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Memorandum

SRF No. 9154

To: Josh Williams, Senior Planner
City of St. Paul

From: Brett Danner, Senior Associate
Pat Corkle, PE, PTOE, Principal

Date: May 20, 2016

Subject: Snelling Midway AUAR Area Traffic Noise Analysis

Vehicular Traffic Noise Analysis

A traffic noise analysis was completed for the proposed Major League Soccer (MLS) stadium and surrounding mixed-use development located in the southeast quadrant of the University Avenue/Snelling Avenue intersection in St. Paul, MN. An Alternative Urban Areawide Review (AUAR) is being prepared for the proposed development. This traffic noise analysis was prepared to inform the noise-related section of the AUAR document (Item 17 –Noise).

The State of Minnesota's noise pollution rules are outlined in Minnesota Rules Chapter 7030. Under Minn. R. 7030.0030 (Noise Control Requirement), local governments are required to take reasonable measures to prevent the approval of land use activities that will violate the state noise standards immediately upon the establishment of the land use.[1] Minn. R. 7030.0030 states:

> *No person may violate the standards established in part 7030.0040, unless exempted by Minnesota Statutes, section 116.07, subdivision 2a. Any municipality having authority to regulate land use shall take all reasonable measures within its jurisdiction to prevent the establishment of land use activities listed in noise area classification (NAC) 1, 2, or 3 in any location where the standards established in part 7030.0040 will be violated immediately upon establishment of the land use.*

The main objective of this traffic noise analysis is to assist the City of St. Paul in fulfilling its responsibilities under Minn. R. 7030.0030. The analysis includes identifying existing and future (with and without the proposed development) traffic noise levels at the AUAR area, as well as identifying reasonable measures to minimize or mitigate noise impacts at planned land uses within the AUAR area. In addition, traffic noise levels are identified at existing land uses surrounding the AUAR area. This traffic noise analysis was completed consistent with the guidance described in the Minnesota

[1] Minnesota Pollution Control Agency. November 2015. A Guide to Noise Control In Minnesota. Acoustical Properties, Measurement, Analysis, and Regulation available at. https://www.pca.state.mn.us/air/noise-program.

Department of Transportation's (MnDOT) highway noise policy (MnDOT Noise Policy for Type I Federal-aid Projects as per 23 CFR 772, effective June 15, 2015).[2]

Introduction

General Project Description

MUSC Holdings LLC proposes to build an 18,000 seat professional soccer stadium with expansion and standing room capacity to accommodate a maximum of 25,500 visitors (plus 500 employees) in the AUAR area. The AUAR area is bounded by Snelling, University, and St. Anthony Avenues and Pascal Street in Saint Paul's Midway area (see Figure 1). The remainder of the site will be redeveloped in a phased manner to accommodate a mixed-use development including retail and service commercial, hospitality, residential, office, potentially institutional uses and public and private open space.

Background Information on Noise

Noise is defined as any unwanted sound. Sound travels in a wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels. Decibels (dB) represent the logarithm of the ratio of a sound energy relative to a reference sound energy. For highway traffic noise, an adjustment, or weighting, of the high- and low- pitched sound is made to approximate the way that an average person hears sound. The adjusted sound levels are stated in units of "A-weighted decibels" (dBA). A sound increase of 3 dBA is barely noticeable by the human ear, a 5 dBA increase is clearly noticeable, and a 10 dBA increase is heard as twice as loud. For example, if the sound energy is doubled (i.e., the amount of traffic doubles), there is a 3 dBA increase in noise, which is just barely noticeable to most people. On the other hand, if traffic increases by a factor of ten times, the resulting sound level will increase by about 10 dBA and be heard to be twice as loud.

In Minnesota, traffic noise impacts are evaluated by measuring and/or modeling the traffic noise levels that are exceeded 10 percent and 50 percent of the time during the hours of the day and/or night that have the loudest traffic scenario. These numbers are identified as the L_{10} and L_{50} levels, respectively. The L_{10} value is the noise level that is exceeded for a total of 10 percent, or 6 minutes, of an hour. The L_{50} value is the noise level that is exceeded for a total of 50 percent, or 30 minutes, of an hour.

[2] The MnDOT Noise Policy is available online on the MnDOT Office of Environmental Stewardship website at http://www.dot.state.mn.us/environment/noise/pdf/mndot-2015-noise-policy.pdf.

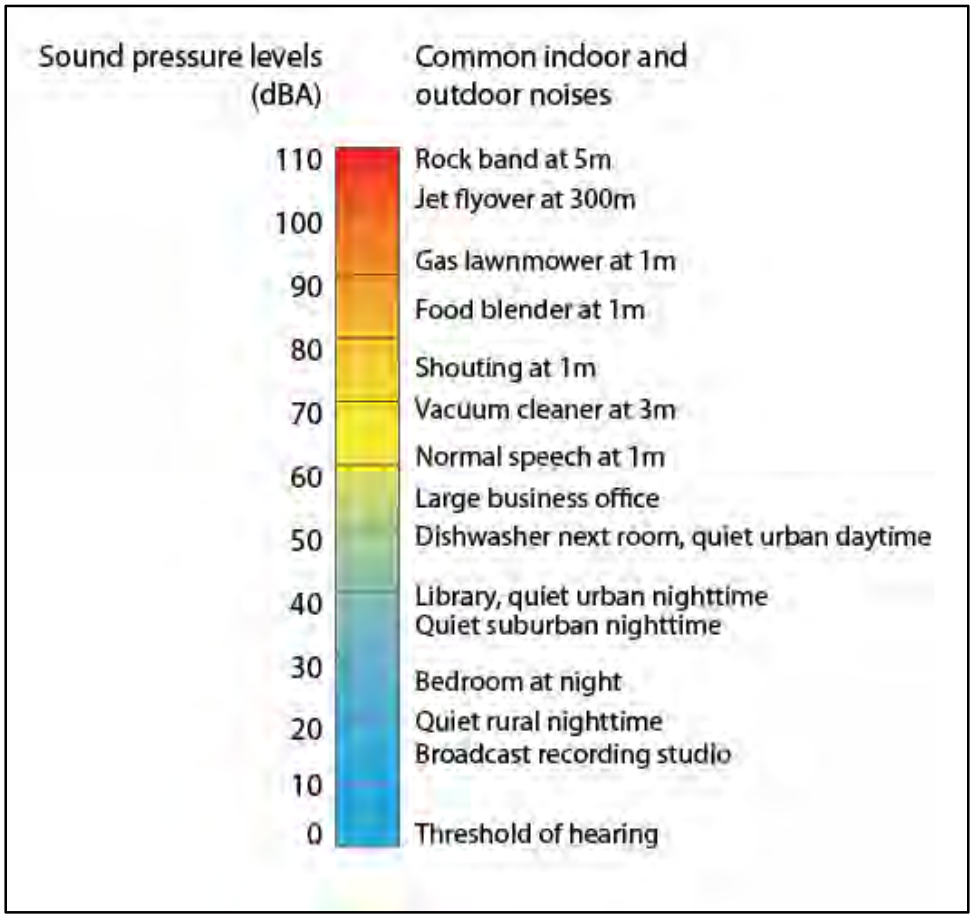
Figure 1. AUAR Area Boundary

Source: Minnesota United MLS Stadium and Surrounding Mixed-Use Urban Village. Scoping Environmental Assessment Worksheet (EAW).

Figure 5-3: AUAR Boundary Area.

Figure 2 provides a rough comparison of the noise levels of some common noise sources.

Figure 2. Decibel Levels of Common Noise Sources



Source: Minnesota Pollution Control Agency. 2016. Noise Program available at https://www.pca.state.mn.us/air/noise-program.

Along with the volume of traffic and other factors (e.g., topography of the area and vehicle speed) that contribute to the loudness of traffic noise, the distance of a receptor from a sound's source is also an important factor. Sound level decreases as distance from a source increases. A general rule regarding sound level decrease due to increasing distance from a line source (roadway) that is commonly used is: beyond approximately 50 feet from the sound source, each doubling of distance from the line source over hard ground (such as pavement or water) will reduce the sound level by 3 dBA, whereas each doubling of distance over soft ground (such as vegetated or grassy ground) results in a sound level decrease of 4.5 dBA.

Minnesota State Noise Standards

Minnesota state noise standards have been established for daytime and nighttime periods. For residential land uses (identified as Noise Area Classification 1 or NAC-1), the state standards for L_{10} are 65 dBA for daytime and 55 dBA for nighttime; the state standards for L_{50} are 60 dBA for daytime and 50 dBA for nighttime. The Minnesota Pollution Control Agency (MPCA) defines daytime as 7:00 a.m. to 10:00 p.m. and nighttime from 10:00 p.m. to 7:00 a.m. State noise standards are depicted in Table 1. Minnesota noise standards apply to the outdoor atmosphere (i.e., exterior noise levels).

Table 1. Minnesota State Noise Standards

Land Use	Code	Daytime L10 (4)	Daytime L50 (4)	Nighttime L10 (5)	Nighttime L50 (5)
Residential	NAC-1 (1)	65 dBA	60 dBA	55 dBA	50 dBA
Commercial	NAC-2 (2)	70 dBA	65 dBA	70 dBA	65 dBA
Industrial	NAC-3 (3)	80 dBA	75 dBA	80 dBA	75 dBA

(1) NAC-1 includes household units, transient lodging and hotels, educational, religious, cultural, entertainment, camping, and picnicking land uses.

(2) NAC-2 includes retail and restaurants, transportation terminals, professional offices, parks, recreational, and amusement land uses.

(3) NAC-3 includes industrial manufacturing, transportation facilities (except terminals), and utilities land uses.

(4) Daytime hours from 7:00 a.m. to 10:00 p.m.

(5) Nighttime hours from 10:00 p.m. to 7:00 a.m.

State noise standards apply to trunk highway facilities and roadways within the cities of Minneapolis and St. Paul. Exemptions to state noise standards are found in Minnesota Statutes 2000, Section 116.07 subd. (2a). There it is stated the conditions and roadway types that are exempt from the State noise standards.

Analysis Methodology

Affected Environment

The AUAR area is located in Ramsey County in the City of St. Paul. The AUAR area is an approximately 34.5-acre property. The AUAR area is bordered by Snelling Avenue to the west and Pascal Street to the east. University Avenue and the Green Line Light Rail Transit (LRT) corridor are located along the northern side of the AUAR area. The southern side of the AUAR area is bordered by St. Anthony Avenue (a one-way westbound frontage road) and I-94. Existing noise sources in the vicinity of the AUAR area include noise generated by vehicular traffic as well as by LRT traffic (LRT vehicles and horn noise).

Noise Monitoring

Noise Level Monitoring Results

Noise level monitoring is commonly performed as part of a traffic noise study to document existing noise levels and to validate the noise model for the project (see discussion of "Field Measurements and Predicted Noise Levels" below). Existing noise levels were monitored at three locations within the AUAR area. Noise monitoring locations are illustrated in the AUAR area figure in Attachment A and described below.

- Monitoring Site 1 (M-1) is located along St. Anthony Avenue and the south side of the AUAR area, northwest of the Pascal Street/St. Anthony Avenue intersection.
- Monitoring Site 2 (M-2) is located along Pascal Street and the east side of the AUAR area, approximately half-way between University Avenue and St. Anthony Avenue.
- Monitoring Site 3 (M-3) is located is along the west side of the AUAR area near the Snelling Avenue/St. Anthony Avenue intersection.

Daytime noise levels were collected in April 2016 at the three receptor locations described above. Noise levels were monitored at each location twice; one 30-minute measurement during the morning and one 30-minute measurement during the afternoon.[3] A trained noise monitoring technician was present at each session for the entire field measurement session to ensure correct operation of the sound level meter (SLM). The field measurement results are presented below in Table 2. Monitored daytime traffic noise levels ranged from 63.0 dBA (L_{10}) to 70.5 dBA (L_{10}).

