Appendix F

NOISE ASSESSMENT

FINAL

Environmental Noise and Vibration Assessment

Tully Road 76 Station Car Wash Project

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
A	Agriculture Zoning District
ADT	Average Daily Traffic
ANSI	American National Standards Institute
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	The City of San Jose
CN	Commercial Neighborhood Zoning District
CNEL	Community Noise Equivalent Level
CP	Commercial Pedestrian Zoning District
dB	decibel
dBA	A-weighted decibel
DNL	Day night noise level
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating, ventilation, and air conditioning
In./sec.	inches per second
ISO	International Organization of Standardization
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
NSLU	Noise-sensitive land use
PPV	peak particle velocity
PQP	Public/Quasi-Public Zoning Districts
Project	Tully Road 76 Station Car Wash Project
R-1-8	Residential Zoning District
SJC	San Jose International Airport
TNM	Traffic Noise Model

1 Introduction

This report reviews applicable noise standards and criteria, evaluates the existing noise environment, and describes modeling assumptions and methodologies used to predict noise impacts and effects associated with the proposed Tully Road 76 Station Car Wash project (project). The report assesses the potential for project-generated noise levels to result in noise impacts on nearby noise-sensitive receptors and the compatibility of the proposed project with existing and future noise levels in the area. Appendix A provides a glossary of terminology and acoustical concepts used in this memorandum. Appendix B presents the traffic noise modeling and traffic count data. Appendix C presents manufacturer reference noise level data. Appendix D presents details on the studied onsite operational noise sources considered in this assessment.

A comment letter received from the City of San Jose Planning Division, dated November 16, 2022, expressed the need for a noise study to evaluate the potential for noise levels to be generated by the car wash equipment. This analysis evaluates gas station and car wash noise associated with the proposed project.

1.1 Noise Analysis Study Area

The project applicant proposes to reconstruct an existing "76" branded fuel station and convenience store at the eastern corner of Tully Road and McLaughlin Avenue in the City of San Jose, California (City). The proposed reconstruction effort includes the demolition of the existing 1,631 square foot convenience store, fueling canopies, and underground storage tanks. The new facility would include a new fueling canopy, new underground storage tanks, a 3,850 square foot structure consisting of a 2,626 square foot convenience store with service bays, and a car wash with a drive-through. The site is bounded by Tully Road to the northwest, McLaughlin Avenue to the southwest, commercial land uses to the northeast, and the Duc Vien Buddhist Temple to the southeast. The project location is shown on Figure 1.

1.2 Project Description

The proposed project would serve the neighborhood by providing a convenience store, gas station with covered fueling, a car wash with a drive-through, an air/water dispenser, and a self-service vacuum station. The automated car wash structure, a feature adjoining the planned convenience store building and vehicle service bay, would be located on the southeastern portion of the project site, encompassing approximately 1,176 square feet of commercial space. The car wash tunnel and convenience store building adjoin an included indoor equipment room to house the mechanical equipment for the car wash and storage. The car wash would have a queueing capacity for approximately eight (8) vehicles along the eastern façade of the building, with the entrance to the car wash on the northeastern façade and the exit on the southern façade facing to McLaughlin Avenue. The proposed project site plan is shown in Figure 2.

2 Existing Noise Environment

The proposed project is located in the southeastern portion of the City of San Jose, California. The project site is zoned as a CP (Commercial Pedestrian Zoning District) and would be rezoned to CN (Commercial Neighborhood Zoning District). The dominant noise source affecting the overall area is transportation noise, primarily generated

from vehicular traffic on the local roadway network. In addition, there is general community noise associated with residents and visitors of the area participating in general suburban community noise sources (e.g., landscape maintenance, etc.).

The existing ambient noise environment in the project area was quantified through noise measurement surveys of the existing area and through the application of accepted noise prediction methodologies, based on industry-standard references. Separate discussions of identified major noise sources and their respective effects are provided in the following sections.

2.1 Existing Ambient Noise Survey

An ambient noise survey was performed by Dudek from May 9 through 10, 2023, to document the existing noise environment in the project area. Specific consideration was given to documenting noise levels in the vicinity of nearby noise-sensitive receptors and existing transportation noise levels in the project area. Noise measurements were performed in accordance with American National Standards Institute (ANSI) and American Standards for Testing and Measurement guidelines at three (3) locations in the Project vicinity, shown on Figure 3. Long-term monitoring was performed in the southern portion of the proposed project site and is representative of the existing ambient noise level exposure at the nearby noise-sensitive Buddhist temple and residential development to the east, presented as LT1. The long-term noise level data provides information on the daily ambient sound levels, hourly average sound levels and the diurnal patterns of sound in the project vicinity. Short-term noise monitoring was conducted at three (3) locations to provide insight into the existing ambient noise environment in the proposed project vicinity. Ambient noise level data cataloged at the monitoring locations is summarized in Table 1. Detailed long-term monitoring data is provided in Appendix B.

The short-term measurements were conducted by an attending Dudek investigator with a SoftdB “Piccolo” model sound level meter equipped with a windscreen-protected, 0.5-inch diameter pre-polarized condenser microphone with pre-amplifier. The sound level meter meets the current ANSI standard for a Type 2 (General Use) sound level meter.

The unattended long-term SPL monitor deployed and retrieved by the Dudek investigator was a SoftdB “Piccolo” model sound level meter equipped with a windscreen-protected, 0.5-inch diameter pre-polarized condenser microphone with pre-amplifier. The sound level meter meets the current ANSI standard for a Type 2 (General Use) sound level meter.

The accuracy of each sound level meter was verified using a field calibrator before and after the measurements, and the measurements were conducted with the microphone positioned approximately five feet above the ground.

Meteorological conditions during the monitoring periods were stable with temperatures of reaching 102°F; winds were measured at 2 mph with light breezes. The sky was sunny and clear with no precipitation occurring during the monitoring period. The primary noise source affecting the noise monitoring locations was vehicular traffic on the local roadway network.

Table 1. Summary of Ambient Noise Measurements

Site	Location	Date	Time	L_{dn}	Daytime			Nighttime		
					L_{eq}	L_{max}	L_{90}	L_{eq}	L_{max}	L_{90}
Long-Term Monitoring										
LT1	Attached to the fence on the southern corner of the Project site	5/9/23 to 5/10/23	4:00 PM to 4:00 PM	70.6	67.1	95.7	52.4	63.4	93.6	41.8
Short-Term Monitoring										
ST1	On the northern corner of the Project site	5/10/23	3:39 PM to 3:45 PM	78.1[1]	77.0	88.4	69.8	-	-	-
ST2	On the western side of McLaughlin Ave., adjacent to the single-family residence at 2421 McLaughlin Ave.	5/10/23	3:50 PM to 4:00 PM	74.0[1]	71.5	87.8	62.3	-	-	-
ST3	In the Buddhist Temple parking lot southeast of the Project site	5/10/23	4:04 PM to 4:10 PM	64.9[1]	59.2	67.2	55.4	-	-	-

Source: Dudek performed this analysis.

Notes: dBA = A-weighted decibels; L_{dn} = Day Night noise level; L_{eq} = average equivalent noise level; Lmax = maximum noise level; L90 = sound level exceeded 90 percent of the period.

Locations of noise monitoring sites are shown on Figure 3.

1- L_{dn} (24-hour) noise levels calculated based on the modeled offset of traffic noise levels at the measurement locations

2.2 Existing Traffic Noise

Observations and cataloged noise level data collected during the ambient noise survey indicate that the noise level exposure at receptors in the area surrounding the project site is primarily attributable to vehicular traffic. The magnitude of the noise level exposure at each receptor location would be dependent on the relative distance from nearby roadways to noise measurement locations, the volume of vehicles on the roadway, and shielding provided by nearby structures.

To determine existing traffic noise levels and in accordance with industry standards and best practices (including the California Department of Transportation [Caltrans 2020]), the average daily traffic volumes for the roadway segments immediately adjacent to the project site were used as inputs into the Federal Highway Administration (FHWA) Traffic Noise Model (TNM) version 2.5. TNM is a computer-aided prediction model that incorporates sound emissions and sound propagation algorithms based on well-established theory and accepted international standards. The acoustical algorithms contained within TNM have been validated with respect to carefully conducted noise measurement programs and show excellent agreement in most cases for sites with and without noise barriers. The noise modeling accounted for factors such as vehicle volume, speed, vehicle type, roadway configuration, distance to the receiver, project buildings, and existing off-site barriers and buildings.

TNM model validation is the process by which the precision of the modeled relationship between existing objects (roadways, buildings, and other objects between the source and receptor), hourly-equivalent traffic (classified volumes and speeds) and predicted noise levels is confirmed. Since TNM can only predict traffic-induced noise levels, TNM models can only be validated for locations for which traffic was the dominant noise source and where traffic volumes were observed simultaneously with the noise measurements.

TNM model validation is performed by comparing monitored ambient equivalent sound levels to TNM-predicted traffic noise levels generated by the observed traffic volumes. Traffic for Tully Road was observed and counted during the ST1 measurement while traffic for McLaughlin Avenue was counted during the ST2 measurement. These traffic counts were used to validate all three measurement locations. A TNM model is considered validated if it is a reasonable representation of the existing project area, and the TNM-predicted traffic noise levels are within ±3.0 dBA of the monitored equivalent sound levels obtained at locations for which traffic was the dominant noise source. Traffic counts were conducted during two of the short-term measurements for the purpose of model validation. TNM validation was fully achieved for all three measurements conducted for the effort. The validation results are included in Table 2.

Table 2. FHWA TNM Validation Results

Survey Location	Measured L_{eq} (dBA)	Modeled L_{eq} (dBA)	Delta(dBA)
ST1	76.7	73.9	2.8
ST2	71.5	68.6	2.9
ST3	59.2	59.4	-0.2

Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); dBA = A-weighted decibels. See Figure 3 for all measurement locations.

Modeled existing traffic noise levels are summarized in Table 3, based on annual average daily traffic volumes from the City of San Jose (City of San Jose 2021) and adjusted to a common existing year (2019) by utilizing Average Daily Traffic (ADT) data for nearby roadways (specifically US 101) from the Caltrans Traffic Census Program (Caltrans 2023). The traffic noise levels were modeled at receivers representing the nearest building façade of the nearby -sensitive receptors in the project area. As shown in Table 3, predicted existing traffic noise levels ranged from approximately 53 to 72 dBA L_{dn} at nearby noise-sensitive land uses.

Table 3. Summary of Modeled Existing Traffic Noise Levels in the Project Vicinity

Prediction Location	Description	Modeled Day/Night Noise Level (dBA L_{dn})
M1	Single family residence at 2421 McLaughlin Ave.	71.6
M2	The garden of the Duc Vien Buddhist Temple at 2420 McLaughlin Ave.	69.0
M3	Single family residence at 1215 Danforth Ct.	52.9
M4	Basketball court for the San Jose Alliance Christian Church	72.2
M5	Southern façade of the San Jose Alliance Christian Church	67.4

Source: TNM 2023, Dudek 2023

Notes: M= modeled location; dBA = A-weighted decibels; L_{dn} = Day Night noise level

Prediction locations are shown on Figure 4.

2.3 Existing Aircraft Operations

The project site is approximately 4.5 miles southeast of the San Jose International Airport (SJC). The proposed project location is not located within any currently adopted 60-, 65- or 70-dBA community noise equivalent level (CNEL)\L_{dn} airport noise contours. As such, noise associated with existing and future aircraft operations in the area is not a substantial contributor to the ambient noise environment.

2.4 Existing Vibration

There are no major sources of groundborne vibration in the project area. Transportation-related vibration from roadways in the vicinity of the project site is the primary source of groundborne vibration. Heavy truck traffic can generate groundborne vibration, which varies considerably depending on vehicle type, weight, and pavement conditions. However, groundborne vibration levels generated from vehicular traffic are not typically perceptible outside of the roadway right-of-way (Caltrans 2013).

3 Regulatory Criteria

The City has developed and adopted goals and policies with the intent of controlling and diminishing environmental noise and to protect its inhabitants from exposure to excessive noise levels. Local noise standards applicable to the proposed project are contained in the City's General Plan Noise Element Municipal Code, and Council Policy and are summarized in the following sections.

3.1 City of San Jose General Plan

The General Plan Noise Element establishes objectives, policies, and actions to protect its inhabitants against exposure of noise-sensitive uses to loud noise and to prevent encroachment of noise-sensitive uses on existing noise producing facilities.

The General Plan establishes exterior noise level standards and maximum allowable noise exposure levels at noise-sensitive land uses, which are considered "normally acceptable", and represented below in Table 4 (Section EC-1.1 and Table EC-1 of the City of San Jose General Plan). The noise level guidelines are presented in terms of the 24-hour CNEL or DNL noise level in dBA. The intent of these guidelines is to affect new project development through the discretionary review process to reduce potential noise exposure and excessive noise within the community.

As outlined in policy EC-1.2, the General Plan seeks to minimize noise impacts of new development on existing noise-sensitive receptors by limiting the effect a project may have on the existing ambient noise environment. A project is considered to cause a significant noise impact if the DNL at noise-sensitive receptors would increase by 5 dBA or more, where ambient noise levels would remain "Normally Acceptable" (60 dBA DNL); or if a project would result in an increase of 3 dBA or more, where noise levels would equal or exceed the "Normally Acceptable" level (60 dBA DNL).

Policy EC-1.3 of the General Plan limits noise generation for new non-residential land uses which are adjacent to residential land uses, to 55 dBA DNL at the residential property line.

The effects of operational noise are discussed briefly in General Plan Policy EC-1.6, which prescribes regulation of commercial and industrial operational noise levels through application of the City's Municipal Code. The Municipal Code standards are discussed in the following section.

The General Plan provides guidelines for construction operations within Policy EC-1.7, requiring construction operations within San Jose to use best available noise suppression devices and techniques; and limit construction hours near residential uses per the City's Municipal Code (7 A.M. to 7 P.M., Monday through Friday).

Policy EC-1.8 of the General Plan states that commercial drive-thru uses will only be allowed "when consistency with the City's exterior noise level guidelines and compatibility with adjacent land uses can be demonstrated."

Table 4. Land Use Compatibility Guidelines in San Jose

Land Use Category	Exterior Noise Exposure (DNL in Decibels (dBA)) 55 60 65 70 75 80
1. Residential, Hotels and Motels, Hospitals and Residential Care[1]	
2. Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds	
3. Schools, Libraries, Churches, Hospitals, Nursing Homes	
4. Office Buildings – Business, Commercial & Professional	
5. Sports Area, Outdoor Spectator Sports	
6. Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters	

[1] Noise mitigation to reduce interior noise levels pursuant to Policy EC-1.1 is required.

Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
Conditionally Acceptable	Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.
Unacceptable	New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

Source: City of San Jose General Plan (Envision 2040)

3.2 City of San Jose Municipal Code

The City of San Jose Municipal Code addresses and provides a means for protection of the citizens of San Jose through both qualitative and quantitative provisions and prohibitions. The primary purpose of the Code is intended to promote and secure the public health, comfort, safety, welfare and prosperity, and the peace and quiet of the city and its inhabitants. The Code serves as an implementation method for the General Plan and enforcement element for establishing the desired character of the City.

As a means of enforcement, the City of San Jose Code of ordinance contains subjective (qualitative) guidelines, codes and statutes within Chapter 10.16. The City of San Jose provides further guidance and regulation on allowable noise levels within Title 20 of the Code of Ordinances, which are specific to land use. The performance standards vary from a maximum noise level of 55 dBA (e.g., residential) to 70 dBA (e.g., industrial or open space next to industrial uses), unless a conditional use permit is granted.

The City of San Jose Zoning Maps designate the parcel where the existing gasoline station is located as Commercial Pedestrian (CP). The parcels abutting the proposed project site are designated as Planned Development Public/Quasi Public and Industrial uses), Commercial Neighborhood (CN), Agriculture (A), and Residential (R-1-8).

The Municipal Code establishes in Section 20.40.600 that for Commercial Zoning Districts or Public/Quasi-Public Districts (PQP), "the sound pressure level generated by any use or combination of uses on a property shall not exceed the decibel levels indicated in Table 20-105 at any property line, except upon issuance and in compliance with a conditional use permit as provided in Chapter 20.100." Table 20-105 establishes a maximum noise level of 55 dB for commercial or PQP uses adjacent to a property used or zoned for residential purposes (consistent with General Plan Policy EC 1.3); and, 60 dB for commercial or PQP uses adjacent to a property used or zoned for commercial or other non-residential purposes.

The Code is not explicit in terms of the acoustical descriptor associated with the noise level limits established in Table 20-135 of the Code. However, a reasonable interpretation of this standard, based on consistency with policy EC-1.3 of the City's General Plan, the noise level standard would be the "maximum" day-night noise level (DNL).

3.3 Council Policy 6-10

The City of San Jose provides additional guidance for the development and issuance of land uses incorporating a drive-through use. This guidance is provided within Council Policy 6-10, "Criteria for the Review of Drive-Through Uses". Section II of Council Policy 6-10 pertains specifically to noise. The Policy requires that noise levels generated by drive-through speakers are not audible from adjacent residential uses. The Policy also limits the use of drive-through speakers where drive-through lanes directly abut residential uses.

Additionally, Section III of Council Policy 6-10 limits the hours of operation for drive-through uses, stating that the drive-through use shall not operate after 10:00 PM when adjacent to properties that are zoned, planned or used as residential.

4 Methodology

Potential noise impacts associated with the project were calculated and analyzed based on project information presented in the project description, information contained in the project site plan provided by the applicant, information gathered from other similar projects, presentations/papers, and data obtained during on-site noise monitoring. Observations made during the site survey, along with land-use information and aerial photography, was used to determine potential locations of noise-sensitive receptors in the project vicinity.

The aggregate noise emission from these outdoor-exposed sound sources has been predicted with the Datakustik CadnaA sound propagation program. CadnaA is a commercially available software program for the calculation, presentation, assessment, and prediction of environmental noise based on algorithms and reference data per International Organization of Standardization (ISO) Standard 9613-2, "Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation" (ISO 1996). The CadnaA computer software allows one to position sources of sound emission in a simulated three-dimensional (3-D) space having heights and footprints consistent with project architectural plans and elevations. In addition to the above-mentioned sound source inputs and building-block structures that define the three-dimensional sound propagation model space, the following assumptions and parameters are included in this CadnaA-supported stationary noise source assessment:

- Ground effect acoustical absorption coefficient equal to 0.5, which intends to represent an average or blending of ground covers that are characterized largely by hard reflective pavements and existing building surfaces across the project site and the surroundings;

- Reflection order of 1, which allows for a single reflection of sound paths on encountered structural surfaces such as the modeled building masses;
- Off-site residential structures and buildings have not been rendered in the model;
- Calm meteorological conditions (i.e., no wind) with 68 degrees Fahrenheit and 50% relative humidity; and
- All of the modeled noise sources are operating concurrently and continuously for a minimum period of 1 hour.

Noise prediction receivers were placed within the noise model, representing noise-sensitive receptors (i.e., single-family residences, outdoor activity areas, churches, schools, etc.), locations of key interest, and the locations of the noise monitoring sites used during the field survey. Noise prediction receivers are shown on Figure 4. The specific noise prediction receivers used in the CadnaA model are listed in Table 3. Noise levels at the specified noise prediction receivers are calculated as discussed above, based on the assessment methodologies and algorithms applicable to various noise sources discussed below (i.e., stationary/operational sources). In addition to computing sound levels at specific receiver locations, CadnaA was used to develop noise contours showing areas of equal and similar sound level (aka, isopleths). Noise contours generated by CadnaA are displayed in Figure 6.

Traffic noise levels were calculated using the FHWA TNM. Traffic noise levels were modeled for the existing traffic scenario and the existing plus project conditions, based on the traffic data currently available from the City of San Jose. TNM input and output data is presented in Appendix C.

Groundborne vibration impacts were qualitatively assessed based on existing reference documentation, through the application of Caltrans methodology outlined within the Transportation- and Construction- Induced Vibration Guidance Manual, and the relative distance to potentially sensitive receptors from a given vibration source.

5 Project Analysis

5.1 Long-Term Operational Noise Sources

5.1.1 Off-Site Roadway Traffic Noise

The proposed project would result in the contribution of additional vehicle trips on local arterial roadways (i.e., Tully Road and McLaughlin Avenue), which could result in increased traffic noise levels at adjacent noise-sensitive land uses. Appendix C contains traffic volume data based on City of San Jose 2019 (adjusted) ADT volumes. In particular, the proposed project would generate 1,385 ADT along Tully Road and McLaughlin Avenue. Project trip information was based on a March 1993 paper submitted to the Institute of Transportation Engineers Journal (Kawamura 1993). The FHWA TNM was used to quantify predicted traffic noise levels. Information used in the TNM models included the roadway geometry, posted traffic speeds, and traffic volumes for the following scenarios: existing (year 2019) and existing (year 2019) plus project. The predicted L_{dn} values for both scenarios are shown in Table 5.

Table 5. Off-Site Roadway Traffic Noise Modeling Results

Prediction Location	Predicted Noise Level, dBA L_{dn}		
	Existing (2019)	Existing (2019) Plus Project	Change due to Project (dBA)
M1	71.6	71.9	0.3
M2	69.0	69.3	0.3
M3	52.9	52.8	-0.1
M4	72.2	72.3	0.1
M5	67.4	68.2	0.8

The City's Noise Element establishes a policy for exterior use areas of sensitive land uses to be protected from high noise levels. The Noise Element sets 55 dBA L_{dn} for the outdoor (i.e., exterior use) areas and 45 dBA L_{dn} for interior areas (e.g., residential indoor space) as the upper limit for normally acceptable levels. In addition, for the purposes of this noise analysis, traffic-related noise impacts are considered significant when they cause an increase of 3 dB or more from existing noise levels. An increase or decrease in noise level of at least 3 dB is required before any noticeable change in community response would be expected (Caltrans 2013a).

Table 5 shows that at all listed receptor locations, the addition of proposed project traffic to the roadway network would result in an L_{dn} increase of less than 3 dB, which is below the discernible level of change for the average healthy human ear. Thus, a **less-than-significant impact** is expected for proposed project-related off-site traffic noise increases affecting existing residences in the vicinity.

5.1.2 Gas Station, Convenience Store, and Car Wash

The proposed project is expected to feature "stationary" producers of noise associated with onsite operations that are distinct from the transportation noise studied in the preceding section. The assumed major onsite operating noise sources are as follows:

- The 2,626 square foot convenience store would likely feature a set of packaged air-conditioners or refrigeration units on its roof, which one could assume might feature five 5-ton air-cooled condensing units that each resemble a Bryant BH16-060 (Bryant 2017) or comparable model and thus having a reference sound power level of 69 dBA. These rooftop HVAC units would also operate during some or all nighttime hours.
- An approximately 1,176 square-foot car wash. Sound sources include:
  - The three car wash tunnel exit air dryers (blowers) exhibit a total of approximately 104 dBA sound power level.
  - Seven (7) idling vehicles queued up for the car-wash and one (1) idling vehicle at the car-wash exit. Conservatively, a vehicle is considered idling with an overall sound power level of 85 dBA. Six (6) additional vehicles are idling in parking stalls near the proposed convenience store, with a 3 dB attenuation to account for half of the vehicles being off and empty.
- Up to eight (8) fuel pumps operate during the day for no more than 20 minutes in any hour (33% of the time), and each generates no more than 80 dBA sound power level.
- A self-service vacuum unit, exhibiting 77 dBA sound power level.

- An air compressor operating up to 15 minutes per hour (e.g., to recharge a connected tank, from which customers would draw pressure to fill tires) with an overall sound power level of 94.6 dBA (Guyer 2013).

Masonry wall segments located adjacently to the car wash tunnel structure entrance and exit and situated on the southeastern property boundary was also included in the model to assist in achieving applicable City of San Jose noise thresholds. The wall varies in height from six feet high to twelve feet high, with the twelve-foot section being a virtual extension of the proposed car wash tunnel wall beyond the exit port. Figure 5 provides a visual representation of the masonry wall with the recommended wall heights and lengths for each wall segment.

Table 6 compares the predicted aggregate proposed project operation noise emission levels (i.e., at the modeled receptor locations appearing in Figure 4) with the applicable City of San Jose noise thresholds. Figure 6 displays predicted levels from project stationary sources out to a modeled calculation boundary. Appendix D, Operational Noise Model Input and Output Data, provides details of the calculated values appearing in Table 6.

Table 6. Predicted Project Stationary Operations Noise at Nearest Sensitive Receptors

Evaluated Quantity	Modeled Nearest Noise-Sensitive Receptors				
	M1	M2	M3	M4	M5
Predicted Stationary Ops Noise Level (hourly L_{eq})	51	50	41	46	45
Predicted Stationary Ops Noise Level (L_{dn})	58	57	47	52	51
Lowest Calculated Ambient Noise Level (L_{dn})[1]	65	65	65	65	65
Delta (i.e., dB difference of Predicted from Ambient)	-7	-8	-18	-13	-14
L_{dn} Limit (residential/church zone)	60	60	60	60	60
Exceedance?	No	No	No	No	No

1 Calculated using measurement results from ST3, as shown in Table 1

Under these conservative sound modeling conditions (such as all gas station pumps in use, three [3] convenience store parking spaces occupied by idling vehicles, the self-service vacuum and air compressor in operation, and a full queue of cars waiting to use the car-wash) and operating 24 hours a day, no exceedances with respect to the municipal standards (i.e., no predicted increase in ambient level or a predicted level greater than the threshold for the analyzed land use as shown in Table 4) are expected; thus, operational noise impact from stationary sources should be **less than significant**.

5.2 Long-term Operational Groundborne Noise and Vibration

The proposed project does not incorporate any project elements that would generate substantial groundborne noise and vibration levels during its long-term operation. Therefore, this potential environmental impact would be **less than significant**.

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SOURCE: Google 2023; Dudek 2023

