APPENDIX Q

MSP 2020 Improvements EA
Traffic Noise – Proposed Roadway Improvements Memorandum

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SRF No. 0107343

MEMORANDUM

TO: Brandon Bourdon, P.E.
Kimley-Horn & Associates, Inc.

FROM: Brett Danner, Senior Associate

DATE: July 17, 2012

SUBJECT: MINNEAPOLIS-ST. PAUL INTERNATIONAL AIRPORT 2020 IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT
TRAFFIC NOISE – PROPOSED ROADWAY IMPROVEMENTS

This memorandum provides a discussion of vehicular traffic noise impacts related to proposed roadway improvements for inclusion in the Minneapolis-St. Paul International Airport 2020 Improvements Environmental Assessment (EA). The following text was developed consistent with guidance from the Minnesota Department of Transportation (MnDOT) Noise Policy for Type I Federal-aid Projects as per 23 CFR 772 (effective date June 1, 2011).

INTRODUCTION

General Project Description

The proposed project includes roadway and interchange improvements on Interstate 494 (I-494) and Trunk Highway (TH) 5 in conjunction with planned improvements to Minneapolis-St. Paul (MSP) International Airport. These improvements are outlined and evaluated in the MSP International Airport Year 2020 Improvements Environmental Assessment (EA). The proposed roadway improvements include construction of an auxiliary lane (approximately 0.3 miles) along westbound I-494 between TH 77 and 24th Avenue South. The I-494/34th Avenue South interchange will be reconstructed as a diverging diamond interchange (DDI). A bridge braid will be constructed between the 34th Avenue South entrance ramp to westbound I-494 and the exit ramp from westbound I-494 to 24th Avenue South. Along TH 5, the Post Road interchange and Glumack Drive interchange will be reconstructed to provide capacity and operational improvements. The project is located in Hennepin County, Minnesota.

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 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.

Table 1 provides a rough comparison of the noise levels of some common noise sources.

Table 1
Decibel Levels of Common Noise Sources

Sound Pressure Level (dBA)	Noise Source
140	Jet Engine (at 75 feet)
130	Jet Aircraft (at 300 feet)
120	Rock and Roll Concert
110	Pneumatic Chipper
100	Jointer/Planer
90	Chainsaw
80	Heavy Truck Traffic
70	Business Office
60	Conversational Speech
50	Library
40	Bedroom
30	Secluded Woods
20	Whisper

Source: "A Guide to Noise Control in Minnesota," Minnesota Pollution Control Agency, http://www.pca.state.mn.us/index.php/view-document.html?gid=5355

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.

Federal and State Noise Policies

The Federal Highway Administration's (FHWA) traffic noise regulation is described in 23 Code of Federal Regulations (CFR) Part 772 of the Code of Federal Regulations (Procedures for Abatement of Highway Traffic Noise and Construction Noise). 23 CFR 772 requires the identification of highway traffic noise impacts and the evaluation of potential noise abatement measures, along with other considerations, in conjunction with the planning and design of a Federal-aid highway project.

Federal Noise Abatement Criteria

A traffic noise impact analysis is completed for all Federal or Federal-aid Type I projects (construction of a highway meeting one or more of eight criteria defined in 23 CFR 772.5). Noise impacts are determined based on land use activities and predicted worst hourly L_{10} noise levels under future conditions. For parks, cemeteries, and recreational areas (Activity Category C), the Federal noise abatement criterion is 70 dBA (L_{10}). For hotels, motels, and commercial/business/office land uses (Activity Category E), the Federal noise abatement criterion is 75 dBA (L_{10}). There is no impact criterion for developed lands that are not sensitive to highway traffic noise (e.g., industrial land uses) (Activity Category F). Federal noise abatement criteria (L_{10}) are shown in Table 2.

Receptor locations where noise levels are "approaching" or exceeding the criterion level must also be evaluated for noise abatement feasibility and reasonableness. A noise impact is also defined as a "substantial increase" in the future modeled noise levels over the existing modeled noise levels. In Minnesota, "approaching" is defined as 1 dBA or less below the Federal noise abatement criteria. For example, 69 dBA (L_{10}) is defined as "approaching" the Federal noise abatement criterion for parkland uses (Activity Category C). A "substantial increase" is defined as an increase of 5 dBA or greater from existing to future conditions.

Table 2
23 CFR Part 772: Noise Abatement Criteria

Activity Category	Activity Criteria [1] [2] L_{10}(h)	Evaluation Location	Activity Description
A	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B [3]	70	Exterior	Residential
C [3]	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E [3] [4]	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	Undeveloped lands that are not permitted

[1] In Minnesota, traffic noise impacts are determined using the hourly L_{10} value.

[2] The L_{10}(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

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

[4] Hotels and motels that function as apartment buildings are classified under Activity Category B.

Minnesota State Noise Standards

The Minnesota Pollution Control Agency (MPCA) is the state agency responsible for enforcing State noise rules. Minnesota state noise standards have been established for daytime and nighttime periods. For residential land uses (identified as noise area classification one or NAC-1), the Minnesota State standards for L_{10} are 65 dBA for daytime and 55 dBA for nighttime; the standards for L_{50} are 60 dBA for daytime and 50 dBA for nighttime. The 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 3. Minnesota State noise standards apply to the outdoor atmosphere (i.e., exterior noise levels).

The State noise standards apply to the project section of I-494 and TH 5. Exemptions to State noise standards are found in Minnesota Statutes 2000, Section 116.07 subd. (2a).

Table 3
Minnesota State Noise Standards

MPCA State Noise Standards					
Land Use	**Code**	**Daytime (7 a.m. – 10 p.m.) dBA**		**Nighttime (10 p.m. – 7 a.m.) dBA**	
Residential	**NAC-1** [(1)]	L_{10} of 65	L_{50} of 60	L_{10} of 55	L_{50} of 50
Commercial	**NAC-2** [(2)]	L_{10} of 70	L_{50} of 65	L_{10} of 70	L_{50} of 65
Industrial	**NAC-3** [(3)]	L_{10} of 80	L_{50} of 75	L_{10} of 80	L_{50} of 75

(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.

Exceptions to the noise area classifications identified in Table 3 are defined in Minnesota Rules 7030.0050, Subp. 3 (Exceptions). Under Minnesota Rules 7030.0050, Subp. 3A., the daytime standards for noise area classification one (NAC-1) shall be applied during the nighttime if the land use activity does not include overnight lodging. Other exceptions allow for the noise area classification to change if specific conditions are met. For example, the standards for a building in NAC-2 are applied to a building in NAC-1 if: 1) the building is constructed in such a way that the exterior to interior sound attenuation is at least 30 dBA; 2) the building has year-round climate control; and 3) the building has no areas or accommodations that are intended for outdoor activities.

ANALYSIS METHODOLOGY

Affected Environment

Roadway improvements associated with the MSP International Airport Year 2020 Improvements are located in Hennepin County, Minnesota. Existing land uses in the vicinity of the proposed roadway improvements include industrial, commercial and business/office uses. Fort Snelling National Cemetery is located north of I-494 and west of TH 5 between the 34th Avenue interchange and Post Road interchange. Fort Snelling State Park is located along the east side of TH 5 as well as the west side of TH 5 (north of the Glumack Drive interchange and MSP runway 30R). Traffic noise is generated by vehicles traveling on I-494, TH 77, TH 5, and other intersecting local roadways throughout the project area. Other noise sources in the project area include aircraft operations at MSP International Airport and light rail transit operations along the 34th Avenue South corridor.

Noise Monitoring

Noise Level Monitoring Results

Field measurements (i.e., noise level monitoring) are commonly performed during a noise study to document existing noise levels. Existing noise levels were monitored at two locations adjacent to existing roadways in the project area. Noise monitoring locations are described below.

- Monitoring Site 1 (B-2B) is a hotel located south of I-494 between TH 77 and 24th Avenue South in Bloomington.

- Monitoring Site 2 (D-9) is a hotel located in the southwest quadrant of the I-494/34th Avenue South interchange in Bloomington.

Daytime noise levels for Minnesota sites were monitored in spring 2012. Traffic noise levels were monitored at each location for two, 30 minute monitoring sessions; once during the morning and again during the afternoon. Two noise meters were used to collect existing noise levels. One noise meter was run continuously during the monitoring session, reflecting ambient/environmental noise levels associated with all sources within the project area. A second noise meter was paused during aircraft events (e.g., landings/take-offs), reflecting traffic noise levels only. A trained noise monitoring technician was present at each session for the entire monitoring session to ensure correct operation of the instrumentation. Field measurements of daytime noise levels are tabulated in Table 4. The results shown in Table 4 are an average of the morning and afternoon measurement at each monitoring location. Monitored daytime traffic noise levels ranged from 65.0 dBA (L_{10}) to 74.5 dBA (L_{10}).

Table 4
Noise Measurement Summary Table

Site ID	Location Description	Measured Level, dBA [1]			
		L_{10}	L_{50}	L_{90}	Leq
Continuous Measurement (all sources)					
B-2B	2201 78th Street East, Bloomington (front of building) [2]	65.6	62.9	60.1	63.8
D-9	7800 International Drive, Bloomington (front of building) [2]	75.1	72.7	70.3	73.1
Traffic Noise Measurement					
B-2B	2201 78th Street East, Bloomington (front of building) [2]	65.0	63.0	60.8	64.2
D-9	7800 International Drive, Bloomington (front of building) [2]	74.5	71.8	68.8	72.4

[1] Average of morning and afternoon measured sound levels.
[2] Field measurements of existing noise levels measured at the front façade of the building facing I-494.

Noise Monitoring and Predicted Noise Levels

Noise monitoring results are presented in Table 6 (Noise Model Results – Daytime Levels) along with the computer modeling results for existing daytime traffic noise levels. Noise monitoring results presented in Table 6 are an average of the morning and afternoon measurements described above. It was found that the predicted traffic noise levels were 4.7 dBA (L_{10}) greater than monitored levels for receptor location B-2B and 3.3 dBA (L_{10}) less than the measured noise levels for receptor location D-9 using I-494 traffic volumes counted during the measurement periods (by vehicle classification) and posted speeds. A discrepancy of 3.0 dBA or less between predicted levels and field measurements is considered acceptable for noise model validation. Because the predicted levels for receptor D-9 were within 0.3 dBA of measured levels, and because predicted levels for receptor B-2B were an overestimate of traffic noise levels compared to measured levels, it was determined that it was best to use the prediction model without corrections.

Traffic Noise Modeling

Noise modeling was completed using the noise prediction program "MINNOISE31", a version of the FHWA "STAMINA" model adapted by MnDOT. This model uses traffic volumes, speed, class of vehicle, and the typical characteristics of the roadway being analyzed (e.g., roadway horizontal and vertical alignment). Traffic data input into the MINNOISE31 noise model input files for the proposed project included existing (year 2010)[1] and future (year 2030) No-Build (airlines relocate, without proposed roadway improvements) and Build Alternative (airlines relocate, with proposed roadway improvements) forecast traffic volumes.

Worst Hourly Traffic Noise Analysis

In general, higher traffic volumes, vehicle speeds, and number of heavy trucks increase the loudness of highway traffic noise. The worst hourly traffic noise impact typically occurs when traffic is flowing more freely and when heavy truck volumes are the greatest. For determining the worst-case traffic noise hour, traffic noise levels for five time periods were modeled at nine representative receptor locations along I-494 between TH 77 and TH 5, and along TH 5 at Post Road and Glumack Drive, taking into account the appropriate vehicle mix (i.e., cars, medium trucks, heavy trucks), seasonal traffic variations where appropriate, and directional split in traffic volume (i.e., eastbound I-494 versus westbound I-494; northbound TH 5 versus southbound TH 5).[2] The p.m. peak hour is generally a period characterized by congested conditions; therefore this time of day was not included in the worst noise hour analysis.

