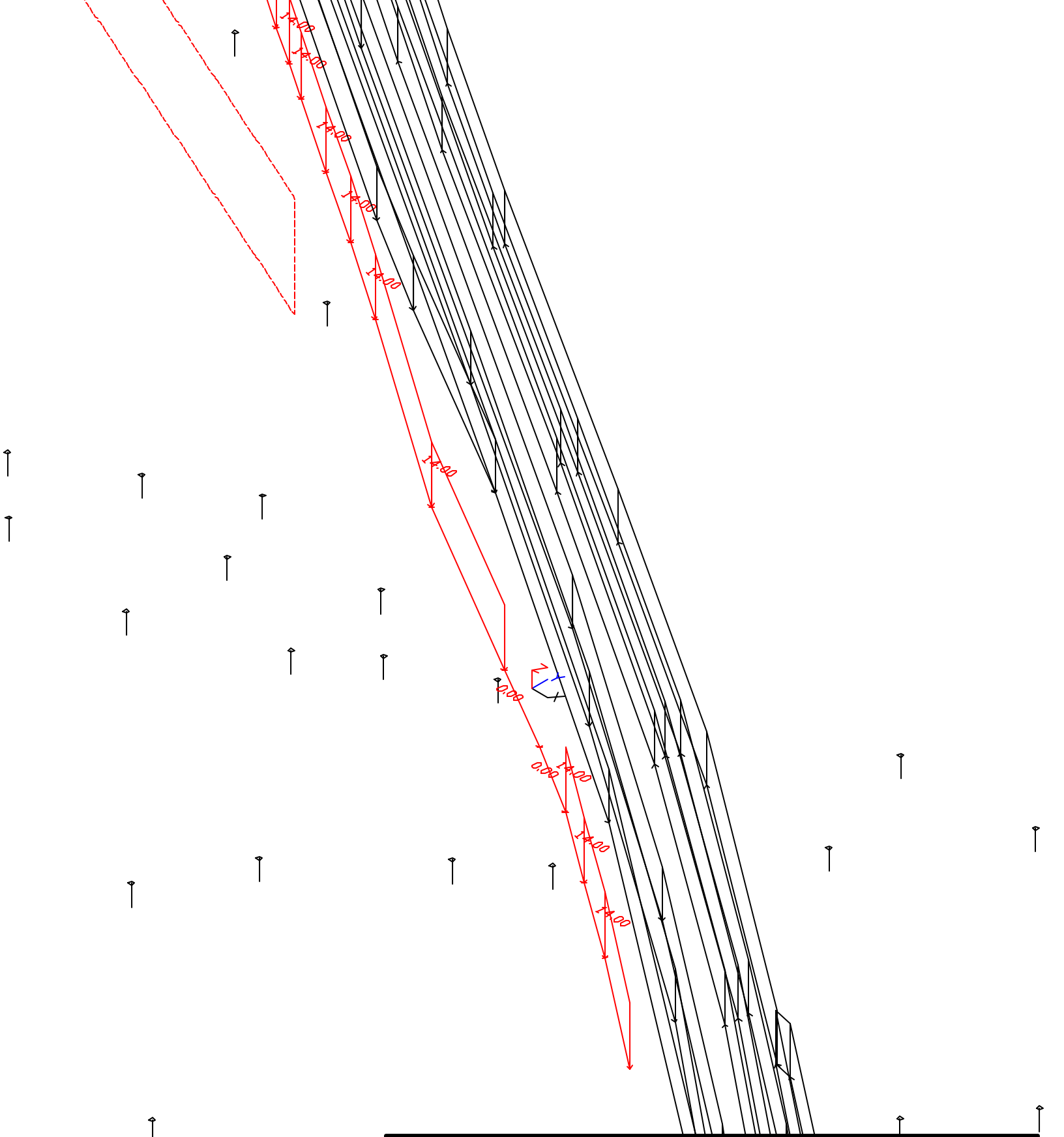
North	Wall Height (ft):	14
	Length of Wall (ft):	922
	Wall Area (sq. ft):	12,908
	Wall Cost ($/sq. ft):	$20
	Total Cost of Selected Wall ($):	$258,160
	Cost Effectiveness ($/Benefitted Residence):	$18,440
	Cost Reasonableness Criteria ($/Benefitted Residence):	$25,000
	Cost Effectiveness < Cost Reasonableness? (yes/no	Yes
South	Wall Height (ft):	14
	Length of Wall (ft):	845
	Wall Area (sq. ft):	11,830
	Wall Cost ($/sq. ft):	$20
	Total Cost of Selected Wall ($):	$236,600
	Cost Effectiveness ($/Benefitted Residence):	$47,320
	Cost Reasonableness Criteria ($/Benefitted Residence):	$25,000
	Cost Effectiveness < Cost Reasonableness? (yes/no	No