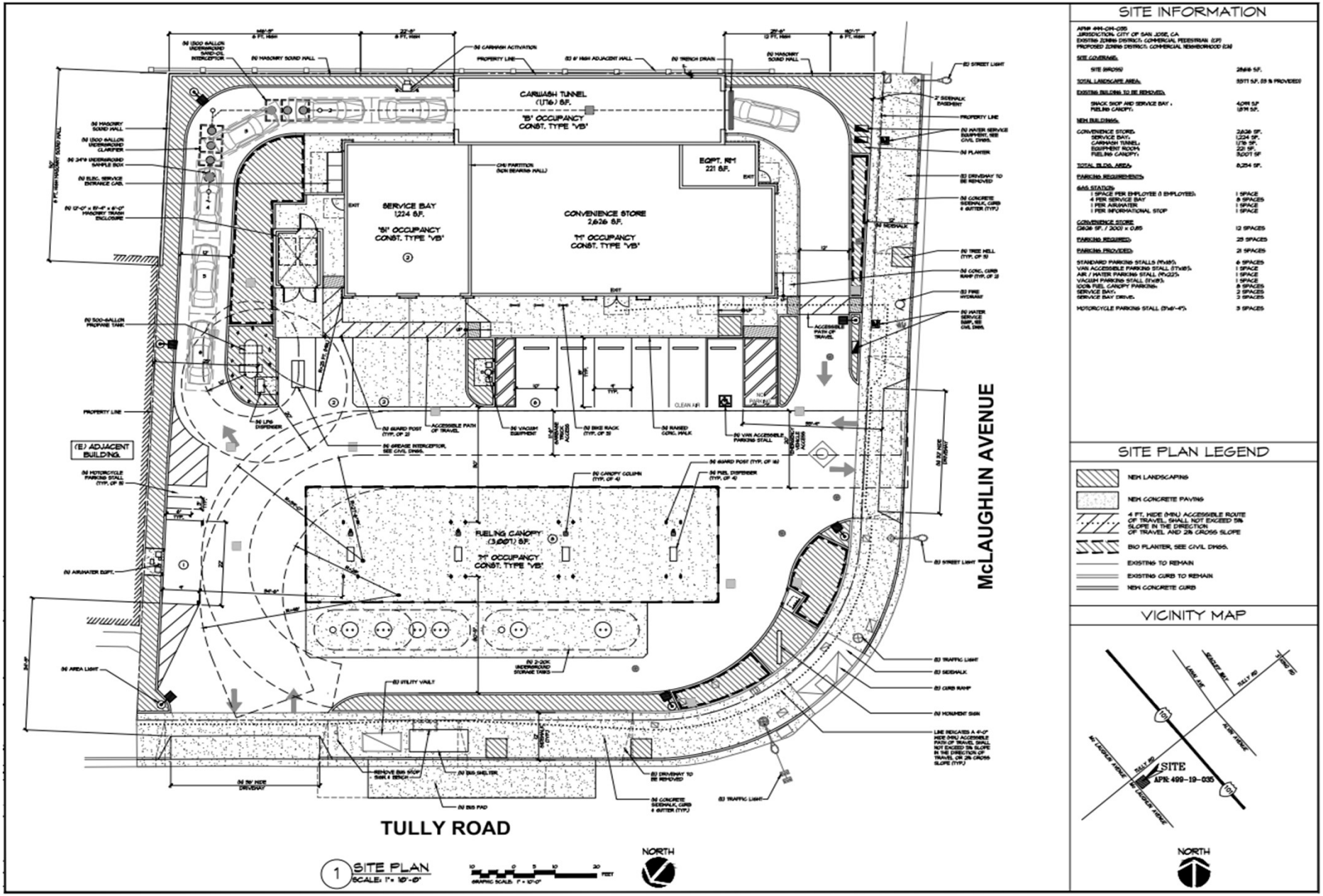
DUDEK

0 59.5 119 Feet

FIGURE 1

Project Location

Tully Road 76 Station Car Wash Project



SOURCE: M&I Architects 2023

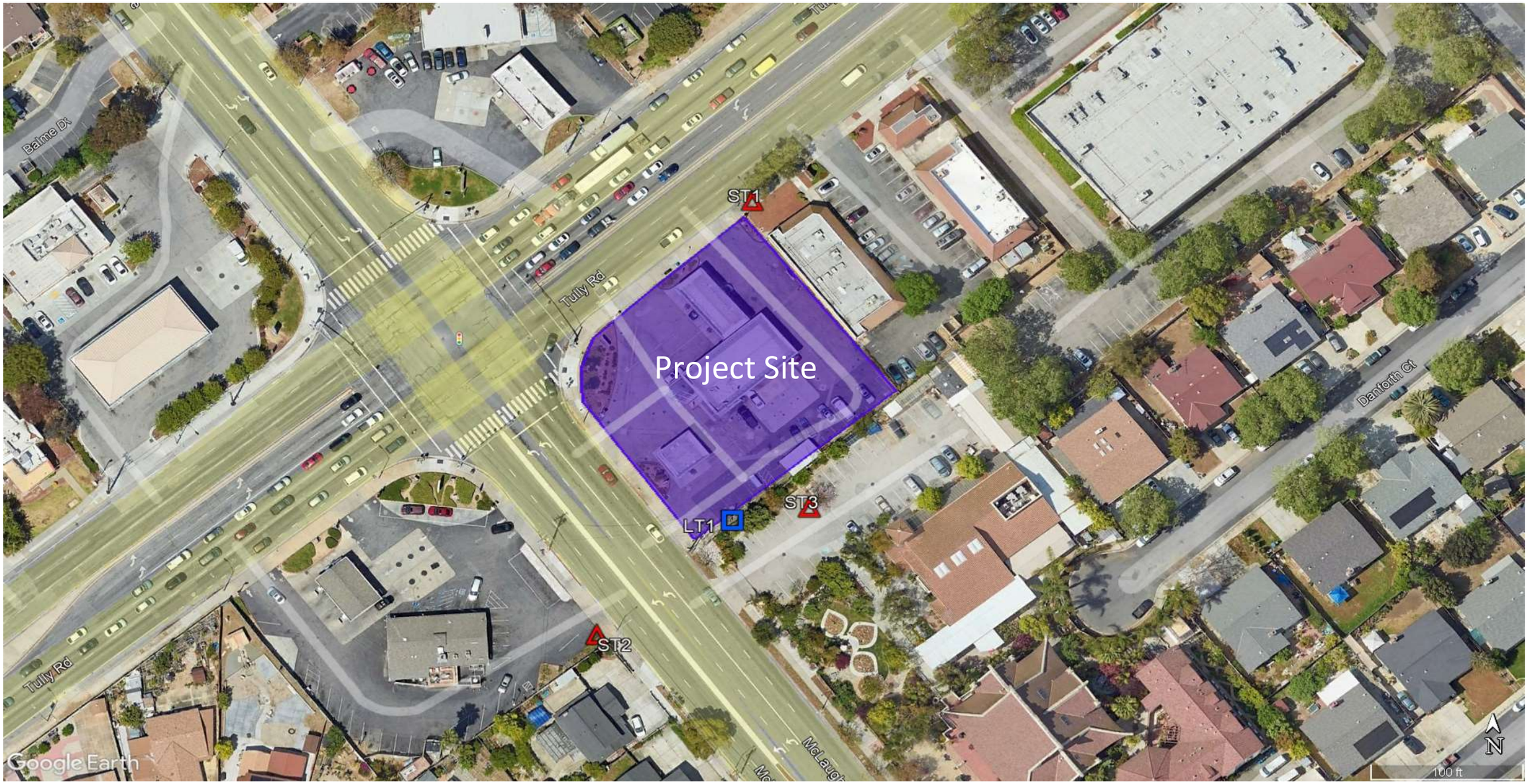
DUDEK

0 18 36 Feet

FIGURE 2

Proposed Site Plan

Tully Road 76 Station Car Wash Project



SOURCE: Google 2023; Dudek 2023

DUDEK

0 44.5 89 Feet

FIGURE 3

Baseline Noise Measurement Locations (Long-term [LT1] and Short-term [ST1, ST2, ST3])

Tully Road 76 Station Car Wash Project



SOURCE: Google 2023; Dudek 2023

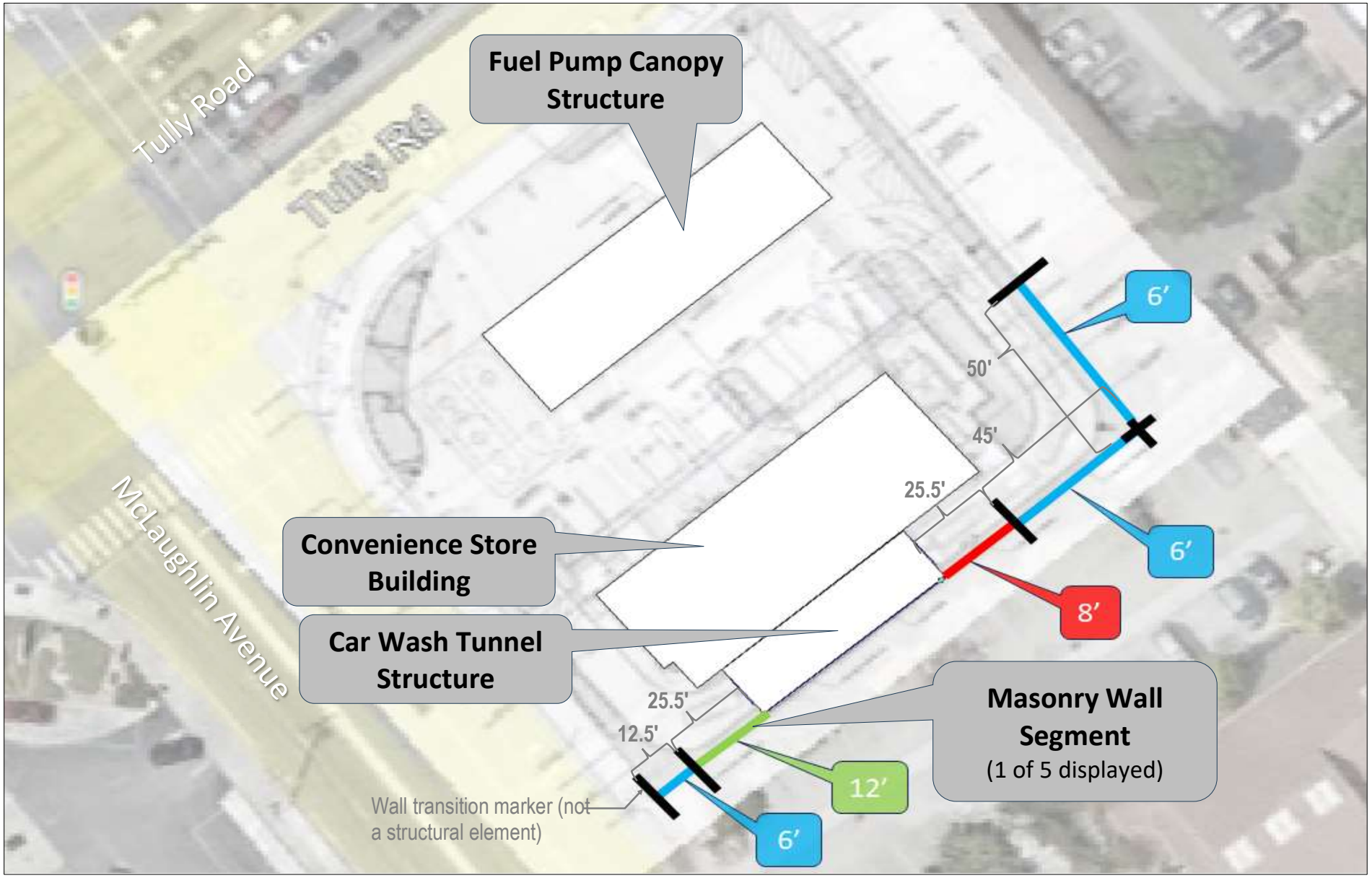
DUDEK

0 44.5 89 Feet

FIGURE 4

Noise Prediction Receiver Locations

Tully Road 76 Station Car Wash Project



SOURCE: Google 2023; Dudek 2023

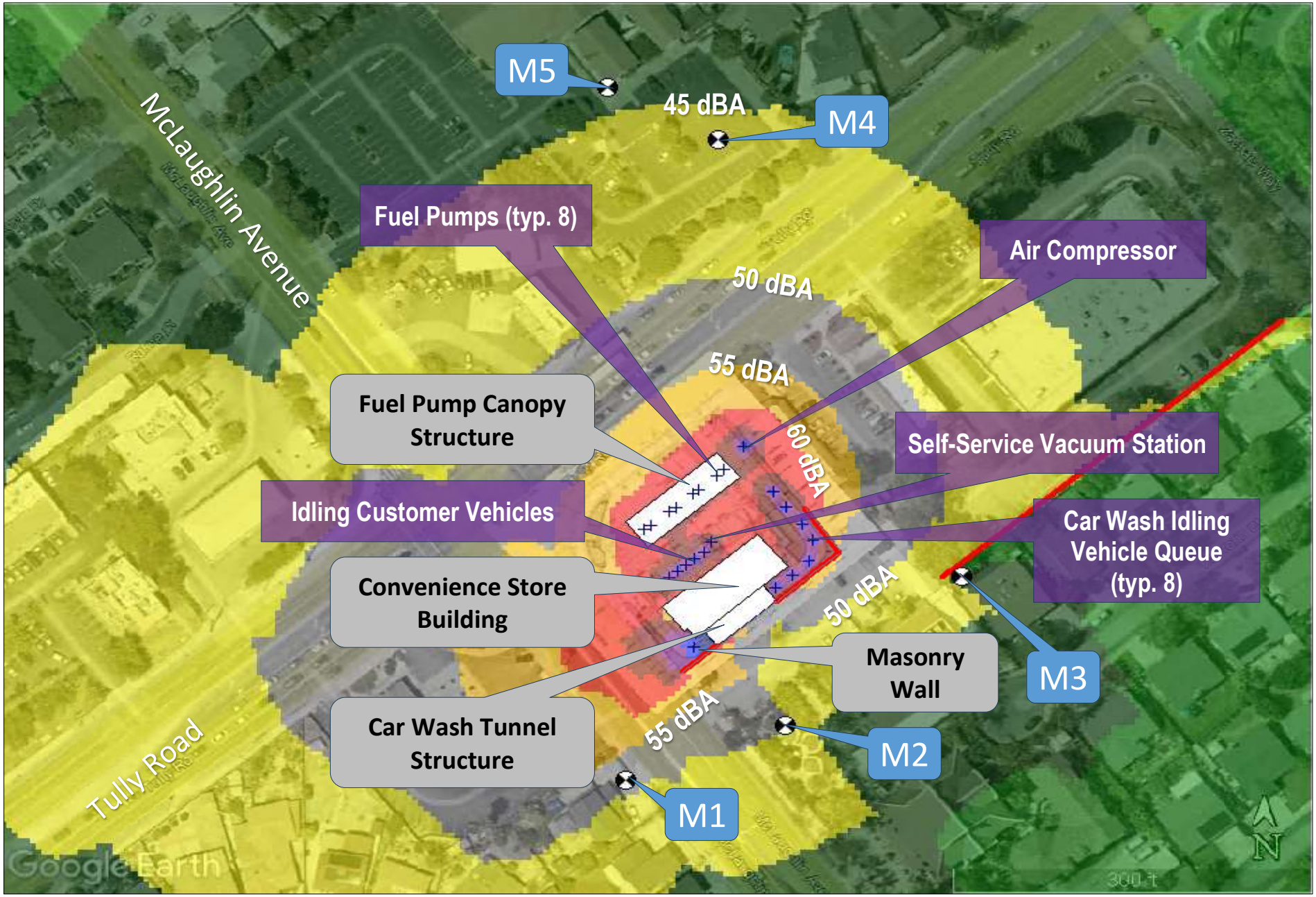
DUDEK

0 26 52 Feet

FIGURE 5

Recommended Masonry Wall Segment Heights and Lengths

Tully Road 76 Station Car Wash Project



SOURCE: Google 2023; Dudek 2023

DUDEK

0 66 132 Feet

FIGURE 6

Predicted Onsite Operations Noise Contours

Tully Road 76 Station Car Wash Project

Appendix A
Acoustic Fundamentals

Appendix A – Acoustic Fundamentals

FUNDAMENTALS OF SOUND

Vibrations, traveling as waves through air from a source, exert a force perceived by the human ear as sound. Sound pressure level (SPL, referred to as sound level) is measured on a logarithmic scale in decibels (dB) that represent the fluctuation of air pressure above and below atmospheric pressure. Frequency, or pitch, is a physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20,000 Hz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are quieter. As noise levels get louder, the human ear starts to hear the frequency spectrum more evenly. To accommodate for this phenomenon, a weighting system to evaluate how loud a noise level is to a human was developed. The frequency weighting called "A" weighting is typically used for quieter noise levels which de-emphasizes the low frequency components of the sound in a manner similar to the response of a human ear. This A-weighted sound level is called the "noise level" and is referenced in units of dBA.

Since sound is measured on a logarithmic scale, a doubling of sound energy results in a 3 dBA increase in the noise level. Changes in a community noise level of less than 3 dBA are not typically noticed by the human ear. Changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. A 5 dBA increase is readily noticeable . The human ear perceives a 10 dBA increase in sound level as a doubling of the sound level (e.g., 65 dBA sounds twice as loud as 55 dBA to a human ear).

An individual's noise exposure occurs over a period of time; however, noise level is a measure of noise at a given instant in time. Community noise sources vary continuously, being the product of many noise sources at various distances, all of which constitute a relatively stable background or ambient noise environment. The background, or ambient, noise level gradually changes throughout a typical day, corresponding to distant noise sources, such as traffic volume, as well as changes in atmospheric conditions

Noise levels are generally higher during the daytime and early evening hours when traffic (including airplanes), commercial, and industrial activity is the greatest. However, noise sources experienced during nighttime hours when background levels are generally lower can be potentially more conspicuous and irritating to the receiver. In order to evaluate noise in a way that considers periodic fluctuations experienced throughout the day and night, a concept termed "community noise equivalent level" (CNEL) was developed, wherein noise measurements are weighted, added, and averaged over a 24-hour period to reflect magnitude, duration, frequency, and time of occurrence. A complete definition of CNEL and other terminology used to describe noise is provided in the following list.

Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-Weighted Sound Level (dBA)	The sound pressure level (SPL) in decibels as measured on a sound level meter (SLM) using the A-weighted filter network, which de-emphasizes the very low and very high frequency components of the measured sound in a manner similar to the frequency response of the average healthy human ear.
Background Sound Level	The amalgam of sounds from indistinct and/or distant sources (e.g., roadway traffic, residential HVAC systems, etc.) that are not nearby or are otherwise the focus of study.
Decibel (dB)	The unit for expressing SPL and is equal to 10 times the logarithm (to the base 10) of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals.
Equivalent Sound Level ($L_{eq[xh]}$)	The value corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period. The L_{eq} may feature notation in its subscript indicating the

	time period (e.g., eight hours as “8h” to populate “[Xh]”) of energy averaging.
Octave Band Center Frequency (OBCF)	Commonly discussed octave frequency bands are: 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz and 16 kHz. Each of these “center frequencies” represents an octave band defined by a lower band limit equal to 0.707 times the center frequency, and an upper band limit equal to 1.414 times the center frequency.
Sound Transmission Loss (TL)	The amount of sound, in decibels (dB), that is isolated by a material or partition in a particular OBCF or 1/3-OBCF. Example: 1/2″ drywall has a TL at 125 Hz of 15 dB.
Sound Transmission Class (STC)	A single-number rating that can be used to conveniently compare, acoustical isolation properties of different materials or assemblies. Generally, higher numbers indicate a material will provide more sound insulation when used as a barrier. Plotted against standardized STC curves, with established curve-fit tolerances, the TL of a material (in dB) at 500 Hz serves as the STC rating.
Statistical Sound Level (L_{XX})	A sound level exceed for a cumulative XX percentage of time within a defined measurement period. The L50 (“L-fifty”) value is thus often called the “median” sound level; and the L90 (“L-ninety”) value is a dB level exceed 90% of the measurement period and hence typically used to evaluate specific continuous or steady-state sound sources, or describe the background sound level (see above definition).

Exterior Noise Distance Attenuation

Noise sources are typically classified in two forms: (1) point sources, such as stationary equipment or a group of construction vehicles and equipment working within a spatially limited area at a given time, and (2) line sources, such as a roadway with a large number of pass-by sources (motor vehicles). Sound generated by a point source typically diminishes (attenuates) at a rate of 6.0 dBA for each doubling of distance from the source to the receptor at acoustically “hard” sites and at a rate of 7.5 dBA for each doubling of distance from source to receptor at acoustically “soft” sites. Sound generated by a line source (i.e., a roadway) typically attenuates at a rate of 3 dBA and 4.5 dBA per doubling distance, for hard and soft sites, respectively. Sound levels can also be attenuated by man-made or natural barriers. For the purpose of sound attenuation discussion, a “hard” or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt or concrete ground surfaces, as well as very hard-packed soils. An acoustically “soft” or absorptive site is characteristic of unpaved loose soil or vegetated ground.

Fundamentals of Vibration

Vibration is an oscillatory motion that can be described in terms of displacement, velocity, or acceleration. The response of humans to vibration is very complex. However, it is generally accepted that human response is best approximated by the vibration velocity level associated with the vibration occurrence.

When evaluating human response, ground-borne vibration is usually expressed in terms of root mean square (RMS) vibration velocity. RMS is defined as the average of the squared amplitude of the vibration signal. As for sound, it is common to express vibration amplitudes in terms of decibels defined as: Lv = 20*LOG(vrms/vref) where vrms is the RMS vibration velocity amplitude in inches/second and vref is the decibel reference of 1x10-6 inches/second (0.000001 ips).

Appendix B
Noise Measurement Data

DUDEK

FIELD NOISE MEASUREMENT DATA

PROJECT: TULLY RD 76 STATION | PROJECT #: 15258
SITE ID: ST1
SITE ADDRESS: TULLY ROAD, ADJACENT TO DRIVEWAY | OBSERVER(S): JVL
START DATE: 5/10/23 | END DATE: 5/10/23
START TIME: 3:39 | END TIME: 3:45

METEOROLOGICAL CONDITIONS

TEMP: 70 F | HUMIDITY: 40 % R.H. | WIND: CALM (LIGHT) MODERATE
WINDSPD: 2 MPH | DIR. N NE S SE S SW W (NW) | (VARIABLE) STEADY GUSTY
SKY: (SUNNY) (CLEAR) OVRCAST PRTLY CLDY FOG RAIN

ACOUSTIC MEASUREMENTS

MEAS. INSTRUMENT: SOFTdB PICCOLO II | TYPE 1 (2) | SERIAL #: 3104
CALIBRATOR: REED R8090 | SERIAL #: 26021
CALIBRATION CHECK | PRE-MEASUREMENT: 94.0 dBA SPL | POST-MEASUREMENT: 94.0 dBA SPL | WINDSCRN: X

SETTINGS: (A-WTD) (SLOW) FAST (FRONTAL) RANDOM ANSI OTHER:

REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC
1	3:39	3:45							
↓									
7									

COMMENTS: REFER TO PICCOLO LOGS FOR SOUND LEVEL DATA.

SOURCE INFO AND TRAFFIC COUNTS

PRIMARY NOISE SOURCE: TRAFFIC AIRCRAFT RAIL INDUSTRIAL OTHER:
ROADWAY TYPE: MAJOR ARTERIAL | DIST. TO RDWY C/L OR EOP: 60'

TRAFFIC COUNT DURATION: ___ MIN | SPEED

COUNT 1 (OR RDWY 1)	DIRECTION	NB/EB	SB/WB	NB/EB SPEED	SB/WB SPEED
	AUTOS	390			
	MED TRKS	2			
	HVY TRKS	4			
	BUSES	2			
	MOTRCLS	2			

IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE ___

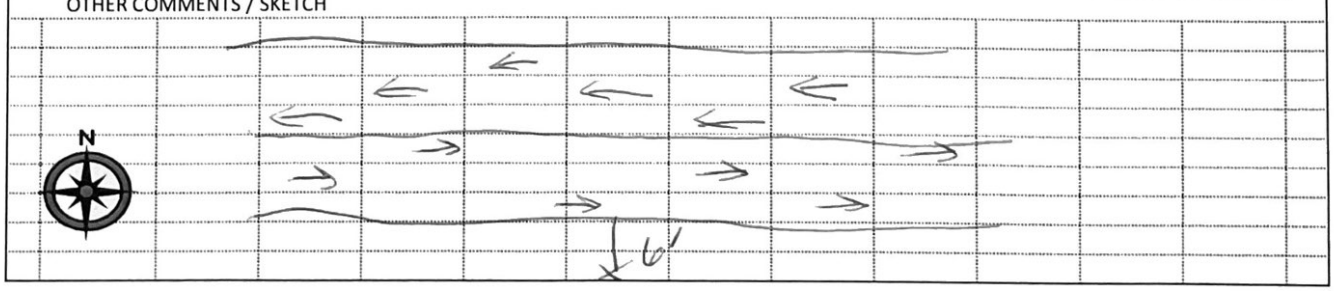
COUNT 2 (OR RDWY 2)	NB/EB	SB/WB	NB/EB SPEED	SB/WB SPEED
___ MIN				

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE 40
POSTED SPEED LIMIT SIGNS SAY:

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL
DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER:

DESCRIPTION / SKETCH

TERRAIN (HARD) SOFT MIXED FLAT OTHER:
PHOTOS
OTHER COMMENTS / SKETCH



DUDEK

FIELD NOISE MEASUREMENT DATA

PROJECT: TULLY ROAD 76 STATION | PROJECT #: 15258
SITE ID: ST2
SITE ADDRESS: MCLAUGHLIN ROAD, N/O D.W | OBSERVER(S): JVL
START DATE: 5/10/23 | END DATE: 5/10/23
START TIME: 3:50 | END TIME: 4:00

METEOROLOGICAL CONDITIONS

TEMP: 70 F | HUMIDITY: 40 % R.H. | WIND: CALM (LIGHT) MODERATE
WINDSPD: 2 MPH | DIR. N NE S SE S SW W (NW) | (VARIABLE) STEADY GUSTY
SKY: (SUNNY) (CLEAR) OVRCAST PRTLY CLDY FOG RAIN

ACOUSTIC MEASUREMENTS

MEAS. INSTRUMENT: SoftdB Piccolo II | TYPE 1 (2) | SERIAL #: 3104
CALIBRATOR: REED R9090 | SERIAL #: 2621
CALIBRATION CHECK | PRE-MEASUREMENT: 94.0 dBA SPL | POST-MEASUREMENT: 94.0 dBA SPL | WINDSCRN: X

SETTINGS: (A-WTD) (SLOW) FAST (FRONTAL) RANDOM ANSI OTHER:

REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC
8	3:50	4:00							
↓									
19									

COMMENTS: REFER TO PICCOLO LOGS FOR SOUND LEVEL DATA

SOURCE INFO AND TRAFFIC COUNTS

PRIMARY NOISE SOURCE: (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL OTHER:
ROADWAY TYPE: ARTERIAL | DIST. TO RDWY C/L OR EOP: 13'
TRAFFIC COUNT DURATION: ___ MIN | SPEED

	DIRECTION	COUNT 1 (OR RDWY 1) NB/EB	COUNT 1 SB/WB	COUNT 1 NB/EB SPEED	COUNT 1 SB/WB SPEED	COUNT 2 (OR RDWY 2) NB/EB	COUNT 2 SB/WB	COUNT 2 NB/EB SPEED	COUNT 2 SB/WB SPEED
	AUTOS	173							
	MED TRKS	0							
	HVY TRKS	0							
	BUSES	3							
	MOTRCLS	0							

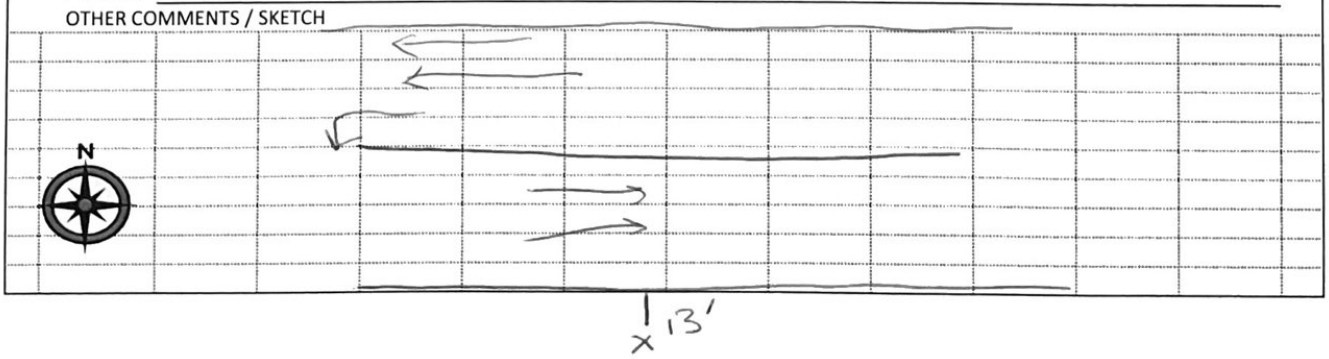
IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE: X

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY: 35

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL
DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER:

DESCRIPTION / SKETCH

TERRAIN (HARD) SOFT MIXED FLAT OTHER:
PHOTOS
OTHER COMMENTS / SKETCH



DUDEK

FIELD NOISE MEASUREMENT DATA

PROJECT: TULLY ROAD 76 STATION — PROJECT #: 15258
SITE ID: ST3
SITE ADDRESS: 2410 MCLAUGHLIN ROAD — OBSERVER(S): JVL
START DATE: 5/10/23 — END DATE: 5/10/23
START TIME: 4:04 — END TIME: 4:10

METEOROLOGICAL CONDITIONS

TEMP: 70 F — HUMIDITY: 40 % R.H. — WIND: CALM (LIGHT) MODERATE
WINDSPD: 2 MPH — DIR. N NE S SE S SW W (NW) — (VARIABLE) STEADY GUSTY
SKY: SUNNY CLEAR OVRCAST PRTLY CLDY FOG RAIN

ACOUSTIC MEASUREMENTS

MEAS. INSTRUMENT: SOFTdB PICCOLO II — TYPE 1 (2) — SERIAL #: 3104
CALIBRATOR: REED R9090 — SERIAL #: 2102
CALIBRATION CHECK — PRE-MEASUREMENT: 94.0 dBA SPL — POST-MEASUREMENT: 94.0 dBA SPL — WINDSCRN: X

SETTINGS: (A-WTD) (SLOW) FAST (FRONTAL) RANDOM ANSI OTHER:

REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC
20	4:04	4:10							
↓									
26									

COMMENTS: REFER TO PICCOLO LOGS FOR SOUND LEVEL DATA.