The daytime L_{10} and L_{50} levels for each of the five modeled time periods are summarized in Table 5, along with daytime monitored traffic noise levels at nine representative receptor locations along the I-494 and TH 5 project corridor. Based on this analysis, it was determined that the time period from 8:00 a.m. to 9:00 a.m. represents the worst-case traffic noise hour. The 8:00 a.m. to 9:00 a.m. hour generally represents a period of higher medium and heavy truck volumes compared to other times of the day, combined with higher traffic volumes just after the a.m. peak hour period. The 6:00 a.m. to 7:00 a.m. 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.[3]

[1] Existing conditions traffic noise analysis based on year 2010 traffic counts for I-494, TH 77, TH 5 and intersecting local roadways (e.g., 24th Avenue South, 34th Avenue South, Post Road, Glumack Drive).
[2] Identification of the worst-case traffic noise hour was based on MnDOT short duration vehicle classification counts for I-494 (Site #1302) from June 2006 and TH 5 (Site #2274) from July1998.
[3] The MPCA defines nighttime as those hours from 10:00 p.m. to 7:00 a.m. (Minnesota Rules 7030.0020, Subp. 10).

Table 5
Worst Hourly Traffic Noise Summary

Receptor ID	Daytime Modeled Noise Level (dBA) by Time Period									
	8:00-9:00 a.m.		10:00-11:00 a.m.		1:00-2:00 p.m.		3:00-4:00 p.m.		6:00-7:00 p.m.	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
A-2 (I)	73.8	71.1	73.4	70.3	72.7	69.7	73.3	70.5	72.9	70.1
B-2B (H)	69.2	**67.0**	69.0	**66.4**	68.1	**65.6**	68.6	**66.3**	68.4	**66.0**
C-2 (I)	64.2	63.0	63.8	62.2	63.0	61.7	63.6	62.4	63.3	61.9
D-9 (H)	**71.9**	**69.7**	**71.7**	**69.1**	**70.9**	**68.4**	**71.4**	**69.2**	**71.1**	**68.8**
E-3 (H)	**71.8**	**69.3**	**71.1**	**68.4**	**70.8**	**67.9**	**71.3**	**68.6**	**71.1**	**68.2**
FSNC-5 (CEM)	**69.5**	**67.7**	**69.0**	**67.0**	**68.4**	**66.4**	**69.0**	**67.2**	**68.6**	**66.7**
FSSP-2 (P)	65.4	62.8	63.7	60.8	64.2	61.5	64.6	62.1	64.2	61.6
FSSP-14 (P)	67.1	62.0	64.8	59.4	65.5	60.4	65.9	61.0	65.5	60.4
MPRB-10 (P)	59.2	57.8	57.7	56.0	58.3	56.7	58.8	57.4	58.5	56.9

Bold numbers are above State daytime standards (see Table 3).
Underlined numbers approach or exceed Federal noise abatement criteria (see Table 2).
(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

PREDICTED NOISE LEVELS AND NOISE IMPACTS

Noise Receptors

Traffic noise impacts were assessed by modeling noise levels at receptor sites likely to be affected by construction of the proposed project. Traffic noise levels were modeled at a total of 108 representative receptor locations along the I-494 and TH 5 project corridor. Six hotel properties are located along the south side of I-494 between TH 77 and TH 5 as described below.

- Two hotel properties are located along the south side of I-494 between TH 77 and 24th Avenue South (receptors B-1B and B-2B). Modeled receptor points B-1B and B-2B were placed at the façade of the buildings closest to the eastbound I-494 travel lanes. There are no patios or balconies associated with these two hotel properties; however, these two hotel properties have areas intended for outdoor activity (i.e., courtyard/pool areas within the middle of the hotel buildings). These courtyard/pool areas are represented by receptors B-1A and B-2A. Modeled noise levels at receptors B-1A and B-2A are reported for informational purposes only.

- Two hotel properties are located along the south side of I-494 between 24th Avenue South and 34th Avenue South (receptors D-1 and D-9). Modeled receptor points D-1 and D-9 were placed at the façade of these two buildings closest to the eastbound I-494 travel lanes. There are no patios, balconies or other outdoor activity areas associated with these two hotel properties.

- Two hotel properties are located along the south side of I-494, east of 34th Avenue South. Receptor E-1A represents the hotel property located in the southeast quadrant of I-494 and 34th Avenue South. Modeled receptor point E-1A was placed at the façade of building closest to the eastbound I-494 travel lanes. Because this property also has small balconies associated with the hotel rooms, additional modeling points were placed at the façade of the building on the first and second floors above ground level (receptor E-1B and receptor E-1C). Modeled noise levels at receptors E-1B and E-1C are reported for informational purposes only.

  Receptor E-3 represents the hotel property east of 34th Avenue South. There are no patios, balconies or other outdoor activity areas associated with this hotel property. Receptor E-3 was placed at the façade of the building closest to the eastbound I-494 travel lanes.

It was assumed that the hotel properties would meet the exceptions defined in Minnesota Rules 7030.0050, Subp. 3. In addition, there is also only one address associated with each hotel property, and the hotel properties do not function as apartment buildings. As such, modeled noise

levels at the six hotel properties were compared to State noise standards for noise area classification two (NAC-2) (i.e., commercial land uses) and Federal Activity Category E (see Table 2).

Nineteen modeled receptor locations represent business/office, commercial and industrial land uses along I-494 between TH 77 and TH 5 and the southwest quadrant of the Glumack Drive interchange (associated with MSP International Airport) as described below.

- Modeled receptors A-1, A-2 and A-3 represent industrial properties along the north side of I-494 between TH 77 and 24th Avenue South. Modeled receptor C-1 represents an industrial property near the northwest quadrant of the 34th Avenue South interchange. Modeled receptors F-1 and F-2 represent industrial properties associated with MSP International Airport in the southwest quadrant of the Glumack Drive interchange. For each of these properties, the modeled receptor point was placed at the façade of the building closest to I-494 or TH 5.

- Modeled receptors C-2 and C-3 represent two office buildings in the northwest quadrant of the 34th Avenue South interchange. For each of these office buildings, the modeled receptor point was placed at the façade of the building closest to the westbound I-494 travel lanes.

- Modeled receptors D-2 through D-8 represent office buildings in the Metro Office Park along the south side of I-494 between 24th Avenue South and 34th Avenue South. For each of these office buildings, the modeled receptor point was placed at the façade of the building closest to the eastbound I-494 travel lanes. Receptor D-10 represents an office building in the southwest quadrant of I-494 and 34th Avenue South. Receptor D-10 was placed at the façade of a parking facility associated with this office building, closest to the eastbound I-494 travel lanes.

- Modeled receptors D-11 and E-2 represent off airport parking properties along the south side of I-494. Modeled receptor D-11 represents an off airport parking property (“Park ’N Go”) in the southwest quadrant of I-494 and 34th Avenue South. Modeled receptor E-2 represents an off airport parking property east of 34th Avenue South.

- Modeled receptor E-4 represents an office building associated with the Minnesota Valley National Wildlife Refuge. Modeled receptor E-4 was placed at the façade of the building closest to the eastbound I-494 travel lanes.

The remaining model receptor locations represent Fort Snelling National Cemetery and Fort Snelling State Park (see discussion below). The locations of the model receptor locations are

illustrated at the end of this report in Figure 1 through Figure 4, Attachment A. Land uses are listed with each modeled receptor location in Tables 6 and 7. [4]

Fort Snelling National Cemetery

Twenty (20) modeled receptor locations were arrayed in the northeast quadrant of the I-494/34th Avenue South interchange within Fort Snelling National Cemetery, adjacent to the proposed interchange improvements (receptors FSNC-1 to FSNC-20; see Figure 2, Attachment A). There are no areas of frequent outdoor use associated with the portion of Fort Snelling National Cemetery in the northeast quadrant of the 34th Avenue South interchange. The 20 modeled receptor locations were identified to document existing and future projected noise levels within the area of Fort Snelling National Cemetery adjacent to the 34th Avenue South interchange.

Fort Snelling State Park

Fort Snelling State Park (east of TH 5)

Twenty (20) modeled receptor locations were identified in Fort Snelling State Park adjacent to proposed improvements at the TH 5/Post Road interchange and the TH 5/Glumack Drive interchange. Eighteen (18) of these receptor locations represent biking/walking trails along the east side of TH 5 from the Post Road interchange to the northern project limits south of TH 55. One modeled receptor location (receptor FSSP-7) represents the information center/office along park entrance road east of the TH 5/Post Road interchange.

North of the park entrance from the TH 5/Post Road interchange, within the Fort Snelling State Park boundary, is the Fort Snelling Officer's Club (receptor FSSP-8). The Officer's Club provides dining services and meeting space/areas. The Officer's Club falls under State noise activity area two and Federal Activity Category E.

Fort Snelling State Park (west of TH 5 – Upper Post Area)

The northwest portion of Fort Snelling State Park (south of TH 55 between Bloomington Road and TH 5) is referred to as the Upper Post area. The portion of the Upper Post area directly adjacent to TH 5 (west of TH 5 along Taylor Avenue) is comprised of historic buildings that previously provided administrative, military support and residential functions (e.g., Officer's Row homes, barracks). These buildings are contributing historic buildings within the Fort Snelling National Historic Landmark District and National Register Historic District. As

[4] Modeled receptor locations in Table 6 and Table 7 are identified by the following labels: Fort Snelling National Cemetery = "FSNC-XX"; Fort Snelling State Park = "FSSP-XX"; Upper Post area = "UP-XX"; Fort Snelling State Park property leased to the Minneapolis Parks and Recreation Board = "MPRB-XX".

described in the *Fort Snelling Light Rail Transit and Upper Post Master Plan* (February 2011), these buildings have been secured and are no longer in active use. Several potential future uses for this portion of the Upper Post area are identified in the *Fort Snelling Light Rail Transit and Upper Post Master Plan*; however, there are no definitive plans in place. [5] There are currently no areas of frequent outdoor use associated with this portion of the Upper Post area. Twenty-six (26) modeled receptor locations were arrayed across this portion of the Upper Post area between Taylor Avenue and TH 5 to document existing and future projected noise levels (receptors UP-1 through UP-26; see Figure 4, Attachment A).

The westernmost portion of the Upper Post area is the former Polo Grounds, Parade Grounds, and golf course (between Bloomington Road and Taylor Avenue). This area is owned by Minnesota DNR. Minnesota DNR leases this area to the Minneapolis Parks and Recreation Board for recreation purposes, including the golf course, soccer fields, baseball fields, and softball fields (*Fort Snelling Light Rail Transit and Upper Post Master Plan*, February 2011). Twelve (12) modeled receptor locations were identified within the portion of the golf course closest to TH 5 (between Leavenworth Avenue and Minnehaha Avenue), and the eastern limits of the recreational fields west of Taylor Avenue facing southbound TH 5 (receptors MPRB-1 through MPRB-12, see Figure 4, Attachment A).

Noise Model Results

Results of the noise modeling analysis for existing (2010) conditions, the future (2030) No Build Alternative, and the future (2030) Build Alternative are tabulated in Table 6 (daytime results) and Table 7 (nighttime results). The results of the traffic noise modeling analysis are summarized below. While both the L_{10} and L_{50} descriptors are shown in Table 6 and Table 7, the following summary describes only the L_{10} noise levels. Traffic noise impacts (e.g., number of receptors exceeding State standards, approaching/exceeding Federal noise abatement criteria) are summarized in Table 8.

Existing Conditions

Existing (2010) daytime modeled noise levels range from 55.7 dBA (L_{10}) to 77.1 dBA (L_{10}), whereas nighttime modeled noise levels range from 53.5 dBA (L_{10}) to 75.4 dBA (L_{10}). Modeled daytime traffic noise levels for existing conditions exceed State daytime L_{10} standards at 29

[5] Hennepin County Department of Housing, Community Works and Transit. 2012. Hennepin County Website (online). *Fort Snelling Light Rail Transit and Upper Post Master Plan* (February 2011) accessed 2012-05-29 at http://hennepin.us/portal/site/HennepinUS/menuitem.b1ab75471750e40fa01dfb47ccf06498/?vgnextoid=a10c66c799ac4210VgnVCM10000049114689RCRD.

modeled receptor locations. Modeled nighttime traffic noise levels for existing conditions exceed State nighttime L_{10} standards at 22 modeled receptor locations.