15 FT Barrier

North	Wall Height (ft):	15
	Length of Wall (ft):	922
	Wall Area (sq. ft):	13,830
	Wall Cost ($/sq. ft):	$20
	Total Cost of Selected Wall ($):	$276,600
	Cost Effectiveness ($/Benefitted Residence):	$19,757
	Cost Reasonableness Criteria ($/Benefitted Residence):	$25,000
	Cost Effectiveness < Cost Reasonableness? (yes/no	Yes
South	Wall Height (ft):	15
	Length of Wall (ft):	845
	Wall Area (sq. ft):	12,675
	Wall Cost ($/sq. ft):	$20
	Total Cost of Selected Wall ($):	$253,500
	Cost Effectiveness ($/Benefitted Residence):	$50,700
	Cost Reasonableness Criteria ($/Benefitted Residence):	$25,000
	Cost Effectiveness < Cost Reasonableness? (yes/no	No

The north barrier is not recommended for construction.

The south barrier is not recommended for construction.



Barrier View-14ft Barrier	Sheet 1 of 1	24 Aug 2018
Run name: 217 Build Long Barrier	Project/Contract No.	
Scale: <DNA - due to perspective>	TNM Version 2.5, Feb 2004	
	Analysis By:	

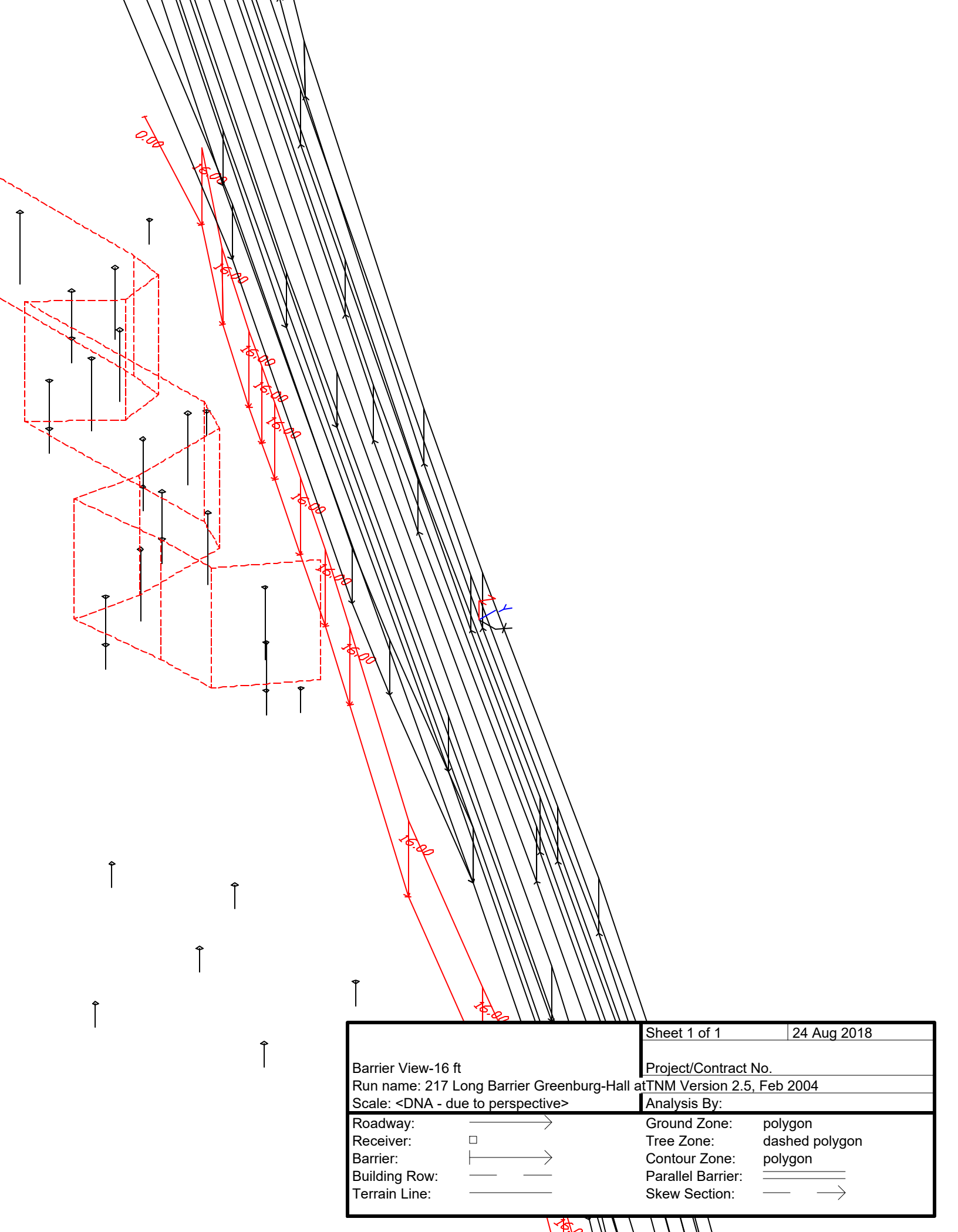
Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