SOURCE INFO AND TRAFFIC COUNTS

PRIMARY NOISE SOURCE: (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL OTHER:
ROADWAY TYPE: ARTERIAL — DIST. TO RDWY C/L OR (EOP): 85'

TRAFFIC COUNT DURATION: ___ MIN — SPEED ___

	DIRECTION	NB/EB	SB/WB	NB/EB	SB/WB
COUNT 1 (OR RDWY 1)	AUTOS	101			
	MED TRKS	0			
	HVY TRKS	1			
	BUSES	1			
	MOTRCLS	0			

IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE: X

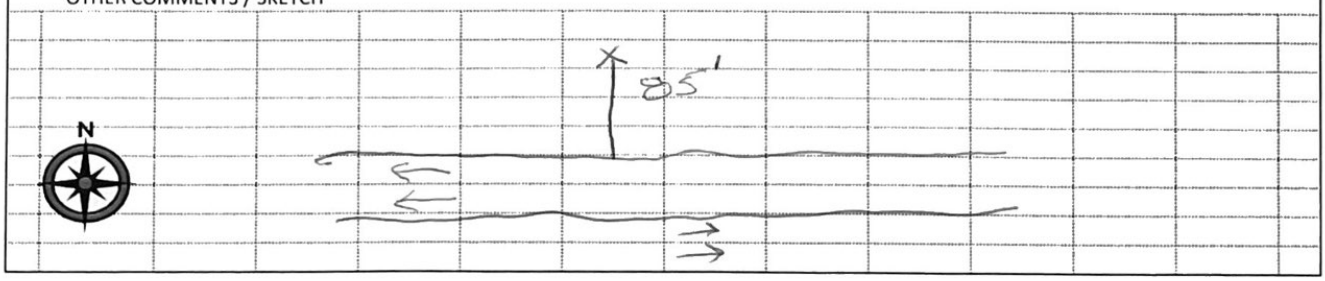
COUNT 2 (OR RDWY 2)	NB/EB	SB/WB	NB/EB	SB/WB

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY: 35

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL
DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER:

DESCRIPTION / SKETCH

TERRAIN (HARD) SOFT MIXED FLAT OTHER:
PHOTOS
OTHER COMMENTS / SKETCH





Noise Measurement Location LT1
Looking South



Noise Measurement Location ST2
Looking East



Noise Measurement Location ST2
Looking South



Noise Measurement Location ST2
Looking North

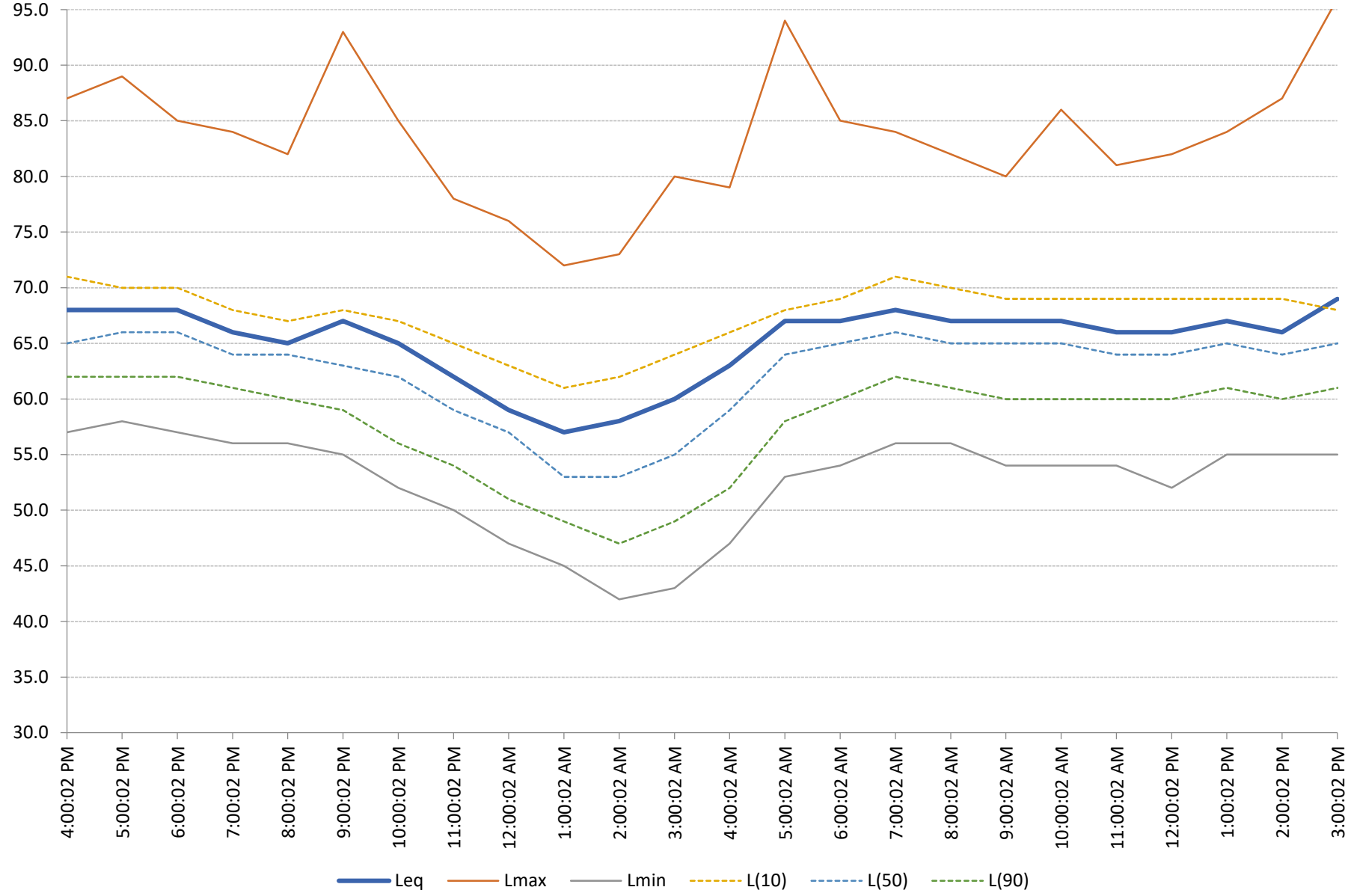
Date	Time	Duration	Leq	Lmax	Lmin	L(10)	L(50)	L(90)
5/9/2023	4:00:02 PM	00:59:58	68.3	86.9	57	70.5	65.2	61.9
5/9/2023	5:00:02 PM	00:59:58	68.2	88.8	58.3	69.8	65.6	62
5/9/2023	6:00:02 PM	00:59:58	67.6	85.4	57.4	69.5	65.6	62.2
5/9/2023	7:00:02 PM	00:59:58	65.9	83.8	55.8	67.9	64.3	60.5
5/9/2023	8:00:02 PM	00:59:58	65.4	81.9	55.6	67.4	63.8	59.7
5/9/2023	9:00:02 PM	00:59:58	67.3	92.6	54.9	67.9	63.3	58.7
5/9/2023	10:00:02 PI	00:59:58	65.4	85.1	52.1	67.4	61.7	56.4
5/9/2023	11:00:02 PI	00:59:58	61.8	78.4	49.8	65.1	59.2	54.2
5/10/2023	12:00:02 AI	00:59:58	59.2	75.7	46.6	62.5	56.5	51.3
5/10/2023	1:00:02 AM	00:59:58	57.2	71.6	45.2	61	53.3	49
5/10/2023	2:00:02 AM	00:59:58	57.8	72.9	41.8	61.8	52.6	46.9
5/10/2023	3:00:02 AM	00:59:58	60.1	80.3	43.2	63.7	54.9	48.9
5/10/2023	4:00:02 AM	00:59:58	62.6	78.7	47.1	66.3	59.3	51.6
5/10/2023	5:00:02 AM	00:59:58	67.4	93.6	53.2	68.4	63.7	58
5/10/2023	6:00:02 AM	00:59:58	66.8	85.1	53.8	69.3	65.1	59.8
5/10/2023	7:00:02 AM	00:59:58	67.8	83.6	56	70.6	65.8	61.9
5/10/2023	8:00:02 AM	00:59:58	66.7	81.7	55.6	69.7	65	61.3
5/10/2023	9:00:02 AM	00:59:58	66.9	80.3	53.7	69.4	65	60.4
5/10/2023	10:00:02 AI	00:59:58	66.5	85.6	54.4	68.8	65	60.1
5/10/2023	11:00:02 AI	00:59:58	66.4	80.9	54	68.8	64.3	60.1
5/10/2023	12:00:02 PI	00:59:58	66.2	82	52.4	68.9	64.2	59.6
5/10/2023	1:00:02 PM	00:59:58	66.7	84.2	55.1	69.2	64.7	60.7
5/10/2023	2:00:02 PM	00:59:58	66.3	86.7	55.1	68.6	64.3	60.4
5/10/2023	3:00:02 PM	00:59:58	69	95.7	54.6	68.3	64.6	60.8
				95.7	52.4			
				93.6	41.8			

		CNEL	DNL
4:00:02 PM	D10	D10	
5:00:02 PM	D11	D11	
6:00:02 PM	D12	D12	
7:00:02 PM	E1	D13	
8:00:02 PM	E2	D14	
9:00:02 PM	E3	D15	
10:00:02 PI	N8	N8	
11:00:02 PI	N9	N9	
12:00:02 AI	N1	N1	
1:00:02 AM	N2	N2	
2:00:02 AM	N3	N3	
3:00:02 AM	N4	N4	
4:00:02 AM	N5	N5	
5:00:02 AM	N6	N6	
6:00:02 AM	N7	N7	
7:00:02 AM	D1	D1	
8:00:02 AM	D2	D2	
9:00:02 AM	D3	D3	
10:00:02 AI	D4	D4	
11:00:02 AI	D5	D5	
12:00:02 PI	D6	D6	
1:00:02 PM	D7	D7	
2:00:02 PM	D8	D8	
3:00:02 PM	D9	D9	

		Leq	Lmax	Lmin	L(10)	L(50)	L(90)
24-hour		66.1	96.0	42.0	67.6	62.4	57.8
Leq day	D	67.3					
Leq eve	E	66.1					
Leq night	N	63.4					
CNEL		71.0					
Leq day	D	67.1					
Leq night	N	63.4					
LDN		70.6					

		Leq	Lmax	Lmin	L(10)	L(50)	L(90)		CNEL	DNL
4:00:02 PM	D10	68.0	87.0	57.0	71.0	65.0	62.0	0	N1	N1
5:00:02 PM	D11	68.0	89.0	58.0	70.0	66.0	62.0	1	N2	N2
6:00:02 PM	D12	68.0	85.0	57.0	70.0	66.0	62.0	2	N3	N3
7:00:02 PM	E1	66.0	84.0	56.0	68.0	64.0	61.0	3	N4	N4
8:00:02 PM	E2	65.0	82.0	56.0	67.0	64.0	60.0	4	N5	N5
9:00:02 PM	E3	67.0	93.0	55.0	68.0	63.0	59.0	5	N6	N6
10:00:02 PI	N8	65.0	85.0	52.0	67.0	62.0	56.0	6	N7	N7
11:00:02 PI	N9	62.0	78.0	50.0	65.0	59.0	54.0	7	D1	D1
12:00:02 AI	N1	59.0	76.0	47.0	63.0	57.0	51.0	8	D2	D2
1:00:02 AM	N2	57.0	72.0	45.0	61.0	53.0	49.0	9	D3	D3
2:00:02 AM	N3	58.0	73.0	42.0	62.0	53.0	47.0	10	D4	D4
3:00:02 AM	N4	60.0	80.0	43.0	64.0	55.0	49.0	11	D5	D5
4:00:02 AM	N5	63.0	79.0	47.0	66.0	59.0	52.0	12	D6	D6
5:00:02 AM	N6	67.0	94.0	53.0	68.0	64.0	58.0	13	D7	D7
6:00:02 AM	N7	67.0	85.0	54.0	69.0	65.0	60.0	14	D8	D8
7:00:02 AM	D1	68.0	84.0	56.0	71.0	66.0	62.0	15	D9	D9
8:00:02 AM	D2	67.0	82.0	56.0	70.0	65.0	61.0	16	D10	D10
9:00:02 AM	D3	67.0	80.0	54.0	69.0	65.0	60.0	17	D11	D11
10:00:02 AI	D4	67.0	86.0	54.0	69.0	65.0	60.0	18	D12	D12
11:00:02 AI	D5	66.0	81.0	54.0	69.0	64.0	60.0	19	E1	D13
12:00:02 PI	D6	66.0	82.0	52.0	69.0	64.0	60.0	20	E2	D14
1:00:02 PM	D7	67.0	84.0	55.0	69.0	65.0	61.0	21	E3	D15
2:00:02 PM	D8	66.0	87.0	55.0	69.0	64.0	60.0	22	N8	N8
3:00:02 PM	D9	69.0	96.0	55.0	68.0	65.0	61.0	23	N9	N9

LT1 Measurement Data



Appendix C

Traffic Noise Model Input and Output Data

Dudek 11 October 2023
CM TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: 15258
RUN: Tully 76 - Existing

Barrier									Points										
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Incre-ment	Perturbs #Up	#Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	0.00				0.00	point1	1	6,172,768.5	1,939,744.0	0.00	8.00	0.00	0	0		
									point2	2	6,172,860.0	1,939,816.6	0.00	8.00	0.00	0	0		
									point85	85	6,172,969.0	1,939,677.4	0.00	8.00	0.00	0	0		
									point3	3	6,173,085.5	1,939,765.8	0.00	8.00					
Barrier2	W	0.00	99.99	0.00				0.00	point4	4	6,172,964.5	1,939,802.0	0.00	12.00	0.00	0	0		
									point5	5	6,173,030.0	1,939,804.6	0.00	12.00	0.00	0	0		
									point6	6	6,173,031.5	1,939,767.6	0.00	12.00	0.00	0	0		
									point7	7	6,172,967.0	1,939,757.0	0.00	12.00	0.00	0	0		
									point8	8	6,172,964.5	1,939,802.0	0.00	12.00					
Barrier3	W	0.00	99.99	0.00				0.00	point9	9	6,173,220.0	1,940,077.4	0.00	12.00	0.00	0	0		
									point10	10	6,173,279.5	1,939,997.4	0.00	12.00	0.00	0	0		
									point11	11	6,173,314.5	1,940,025.9	0.00	12.00	0.00	0	0		
									point12	12	6,173,261.0	1,940,097.9	0.00	12.00	0.00	0	0		
									point13	13	6,173,249.5	1,940,101.0	0.00	12.00	0.00	0	0		
									point14	14	6,173,220.0	1,940,077.4	0.00	12.00					
Barrier4	W	0.00	99.99	0.00				0.00	point15	15	6,173,297.0	1,940,161.5	0.00	12.00	0.00	0	0		
									point16	16	6,173,323.0	1,940,181.4	0.00	12.00	0.00	0	0		
									point17	17	6,173,339.5	1,940,162.6	0.00	12.00	0.00	0	0		
									point18	18	6,173,308.5	1,940,140.2	0.00	12.00	0.00	0	0		
									point19	19	6,173,297.0	1,940,154.2	0.00	12.00	0.00	0	0		
									point20	20	6,173,297.0	1,940,161.5	0.00	12.00					
Barrier5	W	0.00	99.99	0.00				0.00	point21	21	6,173,404.0	1,940,079.4	0.00	12.00	0.00	0	0		
									point22	22	6,173,350.5	1,940,147.9	0.00	12.00	0.00	0	0		
									point23	23	6,173,319.0	1,940,124.4	0.00	12.00	0.00	0	0		
									point24	24	6,173,373.0	1,940,055.6	0.00	12.00	0.00	0	0		
									point25	25	6,173,404.0	1,940,079.4	0.00	12.00					
Barrier6	W	0.00	99.99	0.00				0.00	point26	26	6,173,359.5	1,939,969.5	0.00	8.00	0.00	0	0		
									point27	27	6,173,345.0	1,939,990.1	0.00	8.00	0.00	0	0		
									point28	28	6,173,173.5	1,939,849.0	0.00	8.00					
Barrier7	W	0.00	99.99	0.00				0.00	point29	29	6,173,396.0	1,939,810.0	0.00	12.00	0.00	0	0		
									point30	30	6,173,366.0	1,939,789.2	0.00	12.00	0.00	0	0		
									point31	31	6,173,374.0	1,939,779.4	0.00	12.00	0.00	0	0		
									point32	32	6,173,360.0	1,939,769.4	0.00	12.00	0.00	0	0		
									point33	33	6,173,352.5	1,939,778.6	0.00	12.00	0.00	0	0		
									point34	34	6,173,324.5	1,939,757.9	0.00	12.00	0.00	0	0		