Table 2. Field Measurement Summary Table

Receptor ID	Location Description	Start Time	End Time	Measured Level, L10, dBA	Measured Level, L50, dBA
M-1	South side of AUAR area along St. Anthony Avenue	10:20 AM	10:50 AM	66.5	64.5
M-1	South side of AUAR area along St. Anthony Avenue	12:50 PM	1:20 PM	66.5	64.0
M-2	East side of AUAR area along Pascal Street	11:00 AM	11:30 AM	64.0	59.0
M-2	East side of AUAR area along Pascal Street	1:30 PM	2:00 PM	63.0	58.5

[3] The first measurement at monitoring site 3 (M-3) (southwest corner of AUAR area along Snelling Avenue) was completed at midday. See Table 2 for field measurement start and end times.

Receptor ID	Location Description	Start Time	End Time	Measured Level, L10, dBA	Measured Level, L50, dBA
M-3	Southwest corner of AUAR area along Snelling Avenue	11:45 AM	12:15 PM	70.0	65.0
M-3	Southwest corner of AUAR area along Snelling Avenue	2:15 PM	2:45 PM	70.5	65.0

Field Measurements and Predicted Noise Levels

Noise monitoring results are presented in Table 3 along with the computer modeling results for existing daytime traffic noise levels. Computer modeling results are based on classified traffic (e.g., cars, medium trucks, and heavy trucks) observed during the field measurements. The speeds used for the model predictions were posted speeds (e.g., 55 miles per hour on eastbound and westbound Interstate-94 [I-94], 30 mph on northbound and southbound Snelling Avenue). Noise monitoring results presented in Table 3 are an average of the applicable morning and afternoon field measurements described above.

Table 3. Field Measurements and Predicted Noise Levels

Receptor ID	Field Measurement, L10, dBA	Field Measurement, L50, dBA	Predicted, L10, dBA	Predicted, L50, dBA	Difference (Field – Predicted), L10, dBA	Difference (Field – Predicted), L50, dBA
M-1	66.5	64.3	69.5	68.2	3.0	3.9
M-2	63.5	58.8	65.1	59.6	1.6	0.8
M-3	70.3	65.0	73.3	67.8	3.0	2.8

A discrepancy equal to or less than 3.0 dBA between field measurements and predicted levels is considered acceptable for noise model validation. Monitored traffic noise levels (L_{10}) varied from 1.6 dBA below predicted noise levels at Site M-2 to 3.0 dBA below predicted levels at Site M-1 and Site M-3. The discrepancy between field measurements and predicted levels was equal to or less than the 3.0 dBA (L_{10}) threshold described above. Therefore, the prediction model was utilized without corrections.

Worst Hourly Traffic Noise Analysis

In general, higher traffic volumes, vehicle speeds, and greater numbers of heavy trucks increase the loudness of highway traffic noise. The worst hourly traffic noise impact typically occurs when traffic is flowing more freely (e.g., level of service C conditions) and when heavy truck volumes are the

greatest. For determining the worst-case traffic noise hour, traffic noise levels were modeled for six daytime time periods at 12 representative receptor locations within the AUAR area under existing conditions, taking into account the appropriate classified traffic mix (i.e., cars, medium trucks, heavy trucks)[4] and directional split in traffic volume (e.g., eastbound and westbound I-94, eastbound and westbound University Avenue, northbound and southbound Snelling Avenue). The speeds used for the model predictions were posted speeds.

The daytime L_{10} and L_{50} levels for each of the six modeled time periods are summarized in Table 4. For a majority of the 12 modeled receptor locations, the 9:00 a.m. to 10:00 a.m. period represents the worst-cast traffic noise hour during the daytime period. Based on this analysis, it was determined that the 9:00 a.m. to 10:00 a.m. period represents the worst-case traffic noise hour during the daytime period. The 9:00 a.m. to 10:00 a.m. hour represents a period of higher medium and heavy truck volumes on I-94 at the south end of the AUAR area. The 6:00 a.m. to 7:00 a.m. hour was identified as the loudest hour of the nighttime period because of higher traffic volumes just prior to the start of the morning peak period.

Traffic Noise Modeling

Noise modeling was done using the noise prediction program "MINNOISEV31", a version of the FHWA "STAMINA" model adapted by MnDOT for use in Minnesota. This model uses traffic volumes, speed, class of vehicle,[5] and the typical characteristics of the roadways being analyzed (e.g., roadway horizontal and vertical alignments). The noise modeling assumed free flow conditions through at-grade intersections on local roadways adjacent to the AUAR area (e.g., Snelling Avenue/St. Anthony Avenue intersection, Snelling Avenue/University Avenue intersection, University Avenue/Pascal Street intersection, Pascal Street/St. Anthony Avenue intersection).

[4] Identification of the worst-case traffic noise hour based on May 2006 and June 2002 vehicle classification counts for eastbound and westbound I-94 east of Lexington Avenue in St. Paul (MnDOT Vehicle Classification Count Site #1301), and on February 2016 vehicle classification counts for University Avenue and Lexington Avenue.

[5] The traffic noise analysis for the proposed development followed MnDOT's vehicle classification scheme for use in MINNOISE (cars, medium trucks, and heavy trucks). Cars includes passenger cars, vans, SUVs and pickup trucks; medium trucks include vehicles with six wheels and only two axles, motorcycles, and buses; and heavy trucks include vehicles with three or more axles. See also http://www.dot.state.mn.us/environment/noise/policy/2011.html.

Table 4. Worst Hourly Traffic Noise Summary (Existing Modeled Daytime Noise Levels By Time Period)

Receptor ID	7:00 – 8:00 AM, L_{10}, dBA	7:00 – 8:00 AM, L_{50}, dBA	9:00 – 10:00 AM, L_{10}, dBA	9:00 – 10:00 AM, L_{50}, dBA	11:00 AM – Noon L_{10}, dBA	11:00 AM – Noon L_{50}, dBA	1:00 – 2:00 PM, L_{10}, dBA	1:00 – 2:00 PM, L_{50}, dBA	3:00 – 4:00 PM, L_{10}, dBA	3:00 – 4:00 PM, L_{50}, dBA	5:00 – 6:00 PM, L_{10}, dBA	5:00 – 6:00 PM, L_{50}, dBA
N0	65.5	55.4	67.6	57.8	68.2	59.2	69.2	60.0	68.9	60.5	69.3	61.5
N50	62.5	56.1	63.5	57.0	63.4	57.5	64.4	58.0	63.9	58.5	63.7	58.7
N100	60.7	56.9	61.5	57.3	61.0	57.3	62.0	57.8	61.4	58.0	61.0	57.8
E0	66.3	58.8	66.6	58.6	65.9	58.7	66.6	58.8	66.9	59.7	66.6	60.2
E50	63.2	59.3	63.6	59.2	62.6	58.9	63.4	59.0	63.4	59.4	62.5	59.0
E100	61.7	59.4	62.0	59.4	61.0	58.8	61.7	59.1	61.6	59.3	60.6	58.6
S0	73.5	70.3	73.7	69.9	72.8	69.4	73.3	69.5	73.3	70.0	72.1	69.2
S50	70.4	67.9	70.5	67.7	69.7	67.0	70.0	67.2	70.0	67.5	68.6	66.5
S100	68.5	66.2	68.5	66.1	67.9	65.3	68.1	65.6	68.0	65.8	66.6	64.6
W0	70.0	63.3	70.5	63.3	69.8	63.2	70.7	63.8	70.8	64.8	70.8	65.6
W50	65.8	62.1	66.3	62.0	65.4	61.6	66.2	62.1	66.1	62.7	65.6	62.7
W100	63.7	61.4	64.1	61.4	63.3	60.8	63.9	61.3	63.8	61.6	63.2	61.2
State Standard (NAC-1)	65	60	65	60	65	60	65	60	65	60	65	60
State Standard (NAC-2)	70	65	70	65	70	65	70	65	70	65	70	65
State Standard (NAC-3)	80	75	80	75	80	75	80	75	80	75	80	75

Traffic data for noise model input files included existing[6] and forecast traffic volumes for roadways surrounding the AUAR area. Forecast volumes for the future No Build Alternative (without the proposed development) were based on a 0.5 percent annual growth rate in background traffic volumes. Forecast volumes for the future Build scenario (with the proposed development) include the background traffic growth identified for the No Build Alternative plus the additional traffic generated by planned land uses at the AUAR area. Year 2035 was identified as the future year for analysis. Full build out conditions of the AUAR area are expected to be completed by year 2035.

The daytime hour of analysis was the 9:00 a.m. to 10:00 a.m. hour (see Worst Hourly Traffic Noise Analysis discussion above). The nighttime hour of analysis was the 6:00 a.m. to 7:00 a.m. hour. Traffic noise levels were also analyzed using future (2035) volumes for weekend event arrival (1:00 p.m. – 2:00 p.m.) and departure (4:00 p.m. – 5:00 p.m.) periods. Weekend event arrival and departure periods were evaluated because of higher background traffic levels compared to weekday event periods.

The traffic characteristics used to develop the noise model input from average daily traffic (ADT) volumes is provided in Appendix B. Modeled hourly traffic volumes by vehicle classification for existing conditions, the No Build Alternative, and the Build Alternative scenarios (with proposed development and weekend event conditions) are provided in Attachment C. To account for when congested conditions cause reduce speeds during event arrival and departure periods, a default traffic volume of 1,500 vehicles per lane per hour was used in the noise model input files for I-94, and 700 vehicles per lane per hour for local roadways where appropriate. The posted speed limit was used as the traffic speed for all noise model input files.

The proposed development is anticipated to include construction of new roadways internal to the site. At this stage in the planning process, there is not adequate engineering information (e.g., roadway alignment, profiles, etc.) available to accurately incorporate this internal street network into the traffic noise analysis. The traffic noise analysis was completed based on the existing roadway network surrounding the project site. Existing noise sources in the vicinity of the AUAR area includes traffic noise as well as noise generated from operations of the Green Line LRT. This analysis only considers L_{10} and L_{50} noise levels generated by vehicles (cars, medium trucks, heavy trucks) traveling on area roadways and does not include an evaluation of Green Line LRT.

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[6] Existing traffic volumes from MnDOT annual average daily traffic (AADT) counts (Minnesota Department of Transportation. Office of Transportation Data and Analysis. Traffic Data & Analysis. http://www.dot.state.mn.us/traffic/data/tma.html).

Predicted Noise Levels and Noise Impacts

Noise Receptors

AUAR Area Receptors

Traffic noise levels were identified at 68 representative receptors located at incremental distances from the right of way limits along the north, east, south, and west sides of the AUAR area (e.g., 0 feet, 50 feet, 100 feet, 150 feet, 200 feet, 250 feet, 300 feet, 350 feet, and 400 feet). The purpose of locating representative receptors at these locations was to identify setback distances from existing right of way where modeled traffic noise levels would be at or below state daytime and nighttime standards for different noise area classifications. This analysis was based on existing topography, and assumed no intervening barriers or structures between the modeled receptor locations and roadways adjacent to the AUAR area. AUAR area receptor locations are illustrated in Attachment A.

Receptors Surrounding the AUAR Area

Traffic noise impacts were also assessed by modeling noise levels at representative receptor sites adjacent to the AUAR area along local streets (Snelling Avenue, University Avenue, and Pascal Street). Traffic noise levels were modeled at 12 representative receptor locations representing residential, commercial/office, and transportation (Snelling Avenue LRT Station) uses. Modeled receptors were located at exterior areas where frequent human use occurs. In instances where there was no apparent exterior area of frequent use, the modeled receptor was located at the façade of the building. Modeled receptor locations surrounding the AUAR area are illustrated in Attachment A.

Noise Model Results

AUAR Area Receptors

Daytime and Nighttime Analysis Results

Results of the noise modeling analysis for AUAR area receptors under existing conditions, the future (2035) No Build Alternative, and the future (2035) Build Alternative are tabulated in Table 5 (daytime) and Table 6 (nighttime). The results of the traffic noise modeling analysis are summarized below.

Existing daytime L_{10} noise levels at modeled receptor locations within the AUAR area range from 59.1 dBA to 73.7 dBA, whereas L_{50} noise levels range from 56.8 dBA to 69.9 dBA. Existing nighttime L_{10} modeled noise levels range from 57.9 dBA to 73.0 dBA, whereas L_{50} noise levels range from 52.2 dBA to 69.8 dBA.