Noise Technical Report
Greenburg to Hall Barrier Analysis (Full Length Height Comparison) - Removal of First North End Segment for ROW
217 Auxiliary Lanes

								14 FT Barrier						16 FT Barrier					
Receiver	Receiver Description	Activity Category	Oregon NAAC	Number of Receptors	Existing (2017)	Build Alternative (2040)		TNM Noise Level (dBA)	Insertion Loss (dBA)	Receptors with IL ≥ 7 dBA	Benefitted Receptors (≥ 5 dBA)	Impacted Receptors Receiving 5 dBA IL	Impacted Receptors Not Benefitted	TNM Noise Level (dBA)	Insertion Loss (dBA)	Receptors with IL ≥ 7 dBA	Benefitted Receptors (≥ 5 dBA)	Impacted Receptors Receiving 5 dBA IL	Impacted Receptors Not Benefitted
					TNM Noise Level (dBA)	TNM Noise Level (dBA)	Increase over Existing												
R3/M3	1st Row Apartment Complex on SW Mandamus Ct.	B	65	Info	69	69	0	65	4				Info	64	5		Info	Info	
R18	1st Row House at the NE corner of SW North Dakota St. and SW 90th Ave.	B	65	1	75	76	1	64	12	1	1	1		63	13	1	1	1	
R19	1st Row House on SW North Dakota St. East of SW 90th Ave and North of SW Lomita Ave.	B	65	2	73	74	1	62	12	2	2	2		62	12	2	2	2	
R20	1st Row Office Building on SW Hall Blvd. North of SW 88th Ave.	C	65	1	0	66	66	66						66					
R28	2nd Row House on SW Longstaff St.	B	65	4	61	62	1	60	2					59	3				
R29	2nd Row House at the NW corner of SW North Dakota St. and SW 90th Ave.	B	65	2	69	70	1	63	7	2	2	2		62	8	2	2	2	
R30	2nd Row House on SW 90th Ave. North of SW Lomita Ave.	B	65	2	66	67	1	61	6		2	2		61	6		2	2	
R33	3rd Row House at the SW corner of SW North Dakota St. and SW 90th Ave.	B	65	3	66	66	0	62	4				3	61	5		3	3	
R34	3rd Row Temple on SW Hall Blvd. East of SW Lomita Ave.	C	65	1	58	58	0	58	0					58	0				
R38	4th Row House on SW 91st Ct.	B	65	5	62	63	1	61	2					60	3				
R39	4th Row House on SW Lomita Ave.	B	65	4	60	61	1	58	3					58	3				
R63	1st Row House on SW 95th Ave. North of SW Mandamus Ct.	B	65	2	75	75	0	71	4				2	71	4				2
R64	1st Row Apartment Complex on SW Mandamus Ct. [at the end of the street, on the E side]	B	65	Info	72	72	0	64	8	Info	Info	Info		63	9	Info	Info	Info	
R65	1st Row House on SW North Dakota St. West of SW 90th Ave and East of SW 93rd Ave.	B	65	1	72	72	0	64	8	1	1	1		63	9	1	1	1	
R66	2nd Row House on SW 95th Ave. [across SW Mandamus Ct]	B	65	2	68	69	1	68	1				2	68	1				2
R67	2nd Row Apartment Complex at the corner of SW Mandamus Ct and SW 95th Ave.	B	65	Info	67	68	1	66	2				Info	66	2				Info
R68	2nd Row House on SW 93rd Ave. [at the end of the street, on the E side]	B	65	1	61	61	0	59	2					58	3				
R69	1st Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	1	69	69	0	63	6		1	1		62	7	1	1	1	
R70	2nd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	65	65	0	62	3				2	60	5		2	2	
R71	2nd Row House on SW North Dakota St. [across SW 91st Ct.]	B	65	2	66	67	1	63	4				2	61	6		2	2	
R72	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	61	61	0	58	3					58	3				
R73	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	62	63	1	60	3					59	4				
R74	2nd Row Property Currently under Residential Development	B	65	1	66	66	0	65	1				1	65	1				1