									point35	35	6,173,312.5	1,939,775.0	0.00	12.00	0.00	0	0		
									point36	36	6,173,338.0	1,939,792.9	0.00	12.00	0.00	0	0		
									point37	37	6,173,294.5	1,939,857.9	0.00	12.00	0.00	0	0		
									point38	38	6,173,375.5	1,939,915.8	0.00	12.00	0.00	0	0		
									point39	39	6,173,347.0	1,939,952.0	0.00	12.00	0.00	0	0		
									point40	40	6,173,343.0	1,939,948.4	0.00	12.00	0.00	0	0		
									point41	41	6,173,340.0	1,939,953.2	0.00	12.00	0.00	0	0		
									point42	42	6,173,358.0	1,939,967.5	0.00	12.00					
Barrier8	W	0.00	99.99	0.00				0.00	point43	43	6,173,451.0	1,939,711.2	0.00	12.00	0.00	0	0		
									point44	44	6,173,400.5	1,939,778.5	0.00	12.00	0.00	0	0		
									point45	45	6,173,331.5	1,939,728.8	0.00	12.00	0.00	0	0		
									point46	46	6,173,382.5	1,939,658.2	0.00	12.00	0.00	0	0		
									point47	47	6,173,451.0	1,939,711.2	0.00	12.00					
Barrier9	W	0.00	99.99	0.00				0.00	point48	48	6,173,541.5	1,939,700.9	0.00	12.00	0.00	0	0		
									point49	49	6,173,473.0	1,939,649.6	0.00	12.00	0.00	0	0		
									point50	50	6,173,458.5	1,939,652.1	0.00	12.00	0.00	0	0		
									point51	51	6,173,444.0	1,939,672.2	0.00	12.00	0.00	0	0		
									point52	52	6,173,444.0	1,939,686.1	0.00	12.00	0.00	0	0		
									point53	53	6,173,464.5	1,939,701.6	0.00	12.00	0.00	0	0		
									point54	54	6,173,478.5	1,939,699.0	0.00	12.00	0.00	0	0		
									point55	55	6,173,486.5	1,939,704.9	0.00	12.00	0.00	0	0		
									point56	56	6,173,487.0	1,939,715.2	0.00	12.00	0.00	0	0		
									point57	57	6,173,458.0	1,939,753.1	0.00	12.00	0.00	0	0		
									point58	58	6,173,487.0	1,939,774.8	0.00	12.00	0.00	0	0		
									point59	59	6,173,541.5	1,939,700.9	0.00	12.00					
Barrier10	W	0.00	99.99	0.00				0.00	point60	60	6,173,481.5	1,939,795.6	0.00	8.00	0.00	0	0		
									point61	61	6,173,455.0	1,939,779.0	0.00	8.00	0.00	0	0		
									point62	62	6,173,439.0	1,939,780.6	0.00	8.00	0.00	0	0		
									point63	63	6,173,422.0	1,939,787.4	0.00	8.00	0.00	0	0		
									point64	64	6,173,413.5	1,939,801.9	0.00	8.00	0.00	0	0		
									point65	65	6,173,410.5	1,939,823.9	0.00	8.00	0.00	0	0		
									point66	66	6,173,421.5	1,939,844.2	0.00	8.00	0.00	0	0		
									point67	67	6,173,454.0	1,939,854.5	0.00	8.00					
Barrier11	W	0.00	99.99	0.00				0.00	point68	68	6,173,397.0	1,939,935.5	0.00	8.00	0.00	0	0		
									point69	69	6,173,710.5	1,940,191.8	0.00	8.00					
Barrier12	W	0.00	99.99	0.00				0.00	point70	70	6,173,471.0	1,940,073.1	0.00	12.00	0.00	0	0		
									point71	71	6,173,620.5	1,940,199.0	0.00	12.00	0.00	0	0		
									point72	72	6,173,553.0	1,940,288.9	0.00	12.00	0.00	0	0		
									point73	73	6,173,398.5	1,940,163.8	0.00	12.00	0.00	0	0		
									point74	74	6,173,471.0	1,940,073.1	0.00	12.00					
Barrier13	W	0.00	99.99	0.00				0.00	point75	75	6,172,987.5	1,940,253.5	0.00	10.00	0.00	0	0		
									point76	76	6,172,990.5	1,940,221.9	0.00	10.00	0.00	0	0		
									point77	77	6,173,080.0	1,940,226.8	0.00	10.00	0.00	0	0		
									point78	78	6,173,076.0	1,940,259.5	0.00	10.00	0.00	0	0		
									point79	79	6,172,987.5	1,940,253.5	0.00	10.00					
Barrier14	W	0.00	99.99	0.00				0.00	point80	80	6,173,216.0	1,940,018.1	0.00	10.00	0.00	0	0		
									point81	81	6,173,239.5	1,939,990.2	0.00	10.00	0.00	0	0		
									point84	84	6,173,186.0	1,939,945.8	0.00	10.00	0.00	0	0		
									point82	82	6,173,162.0	1,939,974.6	0.00	10.00	0.00	0	0		

									point83	83	6,173,216.0	1,940,018.1	0.00	10.00						

Dudek					**11 October 2023**	
CM					**TNM 2.5**	
INPUT: BUILDING ROWS						
PROJECT/CONTRACT:	**15258**					
RUN:	**Tully 76 - Existing**					
Building Row			**Points**			
Name	**Average**	**Building**	**No.**	**Coordinates (ground)**		
	Height	**Percent**		**X**	**Y**	**Z**
	ft	%		ft	ft	ft
Building2	12.00	80	1	6,173,743.0	1,940,147.8	0.00
			2	6,173,422.0	1,939,896.8	0.00

Dudek					**11 October 2023**						
CM					**TNM 2.5**						
INPUT: ROADWAYS							**Average pavement type shall be used unless**				
PROJECT/CONTRACT:	**15258**						**a State highway agency substantiates the use**				
RUN:	**Tully 76 - Existing**						**of a different type with the approval of FHWA**				
Roadway		**Points**									
Name	**Width**	**Name**	**No.**	**Coordinates (pavement)**			**Flow Control**			**Segment**	
				X	**Y**	**Z**	**Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Pvmt Type**	**On Struct?**
	ft			ft	ft	ft		mph	%		
Tully EB | W of McLaughlin	44.0	point5	5	6,172,690.0	1,939,725.0	0.00				Average	
		point4	4	6,172,769.0	1,939,786.5	0.00				Average	
		point3	3	6,172,848.0	1,939,848.0	0.00				Average	
		point2	2	6,172,926.0	1,939,910.4	0.00				Average	
		point1	1	6,172,971.0	1,939,945.9	0.00					
Tully EB | E of McLaughlin	44.0	point14	14	6,172,971.0	1,939,945.9	0.00	Signal	0.00	50	Average	
		point13	13	6,173,050.0	1,940,007.5	0.00				Average	
		point12	12	6,173,129.0	1,940,069.0	0.00				Average	
		point11	11	6,173,205.5	1,940,133.4	0.00				Average	
		point10	10	6,173,282.0	1,940,197.8	0.00				Average	
		point9	9	6,173,358.0	1,940,262.4	0.00				Average	
		point8	8	6,173,434.5	1,940,326.8	0.00				Average	
		point7	7	6,173,511.0	1,940,391.1	0.00				Average	
		point6	6	6,173,587.5	1,940,455.5	0.00					
Tully WB | E of McLaughlin	44.0	point22	22	6,173,557.5	1,940,496.1	0.00				Average	
		point21	21	6,173,480.5	1,940,432.4	0.00				Average	
		point20	20	6,173,403.5	1,940,368.5	0.00				Average	
		point19	19	6,173,325.5	1,940,306.1	0.00				Average	
		point18	18	6,173,247.5	1,940,243.4	0.00				Average	
		point17	17	6,173,170.5	1,940,179.5	0.00				Average	
		point16	16	6,173,093.5	1,940,115.6	0.00				Average	
		point15	15	6,173,034.0	1,940,065.9	0.00					
Tully WB | W of McLaughlin	44.0	point28	28	6,173,034.0	1,940,065.9	0.00	Signal	0.00	50	Average	
		point27	27	6,172,955.0	1,940,004.4	0.00				Average	
		point26	26	6,172,876.0	1,939,942.8	0.00				Average	

		point25	25	6,172,798.0	1,939,880.8	0.00				Average	
		point24	24	6,172,719.5	1,939,818.4	0.00				Average	
		point23	23	6,172,653.0	1,939,764.0	0.00					
McLaughlin NB | S of Tully	28.0	point35	35	6,173,472.5	1,939,410.5	0.00				Average	
		point34	34	6,173,351.0	1,939,571.5	0.00				Average	
		point33	33	6,173,289.5	1,939,655.1	0.00				Average	
		point32	32	6,173,231.5	1,939,737.1	0.00				Average	
		point31	31	6,173,170.5	1,939,816.8	0.00				Average	
		point30	30	6,173,111.5	1,939,897.5	0.00				Average	
		point29	29	6,173,057.5	1,939,971.5	0.00					
McLaughlin NB | N of Tully	28.0	point40	40	6,172,986.5	1,940,064.8	0.00	Signal	20.00	50	Average	
		point39	39	6,172,952.5	1,940,110.5	0.00				Average	
		point38	38	6,172,892.0	1,940,190.4	0.00				Average	
		point37	37	6,172,831.0	1,940,269.4	0.00				Average	
		point36	36	6,172,633.0	1,940,520.9	0.00					
McLaughlin SB | N of Tully	28.0	point45	45	6,172,602.5	1,940,502.2	0.00				Average	
		point44	44	6,172,794.5	1,940,245.9	0.00				Average	
		point43	43	6,172,854.5	1,940,165.8	0.00				Average	
		point42	42	6,172,914.0	1,940,085.6	0.00				Average	
		point41	41	6,172,953.0	1,940,033.4	0.00					
McLaughlin SB | S of Tully	28.0	point53	53	6,173,022.0	1,939,943.6	0.00	Signal	20.00	50	Average	
		point52	52	6,173,053.5	1,939,901.0	0.00				Average	
		point51	51	6,173,113.5	1,939,821.1	0.00				Average	
		point50	50	6,173,173.0	1,939,740.5	0.00				Average	
		point49	49	6,173,234.0	1,939,661.2	0.00				Average	
		point48	48	6,173,257.5	1,939,629.9	0.00				Average	
		point47	47	6,173,352.5	1,939,505.9	0.00				Average	
		point46	46	6,173,444.5	1,939,385.8	0.00					
Tully EB | W of McLaughlin L	28.0	point58	58	6,172,745.0	1,939,800.9	0.00				Average	
		point57	57	6,172,823.5	1,939,863.0	0.00				Average	
		point56	56	6,172,902.5	1,939,924.5	0.00				Average	
		point55	55	6,172,981.0	1,939,985.9	0.00				Average	
		point54	54	6,173,060.0	1,940,047.4	0.00					
Tully WB | E of McLaughlin L	28.0	point62	62	6,173,379.0	1,940,332.2	0.00				Average	
		point61	61	6,173,320.0	1,940,267.8	0.00				Average	
		point60	60	6,173,160.5	1,940,136.4	0.00				Average	
		point59	59	6,173,054.5	1,940,048.4	0.00					
McLaughlin SB | N of Tully L	28.0	point65	65	6,172,747.5	1,940,337.2	0.00				Average	
		point64	64	6,172,792.0	1,940,277.8	0.00				Average	

		point63	63	6,172,974.5	1,940,039.4	0.00					
McLaughlin NB | S of Tully L	28.0	point68	68	6,173,279.5	1,939,646.9	0.00				Average	
		point67	67	6,173,227.0	1,939,709.2	0.00				Average	
		point66	66	6,173,035.0	1,939,967.2	0.00					

Dudek						**11 October 2023**					
CM						**TNM 2.5**					
INPUT: RECEIVERS											
PROJECT/CONTRACT:	**15258**										
RUN:	**Tully 76 - Existing**										
Receiver											
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**Ldn**	**Ldn**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST1	1	1	6,173,207.0	1,940,099.8	0.00	4.92	0.00	66	10.0	8.0	Y
ST2	2	1	6,173,105.5	1,939,791.0	0.00	4.92	0.00	66	10.0	8.0	Y
ST3	3	1	6,173,249.0	1,939,882.2	0.00	4.92	0.00	66	10.0	8.0	Y
M1	5	1	6,173,114.0	1,939,751.0	0.00	4.92	0.00	66	10.0	8.0	Y
M2	6	1	6,173,253.0	1,939,802.2	0.00	4.92	0.00	66	10.0	8.0	Y
M3	7	1	6,173,423.0	1,939,949.5	0.00	4.92	0.00	66	10.0	8.0	Y
M4	8	1	6,173,216.0	1,940,331.6	0.00	4.92	0.00	66	10.0	8.0	Y
M5	10	1	6,173,117.0	1,940,383.2	0.00	4.92	0.00	66	10.0	8.0	Y

Dudek 11 October 2023
CM TNM 2.5

INPUT: TRAFFIC FOR Ldn
PROJECT/CONTRACT: 15258
RUN: Tully 76 - Existing

Roadway Name	Points Name	No.	Segment ADT	Autos			MTrucks			HTrucks			Buses			Motorcycles		
				%D	%N	S	%D	%N	S	%D	%N	S	%D	%N	S	%D	%N	S
			veh/24hrs	%	%	mph	%	%	mph	%	%	mph	%	%	mph	%	%	mph
Tully EB | W of McLaughlin	point5	5	20348	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point4	4	20348	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point3	3	20348	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point2	2	20348	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point1	1																
Tully EB | E of McLaughlin	point14	14	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point13	13	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point12	12	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point11	11	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point10	10	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point9	9	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point8	8	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point7	7	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point6	6																
Tully WB | E of McLaughlin	point22	22	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point21	21	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point20	20	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point19	19	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point18	18	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point17	17	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point16	16	27787	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point15	15																
Tully WB | W of McLaughlin	point28	28	20384	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0

	point27	27	20384	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point26	26	20384	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point25	25	20384	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point24	24	20384	97	97	40	2	2	40	1	1	40	0	0	0	2	0	0
	point23	23																
McLaughlin NB | S of Tully	point35	35	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point34	34	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point33	33	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point32	32	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point31	31	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point30	30	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point29	29																
McLaughlin NB | N of Tully	point40	40	9871	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point39	39	9871	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point38	38	9871	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point37	37	9871	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point36	36																
McLaughlin SB | N of Tully	point45	45	9871	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point44	44	9871	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point43	43	9871	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point42	42	9871	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point41	41																
McLaughlin SB | S of Tully	point53	53	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point52	52	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point51	51	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point50	50	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point49	49	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point48	48	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point47	47	10146	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point46	46																
Tully EB | W of McLaughlin L	point58	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point57	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point56	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point55	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point54	54																
Tully WB | E of McLaughlin L	point62	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	point61	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point60	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point59	59																
McLaughlin SB | N of Tully L	point65	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point64	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point63	63																
McLaughlin NB | S of Tully L	point68	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point67	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point66	66																