Future (2030) No Build Alternative

Future (2030) daytime modeled noise levels are predicted to range from 56.7 dBA (L_{10}) to 78.3 dBA (L_{10}) under the No Build Alternative, whereas nighttime modeled noise levels range from 54.6 dBA (L_{10}) to 76.6 dBA (L_{10}). Modeled daytime traffic noise levels are predicted to increase by 0.9 dBA to 2.6 dBA under the No Build Alternative compared to existing conditions. Modeled daytime traffic noise levels are predicted to exceed State daytime L_{10} standards at 35 modeled receptor locations with the No Build Alternative. Modeled nighttime traffic noise levels are predicted to exceed State nighttime L_{10} standards at 25 modeled receptor locations with the No Build Alternative.

Future (2030) Build Alternative

Future (2030) daytime modeled noise levels are predicted to range from 56.8 dBA (L_{10}) to 78.3 dBA (L_{10}) under the Build Alternative. Nighttime modeled noise levels are predicted to range from 54.6 dBA (L_{10}) to 76.6 dBA (L_{10}). In general, modeled daytime traffic noise levels are predicted to increase by 0.9 dBA to 2.7 dBA under the Build Alternative compared to existing conditions. Modeled daytime traffic noise levels are predicted to exceed State daytime L_{10} standards at 35 modeled receptor locations with the Build Alternative. Modeled nighttime traffic noise levels are predicted to exceed State nighttime L_{10} standards at 25 modeled receptor locations with the Build Alternative.

Modeled L_{10} noise levels are projected to approach or exceed Federal noise abatement criteria at 24 modeled receptor locations within the project area under the future Build Alternative. None of the modeled receptor locations are projected to experience a substantial increase in traffic noise levels from existing conditions to the future Build Alternative.

Table 6
Traffic Noise Model Results – Daytime Levels

Receptor ID *	Monitored Noise Levels (dBA) [1]		Daytime Modeled Noise Levels (dBA)									
			Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
A-1 (I) (1)			74.2	71.7	75.2	73.1	1.0	1.4	75.2	73.1	1.0	1.4
A-2 (I) (1)			73.8	71.1	75.0	72.6	1.2	1.5	75.0	72.6	1.2	1.5
A-3 (I) (1)			70.3	67.9	71.6	69.5	1.3	1.6	71.6	69.5	1.3	1.6
B-1A (H) [2]			59.0	57.8	60.0	58.9	1.0	1.1	60.0	58.9	1.0	1.1
B-1B (H) (1) [3]			**73.2**	**70.9**	**74.1**	**72.0**	0.9	1.1	**74.1**	**72.0**	0.9	1.1
B-2A (H) [2]			60.9	59.5	62.0	60.8	1.1	1.3	62.0	60.8	1.1	1.3
B-2B (H) (1) [3]	65.0	**63.0**	69.2	**66.9**	**70.3**	**68.3**	1.1	1.4	**70.3**	**68.3**	1.1	1.4
C-1 (I) (1)			62.8	61.5	64.1	63.1	1.3	1.6	64.2	63.2	1.4	1.7
C-2 (C) (1)			64.2	63.0	65.7	64.7	1.5	1.7	65.8	64.8	1.6	1.8
C-3 (C) (1)			65.0	61.9	67.6	64.9	2.6	3.0	67.7	65.0	2.7	3.1
State Daytime Standard (NAC-1)	65	60	65	60	65	60	--	--	65	60	--	--
State Daytime Standard (NAC-2)	70	65	70	65	70	65	--	--	70	65	--	--
Federal NAC (Act. Cat. C/E)	70/75	--	70/75	--	70/75	--	--	--	70/75	--	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State daytime noise standards.

Underlined numbers approach or exceed Federal noise abatement criteria (NAC). Commercial land uses and hotels/motels fall under Federal Activity Category E.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

[1] Average of daytime (morning and afternoon) monitored noise levels.

[2] Modeled noise levels were based on a receptor location within the area of frequent outdoor use in the center of the building (e.g., courtyard/pool area). Modeled noise levels at receptors B-1A and B-2A are provided for informational purposes only.

[3] Modeled noise levels at the façade of the hotel building closest to the eastbound I-494 travel lanes.

Table 6 continued
Traffic Noise Model Results – Daytime Levels

Receptor ID *	Monitored Noise Levels (dBA) [1]		Daytime Modeled Noise Levels (dBA)									
			Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
D-1 (H) (1)			**75.0**	**72.1**	**76.1**	**73.7**	1.1	1.6	**76.1**	**73.8**	1.1	1.7
D-2 (C) (1)			**77.1**	**73.9**	**78.3**	**75.6**	1.2	1.7	**78.3**	**75.6**	1.2	1.7
D-3 (C) (1)			65.5	62.9	66.7	64.5	1.2	1.6	66.8	64.6	1.3	1.7
D-4 (C) (1)			**76.3**	**73.4**	**77.6**	**75.1**	1.3	1.7	**77.6**	**75.1**	1.3	1.7
D-5 (C) (1)			61.3	58.3	62.5	59.9	1.2	1.6	62.5	60.0	1.2	1.7
D-6 (C) (1)			**76.2**	**73.3**	**77.5**	**75.1**	1.3	1.8	**77.5**	**75.1**	1.3	1.8
D-7 (C) (1)			63.1	61.0	64.4	62.7	1.3	1.7	64.4	62.7	1.3	1.7
D-8 (C) (1)			66.1	63.7	67.4	65.4	1.3	1.7	67.4	65.4	1.3	1.7
D-9 (H) (1)	**74.5**	**71.8**	**71.9**	**69.7**	**73.3**	**71.5**	1.4	1.8	**73.3**	**71.5**	1.4	1.8
D-10 (C) (1)			64.6	62.8	65.9	64.5	1.3	1.7	65.9	64.5	1.3	1.7
D-11 (C) (1)			65.9	64.5	67.3	66.1	1.4	1.6	67.4	66.2	1.5	1.7
State Daytime Standard (NAC-1)	65	60	65	60	65	60	--	--	65	60	--	--
State Daytime Standard (NAC-2)	70	65	70	65	70	65	--	--	70	65	--	--
Federal NAC (Act. Cat. C/E)	70/75	--	70/75	--	70/75	--	--	--	70/75	--	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State daytime noise standards.

Underlined numbers approach or exceed Federal noise abatement criteria (NAC). Commercial land uses and hotels/motels fall under Federal Activity Category E.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) Average of daytime (morning and afternoon) monitored noise levels.

Table 6 continued
Traffic Noise Model Results – Daytime Levels

Receptor ID *	Monitored Noise Levels (dBA) [1]		Daytime Modeled Noise Levels (dBA)									
			Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
E-1A (H) (1) [2]			68.5	**66.8**	69.7	**68.3**	1.2	1.5	69.9	**68.4**	1.4	1.6
E-1B (H) [2]			68.9	**67.3**	**70.2**	**68.8**	1.3	1.5	**70.4**	**68.8**	1.5	1.5
E-1C (H) [2]			69.8	**67.9**	**70.9**	**69.3**	1.1	1.4	**71.1**	**69.4**	1.3	1.5
E-2 (C) (1)			65.2	63.9	66.3	65.2	1.1	1.3	66.3	65.2	1.1	1.3
E-3 (H) (1)			**71.8**	**69.3**	**73.1**	**70.6**	1.3	1.3	**73.1**	**70.6**	1.3	1.3
E-4 (C) (1)			64.6	63.3	65.6	64.5	1.0	1.2	65.6	64.5	1.0	1.2
FSNC-1 (CEM)			**67.1**	**64.8**	**69.3**	**67.2**	2.2	2.4	**69.3**	**67.3**	2.2	2.5
FSNC-2 (CEM)			**65.9**	**64.5**	**67.5**	**66.4**	1.6	1.9	**67.7**	**66.5**	1.8	2.0
FSNC-3 (CEM)			**68.8**	**66.8**	**70.8**	**68.9**	2.0	2.1	**70.9**	**69.2**	2.1	2.4
FSNC-4 (CEM)			**67.7**	**66.2**	**69.2**	**68.0**	1.5	1.8	**69.4**	**68.1**	1.7	1.9
FSNC-5 (CEM)			**69.5**	**67.7**	**70.8**	**69.4**	1.3	1.7	**71.0**	**69.6**	1.5	1.9
State Daytime Standard (NAC-1)	65	60	65	60	65	60	--	--	65	60	--	--
State Daytime Standard (NAC-2)	70	65	70	65	70	65	--	--	70	65	--	--
Federal NAC (Act. Cat. C/E)	70/75	--	70/75	--	70/75	--	--	--	70/75	--	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State daytime noise standards.

Underlined numbers approach or exceed Federal noise abatement criteria (NAC). Commercial land uses and hotels/motels fall under Federal Activity Category E.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) Average of daytime (morning and afternoon) monitored noise levels.

(2) Receptor E-1A is located at the façade of the hotel on ground level. Receptor E-1B and receptor E-1C represent small balconies on the first and second floors, respectively, above ground level. Modeled noise levels at receptor E-1B and receptor E-1C provided for informational purposes only.

Table 6 continued
Traffic Noise Model Results – Daytime Levels

Receptor ID *	Monitored Noise Levels (dBA) [1]		Daytime Modeled Noise Levels (dBA)									
			Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
FSNC-6 (CEM)			**68.1**	**66.6**	**69.5**	**68.2**	1.4	1.6	**69.6**	**68.3**	1.5	1.7
FSNC-7 (CEM)			**66.9**	**65.5**	**68.3**	**67.1**	1.4	1.6	**68.4**	**67.2**	1.5	1.7
FSNC-8 (CEM)			**65.0**	**63.8**	**66.3**	**65.3**	1.3	1.5	**66.4**	**65.4**	1.4	1.6
FSNC-9 (CEM)			**69.8**	**67.7**	**71.1**	**69.2**	1.3	1.5	**71.2**	**69.3**	1.4	1.6
FSNC-10 (CEM)			**68.5**	**66.8**	**69.7**	**68.2**	1.2	1.4	**69.7**	**68.3**	1.2	1.5
FSNC-11 (CEM)			**67.3**	**65.8**	**68.5**	**67.2**	1.2	1.4	**68.5**	**67.3**	1.2	1.5
FSNC-12 (CEM)			**65.2**	**64.0**	**66.5**	**65.4**	1.3	1.4	**66.5**	**65.5**	1.3	1.5
FSNC-13 (CEM)			**69.8**	**67.6**	**71.1**	**69.0**	1.3	1.4	**71.2**	**69.0**	1.4	1.4
FSNC-14 (CEM)			**68.4**	**66.7**	**69.5**	**68.0**	1.1	1.3	**69.6**	**68.1**	1.2	1.4
FSNC-15 (CEM)			**67.3**	**65.7**	**68.4**	**67.0**	1.1	1.3	**68.4**	**67.1**	1.1	1.4
FSNC-16 (CEM)			**65.3**	**64.0**	**66.4**	**65.3**	1.1	1.3	**66.4**	**65.4**	1.1	1.4
FSNC-17 (CEM)			**70.7**	**67.4**	**72.0**	**68.9**	1.3	1.5	**72.0**	**69.0**	1.3	1.6
State Daytime Standard (NAC-1)	65	60	65	60	65	60	--	--	65	60	--	--
State Daytime Standard (NAC-2)	70	65	70	65	70	65	--	--	70	65	--	--
Federal NAC (Act. Cat. C/E)	70/75	--	70/75	--	70/75	--	--	--	70/75	--	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State daytime noise standards.

Underlined numbers approach or exceed Federal noise abatement criteria (NAC). Commercial land uses and hotels/motels fall under Federal Activity Category E.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

[1] Average of daytime (morning and afternoon) monitored noise levels.