R75	3rd Row Property Currently under Residential Development	B	65	4	64	64	0	63	1					62	2				
R76	4th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	2	60	60	0	59	1					59	1				
R77	5th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	4	58	58	0	57	1					57	1				
R78	3rd Row House on SW 93rd Ave. [at the end of the street, on the W side]	B	65	3	59	60	1	58	2					57	3				
R79	4th Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	3	59	60	1	57	3					57	3				
R80	5th Row House on SW North Dakota St. East of SW 94th Ave and West of SW 92nd Ave.	B	65	3	58	59	1	57	2					56	3				
R81	5th Row House on SW 91st Ct. East of SW 92nd Ave.	B	65	3	62	62	0	60	2					59	3				
R82	6th Row House on SW 91st Ct. [at the end of the street, on the W side]	B	65	4	59	60	1	58	2					57	3				
R83	6th Row House on SW 90th Ave. South of SW North Dakota St and East of SW 91st Ct.	B	65	3	59	59	0	57	2					57	2				
R84	5th Row House on SW Lomita Ave. [at the end of the street, on the W side]	B	65	2	58	59	1	56	3					56	3				
R85	5th Row House on SW Lomita Ave. [at the end of the street, on the E side]	B	65	2	56	57	1	55	2					55	2				
R87b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	70	71	1	68	3				2	68	3				2
R88a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	62	63	1	60	3					60	3				
R88b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	65	65	0	63	2				2	62	3				2
R89b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	72	73	1	68	5		2	2		67	6		2	2	
R90a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	64	1	61	3					60	4				
R90b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	66	67	1	64	3				2	63	4				2
R91b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	1	67	67	0	64	3				1	64	3				1
R92b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	68	69	1	64	5		2	2		62	7	2	2	2	
R93a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	60	61	1	58	3					57	4				
R93b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	64	65	1	61	4				2	60	5		2	2	
R94b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	73	74	1	68	6		2	2		66	8	2	2	2	
R95a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	64	1	61	3					60	4				
R95b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	67	67	0	64	3				2	63	4				2
R96b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	72	73	1	67	6		2	2		65	8	2	2	2	
R97a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	64	1	61	3					60	4				
R97b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	66	67	1	64	3				2	63	4				2
R98b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	68	69	1	64	5		2	2		62	7	2	2	2	
R99a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	64	64	0	60	4					59	5		2		
R99b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	66	67	1	62	5		2	2		61	6		2	2	
R100b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	73	74	1	68	6		2	2		65	9	2	2	2	
R101a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	70	71	1	63	8	2	2	2		62	9	2	2	2	
R101b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	73	73	0	68	5		2	2		66	7	2	2	2	
										8	27	27	25			21	38	36	16