Table 5. Traffic Noise Model Results (AUAR Area Receptors) (Daytime Levels)

Receptor ID	Distance from R/W	Existing, L_{10}, dBA	Existing, L_{50}, dBA	No Build (2035), L_{10}, dBA	No Build (2035, L_{50}, dBA	No Build – Existing, L_{10}, dBA	No Build – Existing, L_{50}, dBA	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Build – Existing, L_{10}, dBA	Build – Existing, L_{50}, dBA
N0	0 feet	67.2	57.6	67.7	58.3	0.5	0.7	68.0	58.7	0.8	1.1
N50	50 feet	63.2	56.9	63.6	57.5	0.4	0.6	63.9	57.9	0.7	1.0
N100	100 feet	61.2	57.3	61.5	57.8	0.3	0.5	61.7	58.0	0.5	0.7
N150	150 feet	60.0	57.4	60.3	57.9	0.3	0.5	60.5	58.1	0.5	0.7
N200	200 feet	59.3	57.5	59.7	57.9	0.4	0.4	59.9	58.1	0.6	0.6
N250	250 feet	59.1	57.5	59.4	58.0	0.3	0.5	59.6	58.2	0.5	0.7
N300	300 feet	59.1	57.7	59.4	58.1	0.3	0.4	59.6	58.3	0.5	0.6
N350	350 feet	59.2	57.8	59.6	58.2	0.4	0.4	59.7	58.4	0.5	0.6
N400	400 feet	59.4	58.0	59.8	58.5	0.4	0.5	59.9	58.6	0.5	0.6
E0	0 feet	66.6	58.6	67.0	59.2	0.4	0.6	67.6	60.1	1.0	1.5
E50	50 feet	63.6	59.1	63.9	59.7	0.3	0.6	64.3	60.1	0.7	1.0
E100	100 feet	62.0	59.3	62.3	59.8	0.3	0.5	62.5	60.1	0.5	0.8
E150	150 feet	61.2	59.3	61.5	59.7	0.3	0.4	61.7	59.9	0.5	0.6
E200	200 feet	60.8	59.2	61.2	59.6	0.4	0.4	61.4	59.8	0.6	0.6
E250	250 feet	60.7	59.1	61.0	59.5	0.3	0.4	61.2	59.7	0.5	0.6
State Standard	NAC-1	65	60	65	60	--	--	65	60	--	--
State Standard	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	NAC-3	80	75	80	75	--	--	80	75	--	--

Table 5. Traffic Noise Model Results (AUAR Area Receptors) (Daytime Levels)

Receptor ID	Distance from R/W	Existing, L_{10}, dBA	Existing, L_{50}, dBA	No Build (2035), L_{10}, dBA	No Build (2035, L_{50}, dBA	No Build – Existing, L_{10}, dBA	No Build – Existing, L_{50}, dBA	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Build – Existing, L_{10}, dBA	Build – Existing, L_{50}, dBA
E300	300 feet	60.6	59.1	61.0	59.5	0.4	0.4	61.1	59.7	0.5	0.6
E350	350 feet	60.6	59.1	61.0	59.5	0.4	0.4	61.1	59.7	0.5	0.6
E400	400 feet	60.6	59.1	61.0	59.5	0.4	0.4	61.1	59.7	0.5	0.6
S0	0 feet	73.7	69.9	74.0	70.4	0.3	0.5	74.1	70.6	0.4	0.7
S50	50 feet	70.5	67.7	70.8	68.2	0.3	0.5	70.9	68.3	0.4	0.6
S100	100 feet	68.5	66.1	68.9	66.5	0.4	0.4	69.0	66.6	0.5	0.5
S150	150 feet	67.1	64.8	67.4	65.3	0.3	0.5	67.6	65.4	0.5	0.6
S200	200 feet	66.0	63.8	66.3	64.3	0.3	0.5	66.4	64.4	0.4	0.6
S250	250 feet	65.0	63.0	65.4	63.4	0.4	0.4	65.5	63.6	0.5	0.6
S300	300 feet	64.2	62.3	64.6	62.7	0.4	0.4	64.7	62.9	0.5	0.6
S350	350 feet	63.5	61.7	63.9	62.1	0.4	0.4	64.0	62.3	0.5	0.6
S400	400 feet	62.9	61.2	63.3	61.6	0.4	0.4	63.4	61.8	0.5	0.6
W0	0 feet	70.5	63.3	70.9	63.9	0.4	0.6	71.6	64.8	1.1	1.5
W50	50 feet	66.3	62.0	66.6	62.5	0.3	0.5	67.1	63.1	0.8	1.1
W100	100 feet	64.1	61.4	64.4	61.8	0.3	0.4	64.8	62.2	0.7	0.8
State Standard	NAC-1	65	60	65	60	--	--	65	60	--	--
State Standard	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	NAC-3	80	75	80	75	--	--	80	75	--	--

Table 5. Traffic Noise Model Results (AUAR Area Receptors) (Daytime Levels)

Receptor ID	Distance from R/W	Existing, L_{10}, dBA	Existing, L_{50}, dBA	No Build (2035), L_{10}, dBA	No Build (2035, L_{50}, dBA	No Build – Existing, L_{10}, dBA	No Build – Existing, L_{50}, dBA	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Build – Existing, L_{10}, dBA	Build – Existing, L_{50}, dBA
W150	150 feet	62.9	60.9	63.3	61.3	0.4	0.4	63.6	61.7	0.7	0.8
W200	200 feet	62.3	60.5	62.6	61.0	0.3	0.5	62.9	61.3	0.6	0.8
W250	250 feet	61.9	60.3	62.3	60.7	0.4	0.4	62.5	61.0	0.6	0.7
W300	300 feet	61.6	60.1	62.0	60.5	0.4	0.4	62.2	60.7	0.6	0.6
W350	350 feet	61.4	59.9	61.8	60.3	0.4	0.4	62.0	60.5	0.6	0.6
W400	400 feet	61.3	59.8	61.7	60.2	0.4	0.4	61.8	60.4	0.5	0.6
State Standard	NAC-1	65	60	65	60	--	--	65	60	--	--
State Standard	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	NAC-3	80	75	80	75	--	--	80	75	--	--

Table 6. Traffic Noise Model Results (AUAR Area Receptors) (Nighttime Levels)

Receptor ID	Distance from R/W	Existing, L_{10}, dBA	Existing, L_{50}, dBA	No Build (2035), L_{10}, dBA	No Build (2035, L_{50}, dBA	No Build – Existing, L_{10}, dBA	No Build – Existing, L_{50}, dBA	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Build – Existing, L_{10}, dBA	Build – Existing, L_{50}, dBA
N0	0 feet	62.2	52.2	62.6	52.8	0.4	0.6	62.9	53.0	0.7	0.8
N50	50 feet	60.1	55.0	60.4	55.4	0.3	0.4	60.7	55.5	0.6	0.5
N100	100 feet	58.6	55.9	58.8	56.3	0.2	0.4	59.1	56.4	0.5	0.5
N150	150 feet	58.0	56.2	58.2	56.5	0.2	0.3	58.4	56.6	0.4	0.4
N200	200 feet	57.9	56.4	58.2	56.7	0.3	0.3	58.3	56.8	0.4	0.4
N250	250 feet	58.0	56.6	58.3	56.9	0.3	0.3	58.4	57.0	0.4	0.4
N300	300 feet	58.2	56.8	58.5	57.1	0.3	0.3	58.6	57.2	0.4	0.4
N350	350 feet	58.5	57.0	58.8	57.4	0.3	0.4	58.8	57.5	0.3	0.5
N400	400 feet	58.8	57.3	59.1	57.6	0.3	0.3	59.1	57.7	0.3	0.4
E0	0 feet	64.5	57.1	64.9	57.5	0.4	0.4	65.6	57.6	1.1	0.5
E50	50 feet	62.0	58.5	62.3	58.8	0.3	0.3	62.9	58.8	0.9	0.3
E100	100 feet	60.8	58.7	61.0	59.0	0.2	0.3	61.5	59.1	0.7	0.4
E150	150 feet	60.4	58.6	60.6	58.9	0.2	0.3	60.9	59.0	0.5	0.4
E200	200 feet	60.2	58.5	60.5	58.9	0.3	0.4	60.6	59.0	0.4	0.5
E250	250 feet	60.1	58.5	60.4	58.8	0.3	0.3	60.5	58.9	0.4	0.4
State Standard	NAC-1	55	50	55	50	--	--	55	50	--	--
State Standard	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	NAC-3	80	75	80	75	--	--	80	75	--	--

Table 6. Traffic Noise Model Results (AUAR Area Receptors) (Nighttime Levels)

Receptor ID	Distance from R/W	Existing, L_{10}, dBA	Existing, L_{50}, dBA	No Build (2035), L_{10}, dBA	No Build (2035, L_{50}, dBA	No Build – Existing, L_{10}, dBA	No Build – Existing, L_{50}, dBA	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Build – Existing, L_{10}, dBA	Build – Existing, L_{50}, dBA
E300	300 feet	60.1	58.5	60.4	58.8	0.3	0.3	60.5	58.9	0.4	0.4
E350	350 feet	60.1	58.5	60.4	58.8	0.3	0.3	60.5	58.9	0.4	0.4
E400	400 feet	60.2	58.6	60.4	58.9	0.2	0.3	60.5	59.0	0.3	0.4
S0	0 feet	73.0	69.8	73.3	70.3	0.3	0.5	73.4	70.3	0.4	0.5
S50	50 feet	70.1	67.4	70.4	67.8	0.3	0.4	70.4	67.8	0.3	0.4
S100	100 feet	68.2	65.7	68.5	66.1	0.3	0.4	68.5	66.1	0.3	0.4
S150	150 feet	66.8	64.4	67.1	64.8	0.3	0.4	67.1	64.9	0.3	0.5
S200	200 feet	65.6	63.4	65.9	63.8	0.3	0.4	66.0	63.9	0.4	0.5
S250	250 feet	64.7	62.6	65.0	62.9	0.3	0.3	65.0	63.0	0.3	0.4
S300	300 feet	63.9	61.9	64.2	62.2	0.3	0.3	64.2	62.3	0.3	0.4
S350	350 feet	63.2	61.3	63.5	61.6	0.3	0.3	63.5	61.7	0.3	0.4
S400	400 feet	62.6	60.7	62.9	61.1	0.3	0.4	62.9	61.1	0.3	0.4
W0	0 feet	68.0	60.4	68.3	61.0	0.3	0.6	68.9	61.7	0.9	1.3
W50	50 feet	64.5	60.4	64.8	60.9	0.3	0.5	65.1	61.3	0.6	0.9
W100	100 feet	62.7	60.2	63.0	60.6	0.3	0.4	63.2	60.9	0.5	0.7
State Standard	NAC-1	55	50	55	50	--	--	55	50	--	--
State Standard	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	NAC-3	80	75	80	75	--	--	80	75	--	--

Table 6. Traffic Noise Model Results (AUAR Area Receptors) (Nighttime Levels)

Receptor ID	Distance from R/W	Existing, L_{10}, dBA	Existing, L_{50}, dBA	No Build (2035), L_{10}, dBA	No Build (2035, L_{50}, dBA	No Build – Existing, L_{10}, dBA	No Build – Existing, L_{50}, dBA	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Build – Existing, L_{10}, dBA	Build – Existing, L_{50}, dBA
W150	150 feet	61.9	59.9	62.2	60.3	0.3	0.4	62.4	60.5	0.5	0.6
W200	200 feet	61.4	59.7	61.7	60.1	0.3	0.4	61.9	60.2	0.5	0.5
W250	250 feet	61.2	59.5	61.5	59.9	0.3	0.4	61.6	60.0	0.4	0.5
W300	300 feet	61.0	59.4	61.3	59.7	0.3	0.3	61.4	59.9	0.4	0.5
W350	350 feet	60.9	59.2	61.2	59.6	0.3	0.4	61.3	59.7	0.4	0.5
W400	400 feet	60.8	59.1	61.1	59.5	0.3	0.4	61.2	59.6	0.4	0.5
State Standard	NAC-1	55	50	55	50	--	--	55	50	--	--
State Standard	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	NAC-3	80	75	80	75	--	--	80	75	--	--

Future (2035) daytime L_{10} modeled noise levels within the AUAR area under the No Build Alternative are predicted to range from 59.4 dBA to 74.0 dBA, whereas L_{50} noise levels are predicted to range from 57.4 dBA to 70.4 dBA. Future nighttime L_{10} modeled noise levels under the No Build Alternative within the AUAR area are predicted to range from 58.2 dBA to 73.3 dBA, whereas L_{50} noise levels are predicted to range from 52.8 dBA to 70.3 dBA. Modeled daytime traffic noise levels are predicted to increase by 0.3 dBA to 0.5 dBA (L_{10}) under the No Build Alternative compared to existing conditions. This noise level increase is due to the background traffic growth from existing to future No Build conditions.