Table 6 continued
Traffic Noise Model Results – Daytime Levels

Receptor ID *	Monitored Noise Levels (dBA) [1]		Daytime Modeled Noise Levels (dBA)									
			Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
FSNC-18 (CEM)			**68.6**	**66.7**	**69.7**	**68.0**	1.1	1.3	**69.7**	**68.0**	1.1	1.3
FSNC-19 (CEM)			**67.3**	**65.7**	**68.3**	**66.9**	1.0	1.2	**68.4**	**67.0**	1.1	1.3
FSNC-20 (CEM)			**65.3**	**64.0**	**66.4**	**65.3**	1.1	1.3	**66.4**	**65.3**	1.1	1.3
F-1 (I) (1)			71.0	67.4	71.9	68.7	0.9	1.3	71.9	68.7	0.9	1.3
F-2 (I) (1)			64.1	61.5	65.0	62.7	0.9	1.2	65.0	62.7	0.9	1.2
FSSP-1 (P) [2]			67.1	64.1	68.5	65.8	1.4	1.7	66.3	64.1	-0.8	0.0
FSSP-2 (P)			65.4	62.8	66.4	64.2	1.0	1.4	66.6	64.4	1.2	1.6
FSSP-3 (P)			62.3	60.2	63.4	61.5	1.1	1.3	63.4	61.6	1.1	1.4
FSSP-4 (P)			58.7	57.0	59.7	58.2	1.0	1.2	59.7	58.2	1.0	1.2
FSSP-5 (P)			57.4	55.9	58.4	57.1	1.0	1.2	58.5	57.1	1.1	1.2
State Daytime Standard (NAC-1)	65	60	65	60	65	60	--	--	65	60	--	--
State Daytime Standard (NAC-2)	70	65	70	65	70	65	--	--	70	65	--	--
Federal NAC (Act. Cat. C/E)	70/75	--	70/75	--	70/75	--	--	--	70/75	--	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State daytime noise standards.

Underlined numbers approach or exceed Federal noise abatement criteria (NAC). Commercial land uses and hotels/motels fall under Federal Activity Category E.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

[1] Average of daytime (morning and afternoon) monitored noise levels.

[2] Receptor FSSP-1 is located along the proposed trail south of the realigned Post Road/Fort Snelling State Park entrance road under the Build Alternative.

Table 6 continued
Traffic Noise Model Results – Daytime Levels

Receptor ID *	Monitored Noise Levels (dBA) [1]		Daytime Modeled Noise Levels (dBA)									
			Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
FSSP-6 (P)			55.7	54.3	56.7	55.5	1.0	1.2	56.8	55.6	1.1	1.3
FSSP-7 (P)			57.7	56.2	58.8	57.4	1.1	1.2	58.8	57.5	1.1	1.3
FSSP-8 (C) (1) [2]			65.0	62.6	66.0	63.9	1.0	1.3	66.0	63.9	1.0	1.3
FSSP-9 (P)			62.5	60.4	63.5	61.6	1.0	1.2	63.5	61.7	1.0	1.3
FSSP-10 (P)			63.2	60.8	64.2	62.0	1.0	1.2	64.2	62.0	1.0	1.2
FSSP-11 (P)			63.3	59.5	64.3	60.9	1.0	1.4	64.3	60.9	1.0	1.4
FSSP-12 (P)			65.0	61.0	66.0	62.5	1.0	1.5	66.0	62.5	1.0	1.5
FSSP-13 (P)			65.3	59.5	66.4	61.1	1.1	1.6	66.4	61.2	1.1	1.7
FSSP-14 (P)			67.1	62.0	68.3	63.7	1.2	1.7	68.3	63.7	1.2	1.7
FSSP-15 (P)			65.3	60.0	66.8	62.0	1.5	2.0	66.8	62.0	1.5	2.0
FSSP-16 (P)			64.7	59.9	66.2	62.0	1.5	2.1	66.2	62.0	1.5	2.1
State Daytime Standard (NAC-1)	65	60	65	60	65	60	--	--	65	60	--	--
State Daytime Standard (NAC-2)	70	65	70	65	70	65	--	--	70	65	--	--
Federal NAC (Act. Cat. C/E)	70/75	--	70/75	--	70/75	--	--	--	70/75	--	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State daytime noise standards.

Underlined numbers approach or exceed Federal noise abatement criteria (NAC). Commercial land uses and hotels/motels fall under Federal Activity Category E.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) Average of daytime (morning and afternoon) monitored noise levels.

(2) Receptor FSSP-8 represents the Officer's Club building (east side of TH 5, north of Post Road).

Table 6 continued
Traffic Noise Model Results – Daytime Levels

Receptor ID *	Monitored Noise Levels (dBA) [1]		Daytime Modeled Noise Levels (dBA)									
			Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
FSSP-17 (P)			62.1	57.5	63.7	59.6	1.6	2.1	63.7	59.6	1.6	2.1
FSSP-18 (P)			59.1	54.4	60.6	56.6	1.5	2.2	60.6	56.6	1.5	2.2
FSSP-19 (P)			59.1	54.8	60.7	56.8	1.6	2.0	60.7	56.8	1.6	2.0
FSSP-20 (P)			61.3	57.7	62.8	59.6	1.5	1.9	62.8	59.6	1.5	1.9
UP-1 (P)			68.8	**65.3**	**70.2**	**67.2**	1.4	1.9	**70.2**	**67.2**	1.4	1.9
UP-2 (P)			66.4	63.1	67.7	65.0	1.3	1.9	67.7	65.0	1.3	1.9
UP-3 (P)			63.4	60.7	64.8	62.5	1.4	1.8	64.8	62.5	1.4	1.8
UP-4 (P)			60.3	58.1	61.7	59.8	1.4	1.7	61.7	59.8	1.4	1.7
UP-5 (P)			56.3	54.6	57.6	56.2	1.3	1.6	57.6	56.2	1.3	1.6
UP-6 (P)			**72.0**	**67.9**	**73.5**	**70.0**	1.5	2.1	**73.5**	**70.0**	1.5	2.1
UP-7 (P)			68.6	**65.3**	**70.1**	**67.3**	1.5	2.0	**70.1**	**67.3**	1.5	2.0
UP-8 (P)			64.5	61.6	65.9	63.5	1.4	1.9	65.9	63.5	1.4	1.9
State Daytime Standard (NAC-1)	65	60	65	60	65	60	--	--	65	60	--	--
State Daytime Standard (NAC-2)	70	65	70	65	70	65	--	--	70	65	--	--
Federal NAC (Act. Cat. C/E)	70/75	--	70/75	--	70/75	--	--	--	70/75	--	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State daytime noise standards.

Underlined numbers approach or exceed Federal noise abatement criteria (NAC). Commercial land uses and hotels/motels fall under Federal Activity Category E.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

[1] Average of daytime (morning and afternoon) monitored noise levels.

Table 6 continued
Traffic Noise Model Results – Daytime Levels

Receptor ID *	Monitored Noise Levels (dBA) [1]		Daytime Modeled Noise Levels (dBA)									
			Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
UP-9 (P)			60.5	58.1	61.9	59.9	1.4	1.8	61.9	59.9	1.4	1.8
UP-10 (P)			56.1	54.4	57.5	56.1	1.4	1.7	57.5	56.1	1.4	1.7
UP-11 (P)			68.8	**65.6**	**70.3**	**67.6**	1.5	2.0	**70.3**	**67.6**	1.5	2.0
UP-12 (P)			65.8	63.0	67.3	64.9	1.5	1.9	67.3	64.9	1.5	1.9
UP-13 (P)			62.6	60.3	64.0	62.1	1.4	1.8	64.0	62.1	1.4	1.8
UP-14 (P)			59.3	57.5	60.8	59.3	1.5	1.8	60.8	59.3	1.5	1.8
UP-15 (P)			55.9	54.3	57.3	56.0	1.4	1.7	57.3	56.0	1.4	1.7
UP-16 (P)			**71.0**	**67.4**	**72.5**	**69.5**	1.5	2.1	**72.5**	**69.5**	1.5	2.1
UP-17 (P)			69.1	**66.1**	**70.6**	**68.1**	1.5	2.0	**70.6**	**68.1**	1.5	2.0
UP-18 (P)			65.9	63.3	67.4	**65.3**	1.5	2.0	67.4	**65.3**	1.5	2.0
UP-19 (P)			61.4	59.1	62.9	61.0	1.5	1.9	62.9	61.0	1.5	1.9
UP-20 (P)			68.5	**65.7**	70.0	**67.6**	1.5	1.9	70.0	**67.6**	1.5	1.9
State Daytime Standard (NAC-1)	65	60	65	60	65	60	--	--	65	60	--	--
State Daytime Standard (NAC-2)	70	65	70	65	70	65	--	--	70	65	--	--
Federal NAC (Act. Cat. C/E)	70/75	--	70/75	--	70/75	--	--	--	70/75	--	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State daytime noise standards.

Underlined numbers approach or exceed Federal noise abatement criteria (NAC). Commercial land uses and hotels/motels fall under Federal Activity Category E.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

[1] Average of daytime (morning and afternoon) monitored noise levels.

Table 6 continued
Traffic Noise Model Results – Daytime Levels

Receptor ID *	Monitored Noise Levels (dBA) [1]		Daytime Modeled Noise Levels (dBA)									
			Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
UP-21 (P)			66.7	64.1	68.2	**66.0**	1.5	1.9	68.2	**66.0**	1.5	1.9
UP-22 (P)			63.4	61.1	64.9	63.0	1.5	1.9	64.9	63.0	1.5	1.9
UP-23 (P)			59.8	58.0	61.3	59.8	1.5	1.8	61.3	59.8	1.5	1.8
UP-24 (P)			68.6	**65.8**	**70.1**	**67.7**	1.5	1.9	**70.1**	**67.7**	1.5	1.9
UP-25 (P)			65.8	63.4	67.3	**65.3**	1.5	1.9	67.3	**65.3**	1.5	1.9
UP-26 (P)			63.0	61.2	64.5	63.0	1.5	1.8	64.5	63.0	1.5	1.8
MPRB-1 (P)			56.6	55.0	58.1	56.7	1.5	1.7	58.1	56.7	1.5	1.7
MPRB-2 (P)			56.5	54.9	58.0	56.6	1.5	1.7	58.0	56.6	1.5	1.7
MPRB-3 (P)			56.7	55.1	58.2	56.8	1.5	1.7	58.2	56.8	1.5	1.7
MPRB-4 (P)			57.0	55.3	58.4	57.0	1.4	1.7	58.4	57.0	1.4	1.7
MPRB-5 (P)			57.1	55.4	58.6	57.2	1.5	1.8	58.6	57.2	1.5	1.8
MPRB-6 (P)			57.8	56.3	59.2	58.0	1.4	1.7	59.2	58.0	1.4	1.7
State Daytime Standard (NAC-1)	65	60	65	60	65	60	--	--	65	60	--	--
State Daytime Standard (NAC-2)	70	65	70	65	70	65	--	--	70	65	--	--
Federal NAC (Act. Cat. C/E)	70/75	--	70/75	--	70/75	--	--	--	70/75	--	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State daytime noise standards.

Underlined numbers approach or exceed Federal noise abatement criteria (NAC). Commercial land uses and hotels/motels fall under Federal Activity Category E.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

[1] Average of daytime (morning and afternoon) monitored noise levels.

Table 6 continued
Traffic Noise Model Results – Daytime Levels

Receptor ID *	Monitored Noise Levels (dBA) [1]		Daytime Modeled Noise Levels (dBA)									
			Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
MPRB-7 (P)			58.0	56.6	59.5	58.3	1.5	1.7	59.5	58.3	1.5	1.7
MPRB-8 (P)			58.4	56.9	59.9	58.7	1.5	1.8	59.9	58.7	1.5	1.8
MPRB-9 (P)			58.7	57.3	60.2	59.0	1.5	1.7	60.2	59.0	1.5	1.7
MPRB-10 (P)			59.2	57.8	60.7	59.5	1.5	1.7	60.7	59.5	1.5	1.7
MPRB-11 (P)			59.8	58.3	61.3	60.1	1.5	1.8	61.3	60.1	1.5	1.8
MPRB-12 (P)			60.6	59.1	62.1	60.8	1.5	1.7	62.1	60.8	1.5	1.7
State Daytime Standard (NAC-1)	65	60	65	60	65	60	--	--	65	60	--	--
State Daytime Standard (NAC-2)	70	65	70	65	70	65	--	--	70	65	--	--
Federal NAC (Act. Cat. C/E)	70/75	--	70/75	--	70/75	--	--	--	70/75	--	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State daytime noise standards.