Wall Height (ft):	14	Calculation of Feasible Abatement (a simple majority of impacted receptors receive a minimum of 5 dBA IL):	
Length of Wall (ft):	2,215		
Wall Area (sq. ft):	31,010		
Wall Cost ($/sq. ft):	$20		
Total Cost of Selected Wall ($):	$620,200		52 percent
Cost Effectiveness ($/Benefitted Residence):	$22,970.37		
Residence):	$25,000	Feasible (>50%)?	**Yes**
Cost Effectiveness < Cost Reasonableness? (yes/no):	**Yes**	Design Goal (>7 dBA)?	**Yes**

Wall Height (ft):	16	Calculation of Feasible Abatement (a simple majority of impacted receptors receive a minimum of 5 dBA IL):	
Length of Wall (ft):	2,215		
Wall Area (sq. ft):	35,440		
Wall Cost ($/sq. ft):	$20		
Total Cost of Selected Wall ($):	$708,800		69 percent
Cost Effectiveness ($/Benefitted Residence):	$18,652.63		
Residence):	$25,000	Feasible (>50%)?	**Yes**
Cost Effectiveness < Cost Reasonableness? (yes/no):	**Yes**	Design Goal (>7 dBA)?	**Yes**



	Sheet 1 of 1	24 Aug 2018
Barrier View-16 ft	Project/Contract No.	
Run name: 217 Long Barrier Greenburg-Hall at	TNM Version 2.5, Feb 2004	
Scale: <DNA - due to perspective>	Analysis By:	

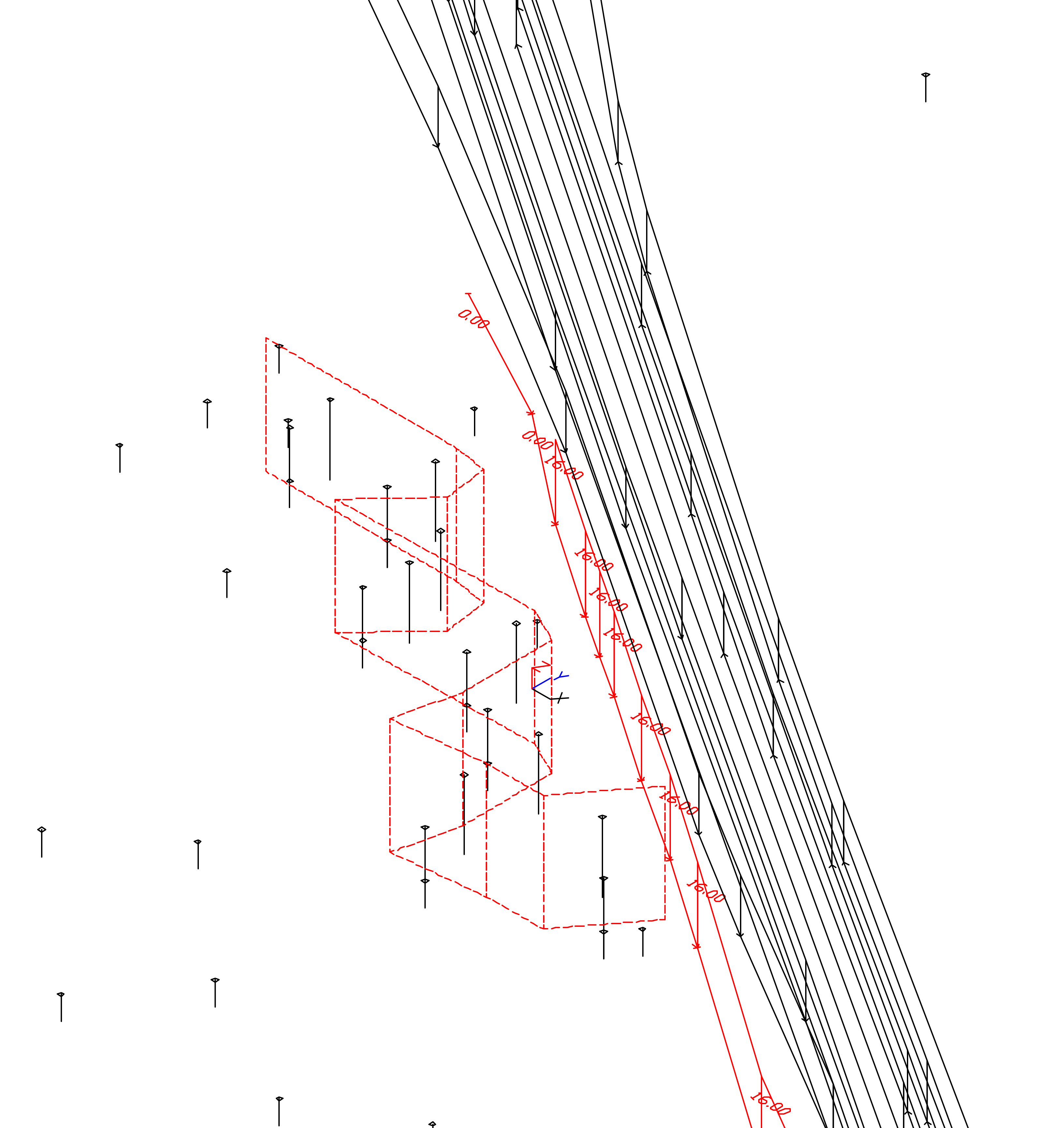
Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