Future (2035) daytime L_{10} modeled noise levels within the AUAR area under the Build scenario (with the proposed development) are predicted to range from 59.6 dBA to 74.1 dBA, whereas L_{50} modeled noise levels range from 57.8 dBA to 70.6 dBA. Nighttime L_{10} modeled noise levels within the AUAR area under Build conditions are predicted to range from 58.3 dBA to 73.4 dBA, whereas L_{50} modeled noise levels are predicted to range from 53.0 dBA to 70.3 dBA. Modeled daytime and nighttime traffic noise levels are predicted to increase by 0.3 dBA to 1.1 dBA (L_{10}) under Build scenario conditions compared to existing conditions.

Modeled noise levels under future Build scenario conditions are compared to state daytime and nighttime standards for NAC-1 (residential land uses), NAC-2 (commercial uses) and NAC-3 (industrial uses) below.

- Modeled daytime L_{10} noise levels within the AUAR area were projected to exceed State daytime standards for NAC-1 (65 dBA) at distances ranging from 50 feet to 300 feet from area roadways. Modeled daytime L_{50} noise levels within the AUAR area were projected to exceed state standards for NAC-1 (60 dBA) out to 400 feet from adjacent roadways.
- Modeled nighttime L_{10} and L_{50} noise levels were predicted to exceed state nighttime standards for NAC-1 at all modeled receptor locations within the AUAR area.
- Modeled L_{10} and L_{50} noise levels were predicted to be below state daytime standards for NAC-2 at all modeled receptor locations along University Avenue and Pascal Street, and at distances ranging from 50 feet to 200 feet along Snelling Avenue and St. Anthony Avenue.
- Modeled L_{10} and L_{50} noise levels were predicted to be below state nighttime standards for NAC-2 at all modeled receptor locations within the AUAR area along University Avenue, Pascal Street, and Snelling Avenue. Modeled L_{10} and L_{50} noise levels were predicted to be below state nighttime standards for NAC-2 at distances of up to 150 feet from St. Anthony Avenue.
- Modeled L_{10} and L_{50} noise levels were predicted to be below state daytime and nighttime standards for NAC-3 at all modeled receptor locations within the AUAR area.

Weekend Event Arrival and Departure Periods

Results of the noise modeling analysis for AUAR area receptors during weekend event arrival (1:00 p.m. – 2:00 p.m.) and departure (4:00 p.m. – 5:00 p.m.) periods are tabulated in Table 7. In general, daytime traffic noise levels for the weekday worst noise hour were predicted to be approximately 1 dBA (L_{10}) greater than weekend event arrival and departure periods. Modeled L_{10} noise levels at one receptor location at the north end of the AUAR area (Receptor N0) and west side of the AUAR area (Receptor W0) were greater during event arrival and departure periods compared to the weekday worst noise hour. This is because of the higher traffic volumes along Snelling Avenue and University Avenue adjacent to the AUAR area during site events as compared to weekday traffic volumes.

Receptors Surrounding the AUAR Area

Daytime and Nighttime Analysis Results

Results of the noise modeling analysis for receptor locations adjacent to the AUAR area under existing conditions, the future (2035) No Build Alternative, and the future (2035) Build Alternative are tabulated in Table 8 (daytime) and Table 9 (nighttime). The results of the traffic noise modeling analysis are summarized below.

Existing daytime L_{10} noise levels at modeled receptor locations surrounding the AUAR area range from 57.3 dBA to 74.0 dBA, whereas L_{50} noise levels range from 53.1 dBA to 70.1 dBA. Existing nighttime L_{10} modeled noise levels range from 54.8 dBA to 73.5 dBA, whereas L_{50} noise levels range from 51.9 dBA to 69.8 dBA.

Future (2035) daytime L_{10} noise levels at modeled receptor locations surrounding the AUAR area under the No Build Alternative are predicted to range from 57.6 dBA to 74.4 dBA, whereas L_{50} noise levels are predicted to range from 53.6 dBA to 70.5 dBA. Future nighttime L_{10} modeled noise levels under the No Build Alternative at receptor locations surrounding the AUAR area are predicted to range from 55.0 dBA to 73.8 dBA, whereas L_{50} noise levels are predicted to range from 52.1 dBA to 70.2 dBA. Modeled daytime traffic noise levels are predicted to increase by 0.3 dBA to 0.5 dBA (L_{10}) under the No Build Alternative compared to existing conditions.

Table 7. Traffic Noise Model Results (AUAR Area Receptors) (Future Event Arrival and Departure Traffic)

Receptor ID	Distance from R/W	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Event Arrival (2035), L_{10}, dBA	Event Arrival (2035), L_{50}, dBA	Build – Arrival, L_{10}, dBA	Build – Arrival, L_{50}, dBA	Event Departure (2035), L_{10}, dBA	Event Departure (2035), L_{50}, dBA	Build – Departure, L_{10}, dBA	Build – Departure, L_{50}, dBA
N0	0 feet	68.0	58.7	68.6	60.3	-0.6	-1.6	68.7	60.4	-0.7	-1.7
N50	50 feet	63.9	57.9	63.8	58.6	0.1	-0.7	63.8	58.7	0.1	-0.8
N100	100 feet	61.7	58.0	61.3	58.1	0.4	-0.1	61.3	58.2	0.4	-0.2
N150	150 feet	60.5	58.1	60.0	57.8	0.5	0.3	60.0	57.9	0.5	0.2
N200	200 feet	59.9	58.1	59.2	57.7	0.7	0.4	59.3	57.7	0.6	0.4
N250	250 feet	59.6	58.2	58.9	57.6	0.7	0.6	58.9	57.6	0.7	0.6
N300	300 feet	59.6	58.3	58.9	57.7	0.7	0.6	58.9	57.7	0.7	0.6
N350	350 feet	59.7	58.4	58.9	57.8	0.8	0.6	58.9	57.8	0.8	0.6
N400	400 feet	59.9	58.6	59.1	57.9	0.8	0.7	59.1	57.9	0.8	0.7
E0	0 feet	67.6	60.1	67.1	60.1	0.5	0.0	67.6	60.5	0.0	-0.4
E50	50 feet	64.3	60.1	63.3	59.6	1.0	0.5	63.8	59.7	0.5	0.4
E100	100 feet	62.5	60.1	61.6	59.3	0.9	0.8	61.9	59.4	0.6	0.7
E150	150 feet	61.7	59.9	60.7	59.1	1.0	0.8	60.9	59.2	0.8	0.7
State Standard	NAC-1	65	60	65	60	--	--	65	60	--	--
State Standard	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	NAC-3	80	75	80	75	--	--	80	75	--	--

Table 7. Traffic Noise Model Results (AUAR Area Receptors) (Future Event Arrival and Departure Traffic)

Receptor ID	Distance from R/W	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Event Arrival (2035), L_{10}, dBA	Event Arrival (2035), L_{50}, dBA	Build – Arrival, L_{10}, dBA	Build – Arrival, L_{50}, dBA	Event Departure (2035), L_{10}, dBA	Event Departure (2035), L_{50}, dBA	Build – Departure, L_{10}, dBA	Build – Departure, L_{50}, dBA
E200	200 feet	61.4	59.8	60.4	59.0	1.0	0.8	60.5	59.0	0.9	0.8
E250	250 feet	61.2	59.7	60.2	58.9	1.0	0.8	60.3	58.9	0.9	0.8
E300	300 feet	61.1	59.7	60.1	58.8	1.0	0.9	60.2	58.9	0.9	0.8
E350	350 feet	61.1	59.7	60.1	58.8	1.0	0.9	60.1	58.8	1.0	0.9
E400	400 feet	61.1	59.7	60.1	58.8	1.0	0.9	60.1	58.8	1.0	0.9
S0	0 feet	74.1	70.6	73.2	69.9	0.9	0.7	73.3	70.1	0.8	0.5
S50	50 feet	70.9	68.3	69.8	67.4	1.1	0.9	69.8	67.5	1.1	0.8
S100	100 feet	69.0	66.6	67.9	65.7	1.1	0.9	67.9	65.7	1.1	0.9
S150	150 feet	67.6	65.4	66.5	64.4	1.1	1.0	66.4	64.4	1.2	1.0
S200	200 feet	66.4	64.4	65.3	63.4	1.1	1.0	65.3	63.4	1.1	1.0
S250	250 feet	65.5	63.6	64.4	62.6	1.1	1.0	64.4	62.6	1.1	1.0
S300	300 feet	64.7	62.9	63.6	61.9	1.1	1.0	63.6	61.9	1.1	1.0
S350	350 feet	64.0	62.3	62.9	61.3	1.1	1.0	62.9	61.3	1.1	1.0
S400	400 feet	63.4	61.8	62.4	60.8	1.0	1.0	62.3	60.8	1.1	1.0
State Standard	NAC-1	65	60	65	60	--	--	65	60	--	--
State Standard	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	NAC-3	80	75	80	75	--	--	80	75	--	--

Table 7. Traffic Noise Model Results (AUAR Area Receptors) (Future Event Arrival and Departure Traffic)

Receptor ID	Distance from R/W	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Event Arrival (2035), L_{10}, dBA	Event Arrival (2035), L_{50}, dBA	Build – Arrival, L_{10}, dBA	Build – Arrival, L_{50}, dBA	Event Departure (2035), L_{10}, dBA	Event Departure (2035), L_{50}, dBA	Build – Departure, L_{10}, dBA	Build – Departure, L_{50}, dBA
W0	0 feet	71.6	64.8	72.1	66.3	-0.5	-1.5	70.9	64.9	0.7	-0.1
W50	50 feet	67.1	63.1	66.9	63.5	0.2	-0.4	66.3	62.9	0.8	0.2
W100	100 feet	64.8	62.2	64.4	62.1	0.4	0.1	64.0	61.8	0.8	0.4
W150	150 feet	63.6	61.7	63.0	61.3	0.6	0.4	62.8	61.1	0.8	0.6
W200	200 feet	62.9	61.3	62.2	60.8	0.7	0.5	62.1	60.6	0.8	0.7
W250	250 feet	62.5	61.0	61.7	60.4	0.8	0.6	61.6	60.3	0.9	0.7
W300	300 feet	62.2	60.7	61.4	60.1	0.8	0.6	61.3	60.0	0.9	0.7
W350	350 feet	62.0	60.5	61.1	59.8	0.9	0.7	61.1	59.8	0.9	0.7
W400	400 feet	61.8	60.4	60.9	59.6	0.9	0.8	60.9	59.6	0.9	0.8
State Standard	NAC-1	65	60	65	60	--	--	65	60	--	--
State Standard	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	NAC-3	80	75	80	75	--	--	80	75	--	--

Table 8. Traffic Noise Model Results (Receptors Surrounding AUAR Area) (Daytime Levels)

Receptor ID	Land Use	State NAC	Existing, L_{10}, dBA	Existing, L_{50}, dBA	No Build (2035), L_{10}, dBA	No Build (2035, L_{50}, dBA	No Build – Existing, L_{10}, dBA	No Build – Existing, L_{50}, dBA	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Build – Existing, L_{10}, dBA	Build – Existing, L_{50}, dBA
A	Res.	1	**74.0**	**70.1**	**74.4**	**70.5**	0.4	0.4	**74.6**	**70.8**	0.6	0.7
B	Res.	1	**65.5**	**63.5**	**65.8**	**64.0**	0.3	0.5	**66.0**	**64.2**	0.5	0.7
C	Com.	2	70.0	63.2	**70.5**	63.8	0.5	0.6	**71.1**	64.6	1.1	1.4
D	Com.	2	67.3	61.9	67.7	62.4	0.4	0.5	68.3	63.1	1.0	1.2
E	Com.	2	**70.3**	63.6	**70.7**	64.1	0.4	0.5	**71.3**	64.9	1.0	1.3
F	Trans.	2	67.7	59.6	68.1	60.2	0.4	0.6	68.5	60.6	0.8	1.0
G	Com.	2	66.8	57.7	67.2	58.3	0.4	0.6	67.7	58.6	0.9	0.9
H	Com.	2	65.9	56.8	66.3	57.4	0.4	0.6	66.7	57.7	0.8	0.9
I	Com.	2	66.0	56.6	66.4	57.2	0.4	0.6	66.9	57.5	0.9	0.9
J	Com.	2	66.5	57.3	67.0	57.9	0.5	0.6	67.4	58.3	0.9	1.0
K	Com.	2	57.3	53.1	57.6	53.6	0.3	0.5	57.7	53.8	0.4	0.7
L	Com.	2	58.5	56.5	58.9	56.9	0.4	0.4	59.1	57.1	0.6	0.6
State Standard	Res.	NAC-1	65	60	65	60	--	--	65	60	--	--
State Standard	Com.	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	Indust.	NAC-3	80	75	80	75	--	--	80	75	--	--

Bold numbers exceed State daytime standards (L_{10} and/or L_{50}).