Dudek
CM
11 October 2023
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 15258
RUN: Tully 76 - Existing
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing Ldn	No Barrier Ldn		Increase over existing		Type Impact	With Barrier Calculated Ldn	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST1	1	1	0.0	78.1	66	78.1	10	Snd Lvl	78.1	0.0	8	-8.0
ST2	2	1	0.0	74.0	66	74.0	10	Snd Lvl	74.0	0.0	8	-8.0
ST3	3	1	0.0	64.9	66	64.9	10	----	64.9	0.0	8	-8.0
M1	5	1	0.0	71.6	66	71.6	10	Snd Lvl	71.6	0.0	8	-8.0
M2	6	1	0.0	69.0	66	69.0	10	Snd Lvl	69.0	0.0	8	-8.0
M3	7	1	0.0	52.9	66	52.9	10	----	52.9	0.0	8	-8.0
M4	8	1	0.0	72.2	66	72.2	10	Snd Lvl	72.2	0.0	8	-8.0
M5	10	1	0.0	67.4	66	67.4	10	Snd Lvl	67.4	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	8	0.0	0.0	0.0
All Impacted	6	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

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INPUT: BARRIERS
PROJECT/CONTRACT: 15258
RUN: Tully 76 - Existing + Project

Barrier									Points										
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Incre-ment	Perturbs #Up	#Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	0.00				0.00	point1	1	6,172,768.5	1,939,744.0	0.00	8.00	0.00	0	0		
									point2	2	6,172,860.0	1,939,816.6	0.00	8.00	0.00	0	0		
									point96	96	6,172,969.0	1,939,677.4	0.00	8.00	0.00	0	0		
									point3	3	6,173,085.5	1,939,765.8	0.00	8.00					
Barrier2	W	0.00	99.99	0.00				0.00	point4	4	6,172,964.5	1,939,802.0	0.00	12.00	0.00	0	0		
									point5	5	6,173,030.0	1,939,804.6	0.00	12.00	0.00	0	0		
									point6	6	6,173,031.5	1,939,767.6	0.00	12.00	0.00	0	0		
									point7	7	6,172,967.0	1,939,757.0	0.00	12.00	0.00	0	0		
									point8	8	6,172,964.5	1,939,802.0	0.00	12.00					
Barrier3	W	0.00	99.99	0.00				0.00	point9	9	6,173,220.0	1,940,077.4	0.00	12.00	0.00	0	0		
									point10	10	6,173,279.5	1,939,997.4	0.00	12.00	0.00	0	0		
									point11	11	6,173,314.5	1,940,025.9	0.00	12.00	0.00	0	0		
									point12	12	6,173,261.0	1,940,097.9	0.00	12.00	0.00	0	0		
									point13	13	6,173,249.5	1,940,101.0	0.00	12.00	0.00	0	0		
									point14	14	6,173,220.0	1,940,077.4	0.00	12.00					
Barrier4	W	0.00	99.99	0.00				0.00	point15	15	6,173,297.0	1,940,161.5	0.00	12.00	0.00	0	0		
									point16	16	6,173,323.0	1,940,181.4	0.00	12.00	0.00	0	0		
									point17	17	6,173,339.5	1,940,162.6	0.00	12.00	0.00	0	0		
									point18	18	6,173,308.5	1,940,140.2	0.00	12.00	0.00	0	0		
									point19	19	6,173,297.0	1,940,154.2	0.00	12.00	0.00	0	0		
									point20	20	6,173,297.0	1,940,161.5	0.00	12.00					
Barrier5	W	0.00	99.99	0.00				0.00	point21	21	6,173,404.0	1,940,079.4	0.00	12.00	0.00	0	0		
									point22	22	6,173,350.5	1,940,147.9	0.00	12.00	0.00	0	0		
									point23	23	6,173,319.0	1,940,124.4	0.00	12.00	0.00	0	0		
									point24	24	6,173,373.0	1,940,055.6	0.00	12.00	0.00	0	0		
									point25	25	6,173,404.0	1,940,079.4	0.00	12.00					
Barrier6	W	0.00	99.99	0.00				0.00	point26	26	6,173,359.5	1,939,969.5	0.00	8.00	0.00	0	0		
									point27	27	6,173,345.0	1,939,990.1	0.00	8.00	0.00	0	0		
									point28	28	6,173,173.5	1,939,849.0	0.00	8.00					
Barrier7	W	0.00	99.99	0.00				0.00	point29	29	6,173,396.0	1,939,810.0	0.00	12.00	0.00	0	0		
									point30	30	6,173,366.0	1,939,789.2	0.00	12.00	0.00	0	0		
									point31	31	6,173,374.0	1,939,779.4	0.00	12.00	0.00	0	0		
									point32	32	6,173,360.0	1,939,769.4	0.00	12.00	0.00	0	0		
									point33	33	6,173,352.5	1,939,778.6	0.00	12.00	0.00	0	0		
									point34	34	6,173,324.5	1,939,757.9	0.00	12.00	0.00	0	0		

									point35	35	6,173,312.5	1,939,775.0	0.00	12.00	0.00	0	0		
									point36	36	6,173,338.0	1,939,792.9	0.00	12.00	0.00	0	0		
									point37	37	6,173,294.5	1,939,857.9	0.00	12.00	0.00	0	0		
									point38	38	6,173,375.5	1,939,915.8	0.00	12.00	0.00	0	0		
									point39	39	6,173,347.0	1,939,952.0	0.00	12.00	0.00	0	0		
									point40	40	6,173,343.0	1,939,948.4	0.00	12.00	0.00	0	0		
									point41	41	6,173,340.0	1,939,953.2	0.00	12.00	0.00	0	0		
									point42	42	6,173,358.0	1,939,967.5	0.00	12.00					
Barrier8	W	0.00	99.99	0.00				0.00	point43	43	6,173,451.0	1,939,711.2	0.00	12.00	0.00	0	0		
									point44	44	6,173,400.5	1,939,778.5	0.00	12.00	0.00	0	0		
									point45	45	6,173,331.5	1,939,728.8	0.00	12.00	0.00	0	0		
									point46	46	6,173,382.5	1,939,658.2	0.00	12.00	0.00	0	0		
									point47	47	6,173,451.0	1,939,711.2	0.00	12.00					
Barrier9	W	0.00	99.99	0.00				0.00	point48	48	6,173,541.5	1,939,700.9	0.00	12.00	0.00	0	0		
									point49	49	6,173,473.0	1,939,649.6	0.00	12.00	0.00	0	0		
									point50	50	6,173,458.5	1,939,652.1	0.00	12.00	0.00	0	0		
									point51	51	6,173,444.0	1,939,672.2	0.00	12.00	0.00	0	0		
									point52	52	6,173,444.0	1,939,686.1	0.00	12.00	0.00	0	0		
									point53	53	6,173,464.5	1,939,701.6	0.00	12.00	0.00	0	0		
									point54	54	6,173,478.5	1,939,699.0	0.00	12.00	0.00	0	0		
									point55	55	6,173,486.5	1,939,704.9	0.00	12.00	0.00	0	0		
									point56	56	6,173,487.0	1,939,715.2	0.00	12.00	0.00	0	0		
									point57	57	6,173,458.0	1,939,753.1	0.00	12.00	0.00	0	0		
									point58	58	6,173,487.0	1,939,774.8	0.00	12.00	0.00	0	0		
									point59	59	6,173,541.5	1,939,700.9	0.00	12.00					
Barrier10	W	0.00	99.99	0.00				0.00	point60	60	6,173,481.5	1,939,795.6	0.00	8.00	0.00	0	0		
									point61	61	6,173,455.0	1,939,779.0	0.00	8.00	0.00	0	0		
									point62	62	6,173,439.0	1,939,780.6	0.00	8.00	0.00	0	0		
									point63	63	6,173,422.0	1,939,787.4	0.00	8.00	0.00	0	0		
									point64	64	6,173,413.5	1,939,801.9	0.00	8.00	0.00	0	0		
									point65	65	6,173,410.5	1,939,823.9	0.00	8.00	0.00	0	0		
									point66	66	6,173,421.5	1,939,844.2	0.00	8.00	0.00	0	0		
									point67	67	6,173,454.0	1,939,854.5	0.00	8.00					
Barrier11	W	0.00	99.99	0.00				0.00	point68	68	6,173,397.0	1,939,935.5	0.00	8.00	0.00	0	0		
									point69	69	6,173,710.5	1,940,191.8	0.00	8.00					
Barrier12	W	0.00	99.99	0.00				0.00	point70	70	6,173,471.0	1,940,073.1	0.00	12.00	0.00	0	0		
									point71	71	6,173,620.5	1,940,199.0	0.00	12.00	0.00	0	0		
									point72	72	6,173,553.0	1,940,288.9	0.00	12.00	0.00	0	0		
									point73	73	6,173,398.5	1,940,163.8	0.00	12.00	0.00	0	0		
									point74	74	6,173,471.0	1,940,073.1	0.00	12.00					
Barrier14	W	0.00	99.99	0.00				0.00	point80	80	6,172,987.5	1,940,253.5	0.00	0.00	0.00	0	0		
									point81	81	6,172,990.5	1,940,221.9	0.00	0.00	0.00	0	0		
									point82	82	6,173,080.0	1,940,226.8	0.00	0.00	0.00	0	0		
									point83	83	6,173,076.0	1,940,259.5	0.00	0.00	0.00	0	0		
									point84	84	6,172,987.5	1,940,253.5	0.00	0.00					
Barrier15	W	0.00	99.99	0.00				0.00	point85	85	6,173,157.0	1,939,911.5	0.00	10.00	0.00	0	0		
									point86	86	6,173,174.0	1,939,889.5	0.00	10.00	0.00	0	0		
									point87	87	6,173,177.5	1,939,891.8	0.00	10.00	0.00	0	0		
									point88	88	6,173,184.0	1,939,883.1	0.00	10.00	0.00	0	0		

									point89	89	6,173,190.5	1,939,888.1	0.00	10.00	0.00	0	0		
									point90	90	6,173,201.5	1,939,874.0	0.00	10.00	0.00	0	0		
									point91	91	6,173,251.5	1,939,914.5	0.00	10.00	0.00	0	0		
									point92	92	6,173,240.5	1,939,928.1	0.00	10.00	0.00	0	0		
									point93	93	6,173,261.5	1,939,944.2	0.00	10.00	0.00	0	0		
									point94	94	6,173,237.0	1,939,975.0	0.00	10.00	0.00	0	0		
									point95	95	6,173,157.0	1,939,911.5	0.00	10.00					

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INPUT: TRAFFIC FOR Ldn
PROJECT/CONTRACT: 15258
RUN: Tully 76 - Existing + Project

Roadway	Points																		
Name	Name	No.	Segment																
			ADT	Autos			MTrucks			HTrucks			Buses			Motorcycles		
				%D	%N	S	%D	%N	S	%D	%N	S	%D	%N	S	%D	%N	S
			veh/24hrs	%	%	mph	%	%	mph	%	%	mph	%	%	mph	%	%	mph
Tully EB | W of McLaughlin	point5	5	21077	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point4	4	21077	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point3	3	21077	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point2	2	21077	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point1	1																
Tully EB | E of McLaughlin	point14	14	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point13	13	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point12	12	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point11	11	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point10	10	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point9	9	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point8	8	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point7	7	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point6	6																
Tully WB | E of McLaughlin	point22	22	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point21	21	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point20	20	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point19	19	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point18	18	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point17	17	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point16	16	28479	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point15	15																
Tully WB | W of McLaughlin	point28	28	21077	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0

	point27	27	21077	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point26	26	21077	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point25	25	21077	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point24	24	21077	97	97	40	2	2	40	1	1	40	0	0	0	0	0	0
	point23	23																
McLaughlin NB | S of Tully	point35	35	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point34	34	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point33	33	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point32	32	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point31	31	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point30	30	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point29	29																
McLaughlin NB | N of Tully	point40	40	10563	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point39	39	10563	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point38	38	10563	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point37	37	10563	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point36	36																
McLaughlin SB | N of Tully	point45	45	10563	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point44	44	10563	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point43	43	10563	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point42	42	10563	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point41	41																
McLaughlin SB | S of Tully	point53	53	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point52	52	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point51	51	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point50	50	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point49	49	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point48	48	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point47	47	10838	97	97	35	2	2	35	1	1	35	0	0	0	0	0	0
	point46	46																
Tully EB | W of McLaughlin L	point58	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point57	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point56	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point55	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point54	54																
Tully WB | E of McLaughlin L	point62	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	point61	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point60	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point59	59																
McLaughlin SB | N of Tully L	point65	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point64	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point63	63																
McLaughlin NB | S of Tully L	point68	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point67	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	point66	66																

Dudek
CM
11 October 2023
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 15258
RUN: Tully 76 - Existing + Project
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing Ldn	No Barrier Ldn		Increase over existing		Type Impact	With Barrier Calculated Ldn	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST1	1	1	0.0	78.2	66	78.2	10	Snd Lvl	78.2	0.0	8	-8.0
ST2	2	1	0.0	74.3	66	74.3	10	Snd Lvl	74.3	0.0	8	-8.0
ST3	3	1	0.0	64.5	66	64.5	10	----	64.5	0.0	8	-8.0
M1	5	1	0.0	71.9	66	71.9	10	Snd Lvl	71.9	0.0	8	-8.0
M2	6	1	0.0	69.3	66	69.3	10	Snd Lvl	69.3	0.0	8	-8.0
M3	7	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
M4	8	1	0.0	72.3	66	72.3	10	Snd Lvl	72.3	0.0	8	-8.0
M5	10	1	0.0	68.2	66	68.2	10	Snd Lvl	68.2	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	8	0.0	0.0	0.0
All Impacted	6	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek
CM
11 October 2023
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: <Project Name?>
RUN: Tully 76 - Validation
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST1	1	1	0.0	73.9	66	73.9	10	Snd Lvl	73.9	0.0	8	-8.0
ST2	2	1	0.0	68.6	66	68.6	10	Snd Lvl	68.6	0.0	8	-8.0
ST3	3	1	0.0	59.4	66	59.4	10	----	59.4	0.0	8	-8.0
M1	5	1	0.0	48.4	66	48.4	10	----	48.4	0.0	8	-8.0
M2	6	1	0.0	68.1	66	68.1	10	Snd Lvl	68.1	0.0	8	-8.0
M3	7	1	0.0	64.0	66	64.0	10	----	64.0	0.0	8	-8.0
M4	8	1	0.0	66.2	66	66.2	10	Snd Lvl	66.2	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	7	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek **11 October 2023**
CM **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **<Project Name?>**
RUN: **Tully 76 - Validation**