Noise Technical Report
Greenburg to Hall Barrier Analysis (Full Length Height Comparison) - Removal of First Two North End Segments for ROW
217 Auxiliary Lanes

Receiver	Receiver Description	Activity Category	Oregon NAAC	Number of Receptors	Existing (2017)	Build Alternative (2040)		14 FT Barrier						16 FT Barrier					
					TNM Noise Level (dBA)	TNM Noise Level (dBA)	Increase over Existing	TNM Noise Level (dBA)	Insertion Loss (dBA)	Receptors with IL ≥ 7 dBA	Benefitted Receptors (≥ 5 dBA)	Impacted Receptors Receiving 5 dBA IL	Impacted Receptors Not Benefitted	TNM Noise Level (dBA)	Insertion Loss (dBA)	Receptors with IL ≥ 7 dBA	Benefitted Receptors (≥ 5 dBA)	Impacted Receptors Receiving 5 dBA IL	Impacted Receptors Not Benefitted
R3/M3	1st Row Apartment Complex on SW Mandamus Ct.	B	65	Info	**69**	**69**	0	**65**	4				Info	**65**	4				Info
R18	1st Row House at the NE corner of SW North Dakota St. and SW 90th Ave.	B	65	1	**75**	**76**	1	64	12	1	1	1		63	13	1	1	1	
R19	1st Row House on SW North Dakota St. East of SW 90th Ave and North of SW Lomita Ave.	B	65	2	**73**	**74**	1	62	12	2	2	2		62	12	2	2	2	
R20	1st Row Office Building on SW Hall Blvd. North of SW 88th Ave.	C	65	1	0	**66**	66	**66**						**66**					
R28	2nd Row House on SW Longstaff St.	B	65	4	61	62	1	60	2					60	2				
R29	2nd Row House at the NW corner of SW North Dakota St. and SW 90th Ave.	B	65	2	**69**	**70**	1	63	7	2	2	2		62	8	2	2	2	
R30	2nd Row House on SW 90th Ave. North of SW Lomita Ave.	B	65	2	**66**	**67**	1	61	6		2	2		61	6		2	2	
R33	3rd Row House at the SW corner of SW North Dakota St. and SW 90th Ave.	B	65	3	**66**	**66**	0	62	4				3	61	5		3	3	
R34	3rd Row Temple on SW Hall Blvd. East of SW Lomita Ave.	C	65	1	58	58	0	58	0					58	0				
R38	4th Row House on SW 91st Ct.	B	65	5	62	63	1	61	2					60	3				
R39	4th Row House on SW Lomita Ave.	B	65	4	60	61	1	58	3					58	3				
R63	1st Row House on SW 95th Ave. North of SW Mandamus Ct.	B	65	2	**75**	**75**	0	**75**	0				2	**75**	0				2
R64	1st Row Apartment Complex on SW Mandamus Ct. [at the end of the street, on the E side]	B	65	Info	**72**	**72**	0	64	8	Info	Info	Info		63	9	Info	Info	Info	
R65	1st Row House on SW North Dakota St. West of SW 90th Ave and East of SW 93rd Ave.	B	65	1	**72**	**72**	0	64	8	1	1	1		63	9	1	1	1	
R66	2nd Row House on SW 95th Ave. [across SW Mandamus Ct]	B	65	2	**68**	**69**	1	**69**	0				2	**69**	0				2
R67	2nd Row Apartment Complex at the corner of SW Mandamus Ct and SW 95th Ave.	B	65	Info	**67**	**68**	1	**68**	0				Info	**68**	0				Info
R68	2nd Row House on SW 93rd Ave. [at the end of the street, on the E side]	B	65	1	61	61	0	59	2					58	3				
R69	1st Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	1	**69**	**69**	0	63	6		1	1		62	7	1	1	1	
R70	2nd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	**65**	**65**	0	62	3				2	60	5		2	2	
R71	2nd Row House on SW North Dakota St. [across SW 91st Ct.]	B	65	2	**66**	**67**	1	63	4				2	61	6		2	2	
R72	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	61	61	0	58	3					58	3				
R73	3rd Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	2	62	63	1	60	3					59	4				
R74	2nd Row Property Currently under Residential Development	B	65	1	**66**	**66**	0	**66**	0				1	**66**	0				1
R75	3rd Row Property Currently under Residential Development	B	65	4	64	64	0	64	0					63	1				