Underlined numbers approach or exceed Federal noise abatement criteria (NAC). Commercial land uses and hotels/motels fall under Federal Activity Category E.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

[1] Average of daytime (morning and afternoon) monitored noise levels.

Table 7
Traffic Noise Model Results – Nighttime Levels

Receptor ID *	Nighttime Modeled Noise Levels (dBA)									
	Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
A-1 (I) (1)	72.7	69.6	73.8	71.0	1.1	1.4	73.8	71.0	1.1	1.4
A-2 (I) (1)	72.3	69.0	73.5	70.5	1.2	1.5	73.5	70.5	1.2	1.5
A-3 (I) (1)	68.7	65.9	70.0	67.5	1.3	1.6	70.0	67.5	1.3	1.6
B-1A (H) [(1)]	57.2	55.7	58.2	56.9	1.0	1.2	58.2	56.9	1.0	1.2
B-1B (H) (1) [(2)]	**71.5**	**68.7**	**72.3**	**69.8**	0.8	1.1	**72.3**	**69.8**	0.8	1.1
B-2A (H) [(1)]	59.2	57.5	60.2	58.8	1.0	1.3	60.3	58.8	1.1	1.3
B-2B (H) (1) [(2)]	67.5	64.8	68.6	**66.2**	1.1	1.4	68.6	**66.2**	1.1	1.4
C-1 (I) (1)	61.1	59.6	62.4	61.1	1.3	1.5	62.6	61.3	1.5	1.7
C-2 (C) (1)	62.6	61.0	64.0	62.7	1.4	1.7	64.1	62.9	1.5	1.9
C-3 (C) (1)	63.4	59.6	66.0	62.7	2.6	3.1	66.0	62.8	2.6	3.2
D-1 (H) (1)	**73.2**	**69.9**	**74.4**	**71.5**	1.2	1.6	**74.4**	**71.6**	1.2	1.7
State Nighttime Standard (NAC-1) [(3)]	55	50	55	50	--	--	55	50	--	--
State Nighttime Standard (NAC-2)	70	65	70	65	--	--	70	65	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State nighttime noise standards.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) Modeled noise levels were based on a receptor location within the area of frequent outdoor use in the center of the building (e.g., courtyard/pool area). Modeled noise levels at receptors B-1A and B-2A are provided for informational purposes only.

(2) Modeled noise levels at the façade of the hotel building closest to the eastbound I-494 travel lanes.

(3) State daytime standards for noise area classification one applies during the nighttime period if the land use does not include overnight lodging.

Table 7 continued
Traffic Noise Model Results – Nighttime Levels

Receptor ID *	Nighttime Modeled Noise Levels (dBA)									
	Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
D-2 (C) (1)	**75.4**	**71.7**	**76.6**	**73.3**	1.2	1.6	**76.6**	**73.4**	1.2	1.7
D-3 (C) (1)	63.9	60.8	65.1	62.4	1.2	1.6	65.1	62.5	1.2	1.7
D-4 (C) (1)	**74.5**	**71.1**	**75.8**	**72.9**	1.3	1.8	**75.8**	**72.9**	1.3	1.8
D-5 (C) (1)	59.7	56.1	60.8	57.8	1.1	1.7	60.9	57.8	1.2	1.7
D-6 (C) (1)	**74.4**	**71.1**	**75.8**	**72.9**	1.4	1.8	**75.8**	**72.9**	1.4	1.8
D-7 (C) (1)	61.4	58.9	62.7	60.6	1.3	1.7	62.7	60.6	1.3	1.7
D-8 (C) (1)	64.4	61.5	65.7	63.3	1.3	1.8	65.8	63.3	1.4	1.8
D-9 (H) (1)	**70.2**	**67.6**	**71.6**	**69.3**	1.4	1.7	**71.6**	**69.4**	1.4	1.8
D-10 (C) (1)	62.9	60.8	64.2	62.4	1.3	1.6	64.2	62.5	1.3	1.7
D-11 (C) (1)	64.2	62.4	65.6	64.1	1.4	1.7	65.7	64.2	1.5	1.8
E-1A (H) (1) [(1)]	66.8	64.7	68.0	**66.2**	1.2	1.5	68.2	**66.3**	1.4	1.6
E-1B (H) [(1)]	67.2	**65.2**	68.4	**66.7**	1.2	1.5	68.6	**66.7**	1.4	1.5
E-1C (H) [(1)]	68.1	**65.8**	69.2	**67.2**	1.1	1.4	69.4	**67.3**	1.3	1.5
State Nighttime Standard (NAC-1) [(2)]	55	50	55	50	--	--	55	50	--	--
State Nighttime Standard (NAC-2)	70	65	70	65	--	--	70	65	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State nighttime noise standards.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) Receptor E-1A is located at the façade of the hotel on ground level. Receptor E-1B and receptor E-1C represent small balconies on the first and second floors, respectively, above ground level. Modeled noise levels at receptor E-1B and receptor E-1C provided for informational purposes only.

(2) State daytime standards for noise area classification one applies during the nighttime period if the land use does not include overnight lodging.

Table 7 continued
Traffic Noise Model Results – Nighttime Levels

Receptor ID *	Nighttime Modeled Noise Levels (dBA)									
	Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
E-2 (C) (1)	63.4	61.8	64.5	63.1	1.1	1.3	64.5	63.1	1.1	1.3
E-3 (H) (1)	**70.1**	**67.0**	**71.4**	**68.3**	1.3	1.3	**71.4**	**68.3**	1.3	1.3
E-4 (C) (1)	62.7	61.2	63.7	62.4	1.0	1.2	63.7	62.4	1.0	1.2
FSNC-1 (CEM)	**65.8**	**62.7**	**68.0**	**65.2**	2.2	2.5	**68.0**	**65.4**	2.2	2.7
FSNC-2 (CEM)	64.3	**62.5**	**65.9**	**64.4**	1.6	1.9	**66.1**	**64.6**	1.8	2.1
FSNC-3 (CEM)	**67.4**	**64.7**	**69.4**	**66.9**	2.0	2.2	**69.5**	**67.2**	2.1	2.5
FSNC-4 (CEM)	**66.1**	**64.2**	**67.6**	**66.0**	1.5	1.8	**67.7**	**66.2**	1.6	2.0
FSNC-5 (CEM)	**67.9**	**65.7**	**69.2**	**67.3**	1.3	1.6	**69.4**	**67.5**	1.5	1.8
FSNC-6 (CEM)	**66.5**	**64.6**	**67.8**	**66.2**	1.3	1.6	**67.9**	**66.3**	1.4	1.7
FSNC-7 (CEM)	**65.3**	**63.5**	**66.6**	**65.1**	1.3	1.6	**66.7**	**65.2**	1.4	1.7
FSNC-8 (CEM)	63.3	**61.7**	64.6	**63.3**	1.3	1.6	64.7	**63.4**	1.4	1.7
FSNC-9 (CEM)	**68.2**	**65.6**	**69.5**	**67.1**	1.3	1.5	**69.5**	**67.2**	1.3	1.6
FSNC-10 (CEM)	**66.8**	**64.7**	**68.0**	**66.1**	1.2	1.4	**68.0**	**66.2**	1.2	1.5
FSNC-11 (CEM)	**65.6**	**63.7**	**66.8**	**65.2**	1.2	1.5	**66.8**	**65.2**	1.2	1.5
State Nighttime Standard (NAC-1) [(1)]	55	50	55	50	--	--	55	50	--	--
State Nighttime Standard (NAC-2)	70	65	70	65	--	--	70	65	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State nighttime noise standards.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) State daytime standards for noise area classification one applies during the nighttime period if the land use does not include overnight lodging.

Table 7 continued
Traffic Noise Model Results – Nighttime Levels

Receptor ID *	Nighttime Modeled Noise Levels (dBA)									
	Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
FSNC-12 (CEM)	63.5	**62.0**	64.7	**63.4**	1.2	1.4	64.8	**63.5**	1.3	1.5
FSNC-13 (CEM)	**68.2**	**65.4**	**69.5**	**66.8**	1.3	1.4	**69.5**	**66.9**	1.3	1.5
FSNC-14 (CEM)	**66.8**	**64.6**	**67.8**	**65.9**	1.0	1.3	**67.9**	**66.0**	1.1	1.4
FSNC-15 (CEM)	**65.6**	**63.6**	**66.6**	**65.0**	1.0	1.4	**66.7**	**65.0**	1.1	1.4
FSNC-16 (CEM)	63.6	**61.9**	64.6	**63.3**	1.0	1.4	64.7	**63.3**	1.1	1.4
FSNC-17 (CEM)	**69.0**	**65.1**	**70.4**	**66.6**	1.4	1.5	**70.4**	**66.6**	1.4	1.5
FSNC-18 (CEM)	**66.9**	**64.5**	**68.0**	**65.8**	1.1	1.3	**68.0**	**65.8**	1.1	1.3
FSNC-19 (CEM)	**65.6**	**63.6**	**66.6**	**64.8**	1.0	1.2	**66.6**	**64.9**	1.0	1.3
FSNC-20 (CEM)	63.6	**61.9**	64.6	**63.2**	1.0	1.3	64.6	**63.2**	1.0	1.3
F-1 (I) (1)	68.7	64.3	69.7	65.7	1.0	1.4	69.7	65.7	1.0	1.4
F-2 (I) (1)	62.2	58.9	63.0	60.1	0.8	1.2	63.0	60.1	0.8	1.2
FSSP-1 (P) [(1)]	65.0	61.3	66.4	63.2	1.4	1.9	64.2	61.5	-0.8	0.2
FSSP-2 (P)	63.2	60.1	64.3	61.6	1.1	1.5	64.5	61.8	1.3	1.7
State Nighttime Standard (NAC-1) [(2)]	55	50	55	50	--	--	55	50	--	--
State Nighttime Standard (NAC-2)	70	65	70	65	--	--	70	65	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State nighttime noise standards.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) Receptor FSSP-1 is located along the proposed trail south of the realigned Post Road/Fort Snelling State Park entrance road under the Build Alternative.

(2) State daytime standards for noise area classification one applies during the nighttime period if the land use does not include overnight lodging.

Table 7 continued
Traffic Noise Model Results – Nighttime Levels

Receptor ID *	Nighttime Modeled Noise Levels (dBA)									
	Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
FSSP-3 (P)	60.2	57.6	61.2	59.0	1.0	1.4	61.2	59.0	1.0	1.4
FSSP-4 (P)	56.5	54.4	57.5	55.7	1.0	1.3	57.5	55.7	1.0	1.3
FSSP-5 (P)	55.2	53.4	56.3	54.6	1.1	1.2	56.3	54.7	1.1	1.3
FSSP-6 (P)	53.5	51.8	54.6	53.1	1.1	1.3	54.6	53.1	1.1	1.3
FSSP-7 (P)	55.6	53.7	56.6	55.0	1.0	1.3	56.6	55.0	1.0	1.3
FSSP-8 (C) (1) [(1)]	62.9	59.9	63.9	61.3	1.0	1.4	63.9	61.3	1.0	1.4
FSSP-9 (P)	60.4	57.8	61.3	59.1	0.9	1.3	61.4	59.1	1.0	1.3
FSSP-10 (P)	61.2	58.2	62.1	59.5	0.9	1.3	62.1	59.5	0.9	1.3
FSSP-11 (P)	60.9	56.7	61.9	58.2	1.0	1.5	61.9	58.2	1.0	1.5
FSSP-12 (P)	62.7	58.2	63.7	59.7	1.0	1.5	63.7	59.7	1.0	1.5
FSSP-13 (P)	62.6	56.2	63.7	58.0	1.1	1.8	63.7	58.0	1.1	1.8
FSSP-14 (P)	64.6	59.0	65.8	60.8	1.2	1.8	65.8	60.8	1.2	1.8
FSSP-15 (P)	62.7	56.9	64.2	59.0	1.5	2.1	64.2	59.0	1.5	2.1
State Nighttime Standard (NAC-1) [(2)]	55	50	55	50	--	--	55	50	--	--
State Nighttime Standard (NAC-2)	70	65	70	65	--	--	70	65	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State nighttime noise standards.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) Receptor FSSP-8 represents the Officer's Club building (east side of TH 5, north of Post Road).