Land use codes: Res. = residential; Com. = retail commercial/office; Trans. = LRT Station & Platform Area; Indust. = Industrial.

Table 9. Traffic Noise Model Results (Receptors Surrounding AUAR Area) (Nighttime Levels)

Receptor ID	Land Use	State NAC	Existing, L_{10}, dBA	Existing, L_{50}, dBA	No Build (2035), L_{10}, dBA	No Build (2035, L_{50}, dBA	No Build – Existing, L_{10}, dBA	No Build – Existing, L_{50}, dBA	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Build – Existing, L_{10}, dBA	Build – Existing, L_{50}, dBA
A	Res.	1	**73.5**	**69.8**	**73.8**	**70.2**	0.3	0.4	**74.0**	**70.3**	0.5	0.5
B	Res.	1	**65.1**	**63.1**	**65.4**	**63.5**	0.3	0.4	**65.5**	**63.6**	0.4	0.5
C	Com.	2	67.7	60.5	68.0	61.0	0.3	0.5	68.6	61.8	0.9	1.3
D	Com.	2	65.3	59.6	65.6	60.1	0.3	0.5	66.0	60.7	0.7	1.1
E	Com.	2	66.9	59.2	67.3	59.8	0.4	0.6	68.0	60.7	1.1	1.5
F	Trans.	2	63.4	54.8	63.8	55.4	0.4	0.6	64.2	55.7	0.8	0.9
G	Com.	2	62.9	53.3	63.3	53.8	0.4	0.5	63.7	54.2	0.8	0.9
H	Com.	2	62.0	52.4	62.4	53.0	0.4	0.6	62.7	53.3	0.7	0.9
I	Com.	2	61.9	51.9	62.3	52.4	0.4	0.5	62.6	52.8	0.7	0.9
J	Com.	2	62.3	52.4	62.7	53.0	0.4	0.6	63.2	53.5	0.9	1.1
K	Com.	2	54.8	52.1	55.0	52.1	0.2	0.0	55.0	52.2	0.2	0.1
L	Com.	2	57.7	56.1	57.9	56.4	0.2	0.3	58.2	56.5	0.5	0.4
State Standard	Res.	NAC-1	65	60	65	60	--	--	65	60	--	--
State Standard	Com.	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	Indust.	NAC-3	80	75	80	75	--	--	80	75	--	--

Bold numbers exceed State nighttime standards (L_{10} and/or L_{50}).

Land use codes: Res. = residential; Com. = retail commercial/office; Trans. = LRT Station & Platform Area; Indust. = Industrial.

Future (2035) daytime L_{10} noise levels at modeled receptor locations surrounding the AUAR area under the Build Alternative (with the proposed development) are predicted to range from 57.7 dBA to 74.6 dBA, whereas L_{50} modeled noise levels range from 53.8 dBA to 70.8 dBA. Nighttime L_{10} noise levels at modeled receptor locations surrounding the AUAR area under the Build Alternative are predicted to range from 55.0 dBA to 74.4 dBA, whereas L_{50} modeled noise levels are predicted to range from 52.2 dBA to 70.3 dBA. Modeled daytime and nighttime traffic noise levels are predicted to increase by 0.2 dBA to 1.1 dBA (L_{10}) under Build Alternative conditions compared to existing conditions.

Modeled noise levels at receptor locations surrounding the AUAR area in comparison to state daytime and nighttime standards for NAC-1 (residential land uses) and NAC-2 (commercial uses) are described below.

- Modeled noise levels exceed State daytime and nighttime L_{10} and L_{50} standards for NAC-1 at residential land uses along the west side of Snelling Avenue and north of St. Anthony Avenue under existing conditions, the future No Build Alternative, and future Build Alternative.
- In general, modeled noise levels are below State daytime L_{10} and L_{50} standards for NAC-2 at modeled commercial receptor locations surrounding the AUAR area under existing conditions, the future No Build Alternative, and future Build Alternative. Modeled daytime L_{10} noise levels at one commercial receptor location adjacent to the Snelling Avenue/University Avenue intersection exceeds state daytime standards for NAC-2 under existing conditions, the future No Build Alternative, and future Build Alternative.
- Modeled noise levels are below State nighttime L_{10} and L_{50} standards for NAC-2 for all commercial receptor locations surrounding the AUAR area under existing conditions, the future No Build Alternative, and future Build Alternative.

Weekend Event Arrival and Departure Periods

Results of the noise modeling analysis during weekend event arrival (1:00 p.m. – 2:00 p.m.) and departure (4:00 p.m. – 5:00 p.m.) periods for receptors surrounding the AUAR area are tabulated in Table 10. Modeled noise levels at commercial receptor locations along Snelling Avenue and University Avenue were predicted to be approximately 1 dBA (L_{10}) up to nearly 3 dBA (L_{50}) greater during event arrival and departure periods compared to the weekday worst noise hour. This is because of the higher traffic volumes along Snelling Avenue and University Avenue during site events compared to weekday traffic volumes.

Table 10. Traffic Noise Model Results (Receptors Surrounding Area) (Future Event Arrival and Departure Traffic)

Receptor ID	Land Use	State NAC	Build (2035), L_{10}, dBA	Build (2035), L_{50}, dBA	Event Arrival (2035), L_{10}, dBA	Event Arrival (2035), L_{50}, dBA	Build – Arrival, L_{10}, dBA	Build – Arrival, L_{50}, dBA	Event Departure (2035), L_{10}, dBA	Event Departure (2035), L_{50}, dBA	Build – Departure, L_{10}, dBA	Build – Departure, L_{50}, dBA
A	Res.	1	**74.6**	**70.8**	**73.4**	**70.2**	1.2	0.6	**74.3**	**70.9**	0.3	-0.1
B	Res.	1	**66.0**	**64.2**	**65.1**	**63.6**	0.9	0.6	**65.2**	**63.6**	0.8	0.6
C	Com.	2	**71.1**	64.6	**70.8**	**65.3**	0.3	-0.7	**71.5**	**65.9**	-0.4	-1.3
D	Com.	2	68.3	63.1	67.9	63.6	0.4	-0.5	68.4	63.9	-0.1	-0.8
E	Com.	2	**71.3**	64.9	**71.0**	**65.5**	0.3	-0.6	**71.6**	**66.1**	-0.3	-1.2
F	Trans.	2	68.5	60.6	69.2	62.5	-0.7	-1.9	69.3	62.6	-0.8	-2.0
G	Com.	2	67.7	58.6	68.8	60.9	-1.1	-2.3	68.9	61.1	-1.2	-2.5
H	Com.	2	66.7	57.7	67.9	60.1	-1.2	-2.4	68.1	60.4	-1.4	-2.7
I	Com.	2	66.9	57.5	68.1	60.0	-1.2	-2.5	68.3	60.3	-1.4	-2.8
J	Com.	2	67.4	58.3	68.6	60.7	-1.2	-2.4	68.8	61.0	-1.4	-2.7
K	Com.	2	57.7	53.8	57.4	53.6	0.3	0.2	56.9	53.3	0.8	0.5
L	Com.	2	59.1	57.1	58.2	56.5	0.9	0.6	58.4	56.5	0.7	0.6
State Standard	Res.	NAC-1	65	60	65	60	--	--	65	60	--	--
State Standard	Com.	NAC-2	70	65	70	65	--	--	70	65	--	--
State Standard	Indust.	NAC-3	80	75	80	75	--	--	80	75	--	--

Bold numbers exceed State daytime standards (L_{10} and/or L_{50}).

Land use codes: Res. = residential; Com. = retail commercial/office; Trans. = LRT Station & Platform Area; Indust. = Industrial.

Mitigation Strategies

AUAR Area Site Plan

As described in the previous section, modeled traffic noise levels are projected to exceed state noise standards for NAC-1 and NAC-2, depending upon the location within the AUAR area. The following strategies were evaluated to prevent future traffic noise impacts and minimize/mitigate the effects of traffic noise on future development within the AUAR area.

The AUAR area site plan is illustrated in Appendix A. The AUAR area is anticipated to be redeveloped in a phased manner to accommodate a mixed-use development including retail and service commercial, hospitality, residential, office, and open space uses. As shown in the site plan, locating outdoor use areas towards the interior of residential, hospitality, and office buildings will help prevent traffic noise impacts at these future uses. Locating outdoor uses in this manner results in greater setback distances from adjacent roadways (e.g., modeled L_{10} noise levels at approximately 50 feet from University Avenue and Pascal Street were projected to be below state daytime L_{10} standards for NAC-1). The buildings themselves also function to shield the outdoor use areas from traffic noise generated on nearby roadways.

The AUAR area site plan identifies two public assembly areas: one at the north end of the AUAR area along University Avenue and another in the southwest corner of the AUAR area at the Snelling Avenue/St. Anthony Avenue intersection (see AUAR area site plan figure in Attachment A). Public assembly areas are classified under NAC-2. The daytime and nighttime noise standards for NAC-2 are 70 dBA (L_{10}) and 65 dBA (L_{50}) (see Table 1).

The first public assembly area is located at the north end of the AUAR area along University Avenue. Modeled L_{10} and L_{50} traffic noise levels at the north end of the AUAR area at 50 feet from University Avenue are projected to be below state daytime and nighttime standards for NAC-2 (see Receptor N50 in Table 5 and Table 6).[7] Providing a setback from University Avenue would prevent traffic noise impacts for any future public assembly area at this location.

A second public assembly area is located in the southwest corner of the AUAR area at the Snelling Avenue/St. Anthony Avenue intersection. Traffic noise levels were modeled at a representative receptor located in the middle of the public assembly area (see Receptor CP-1 in the AUAR area figure in Attachment A). Daytime modeled noise levels at Receptor CP-1 were 70.2 dBA (L_{10}) and 68.0 dBA (L_{50}), whereas nighttime modeled noise levels at Receptor CP-1 were 69.8 dBA (L_{10}) and

[7] The traffic noise analysis described in this memorandum does not account for noise generated by Green Line LRT operations (e.g., LRT cars, horn noise).

67.4 dBA (L_{50}). Modeled L_{10} and L_{50} traffic noise levels at Receptor CP-1 are projected to exceed state daytime and/or nighttime standards for NAC-2 under future (2035) Build conditions.