R76	4th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	2	60	60	0	60	0					60	0				
R77	5th Row House on SW 95th Ave. North of SW North Dakota St.	B	65	4	58	58	0	58	0					57	1				
R78	3rd Row House on SW 93rd Ave. [at the end of the street, on the W side]	B	65	3	59	60	1	58	2					57	3				
R79	4th Row House on SW North Dakota St. East of SW 93rd Ave and West of SW 90th Ave.	B	65	3	59	60	1	58	2					57	3				
R80	5th Row House on SW North Dakota St. East of SW 94th Ave and West of SW 92nd Ave.	B	65	3	58	59	1	57	2					56	3				
R81	5th Row House on SW 91st Ct. East of SW 92nd Ave.	B	65	3	62	62	0	60	2					59	3				
R82	6th Row House on SW 91st Ct. [at the end of the street, on the W side]	B	65	4	59	60	1	58	2					57	3				
R83	6th Row House on SW 90th Ave. South of SW North Dakota St and East of SW 91st Ct.	B	65	3	59	59	0	57	2					57	2				
R84	5th Row House on SW Lomita Ave. [at the end of the street, on the W side]	B	65	2	58	59	1	56	3					56	3				
R85	5th Row House on SW Lomita Ave. [at the end of the street, on the E side]	B	65	2	56	57	1	55	2					55	2				
R87b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**70**	**71**	1	**70**	1				2	**70**	1				2
R88a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	62	63	1	62	1					61	2				
R88b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**65**	**65**	0	64	1				2	63	2				2
R89b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**72**	**73**	1	**71**	2				2	**71**	2				2
R90a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	64	1	62	2					62	2				
R90b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**	**67**	1	**65**	2				2	64	3				2
R91b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	1	**67**	**67**	0	**65**	2				1	**65**	2				1
R92b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**68**	**69**	1	64	5		2	2		63	6		2	2	
R93a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	60	61	1	58	3					58	3				
R93b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	64	**65**	1	62	3				2	60	5		2	2	
R94b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**73**	**74**	1	**68**	6		2	2		**66**	8	2	2	2	
R95a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	64	1	61	3					60	4				
R95b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**67**	**67**	0	64	3				2	63	4				2
R96b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**72**	**73**	1	**67**	6		2	2		**65**	8	2	2	2	
R97a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	63	64	1	61	3					60	4				
R97b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**	**67**	1	64	3				2	63	4				2
R98b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**68**	**69**	1	64	5		2	2		62	7	2	2	2	
R99a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	64	64	0	60	4					59	5		2		
R99b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**66**	**67**	1	63	4				2	61	6		2	2	
R100b	1st Row Apartment Complex on SW Mandamus Ct. Front of Building 2nd Floor Balcony	B	65	2	**73**	**74**	1	**68**	6		2	2		**65**	9	2	2	2	
R101a	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 1st Floor Patio	B	65	2	**70**	**71**	1	63	8	2	2	2		62	9	2	2	2	
R101b	1st Row Apartment Complex on SW Mandamus Ct. Back of Building 2nd Floor Balcony	B	65	2	**73**	**73**	0	**68**	5		2	2		**66**	7	2	2	2	
										8	23	23	29			19	36	34	18