(2) State daytime standards for noise area classification one applies during the nighttime period if the land use does not include overnight lodging.

Table 7 continued
Traffic Noise Model Results – Nighttime Levels

Receptor ID *	Nighttime Modeled Noise Levels (dBA)									
	Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
FSSP-16 (P)	62.2	56.9	63.7	59.1	1.5	2.2	63.7	59.1	1.5	2.2
FSSP-17 (P)	59.9	54.4	61.5	56.7	1.6	2.3	61.5	56.7	1.6	2.3
FSSP-18 (P)	57.1	51.6	58.7	53.9	1.6	2.3	58.7	53.9	1.6	2.3
FSSP-19 (P)	57.4	52.4	59.0	54.5	1.6	2.1	59.0	54.5	1.6	2.1
FSSP-20 (P)	59.8	55.8	61.3	57.7	1.5	1.9	61.3	57.7	1.5	1.9
UP-1 (P)	66.6	62.2	68.0	64.3	1.4	2.1	68.0	64.3	1.4	2.1
UP-2 (P)	64.1	60.2	65.5	62.1	1.4	1.9	65.5	62.1	1.4	1.9
UP-3 (P)	61.2	57.9	62.5	59.7	1.3	1.8	62.6	59.8	1.4	1.9
UP-4 (P)	58.2	55.4	59.5	57.1	1.3	1.7	59.5	57.1	1.3	1.7
UP-5 (P)	54.2	52.2	55.5	53.8	1.3	1.6	55.5	53.8	1.3	1.6
UP-6 (P)	69.7	64.7	**71.2**	**66.9**	1.5	2.2	**71.2**	**66.9**	1.5	2.2
UP-7 (P)	66.4	62.4	67.9	64.4	1.5	2.0	67.9	64.4	1.5	2.0
UP-8 (P)	62.4	58.8	63.8	60.8	1.4	2.0	63.8	60.8	1.4	2.0
UP-9 (P)	58.3	55.5	59.7	57.4	1.4	1.9	59.7	57.4	1.4	1.9
State Nighttime Standard (NAC-1) [(1)]	55	50	55	50	--	--	55	50	--	--
State Nighttime Standard (NAC-2)	70	65	70	65	--	--	70	65	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State nighttime noise standards.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) State daytime standards for noise area classification one applies during the nighttime period if the land use does not include overnight lodging.

Table 7 continued
Traffic Noise Model Results – Nighttime Levels

Receptor ID *	Nighttime Modeled Noise Levels (dBA)									
	Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
UP-10 (P)	54.1	52.2	55.5	53.8	1.4	1.6	55.5	53.8	1.4	1.6
UP-11 (P)	66.6	62.8	68.1	64.9	1.5	2.1	68.1	64.9	1.5	2.1
UP-12 (P)	63.7	60.2	65.2	62.3	1.5	2.1	65.2	62.3	1.5	2.1
UP-13 (P)	60.4	57.7	61.9	59.6	1.5	1.9	61.9	59.6	1.5	1.9
UP-14 (P)	57.3	55.1	58.7	56.9	1.4	1.8	58.7	56.9	1.4	1.8
UP-15 (P)	54.0	52.2	55.4	53.9	1.4	1.7	55.4	53.9	1.4	1.7
UP-16 (P)	68.9	64.5	**70.5**	**66.8**	1.6	2.3	**70.5**	**66.8**	1.6	2.3
UP-17 (P)	67.1	63.3	68.6	65.4	1.5	2.1	68.6	65.4	1.5	2.1
UP-18 (P)	63.9	60.8	65.4	62.8	1.5	2.0	65.4	62.8	1.5	2.0
UP-19 (P)	59.5	56.8	61.0	58.7	1.5	1.9	61.0	58.7	1.5	1.9
UP-20 (P)	66.5	63.0	68.0	**65.1**	1.5	2.1	68.0	**65.1**	1.5	2.1
UP-21 (P)	64.8	61.6	66.2	63.6	1.4	2.0	66.2	63.6	1.4	2.0
UP-22 (P)	61.5	58.8	63.0	60.7	1.5	1.9	63.0	60.7	1.5	1.9
State Nighttime Standard (NAC-1) [(1)]	55	50	55	50	--	--	55	50	--	--
State Nighttime Standard (NAC-2)	70	65	70	65	--	--	70	65	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State nighttime noise standards.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) State daytime standards for noise area classification one applies during the nighttime period if the land use does not include overnight lodging.

Table 7 continued
Traffic Noise Model Results – Nighttime Levels

Receptor ID *	Nighttime Modeled Noise Levels (dBA)									
	Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
UP-23 (P)	58.1	56.2	59.6	57.9	1.5	1.7	59.6	57.9	1.5	1.7
UP-24 (P)	66.7	63.3	68.2	**65.3**	1.5	2.0	68.2	**65.3**	1.5	2.0
UP-25 (P)	64.0	61.3	65.5	63.1	1.5	1.8	65.5	63.1	1.5	1.8
UP-26 (P)	61.4	59.4	62.9	61.2	1.5	1.8	62.9	61.2	1.5	1.8
MPRB-1 (P)	54.8	53.0	56.2	54.7	1.4	1.7	56.2	54.7	1.4	1.7
MPRB-2 (P)	54.8	53.0	56.2	54.7	1.4	1.7	56.2	54.7	1.4	1.7
MPRB-3 (P)	55.1	53.2	56.5	55.0	1.4	1.8	56.5	55.0	1.4	1.8
MPRB-4 (P)	55.3	53.5	56.8	55.2	1.5	1.7	56.8	55.2	1.5	1.7
MPRB-5 (P)	55.5	53.7	56.9	55.4	1.4	1.7	56.9	55.4	1.4	1.7
MPRB-6 (P)	56.4	54.9	57.9	56.5	1.5	1.6	57.9	56.5	1.5	1.6
MPRB-7 (P)	56.8	55.3	58.2	56.9	1.4	1.6	58.2	56.9	1.4	1.6
MPRB-8 (P)	57.2	55.7	58.7	57.4	1.5	1.7	58.7	57.4	1.5	1.7
State Nighttime Standard (NAC-1) [(1)]	55	50	55	50	--	--	55	50	--	--
State Nighttime Standard (NAC-2)	70	65	70	65	--	--	70	65	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State nighttime noise standards.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) State daytime standards for noise area classification one applies during the nighttime period if the land use does not include overnight lodging.

Table 7 continued
Traffic Noise Model Results – Nighttime Levels

Receptor ID *	Nighttime Modeled Noise Levels (dBA)									
	Existing (2010)		No Build Alternative (2030)		Difference (No Build-Existing)		Build Alternative (2030)		Difference (Build Alt. – Existing)	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
MPRB-9 (P)	57.7	56.2	59.1	57.8	1.4	1.6	59.1	57.8	1.4	1.6
MPRB-10 (P)	58.3	56.7	59.7	58.4	1.4	1.7	59.7	58.4	1.4	1.7
MPRB-11 (P)	58.9	57.4	60.3	59.0	1.4	1.6	60.3	59.0	1.4	1.6
MPRB-12 (P)	59.8	58.1	61.2	59.8	1.4	1.7	61.2	59.8	1.4	1.7
State Nighttime Standard (NAC-1) [(1)]	55	50	55	50	--	--	55	50	--	--
State Nighttime Standard (NAC-2)	70	65	70	65	--	--	70	65	--	--

* Number in "receptor" column is the number of hotel/commercial/industrial establishments represented by each modeled receptor location. Does not apply to cemetery or park modeled receptor locations.

Bold numbers exceed State nighttime noise standards.

(H) – hotel; (C) – commercial/business/office; (I) – industrial; (P) – park; (CEM) – cemetery

(1) State daytime standards for noise area classification one applies during the nighttime period if the land use does not include overnight lodging.

Table 8
Noise Impact Summary Table

Modeled receptor locations within the Project Area		Type of Impact (# of Modeled Receptor Locations)			
		Receptors exceeding State Daytime Standards (L_{10})	Receptors exceeding State Nighttime Standards (L_{10})	Receptors Approaching/Exceeding Federal Noise Abatement Criteria	Substantial Increase (Increase ≥ 5 dBA from Existing to Build Alternative)
I-494 Corridor [(1)]	Existing	8	7	4	--
	No Build Alternative	8	7	5	--
	Build Alternative	8	7	5	0
Fort Snelling National Cemetery	Existing	19	15	4	--
	No Build Alternative	20	16	11	--
	Build Alternative	20	16	11	0
MSP Int'l Airport (southwest of Glumack Dr)	Existing	0	0	0	--
	No Build Alternative	0	0	0	--
	Build Alternative	0	0	0	0
Fort Snelling State Park (east of TH 5)	Existing	0	0	0	--
	No Build Alternative	0	0	0	--
	Build Alternative	0	0	0	0
Upper Post Area (between Taylor Ave and TH 5)	Existing	2	0	3	--
	No Build Alternative	7	2	8	--
	Build Alternative	7	2	8	0
Upper Post Area (Recreation Uses)	Existing	0	0	0	--
	No Build Alternative	0	0	0	--
	Build Alternative	0	0	0	0

(1) Does not include modeled receptor locations B-1A and B-1B (hotel courtyard/pool areas) and modeled receptor locations E-1B and E-1C (balconies at hotel property represented by receptor E-1A). Results for these modeled receptor locations were provided in Table 6 and Table 7 for informational purposes only.

CONSIDERATION OF NOISE ABATEMENT

Noise Abatement Measures

The construction of the proposed roadway improvements associated with the MSP International Airport improvements are considered a Type I project for the purposes of traffic noise analysis (23 CFR 772.5). 23 CFR 772.15(c) describes noise abatement measures that are to be considered when a traffic noise impact has been identified with a Type I highway project. These noise abatement measures include:

- Construction of noise barriers, including acquisition of property rights, either within or outside the highway right of way. Landscaping is not a viable noise abatement measure.

- Traffic management measures, including, but not limited to, traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive lane designations.

- Alteration of horizontal and vertical alignments.

- Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise.

- Noise insulation of Activity Category D land use facilities listed in Table 2 (auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios).

Noise Barrier Evaluation

The following evaluation of noise barriers was completed consistent with MnDOT's policies and procedures for evaluating noise barrier feasibility and reasonableness. These policies and procedures are set forth in Chapter 5 of the MnDOT Highway Noise Policy (Analysis of Noise Abatement Measures). The factors for determining noise barrier feasibility and reasonableness as described in the MnDOT noise policy are summarized below.

Noise Barrier Feasibility

Noise barrier feasibility is determined based on a consideration of two factors: 1) acoustic feasibility and 2) engineering feasibility.

- **Acoustic feasibility:** For a noise barrier to be considered acoustically effective, it must achieve a noise reduction of at least 5 dBA at the impacted receptors for those receptors to be considered benefited by a noise barrier. Not every impacted receptor must receive this minimum 5 dBA reduction; however, at least one impacted receptor must meet the minimum 5 dBA reduction for a noise barrier to achieve acoustic feasibility.