A noise wall was evaluated in the southwest corner of the AUAR area along Snelling Avenue and St. Anthony Avenue, adjacent to Receptor CP-1. The evaluation of this noise barrier was completed following the procedures and criteria identified in the MnDOT Highway Noise Policy. The total length of the modeled noise wall was approximately 475 feet. The height of the modeled noise wall was 20 feet. A gap was included in the noise wall to accommodate the sidewalk connection through the public assembly area to pedestrian crossings at the Snelling Avenue/St. Anthony Avenue intersection.

Results of the noise wall evaluation are tabulated in Table 11 (daytime) and Table 12 (nighttime). The modeled noise wall does not achieve a minimum 5 dBA reduction to be considered acoustically feasible; therefore, a noise wall is not recommended at this location.

Receptors Surrounding the AUAR Area

Traffic noise levels are projected to increase by less than 1 dBA (L_{10}) at modeled receptor locations surrounding the AUAR area under future Build Alternative conditions compared to future No Build Alternative conditions. Additional traffic generated during weekend stadium event periods is projected to increase traffic noise levels by approximately 1 dBA (L_{10}) at commercial receptor locations along Snelling Avenue and University Avenue compared to future Build Alternative conditions (weekday worst noise hour). As a general rule, a change in sound levels of 3 dBA is barely noticeable by the human ear.

Modeled traffic noise levels currently exceed state standards for NAC-1 at residential receptor locations west of the AUAR area along Snelling Avenue, exceed state standards under the future No Build Alternative, and exceed state standards under future Build Alternative conditions. In general, modeled traffic noise levels at commercial receptor locations surrounding the AUAR area are below state standards for NAC-2 under existing, future No Build Alternative, and future Build Alternative conditions. Therefore, mitigation measures at modeled receptor locations surrounding the AUAR area were not considered.

Table 11. Noise Wall Evaluation Results (Daytime) (Southwest Quadrant of AUAR Area)

Receptor ID	Daytime L10, Build 2035 (no wall)	Daytime L10, Build 2035 (with noise wall)	Reduction (in dBA) with noise barrier	Number of residences, commercial or industrial establishments	Number of benefited residences, commercial or industrial establishments (1)	Design goal reduction ≥7 dBA (2)	Length of barrier (feet)	Wall Area (sq ft) (3)	Total cost of wall $20/sq ft	Cost/ Benefited Receptor
CP-1	70.2	66.4	3.8	1	0	0	475	8,800	$176,000	N/A

(1) Number of benefited residences, commercial establishments, or industrial establishments with a minimum 5 dBA reduction.

(2) Noise wall must meet a noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier to be considered reasonable.

(3) Noise wall surface area includes tapers at wall ends.

Table 12. Noise Wall Evaluation Results (Nighttime) (Southwest Quadrant of AUAR Area)

Receptor ID	Nighttime L10, Build 2035 (no wall)	Nighttime L10, Build 2035 (with noise wall)	Reduction (in dBA) with noise barrier	Number of residences, commercial or industrial establishments	Number of benefited residences, commercial or industrial establishments (1)	Design goal reduction ≥7 dBA (2)	Length of barrier (feet)	Wall Area (sq ft) (3)	Total cost of wall $20/sq ft	Cost/ Benefited Receptor
CP-1	69.8	66.2	3.6	1	0	0	475	8,800	$176,000	N/A

(1) Number of benefited residences, commercial establishments, or industrial establishments with a minimum 5 dBA reduction.

(2) Noise wall must meet a noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier to be considered reasonable.

(3) Noise wall surface area includes tapers at wall ends.

Conclusions and Recommendations

AUAR Area Receptors

Traffic noise levels were modeled at 68 representative receptor locations within the AUAR area. Receptors were located at incremental distances along University Avenue, Pascal Street, St. Anthony Avenue, and Snelling Avenue, ranging from 0 feet (at the right of way limits) up to 400 feet from the right of way limits.

Daytime L_{10} modeled noise levels within the AUAR area are predicted to range from 59.6 dBA to 74.1 dBA under future (2035) Build conditions, whereas daytime L_{50} modeled noise levels are predicted to range from 57.8 dBA to 70.6 dBA. Daytime traffic noise levels are projected to increase by approximately 0.4 dBA to 1.1 dBA (L_{10}) compared to existing conditions. Nighttime L_{10} modeled noise levels within the AUAR area are predicted to range from 58.3 dBA to 73.4 dBA under future (2035) Build conditions, whereas nighttime L_{50} modeled noise levels are predicted to range from 53.0 dBA to 70.3 dBA. Nighttime traffic noise levels are projected to increase by approximately 0.3 dBA to 1.1 dBA (L_{10}) compared to existing conditions.

Depending upon the location within the AUAR area, modeled traffic noise levels are projected to exceed state daytime and nighttime L_{10} and L_{50} standards for NAC-1 and NAC-2. Recommended strategies to help prevent future traffic noise impacts on development within the AUAR area include incorporating setback distances between area roadways and outdoor uses and locating buildings within the AUAR area between outdoor use areas and adjacent roadways.

The AUAR area site plan identifies two public assembly areas. Modeled noise levels at the public assembly area at the north end of the AUAR area along University Avenue are projected to be below state daytime and nighttime L_{10} and L_{50} standards for NAC-2, assuming a setback distance of at least 50 feet or greater. Modeled noise levels at a public assembly area in the southwest corner of the AUAR area along Snelling Avenue and St. Anthony Avenue are projected to exceed state daytime and nighttime L_{10} and/or L_{50} standards for NAC-2. A modeled noise wall adjacent to this public assembly area along Snelling Avenue and St. Anthony Avenue was not acoustically feasible (i.e., did not achieve a minimum 5 dBA reduction in traffic noise levels).

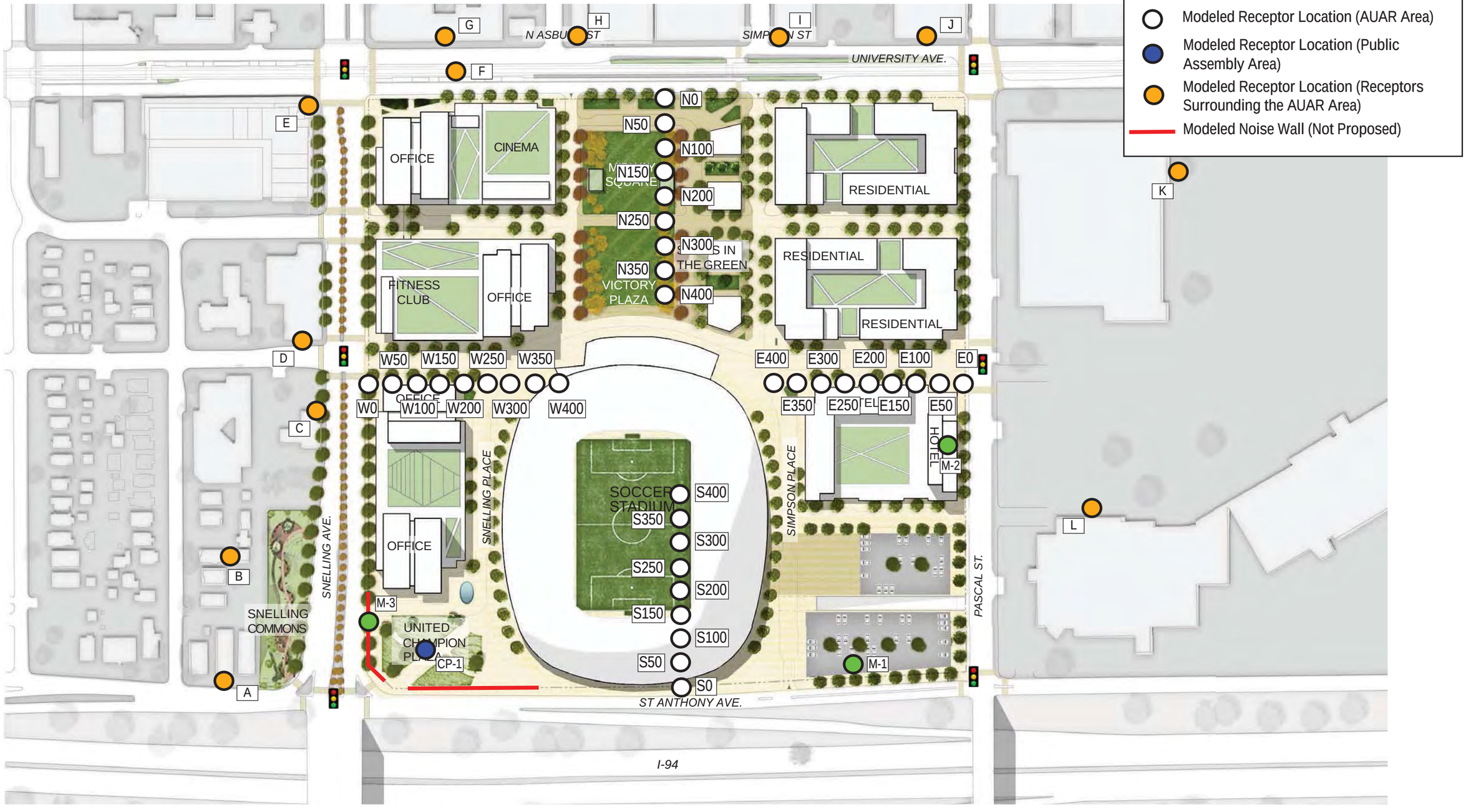
Receptors Surrounding the AUAR Area

Traffic noise levels were modeled at 12 representative receptor locations surrounding the AUAR area along Snelling Avenue, University Avenue, and Pascal Street. Future (2035) daytime L_{10} noise levels at modeled receptor locations surrounding the AUAR area with the proposed development are predicted to range from 57.7 dBA to 74.6 dBA, whereas L_{50} modeled noise levels range from 53.8 dBA to 70.8 dBA. Nighttime L_{10} noise levels at modeled receptor locations surrounding the AUAR area under the Build scenario are predicted to range from 55.0 dBA to 74.4 dBA, whereas L_{50} modeled noise levels are predicted to range from 52.2 dBA to 70.3 dBA. Modeled daytime and

nighttime traffic noise levels are predicted to increase by 0.2 dBA to 1.1 dBA (L_{10}) under Build Alternative conditions compared to existing conditions.

Modeled traffic noise levels would exceed state daytime and nighttime L_{10} and L_{50} standards for NAC-1 at residential receptor locations west of the AUAR area and Snelling Avenue under future No Build and Build conditions. Modeled traffic noise levels would exceed state daytime L_{10} standards for NAC-2 at one commercial receptor location at the Snelling Avenue/University Avenue intersection under future No Build and Build conditions. Modeled traffic noise levels at other commercial receptor locations surrounding the AUAR area would be below state daytime and nighttime standards for NAC-2 under future No Build and Build conditions. Because modeled traffic noise levels are either below state standards or would exceed state standards regardless of the No Build or Build Alternatives, mitigation measures at modeled receptor locations surrounding the AUAR area were not evaluated.

Attachment A (AUAR Area Master Plan)



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SRF Consulting Group, Inc.

0169154
April 2016

RK Midway Master Plan - Traffic Noise Analysis

Snelling Midway Stadium Environmental Review
City of St. Paul

Figure 3

Attachment B (Noise Model Traffic Assumptions)

Table 13. Traffic Characteristics, Noise Model Input (I-94)

	Traffic Volume (% of Daily Traffic)	Directional Split	Vehicle Class (% Cars)	Vehicle Class (% Medium Trucks)	Vehicle Class (% Heavy Trucks)	Modeled Speed (mph)
Daytime (9:00 a.m. to 10:00 a.m.)	5.5%	48% EB/ 52% WB	93% EB/ 93% WB	3% EB/ 2% WB	4% EB/ 5% WB	55 mph
Nighttime (6:00 a.m. to 7:00 a.m.)	5.6%	38% EB/ 62% WB	93% EB/ 95% WB	3% EB/ 1% WB	4% EB/ 4% WB	55 mph
Weekend Event Arrival	7.6%	54% EB/ 46% WB	97% EB/ 97% WB	1% EB/ 1% WB	2% EB/ 2% WB	55 mph
Weekend Event Departure	7.1%	47% EB/ 53% WB	97% EB/ 97% WB	1% EB/ 1% WB	2% EB/ 2% WB	55 mph

Source: Noise model input assumptions based on traffic count data from MnDOT loop detector site S479, MnDOT loop detector site S549, and MnDOT Vehicle Classification Count Site #1301. Vehicle classification percentages may not add to 100 percent due to rounding.