Wall Height (ft):	14	Calculation of Feasible Abatement (a simple majority of impacted receptors receive a minimum of 5 dBA IL):	
Length of Wall (ft):	2,063		
Wall Area (sq. ft):	28,882		
Wall Cost ($/sq. ft):	$20		44 percent
Total Cost of Selected Wall ($):	$577,640		
Cost Effectiveness ($/Benefitted Residence):	$25,114.78		
Cost Reasonableness Criteria ($/Benefitted Residence):	$25,000	Feasible (>50%)?	**No**
Cost Effectiveness < Cost Reasonableness? (yes/no):	**No**	Design Goal (>7 dBA)?	**Yes**

Wall Height (ft):	16	Calculation of Feasible Abatement (a simple majority of impacted receptors receive a minimum of 5 dBA IL):	
Length of Wall (ft):	2,063		
Wall Area (sq. ft):	33,008		
Wall Cost ($/sq. ft):	$20		65 percent
Total Cost of Selected Wall ($):	$660,160		
Cost Effectiveness ($/Benefitted Residence):	$18,337.78		
Cost Reasonableness Criteria ($/Benefitted Residence):	$25,000	Feasible (>50%)?	**Yes**
Cost Effectiveness < Cost Reasonableness? (yes/no):	**Yes**	Design Goal (>7 dBA)?	**Yes**



Sheet 1 of 1 | 24 Aug 2018

Barrier View-16 ft

Project/Contract No.

Run name: 217 Long Barrier Greenburg-Hall at TNM Version 2.5, Feb 2004

Scale: <DNA - due to perspective>

Analysis By:

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

APPENDIX G

TYPICAL CONSTRUCTION NOISE LEVELS

Noise Technical Report

Oregon Department of Transportation
123 NW Flanders Street
Portland, OR 97209

August 2018

		Equipment type	Noise Level (dBA) at 50 feet	Noise Level (dBA) Average at 50 feet[a]	Noise Level (dBA) Average at 50 feet[b]
Equipment Powered by Internal Combustion Engines	Earth Moving	Front Loaders	72–84	78	85
		Backhoes	72–93	83	83
		Tractors	77–96	87	85
		Scrapers	80–93	87	87
		Graders	80–93	84	84
		Pavers	86–89	88	—
		Trucks	82–94	88	—
	Materials Handling	Concrete Mixers	75–88	82	—
		Concrete Pumps	81–84	83	—
		Cranes, Movable	75–88	82	79
		Cranes, Derrick	86–89	88	—
	Stationary	Pumps	68–72	70	—
		Generators	71–82	77	—
		Compressors	74–87	81	73
	Impact Equipment	Mounted Breakers (Hoerams)	76–94[c]	85	—
		Pneumatic Wrenches	82–89	86	—
		Jackhammers & Rock Drills	81–98	90	—
		Impact Drivers (Peak)	95–106	101	—
	Other	Vibrator	69–81	75	—
		Saws	72–82	77	—

[a] From the Colorado Construction Noise Symposium, Construction Noise Ranges Chart

[b] From Highway Construction Noise: Measurement, Prediction and Mitigation. U.S. Department of Transportation, Federal Highway Administration, HH1-22/R10-91(200)EW

[c] From Allied Construction Products, Cleveland, OH 1999