- **Engineering feasibility:** Engineering feasibility addresses whether or not it is possible to design and construct a proposed noise abatement measure. A sample of potential constructability considerations includes safety, topography, drainage, utilities, and maintenance considerations. Engineering considerations are also taken into consideration in determining noise barrier height. MnDOT has established a maximum noise barrier height of 20 feet above the finished ground line at the noise barrier. In addition, MnDOT has established a maximum noise barrier height of 10 feet above the bridge deck when it is necessary for a noise barrier to be attached to a bridge structure.

The feasibility of noise barrier construction is sometimes dependent on design details that are not known until the final design phase of the project. For the purpose of this traffic noise analysis, it was assumed that noise barriers were feasible with respect to engineering feasibility/constructability considerations. It was also assumed that utilities located within existing right of way could be relocated to accommodate modeled noise barriers, and existing and proposed drainage could be maintained. All modeled noise barriers were located within existing right of way limits.

Noise Barrier Reasonableness

Noise barrier reasonableness decisions are based on a consideration of three reasonableness factors: 1) noise reduction design goal, 2) cost effectiveness, and 3) the viewpoint of benefited residents and property owners.

- **Noise reduction design goal:** A minimum 7 dBA reduction must be achieved for at least one benefited receptor behind the noise barrier to meet noise reduction design goals.

- **Cost effectiveness:** To be considered cost-effective, the cost per individual benefited receptor (i.e., residence, commercial entity, industrial entity) should be equal to, or less than

$43,500. In order to assess cost effectiveness, at least one benefited receptor behind the noise barrier must meet the noise reduction design goal described above. The following formula is used to determine the cost-effectiveness of the barrier:

The cost-effectiveness index is equal to the cost of the noise barrier[1] divided by the number of individual benefited receptors (i.e., residences, commercial entities, industrial entities) that are predicted to experience noise level reductions of 5 dBA or more. Only those receptors that experience a 5 dBA or greater decibel decrease are considered in this formula. The result is a cost per benefited receptor value (residence, commercial entity, or industrial entity represented by each modeled receptor). To be considered cost-effective, the cost per individual benefited receptor must be equal to or less than $43,500 per receptor.

[1]The cost of a noise barrier is calculated using $20 per square foot of barrier, based on historical data over the five year period from 2005-2010.

There are several steps to assessing the cost effectiveness of noise barriers. First, the cost-effective noise barrier height is determined for each segment of the project area, beginning with the evaluation of a 20-foot high noise barrier (MnDOT's maximum height; see discussion of engineering feasibility above). If a 20-foot high noise barrier meets the reasonableness criteria and is feasible, it would be proposed for construction. If the 20-foot high barrier meets the noise reduction design goal but does not meet the cost effectiveness criteria, then noise barrier heights less than 20 feet are studied. If a noise barrier height less than 20 feet meets the reasonableness criteria and is feasible, it would then be proposed for construction. Noise barrier cost effectiveness is studied up to the point where a modeled barrier does not meet the noise reduction design goal of a minimum 7 dBA reduction for at least one benefited receptor.

- **Viewpoint of benefited residents and property owners:** The third criterion in determining noise barrier reasonableness is the viewpoint of benefited residents and property owners. A benefited property is defined as a receptor adjacent to a proposed noise abatement measure that receives a noise reduction equal to or greater than 5 dBA. If benefited residents and property owners indicate that a proposed noise barrier is not desired, then the noise barrier is removed from further consideration and would not be constructed with the project.

There are two steps in determining the desires of the benefited property owners and residents regarding the construction of a proposed noise abatement measures. First, the viewpoint of benefited property owners and residents is solicited through a public involvement process (e.g., open house meeting, direct mailing of a solicitation form). Second, the input received from benefited property owners and residents through this public involvement process is expressed in a vote that is weighted as follows:

The owner of a benefited property immediately adjacent to the highway right of way for the proposed project (i.e., first-row properties) receives 4 points and the resident (owner or renter) receives 2 points. The owner/resident of a benefited property receives a total of 6 points.

The owner of a benefited property not immediately adjacent to the highway right of way for the proposed project (e.g., second-row properties, third-row properties) receives 2 points and the resident (owner or renter) receives 1 point. The owner/resident of a benefited property receives a total of 3 points.

When there is no outdoor area of frequent human use associated with a benefited property, the owner of the benefited property receives a total of 4 points if the property is located immediately adjacent to the highway right of way (i.e., first-row properties). If the property is not immediately adjacent to the highway right of way (i.e., second-row properties, third-row properties), the owner of the benefited property receives a total of 2 points.

Only those benefited property owners and residents, including individual units of multi-family residential buildings that are considered to be benefited receptors, regardless of floor location (e.g., first floor, second floor, etc.), have a vote according to the point system described above. Non-benefiting receptors do not receive points. A simple majority (greater than 50 percent) of all possible voting points for each of the proposed noise barriers must vote “down” the proposed abatement measure in order for it to be removed from further consideration.

Noise Barrier Analysis Results

Noise barriers were evaluated at all modeled receptor locations that are predicted to approach or exceed Federal noise abatement criteria and/or exceed State daytime/nighttime noise standards

under the future (2030) Build Alternative. The locations of modeled noise barriers are illustrated in Figure 1 and Figure 2, Attachment A.

Noise barrier cost-effectiveness results are tabulated at the end of this report in Attachment B. Multiple noise barrier configurations were evaluated (barrier lengths and heights). The results presented below represent the most acoustically effective and/or cost effective noise barrier configuration. Results for a 20-foot high noise barrier are described with each modeled barrier first, followed by a discussion of additional barrier heights less than 20 feet where applicable. The discussion of noise barrier modeling results presented below includes only daytime results. For reference, nighttime noise barrier cost effectiveness results are also tabulated and presented at the end of this report in Attachment B with the daytime noise barrier cost effectiveness results. Results of daytime noise barrier cost effectiveness for the project are consistent with noise barrier cost effectiveness for nighttime conditions.

Area A (north of I-494, TH 77 to 24th Avenue South)
Receptors A-1 through A-3

Land uses north of I-494 between TH 77 and 24th Avenue South consist of industrial uses. Modeled daytime and nighttime noise levels are projected to be below State standards with the future Build Alternative. There is no Federal noise abatement criterion associated with industrial land uses (Activity Category F, see Table 2). Therefore, mitigation measures were not evaluated.

Area B (south of I-494, TH 77 to 24th Avenue South)
Receptors B-1B and B-2B

Two hotels are located south of I-494 between TH 77 and 24th Avenue South. Traffic noise levels were modeled at the façade of each hotel building, represented by receptor points B-1B and B-2B. Modeled daytime noise levels at these two receptor locations are projected to exceed State L_{10} standards with the future Build Alternative. Modeled nighttime noise levels are projected to exceed State nighttime standards at receptor B-1B with the future Build Alternative, whereas modeled nighttime noise levels are projected to be below State nighttime standards at receptor B-2B with the future Build Alternative.

There are no patios or balconies associated with these two hotel properties; however, these two hotel properties have courtyard/pool areas within the middle of the hotel buildings. These courtyard/pool areas are represented by modeled receptors B-1A and B-2A. Modeled noise levels at receptors B-1A and B-2A are provided for informational purposes only, and are not included in noise barrier cost effectiveness results. Modeled daytime noise levels at receptors

B-1A and B-2A are projected to be 60.0 dBA (L_{10}) and 62.0 dBA (L_{10}), respectively. Modeled nighttime noise levels at receptors B-1A and B-2A are projected to be 58.2 dBA (L_{10}) and 60.2 dBA (L_{10}), respectively.

An approximately 2,290-foot long, 20-foot high noise barrier was modeled along the entrance ramp from northbound TH 77 and Lindau Lane to eastbound I-494. Additional barrier heights (16 feet and 14 feet) were evaluated for Area B. The cost-effectiveness results for Area B are summarized below.

- An approximately 2,290-foot long, 20-foot high noise barrier was modeled along the entrance ramp from northbound TH 77 and Lindau Lane to eastbound I-494. The approximately 2,290-foot long, 20-foot high modeled barrier provides a reduction in daytime modeled traffic noise levels that varies from 5.5 dBA to 9.7 dBA. The cost effectiveness of the approximately 2,290-foot long, 20-foot high barrier is $451,000/benefited receptor (see Table B-1, Attachment B). The 2,290-foot long, 20-foot high modeled barrier does not meet MnDOT's cost effectiveness criteria of $43,500/benefited receptor. Therefore, the analyzed barrier is not proposed.

- An approximately 2,290-foot long, 16-foot high noise barrier was modeled along the entrance ramp from northbound TH 77 and Lindau Lane to eastbound I-494. The approximately 2,290-foot long, 16-foot high modeled barrier provides a reduction in daytime modeled traffic noise levels that varies from 3.6 dBA to 7.6 dBA. The cost effectiveness of the approximately 2,290-foot long, 16-foot high barrier is $722,800/benefited receptor (see Table B-1, Attachment B). The 2,290-foot long, 16-foot high modeled barrier does not meet MnDOT's cost effectiveness criteria of $43,500/benefited receptor. Therefore, the analyzed barrier is not proposed.

- An approximately 2,290-foot long, 14-foot high noise barrier was modeled along the entrance ramp from northbound TH 77 and Lindau Lane to eastbound I-494. The approximately 2,290-foot long, 14-foot high modeled barrier provides a reduction in daytime modeled traffic noise levels that varies from 2.6 dBA to 6.4 dBA (see Table B-1, Attachment B). The approximately 2,290-foot long, 14-foot high modeled barrier does not meet the minimum 7 dBA noise reduction design goal to be considered reasonable. Therefore, the analyzed barrier is not proposed.

Area C (north of I-494, 24th Avenue South to 34th Avenue South)
Receptors C-1 through C-3

Land uses north of I-494 between 24th Avenue South and 34th Avenue South consist of industrial and business/office uses. Modeled daytime and nighttime noise levels are projected to be below State standards and Federal noise abatement criteria with the future Build Alternative; therefore, mitigation measures were not evaluated.

Area D (south of I-494, 24th Avenue South to 34th Avenue South)
Receptors D-1 through D-11

Land uses south of I-494 between 24th Avenue South and 34th Avenue South consist of hotel, business/office, and commercial uses. Modeled receptors D-1 and D-9 represent two hotel properties, whereas modeled receptors D-2 through D-8 and receptor D-10 represent office buildings. Modeled receptor D-11 represents a commercial property ("Park 'N Go") in the southwest quadrant of the 34th Avenue South interchange (see "Noise Receptors" discussion above).

Modeled traffic noise levels are projected to exceed State daytime standards by 3.1 dBA to 8.3 dBA at five modeled receptor locations with the future Build Alternative. Modeled traffic noise levels are projected to exceed State nighttime standards by 1.4 dBA to 6.5 dBA at five modeled receptor locations with the future Build Alternative. Traffic noise levels are also projected to approach or exceed Federal noise abatement criteria ($\geq$ 69 dBA) at four modeled receptor locations south of I-494 between 24th Avenue South and 34th Avenue South under the future Build Alternative.

An approximately 2,390-foot long, 20-foot high noise barrier was modeled along eastbound I-494 between 24th Avenue South and 34th Avenue South. This analysis assumes it is feasible to accommodate a noise barrier between eastbound I-494 and East 78th Street. A noise barrier along the south side of East 78th Street is not feasible because of intersecting driveways and local roadways. Additional barrier heights (16 feet and 14 feet) were evaluated for Area D. The cost-effectiveness results for Area D are summarized below.

- An approximately 2,390-foot long, 20-foot high noise barrier was modeled along eastbound I-494 between 24th Avenue South and 34th Avenue South. The middle portion of this modeled barrier (approximately 855 feet adjacent to receptors D-2 through D-7) consisted of an approximately 16-foot high barrier, while the remainder of the barrier was approximately 20-feet high. The approximately 2,390-foot long, 20-foot high modeled barrier provides a

reduction in daytime modeled traffic noise levels that varies from 1.0 dBA to 10.3 dBA. The cost effectiveness of the approximately 2,390-foot long, 20-foot high barrier is $124,800/benefited receptor (see Table B-3, Attachment B). The 2,390-foot long, 20-foot high modeled barrier does not meet MnDOT's cost effectiveness criteria of $43,500/benefited receptor. Therefore, the analyzed barrier is not proposed.