Roadway	Points		Segment									
Name	Name	No.	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Tully EB | W of McLaughlin	point5	5	1950	40	10	40	20	40	10	40	10	40
	point4	4	1950	40	10	40	20	40	10	40	10	40
	point3	3	1950	40	10	40	20	40	10	40	10	40
	point2	2	1950	40	10	40	20	40	10	40	10	40
	point1	1										
Tully EB | E of McLaughlin	point14	14	1950	40	10	40	20	40	10	40	10	40
	point13	13	1950	40	10	40	20	40	10	40	10	40
	point12	12	1950	40	10	40	20	40	10	40	10	40
	point11	11	1950	40	10	40	20	40	10	40	10	40
	point10	10	1950	40	10	40	20	40	10	40	10	40
	point9	9	1950	40	10	40	20	40	10	40	10	40
	point8	8	1950	40	10	40	20	40	10	40	10	40
	point7	7	1950	40	10	40	20	40	10	40	10	40
	point6	6										
Tully WB | E of McLaughlin	point22	22	1950	40	10	40	20	40	10	40	10	40
	point21	21	1950	40	10	40	20	40	10	40	10	40
	point20	20	1950	40	10	40	20	40	10	40	10	40
	point19	19	1950	40	10	40	20	40	10	40	10	40
	point18	18	1950	40	10	40	20	40	10	40	10	40
	point17	17	1950	40	10	40	20	40	10	40	10	40
	point16	16	1950	40	10	40	20	40	10	40	10	40
	point15	15										
Tully WB | W of McLaughlin	point28	28	1950	40	10	40	20	40	10	40	10	40

	point27	27	1950	40	10	40	20	40	10	40	10	40
	point26	26	1950	40	10	40	20	40	10	40	10	40
	point25	25	1950	40	10	40	20	40	10	40	10	40
	point24	24	1950	40	10	40	20	40	10	40	10	40
	point23	23										
McLaughlin NB | S of Tully	point35	35	519	35	0	0	0	0	9	35	0	0
	point34	34	519	35	0	0	0	0	9	35	0	0
	point33	33	519	35	0	0	0	0	9	35	0	0
	point32	32	519	35	0	0	0	0	9	35	0	0
	point31	31	519	35	0	0	0	0	9	35	0	0
	point30	30	519	35	0	0	0	0	9	35	0	0
	point29	29										
McLaughlin NB | N of Tully	point40	40	519	35	0	0	0	0	9	35	0	0
	point39	39	519	35	0	0	0	0	9	35	0	0
	point38	38	519	35	0	0	0	0	9	35	0	0
	point37	37	519	35	0	0	0	0	9	35	0	0
	point36	36										
McLaughlin SB | N of Tully	point45	45	519	35	0	0	0	0	9	35	0	0
	point44	44	519	35	0	0	0	0	9	35	0	0
	point43	43	519	35	0	0	0	0	9	35	0	0
	point42	42	519	35	0	0	0	0	9	35	0	0
	point41	41										
McLaughlin SB | S of Tully	point53	53	519	35	0	0	0	0	9	35	0	0
	point52	52	519	35	0	0	0	0	9	35	0	0
	point51	51	519	35	0	0	0	0	9	35	0	0
	point50	50	519	35	0	0	0	0	9	35	0	0
	point49	49	519	35	0	0	0	0	9	35	0	0
	point48	48	519	35	0	0	0	0	9	35	0	0
	point47	47	519	35	0	0	0	0	9	35	0	0
	point46	46										
Tully EB | W of McLaughlin L	point58	58	0	0	0	0	0	0	0	0	0	0
	point57	57	0	0	0	0	0	0	0	0	0	0
	point56	56	0	0	0	0	0	0	0	0	0	0
	point55	55	0	0	0	0	0	0	0	0	0	0
	point54	54										
Tully WB | E of McLaughlin L	point62	62	0	0	0	0	0	0	0	0	0	0

	point61	61	0	0	0	0	0	0	0	0	0	0
	point60	60	0	0	0	0	0	0	0	0	0	0
	point59	59										
McLaughlin SB | N of Tully L	point65	65	0	0	0	0	0	0	0	0	0	0
	point64	64	0	0	0	0	0	0	0	0	0	0
	point63	63										
McLaughlin NB | S of Tully L	point68	68	0	0	0	0	0	0	0	0	0	0
	point67	67	0	0	0	0	0	0	0	0	0	0
	point66	66										

Appendix D

Operational Noise Model Input and Output Data

AHUs (plenum-type return fan only, no condenser units [see separate worksheet]):

Building Minimum Ventilation

												A-weighting adjustments	26	13	9	3	0	-1	-1	1	
												average of values for the two fan diameter ranges, per Guyer (Table 12)	plug	40	40	38	34	29	23	19	16	
												average of values for the two fan diameter ranges, per Guyer (Table 12)	tube	47	44	46	47	44	45	38	35	
												per Guyer (Table 12, presumed based on Bies & Hansen ENC)	prop	46	48	55	53	52	48	43	38	
percent GSF actually occupied (and need ventilation):			95																			
														A-weighted PWL (for CadnaA inputs)								
Tag	**Building**	**GSF**	**Avail. SF**	**Height (ft)**	**Avg. minutes to change air***	**Volume (ft3)**	**CFM**	**m^2**	**comparable facility function**	**Pressure (iwg)**	**Pressure (Pa)**	**Q (m^3/s)**	**fantype = plug, tube, or prop**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**OA dB**
return air fans in building rooftop AHUs:																						
Bldg1	Retail	4071	3867	15	15	58012	3867.45	359	retail	2.5	625	2	plug	53	65	66	67	64	57	51	46	**71**
													fan or AHU cabinet liner/interior attenuation (excludes inlet/outlet PWL split, already in calcs above:	2	3	4	5	6	8	10	10	

*from Loren Cook's "Engineering Cookbook", 1999 edition, p. 42

ACCs (air-cooled chillers on rooftops):

Building Interior Comfort

with or without sound insulation? (enter Y/N): y

	tons	LWA	**unweighted** PWL (dB) per OCBF (Hz) at full load (100%)								data for models "without sound insulation" or no "sound blankets"									data for models "with sound insulation" or "sound blankets"								
			63	125	250	500	1000	2000	4000	8000	LWA	63	125	250	500	1000	2000	4000	8000	LWA	63	125	250	500	1000	2000	4000	8000
Bryant BH16-018 (no sound blanket)	1.5	67	66.2	66.2	63.9	63.8	62.3	58.4	56.4	50.3	68	66.2	66.2	63.8	64.1	64.6	59.9	57.7	53.6	67	66.2	66.2	63.9	63.8	62.3	58.4	56.4	50.3
Bryant BH16-024 (no sound blanket)	2	71	65	65	63.7	63.4	68.5	64.7	58.7	52.8	72	63.4	63.4	63.3	63.3	70.4	64.5	59.3	55.5	71	65	65	63.7	63.4	68.5	64.7	58.7	52.8
Bryant BH16-036 (no sound blanket)	3	71	68.2	68.2	66.4	67.5	68.4	59.6	58.2	52.4	72	67.7	67.7	66.8	68.1	69.9	62.8	60.3	55.2	71	68.2	68.2	66.4	67.5	68.4	59.6	58.2	52.4
Bryant BH16-048 (no sound blanket)	4	71	68.4	68.4	67.7	69.7	67.6	59.4	56.4	50	73	67.5	67.5	67.8	70.1	70.6	63.1	58.5	53.3	71	68.4	68.4	67.7	69.7	67.6	59.4	56.4	50
Bryant BH16-060 (no sound blanket)	5	69	63.7	63.7	65.4	67.3	64.9	58.3	56.2	51.9	70	61.7	61.7	65.6	68.1	65.8	59.8	58.4	56.1	69	63.7	63.7	65.4	67.3	64.9	58.3	56.2	51.9
Daikin AGZ-E 30 (w/out sound insulation)	30	85	84	84	83	84	77	75	74	70	88	92	91	88	87	83	78	73	68	85	84	84	83	84	77	75	74	70
Daikin AGZ-E 40 (w/out sound insulation)	40	85	84	84	83	84	77	75	74	70	89	92	91	90	88	84	79	74	69	85	84	84	83	84	77	75	74	70
Daikin AGZ-E 50 (w/out sound insulation)	50	87	85	85	85	86	80	77	75	70	90	93	93	91	89	85	79	74	69	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 60 (w/out sound insulation)	60	87	85	85	85	86	80	77	75	70	91	94	93	94	89	86	81	76	71	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 70 (w/out sound insulation)	70	87	85	85	85	86	80	77	75	70	92	95	95	94	89	87	81	76	71	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 80 (w/out sound insulation)	80	88	88	85	87	86	81	81	77	71	92	95	95	95	89	87	81	76	71	88	88	85	87	86	81	81	77	71
Daikin AGZ-E 90 (w/out sound insulation)	90	88	88	87	87	86	83	80	77	71	93	94	95	92	91	89	83	81	81	88	88	87	87	86	83	80	77	71
Daikin AGZ-E 120 (w/out sound insulation)	120	89	91	85	88	86	82	81	79	72	95	93	96	92	92	90	84	84	82	89	91	85	88	86	82	81	79	72
Daikin AGZ-E 240 (w/out sound insulation)	241	94	94	88	91	90	91	84	82	75	100	98	98	98	95	96	90	90	86	94	94	88	91	90	91	84	82	75

actual percent of GSF occupied: 95

Phase	Building Tag	GSF	Avail. SF	comparable facility function	Avg. GSF per ton*	tons of refrig.	Approx. Qty. of ACCs	tons per ACC	Approx. Total PWL (dBA)
Bldg1	Retail	4071	3867	Retail	165	23.4	5	5	**78**

*based upon "lo" value per Loren Cook's "Engineering Coolbook", 1999 edition, pp. 59-60

	unweighted PWL (dB) per OCBF (Hz) at full load (100%)							
	63	125	250	500	1000	2000	4000	8000
	75	75	75	77	75	66	63	57
a weighting adj								

A-weighted Octave Band Center Frequencies (OBCF, Hz)

		31	63	125	250	500	1000	2000	4000	8000	PWL (dBA)	Notes & Data Source
		-39	-26	-16	-9	-3	0	1	1	-1		A-weighting adjustments (dB)
Carwash Tunnel Interior Sources												
Dryer blower assembly (3 blowers on one "arch")		57	76	81	84	99	90	90	85	78	100	Sonny's Enterprises (Blower Assembly, One Arch, 45 HP)
											10	MD Acoustics - McHolland Retail Noise Impact Study - City of Hemet 10/27/2017
											10	
Total dryer blower noise level		57	76	81	84	99	90	90	85	78	100	

	ft3										building dimensions (ft) L	W	H	
room volume, without absorption	14256	7	7	7	7	7	7	7	7	7	66	18	12	Table 6.2, EEI EPPENG

	lb/ft2	transmission loss (TL) of structural element (w/out penetrations)									
	5	8	14	18	22	27	30	33	35	38	Table 6.3, EEI EPPENG
	10	14	18	22	26	30	33	36	40	45	Table 6.3, EEI EPPENG
	20	20	24	28	30	33	36	39	43	48	Table 6.3, EEI EPPENG
	35	24	28	31	33	36	39	42	47	52	Table 6.3, EEI EPPENG
	50	28	32	34	36	39	42	45	51	56	Table 6.3, EEI EPPENG
	80	31	35	37	39	42	45	48	54	59	Table 6.3, EEI EPPENG
building **wall** transmission loss (TL)	50	28	32	34	36	39	42	45	51	56	Table 6.3, EEI EPPENG
building **roof** transmission loss (TL)	20	20	24	28	30	33	36	39	43	48	Table 6.3, EEI EPPENG
additional data: paint on 8" concrete block (51 lb/ft2) TL				37	46	46	54	59	60		Harris (Noise Control in Buildings, Appx 5.2c)
building **long wall** TL (greater of Harris sample or EPPENG)		28	32	37	46	46	54	59	60	56	
building **short wall** TL (opening, no TL)		0	0	0	0	0	0	0	0	0	

Façade Sound Emission Levels	ft2													
Car Wash Tunnel														
long wall area	792	19	19	19	19	19	19	19	19	19				Table 6.4, EEI EPPENG
long wall sound power (dBA)		**35**	**50**	**50**	**44**	**59**	**42**	**37**	**31**	**28**	L	W	H	Eq. 6.1, EEI EPPENG
exit open end area (from W and H of port, not wall)	100	10	10	10	10	10	10	10	10	10	3.28	10	10	Table 6.4, EEI EPPENG "L" is distance from blower to exit port
exit port sound power (dBA)		**54**	**73**	**78**	**81**	**96**	**87**	**87**	**82**	**75**				Eq. 6.1, EEI EPPENG
roof area	1188	21	21	21	21	21	21	21	21	21				Table 6.4, EEI EPPENG
roof sound power (dBA)		**45**	**60**	**61**	**62**	**74**	**62**	**59**	**50**	**38**	L	W	H	Eq. 6.1, EEI EPPENG
entrance open end area (from W and H of port, not wall)	100	10	10	10	10	10	10	10	10	10	60	10	10	Table 6.4, EEI EPPENG "L" is distance from blower to entrance port
entrance port sound power (dBA)		**29**	**48**	**53**	**56**	**71**	**62**	**62**	**57**	**50**				Eq. 6.1, EEI EPPENG

	Sum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
dB	94.57587	92.74756	86.65056	83.18156	80.78355	80.55055	77.35056	72.57956	69.65855
dB(A)	85.01097	66.54756	70.55056	74.58156	77.58356	80.55055	78.55055	73.57956	68.55856

Car, no-load/ ground run

Original title:"Pkw, Standlauf"

A-weighted sound power level, related to a continuous work

Source type: point
Height of emission: 0,5 m
Reference spectrum: traffic noise

Particularly it is pointed out that the emission data do not include adjustment values for special noise characteristics in accordance with OENORM S 5004 like impulsiveness and tonality.

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Source:
forum SCHALL, Emissionsdatenkatalog, August 2016

Last updated 23-10-2017

	A-weighted Octave Band Center Frequencies (OBCF, Hz)										
Equipment	**31**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**PWL (dBA)**	**Source**
Air Compressor	87	84	84	83	86	89	89	87	84	95	https://www.cedengineering.com/userfiles/An%20Introduction%20to%20Sound%20Level%20Data%20for%20Mech%20&%20Elec%20Equip%20R1.pdf
Vacuum	30	50	49	52	52	58	64	67	69	77	Vacutech