Table 14. Traffic Characteristics, Noise Model Input (Interchange Ramps)

	Traffic Volume (% of Daily Traffic)	Directional Split	Vehicle Class (% Cars)	Vehicle Class (% Medium Trucks)	Vehicle Class (% Heavy Trucks)	Modeled Speed (mph)
Daytime (9:00 a.m. to 10:00 a.m.)	5.3% to 6.6%	N/A	96.2%	3.4%	0.4%	40 mph
Nighttime (6:00 a.m. to 7:00 a.m.)	2.9% to 4.4%	N/A	96.7%	3.1%	0.2%	40 mph
Weekend Event Arrival	From traffic study	N/A	98.9%	0.7%	0.3%	40 mph
Weekend Event Departure	From traffic study	N/A	98.9%	0.7%	0.3%	40 mph

Source: Noise model input assumptions based on traffic count data from MnDOT loop detector site 2500, site 2637, site 2671, and site 3170. Vehicle classification based on 24-hour traffic counts collected in February 2016 at the University Avenue/Lexington Avenue intersection. Vehicle classification percentages may not add to 100 percent due to rounding.

Table 15. Traffic Characteristics, Noise Model Input (Local Roadways, North/South)

	Traffic Volume (% of Daily Traffic)	Directional Split	Vehicle Class (% Cars)	Vehicle Class (% Medium Trucks)	Vehicle Class (% Heavy Trucks)	Modeled Speed (mph)
Daytime (9:00 a.m. to 10:00 a.m.)	5.3%	51% NB/ 49% SB	96.2%	3.4%	0.4%	30 mph
Nighttime (6:00 a.m. to 7:00 a.m.)	2.7%	50% NB/ 50% SB	96.7%	3.1%	0.2%	30 mph
Weekend Event Arrival	From traffic study	From traffic study	98.9%	0.7%	0.3%	30 mph
Weekend Event Departure	From traffic study	From traffic study	98.9%	0.7%	0.3%	30 mph

Source: Noise model input assumptions based on 24-hour traffic counts (by vehicle classification) collected in February 2016 at the University Avenue/Lexington Avenue intersection. Vehicle classification percentages may not add to 100 percent due to rounding.

Table 16. Traffic Characteristics, Noise Model Input (Local Roadways, East/West)

	Traffic Volume (% of Daily Traffic)	Directional Split	Vehicle Class (% Cars)	Vehicle Class (% Medium Trucks)	Vehicle Class (% Heavy Trucks)	Modeled Speed (mph)
Daytime (9:00 a.m. to 10:00 a.m.)	4.8%	55% EB/ 45% WB	96.2%	3.4%	0.4%	30 mph
Nighttime (6:00 a.m. to 7:00 a.m.)	1.5%	44% EB/ 56% WB	96.7%	3.1%	0.2%	30 mph
Weekend Event Arrival	From traffic study	From traffic study	98.9%	0.7%	0.3%	30 mph
Weekend Event Departure	From traffic study	From traffic study	98.9%	0.7%	0.3%	30 mph

Source: Noise model input assumptions based on 24-hour traffic counts (by vehicle classification) collected in February 2016 at the University Avenue/Lexington Avenue intersection. Vehicle classification percentages may not add to 100 percent due to rounding.

Attachment C (Noise Model Traffic Volume Inputs)

Table 17. Modeled Hourly Traffic Volumes for Existing Daytime Conditions

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
I-94 (west of Snelling Ave.)	55 mph	Eastbound	3,904	126	168
I-94 (east of Snelling Ave.)	55 mph	Eastbound	3,634	117	156
I-94 (east of Snelling Ave.)	55 mph	Westbound	3,937	85	212
I-94 (west of Snelling Ave.)	55mph	Westbound	4,229	91	227
I-94/Snelling Ave. northeast ramp	40 mph	Westbound	651	23	3
I-94/Snelling Ave. northwest ramp	40 mph	Westbound	1,027	36	4
I-94/Snelling Ave. southeast ramp	40 mph	Eastbound	535	19	2
I-94/Snelling Ave. southwest ramp	40 mph	Eastbound	912	32	4
Snelling Ave. (south of I-94)	30 mph	Northbound	1,118	40	5
Snelling Ave. (I-94 to University Ave.)	30 mph	Northbound	871	31	4
Snelling Ave. (north of University Ave.)	30 mph	Northbound	793	28	3
Snelling Ave. (north of University Ave.)	30 mph	Southbound	762	27	3
Snelling Ave. (I-94 to University Ave.)	30 mph	Southbound	837	30	3
Snelling Ave. (south of I-94)	30 mph	Southbound	1,074	38	4
University Ave. (west of Snelling Ave.)	30 mph	Eastbound	414	15	2
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	378	13	2
University Ave. (east of Pascal St.)	30 mph	Eastbound	434	15	2
University Ave. (east of Pascal St.)	30 mph	Westbound	355	13	1

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Westbound	310	11	1
University Ave. (west of Snelling Ave.)	30 mph	Westbound	339	12	1
Pascal St. (north of University Ave.)	30 mph	Northbound & Southbound	206	7	1
Pascal St. (University Ave. to St. Anthony Ave.)	30 mph	Northbound & Southbound	428	15	2
Pascal St. (south of St. Anthony Ave.)	30 mph	Northbound & Southbound	219	8	1
St. Anthony Ave. (east of Pascal St.)	30 mph	Westbound	372	13	2
St. Anthony Ave. (Pascal St. to Snelling Ave.)	30 mph	Westbound	372	13	2
St. Anthony Ave. (west of Snelling Ave.)	30 mph	Westbound	76	3	0
Concordia Ave. (west of Snelling Ave.)	30 mph	Eastbound	8	0	0
Concordia Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	270	10	1
Concordia Ave. (east of Pascal St.)	30 mph	Eastbound	270	10	1

Table 18. Modeled Hourly Traffic Volumes for Existing Nighttime Conditions

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
I-94 (west of Snelling Ave.)	55 mph	Eastbound	3,147	102	135
I-94 (east of Snelling Ave.)	55 mph	Eastbound	2,929	94	126
I-94 (east of Snelling Ave.)	55 mph	Westbound	4,882	51	206
I-94 (west of Snelling Ave.)	55mph	Westbound	5,134	166	221
I-94/Snelling Ave. northeast ramp	40 mph	Westbound	436	14	1
I-94/Snelling Ave. northwest ramp	40 mph	Westbound	745	24	2
I-94/Snelling Ave. southeast ramp	40 mph	Eastbound	305	10	1
I-94/Snelling Ave. southwest ramp	40 mph	Eastbound	492	16	1
Snelling Ave. (south of I-94)	30 mph	Northbound	561	18	1
Snelling Ave. (I-94 to University Ave.)	30 mph	Northbound	437	18	1
Snelling Ave. (north of University Ave.)	30 mph	Northbound	398	13	1
Snelling Ave. (north of University Ave.)	30 mph	Southbound	398	13	1
Snelling Ave. (I-94 to University Ave.)	30 mph	Southbound	437	18	1
Snelling Ave. (south of I-94)	30 mph	Southbound	561	18	1
University Ave. (west of Snelling Ave.)	30 mph	Eastbound	104	3	0
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	95	3	0
University Ave. (east of Pascal St.)	30 mph	Eastbound	109	3	0
University Ave. (east of Pascal St.)	30 mph	Westbound	139	4	0

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Westbound	121	4	0
University Ave. (west of Snelling Ave.)	30 mph	Westbound	132	4	0
Pascal St. (north of University Ave.)	30 mph	Northbound & Southbound	106	3	0
Pascal St. (University Ave. to St. Anthony Ave.)	30 mph	Northbound & Southbound	219	7	0
Pascal St. (south of St. Anthony Ave.)	30 mph	Northbound & Southbound	112	4	0
St. Anthony Ave. (east of Pascal St.)	30 mph	Westbound	191	6	0
St. Anthony Ave. (Pascal St. to Snelling Ave.)	30 mph	Westbound	191	6	0
St. Anthony Ave. (west of Snelling Ave.)	30 mph	Westbound	39	1	
Concordia Ave. (west of Snelling Ave.)	30 mph	Eastbound	4	0	0
Concordia Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	138	4	0
Concordia Ave. (east of Pascal St.)	30 mph	Eastbound	138	4	0

Table 19. Modeled Hourly Volumes for No Build (2035) Alternative Daytime Conditions

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
I-94 (west of Snelling Ave.)	55 mph	Eastbound	4,292	138	195
I-94 (east of Snelling Ave.)	55 mph	Eastbound	3,995	129	172
I-94 (east of Snelling Ave.)	55 mph	Westbound	4,185	90	225
I-94 (west of Snelling Ave.)	55mph	Westbound	4,649	100	250
I-94/Snelling Ave. northeast ramp	40 mph	Westbound	717	25	3
I-94/Snelling Ave. northwest ramp	40 mph	Westbound	1,130	40	5
I-94/Snelling Ave. southeast ramp	40 mph	Eastbound	589	29	2
I-94/Snelling Ave. southwest ramp	40 mph	Eastbound	1,003	35	4
Snelling Ave. (south of I-94)	30 mph	Northbound	1,230	43	5
Snelling Ave. (I-94 to University Ave.)	30 mph	Northbound	958	34	4
Snelling Ave. (north of University Ave.)	30 mph	Northbound	872	31	4
Snelling Ave. (north of University Ave.)	30 mph	Southbound	838	30	3
Snelling Ave. (I-94 to University Ave.)	30 mph	Southbound	921	33	4
Snelling Ave. (south of I-94)	30 mph	Southbound	1,182	42	5
University Ave. (west of Snelling Ave.)	30 mph	Eastbound	455	16	2
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	417	15	2
University Ave. (east of Pascal St.)	30 mph	Eastbound	477	17	2
University Ave. (east of Pascal St.)	30 mph	Westbound	391	14	2

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Westbound	341	12	1
University Ave. (west of Snelling Ave.)	30 mph	Westbound	372	13	2
Pascal St. (north of University Ave.)	30 mph	Northbound & Southbound	227	8	1
Pascal St. (University Ave. to St. Anthony Ave.)	30 mph	Northbound & Southbound	472	17	2
Pascal St. (south of St. Anthony Ave.)	30 mph	Northbound & Southbound	242	9	1
St. Anthony Ave. (east of Pascal St.)	30 mph	Westbound	410	15	2
St. Anthony Ave. (Pascal St. to Snelling Ave.)	30 mph	Westbound	410	15	2
St. Anthony Ave. (west of Snelling Ave.)	30 mph	Westbound	84	3	0
Concordia Ave. (west of Snelling Ave.)	30 mph	Eastbound	8	0	0
Concordia Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	298	11	1
Concordia Ave. (east of Pascal St.)	30 mph	Eastbound	298	11	1

Table 20. Modeled Hourly Volumes for No Build (2035) Alternative Nighttime Conditions

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
I-94 (west of Snelling Ave.)	55 mph	Eastbound	3,459	112	149
I-94 (east of Snelling Ave.)	55 mph	Eastbound	3,220	104	138
I-94 (east of Snelling Ave.)	55 mph	Westbound	4,275	45	180
I-94 (west of Snelling Ave.)	55mph	Westbound	5,880	180	240
I-94/Snelling Ave. northeast ramp	40 mph	Westbound	481	15	1
I-94/Snelling Ave. northwest ramp	40 mph	Westbound	819	26	2
I-94/Snelling Ave. southeast ramp	40 mph	Eastbound	335	11	1
I-94/Snelling Ave. southwest ramp	40 mph	Eastbound	541	17	1
Snelling Ave. (south of I-94)	30 mph	Northbound	617	20	1
Snelling Ave. (I-94 to University Ave.)	30 mph	Northbound	481	15	1
Snelling Ave. (north of University Ave.)	30 mph	Northbound	438	14	1
Snelling Ave. (north of University Ave.)	30 mph	Southbound	438	14	1
Snelling Ave. (I-94 to University Ave.)	30 mph	Southbound	481	15	1
Snelling Ave. (south of I-94)	30 mph	Southbound	617	20	1
University Ave. (west of Snelling Ave.)	30 mph	Eastbound	114	4	0
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	105	3	0
University Ave. (east of Pascal St.)	30 mph	Eastbound	120	4	0
University Ave. (east of Pascal St.)	30 mph	Westbound	153	5	0

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Westbound	133	4	0
University Ave. (west of Snelling Ave.)	30 mph	Westbound	145	5	0
Pascal St. (north of University Ave.)	30 mph	Northbound & Southbound	116	4	0
Pascal St. (University Ave. to St. Anthony Ave.)	30 mph	Northbound & Southbound	242	8	0
Pascal St. (south of St. Anthony Ave.)	30 mph	Northbound & Southbound	124	4	0
St. Anthony Ave. (east of Pascal St.)	30 mph	Westbound	210	7	0
St. Anthony Ave. (Pascal St. to Snelling Ave.)	30 mph	Westbound	210	7	0
St. Anthony Ave. (west of Snelling Ave.)	30 mph	Westbound	43	1	0
Concordia Ave. (west of Snelling Ave.)	30 mph	Eastbound	4	0	0
Concordia Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	153	5	0
Concordia Ave. (east of Pascal St.)	30 mph	Eastbound	153	5	0

Table 21. Modeled Hourly Volumes for Proposed Development (2035) Daytime Conditions

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
I-94 (west of Snelling Ave.)	55 mph	Eastbound	4,359	141	187
I-94 (east of Snelling Ave.)	55 mph	Eastbound	4,063	131	175
I-94 (east of Snelling Ave.)	55 mph	Westbound	4,185	90	225
I-94 (west of Snelling Ave.)	55mph	Westbound	4,722	102	254
I-94/Snelling Ave. northeast ramp	40 mph	Westbound	889	31	4
I-94/Snelling Ave. northwest ramp	40 mph	Westbound	1,291	46	5
I-94/Snelling Ave. southeast ramp	40 mph	Eastbound	729	26	3
I-94/Snelling Ave. southwest ramp	40 mph	Eastbound	1,145	40	5
Snelling Ave. (south of I-94)	30 mph	Northbound	1,261	45	5
Snelling Ave. (I-94 to University Ave.)	30 mph	Northbound	1,153	41	5
Snelling Ave. (north of University Ave.)	30 mph	Northbound	918	32	4
Snelling Ave. (north of University Ave.)	30 mph	Southbound	882	31	4
Snelling Ave. (I-94 to University Ave.)	30 mph	Southbound	1,108	39	5
Snelling Ave. (south of I-94)	30 mph	Southbound	1,212	43	5
University Ave. (west of Snelling Ave.)	30 mph	Eastbound	484	17	2
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	444	16	2
University Ave. (east of Pascal St.)	30 mph	Eastbound	516	18	2
University Ave. (east of Pascal St.)	30 mph	Westbound	422	15	2

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Westbound	364	13	2
University Ave. (west of Snelling Ave.)	30 mph	Westbound	396	14	2
Pascal St. (north of University Ave.)	30 mph	Northbound & Southbound	227	8	1
Pascal St. (University Ave. to St. Anthony Ave.)	30 mph	Northbound & Southbound	599	21	2
Pascal St. (south of St. Anthony Ave.)	30 mph	Northbound & Southbound	298	11	1
St. Anthony Ave. (east of Pascal St.)	30 mph	Westbound	441	16	2
St. Anthony Ave. (Pascal St. to Snelling Ave.)	30 mph	Westbound	441	16	2
St. Anthony Ave. (west of Snelling Ave.)	30 mph	Westbound	84	3	0
Concordia Ave. (west of Snelling Ave.)	30 mph	Eastbound	8	0	0
Concordia Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	342	12	1
Concordia Ave. (east of Pascal St.)	30 mph	Eastbound	342	12	1

Table 22. Modeled Hourly Volumes for Proposed Development (2035) Nighttime Conditions

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
I-94 (west of Snelling Ave.)	55 mph	Eastbound	3,514	113	151
I-94 (east of Snelling Ave.)	55 mph	Eastbound	3,275	106	141
I-94 (east of Snelling Ave.)	55 mph	Westbound	4,275	45	180
I-94 (west of Snelling Ave.)	55mph	Westbound	5,580	180	240
I-94/Snelling Ave. northeast ramp	40 mph	Westbound	596	19	1
I-94/Snelling Ave. northwest ramp	40 mph	Westbound	936	30	2
I-94/Snelling Ave. southeast ramp	40 mph	Eastbound	415	13	1
I-94/Snelling Ave. southwest ramp	40 mph	Eastbound	618	20	1
Snelling Ave. (south of I-94)	30 mph	Northbound	633	20	1
Snelling Ave. (I-94 to University Ave.)	30 mph	Northbound	579	19	1
Snelling Ave. (north of University Ave.)	30 mph	Northbound	461	15	1
Snelling Ave. (north of University Ave.)	30 mph	Southbound	461	15	1
Snelling Ave. (I-94 to University Ave.)	30 mph	Southbound	579	19	1
Snelling Ave. (south of I-94)	30 mph	Southbound	633	20	1
University Ave. (west of Snelling Ave.)	30 mph	Eastbound	122	4	0
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	112	4	0
University Ave. (east of Pascal St.)	30 mph	Eastbound	130	4	0
University Ave. (east of Pascal St.)	30 mph	Westbound	165	5	0

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Westbound	142	5	0
University Ave. (west of Snelling Ave.)	30 mph	Westbound	155	5	0
Pascal St. (north of University Ave.)	30 mph	Northbound & Southbound	116	4	0
Pascal St. (University Ave. to St. Anthony Ave.)	30 mph	Northbound & Southbound	307	10	1
Pascal St. (south of St. Anthony Ave.)	30 mph	Northbound & Southbound	153	5	0
St. Anthony Ave. (east of Pascal St.)	30 mph	Westbound	226	7	0
St. Anthony Ave. (Pascal St. to Snelling Ave.)	30 mph	Westbound	226	7	0
St. Anthony Ave. (west of Snelling Ave.)	30 mph	Westbound	43	1	0
Concordia Ave. (west of Snelling Ave.)	30 mph	Eastbound	4	0	0
Concordia Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	175	6	0
Concordia Ave. (east of Pascal St.)	30 mph	Eastbound	175	6	0

Table 23. Modeled Hourly Volumes for Proposed Development (2035) Daytime Conditions (Future Event Arrival Period)

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
I-94 (west of Snelling Ave.)	55 mph	Eastbound	5,820	60	120
I-94 (east of Snelling Ave.)	55 mph	Eastbound	4,365	45	90
I-94 (east of Snelling Ave.)	55 mph	Westbound	4,356	45	90
I-94 (west of Snelling Ave.)	55mph	Westbound	5,820	60	120
I-94/Snelling Ave. northeast ramp	40 mph	Westbound	945	7	3
I-94/Snelling Ave. northwest ramp	40 mph	Westbound	1,329	9	4
I-94/Snelling Ave. southeast ramp	40 mph	Eastbound	652	5	2
I-94/Snelling Ave. southwest ramp	40 mph	Eastbound	2,364	17	7
Snelling Ave. (south of I-94)	30 mph	Northbound	1,385	10	4
Snelling Ave. (I-94 to University Ave.)	30 mph	Northbound	2,077	15	6
Snelling Ave. (north of University Ave.)	30 mph	Northbound	1,214	9	4
Snelling Ave. (north of University Ave.)	30 mph	Southbound	1,323	9	4
Snelling Ave. (I-94 to University Ave.)	30 mph	Southbound	1,420	10	4
Snelling Ave. (south of I-94)	30 mph	Southbound	1,319	9	4
University Ave. (west of Snelling Ave.)	30 mph	Eastbound	521	4	2
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	684	5	2
University Ave. (east of Pascal St.)	30 mph	Eastbound	865	5	3
University Ave. (east of Pascal St.)	30 mph	Westbound	691	5	2

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Westbound	717	5	2
University Ave. (west of Snelling Ave.)	30 mph	Westbound	437	3	1
Pascal St. (north of University Ave.)	30 mph	Northbound & Southbound	222	2	1
Pascal St. (University Ave. to St. Anthony Ave.)	30 mph	Northbound & Southbound	755	5	2
Pascal St. (south of St. Anthony Ave.)	30 mph	Northbound & Southbound	744	5	2
St. Anthony Ave. (east of Pascal St.)	30 mph	Westbound	655	5	2
St. Anthony Ave. (Pascal St. to Snelling Ave.)	30 mph	Westbound	507	4	2
St. Anthony Ave. (west of Snelling Ave.)	30 mph	Westbound	103	1	0
Concordia Ave. (west of Snelling Ave.)	30 mph	Eastbound	15	0	0
Concordia Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	605	4	2
Concordia Ave. (east of Pascal St.)	30 mph	Eastbound	592	4	2

Table 24. Modeled Hourly Volumes for Proposed Development (2035) Daytime Conditions (Future Event Departure Period)

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
I-94 (west of Snelling Ave.)	55 mph	Eastbound	5747	59	118
I-94 (east of Snelling Ave.)	55 mph	Eastbound	4365	45	90
I-94 (east of Snelling Ave.)	55 mph	Westbound	4365	45	90
I-94 (west of Snelling Ave.)	55mph	Westbound	5820	60	120
I-94/Snelling Ave. northeast ramp	40 mph	Westbound	597	4	2
I-94/Snelling Ave. northwest ramp	40 mph	Westbound	2499	18	8
I-94/Snelling Ave. southeast ramp	40 mph	Eastbound	946	7	3
I-94/Snelling Ave. southwest ramp	40 mph	Eastbound	1236	9	4
Snelling Ave. (south of I-94)	30 mph	Northbound	1385	10	4
Snelling Ave. (I-94 to University Ave.)	30 mph	Northbound	1193	8	4
Snelling Ave. (north of University Ave.)	30 mph	Northbound	1275	9	4
Snelling Ave. (north of University Ave.)	30 mph	Southbound	1118	8	3
Snelling Ave. (I-94 to University Ave.)	30 mph	Southbound	2077	15	6
Snelling Ave. (south of I-94)	30 mph	Southbound	1385	10	4
University Ave. (west of Snelling Ave.)	30 mph	Eastbound	497	4	2
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	706	5	2
University Ave. (east of Pascal St.)	30 mph	Eastbound	671	5	2
University Ave. (east of Pascal St.)	30 mph	Westbound	680	5	2

Roadway Segment	Modeled Speed (miles per hour, MPH)	Direction	Traffic Characteristics, Cars	Traffic Characteristics, Medium Trucks	Traffic Characteristics, Heavy Trucks
University Ave. (Snelling Ave. to Pascal St.)	30 mph	Westbound	760	5	2
University Ave. (west of Snelling Ave.)	30 mph	Westbound	537	4	2
Pascal St. (north of University Ave.)	30 mph	Northbound & Southbound	289	2	1
Pascal St. (University Ave. to St. Anthony Ave.)	30 mph	Northbound & Southbound	875	6	3
Pascal St. (south of St. Anthony Ave.)	30 mph	Northbound & Southbound	835	6	3
St. Anthony Ave. (east of Pascal St.)	30 mph	Westbound	719	5	2
St. Anthony Ave. (Pascal St. to Snelling Ave.)	30 mph	Westbound	756	5	2
St. Anthony Ave. (west of Snelling Ave.)	30 mph	Westbound	43	0	0
Concordia Ave. (west of Snelling Ave.)	30 mph	Eastbound	15	0	0
Concordia Ave. (Snelling Ave. to Pascal St.)	30 mph	Eastbound	360	3	1
Concordia Ave. (east of Pascal St.)	30 mph	Eastbound	430	3	1