- An approximately 2,390-foot long, 16-foot high noise barrier was modeled along eastbound I-494 between 24th Avenue South and 34th Avenue South. The middle portion of this modeled barrier (approximately 855 feet adjacent to receptors D-2 through D-7) consisted of an approximately 12-foot high barrier, while the remainder of the barrier was approximately 16-feet high. The approximately 2,390-foot long, 16-foot high modeled barrier provides a reduction in daytime modeled traffic noise levels that varies from 0.5 dBA to 7.9 dBA. The cost effectiveness of the approximately 2,390-foot long, 16-foot high barrier is $114,400/benefited receptor (see Table B-3, Attachment B). The 2,390-foot long, 16-foot high modeled barrier does not meet MnDOT's cost effectiveness criteria of $43,500/benefited receptor. Therefore, the analyzed barrier is not proposed.

- An approximately 2,390-foot long, 14-foot high noise barrier was modeled along eastbound I-494 between 24th Avenue South and 34th Avenue South. The middle portion of this modeled barrier (approximately 855 feet adjacent to receptors D-2 through D-7) consisted of an approximately 10-foot high barrier, while the remainder of the barrier was approximately 14-feet high. The approximately 2,390-foot long, 14-foot high modeled barrier provides a reduction in daytime modeled traffic noise levels that varies from 0.3 dBA to 6.3 dBA (see Table B-3, Attachment B). The approximately 2,390-foot long, 14-foot high modeled barrier does not meet the minimum 7 dBA noise reduction design goal to be considered reasonable. Therefore, the analyzed barrier is not proposed.

Area E (south of I-494, east of 34th Avenue South)
Receptors E-1A through E-4

Land uses south of I-494 and east of 34th Avenue South consist of two hotel properties and two commercial/business/office properties. The two hotel properties are represented by modeled receptors E-1A and E-3. Modeled receptors E-1A and E-3 were placed at the façade of each hotel building (see "Noise Receptors" discussion above). Modeled receptor E-2 represents an off airport parking property, whereas modeled receptor E-4 represents an office building associated with the Minnesota Valley National Wildlife Refuge.

Because there are outdoor balconies associated with the hotel property represented by receptor E-1A, additional modeled receptor points were placed at the first and second floor balconies above ground level. These balconies are represented by modeled receptors E-1B and E-1C. Modeled noise levels at receptors E-1B and E-1C are provided for informational purposes only, and are not included in noise barrier cost effectiveness results. Modeled daytime noise levels at receptors E-1B and E-1C are projected to be 70.4 dBA (L_{10}) and 71.1 dBA (L_{10}), respectively. Modeled nighttime noise levels at receptors E-1B and E-1C are projected to be 68.6 dBA (L_{10}) and 69.4 dBA (L_{10}), respectively.

Modeled traffic noise levels are projected to exceed State daytime standards by 3.1 dBA at one hotel property (modeled receptor E-3) with the future Build Alternative. Modeled traffic noise levels are projected to exceed State nighttime standards by 1.4 dBA at this hotel property with the future Build Alternative. Traffic noise levels are not projected to approach or exceed Federal noise abatement criteria ($\geq$ 75 dBA) at the modeled receptor locations south of I-494 and east of 34th Avenue South under the future Build Alternative.

An approximately 1,430-foot long, 20-foot high noise barrier was modeled south of I-494 along the entrance ramp from 34th Avenue South to TH 5 and I-494. The 1,430-foot long modeled barrier terminates at a point adjacent to the split between the entrance ramp to northbound TH 5 and eastbound I-494, and would not shield the business/office uses represented by receptor E-4. Additional barrier heights (16 feet and 14 feet) were evaluated for Area E. The cost-effectiveness results for Area E are summarized below.

- The approximately 1,430-foot long, 20-foot high modeled barrier provides a reduction in daytime modeled traffic noise levels that varies from 0.4 dBA to 9.8 dBA. The cost effectiveness of the approximately 1,430-foot long, 20-foot high barrier is $558,000/benefited receptor (see Table B-5, Attachment B). The 1,430-foot long, 20-foot high modeled barrier does not meet MnDOT's cost effectiveness criteria of $43,500/benefited receptor. Therefore, the analyzed barrier is not proposed.

- The approximately 1,430-foot long, 16-foot high modeled barrier provides a reduction in daytime modeled traffic noise levels that varies from 0.2 dBA to 7.4 dBA. The cost effectiveness of the approximately 1,430-foot long, 18-foot high barrier is $447,600/benefited receptor (see Table B-5, Attachment B). The 1,430-foot long, 18-foot high modeled barrier does not meet MnDOT's cost effectiveness criteria of $43,500/benefited receptor. Therefore, the analyzed barrier is not proposed.

- The approximately 1,430-foot long, 14-foot high modeled barrier provides a reduction in daytime modeled traffic noise levels that varies from 0.2 dBA to 6.0 dBA. The approximately 1,430-foot long, 14-foot high modeled barrier does not meet the minimum 7 dBA noise reduction design goal to be considered reasonable. Therefore, the analyzed barrier is not proposed.

Fort Snelling National Cemetery
Receptors FSNC-1 through FSNC-20

Fort Snelling National Cemetery is located in the northeast quadrant of the I-494/34th Avenue South interchange. Twenty (20) representative receptor locations were arrayed across the portion of the cemetery adjacent to the interchange. Modeled daytime noise levels at receptor locations in Fort Snelling National Cemetery are predicted to range from 66.4 dBA (L_{10}) to 72.0 dBA (L_{10}) under the future (2030) Build Alternative. Nighttime modeled noise levels are predicted to range from 64.6 dBA (L_{10}) to 70.4 dBA (L_{10}) under the future Build Alternative. There is no outdoor area of frequent use located in the portion of Fort Snelling National Cemetery adjacent to the 34th Avenue South interchange; therefore, mitigation measures were not evaluated.

Area F (southwest of TH 5 and Glumack Drive)
Receptors F-1 and F-2

Land uses west of TH 5 and south of Glumack Drive consist of industrial uses associated with Minneapolis-St. Paul International Airport. Modeled daytime and nighttime noise levels are projected to be below State standards with the future Build Alternative. There is no Federal noise abatement criterion associated with industrial land uses (Activity Category F, see Table 2). Therefore, mitigation measures were not evaluated.

Fort Snelling State Park
Receptors FSSP-1 through FSSP-20

Fort Snelling State Park is located east of TH 5 adjacent to the Post Road and Glumack Drive interchanges Modeled traffic noise levels are projected to be below State standards and Federal noise abatement criteria at 19 modeled receptor locations representing areas of frequent outdoor use in Fort Snelling State Park under the future Build Alternative (bicycle/pedestrian trails and information center/office). Modeled traffic noise levels are also projected to be below State standards and Federal noise abatement criteria at the Officer's Club (receptor FSSP-8; commercial land use located within Fort Snelling State Park) under the future Build Alternative. Therefore, mitigation measures were not evaluated.

Upper Post Area
Receptors UP-1 through UP-26

The Upper Post area is located in the northeast quadrant of the I-494/34th Avenue South interchange. Twenty (26) representative receptor locations were arrayed across this portion of Fort Snelling adjacent to TH 5. Modeled daytime noise levels at receptor are predicted to range from 56.9 dBA (L_{10}) to 72.5 dBA (L_{10}) under the future Build Alternative. Nighttime modeled noise levels range from 54.9 dBA (L_{10}) to 70.5 dBA (L_{10}). There are no outdoor areas of frequent use located in the portion of the Upper Post area between Taylor Avenue and TH 5. Therefore, mitigation measures were not evaluated.

Upper Post Area (Recreational Uses)
Receptors MPRB-1 through MPRB-12

Land uses in the Upper Post area west of Taylor Avenue consist of recreational uses (golf course, soccer fields, baseball fields, and softball fields). This land is under lease from the Minnesota Department of Natural Resources to the Minneapolis Parks and Recreation Board (MPRB). Modeled traffic noise levels under the future Build Alternative are below State standards and Federal noise abatement criteria at 12 modeled receptor locations representing the recreational uses described above. Therefore, mitigation measures were not evaluated.

Other Noise Mitigation Techniques

Noise abatement measures other than noise barriers were considered for proposed project. These measures are summarized below.

- Traffic Management Measures: These measures include such items as prohibition of certain vehicle types and time-use restrictions for certain vehicle types. These traffic management measures are not reasonable for the proposed project because this would be inconsistent with the function of I-494 and TH 5.

- Modified Speed Limits: In, general, a decrease in speed of approximately 20 miles per hour is necessary for a noticeable decrease in noise levels. However, lower speeds would reduce the capacity of I-494 and TH 5 and is therefore not consistent with the function of these roadways. In addition, motorists would likely not obey a substantially lower speed limit.

- Vertical and Horizontal Alignment: The proposed project includes construction of an auxiliary lane along westbound I-494; bridge braided ramps between 24th Avenue South and 34th Avenue South; and reconstruction of the 34th Avenue South, Post Road, and Glumack

Drive interchanges. Changes in the horizontal and vertical alignments of I-494 are not within the project scope. Changes in horizontal alignments of the proposed interchange improvements would result in additional right of way impacts to adjacent properties, and would result in increases in traffic noise where roadways are shifted closer to receptor locations. Vertical profiles of the proposed improvements are defined by existing topography, existing roadway profiles, and vertical clearance between roadways (e.g., clearance between proposed braided bridge ramps west of 34th Avenue South).

- Landscaping/Natural Noise Screening: Vegetation is only effective for reducing noise levels if it is at least 100 to 200 feet deep, a minimum of 15 feet above the line of sight, and dense enough that it cannot be seen through (e.g., evergreen vegetation, which maintains its foliage year round). It is not feasible to plant enough vegetation within the highway right of way to achieve substantial noise level reductions. As such, vegetation is not a reasonable noise mitigation measure.

- Exclusive Land Use Designations: Buffer zones are undeveloped, open spaces adjacent to a highway corridor. Acquisition of property to serve as a buffer zone between the proposed roadway and adjacent lands is not feasible because the I-494 and TH 5 project corridors are developed (hotels, business/office, industrial land uses) or are in parkland uses (Fort Snelling State Park).

- Acoustical Insulation of Houses: Under MnDOT policy and Federal noise abatement criteria, only public buildings such as schools and hospitals should be considered for acoustical insulation (Activity Category D, see Table 2). These land uses are not located within the project area.

CONCLUSIONS AND RECOMMENDATIONS

Increases in forecast traffic volumes and construction of the proposed roadway improvements are projected to result in increases in traffic noise levels compared to existing conditions. In general, modeled daytime and nighttime traffic noise levels are predicted to increase by 0.9 dBA to 2.7 dBA under the future (2030) Build Alternative compared to existing conditions. Daytime modeled noise levels are predicted to range from 56.8 dBA (L_{10}) to 78.3 dBA (L_{10}) with the future Build Alternative. Nighttime modeled noise levels are predicted to range from 54.6 dBA (L_{10}) to 76.6 dBA (L_{10}) with the future Build Alternative. Modeled daytime traffic noise levels are predicted to exceed State daytime L_{10} standards at 33 modeled receptor locations with the Build Alternative; whereas modeled nighttime traffic noise levels are predicted to exceed State nighttime L_{10} standards at 26 modeled receptor locations with the Build Alternative.

Modeled L_{10} noise levels are projected to approach or exceed Federal noise abatement criteria at 23 modeled receptor locations within the project area under the future Build Alternative.

Noise barriers were evaluated at modeled receptor locations where traffic noise levels were predicted to exceed State standards or approach/exceed Federal noise abatement criteria. None of the modeled noise barriers were found to be reasonable (i.e. meet the noise reduction design goal of 7 dBA or the cost effectiveness criteria of $43,500/benefited receptor).

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Attachment A

Figures

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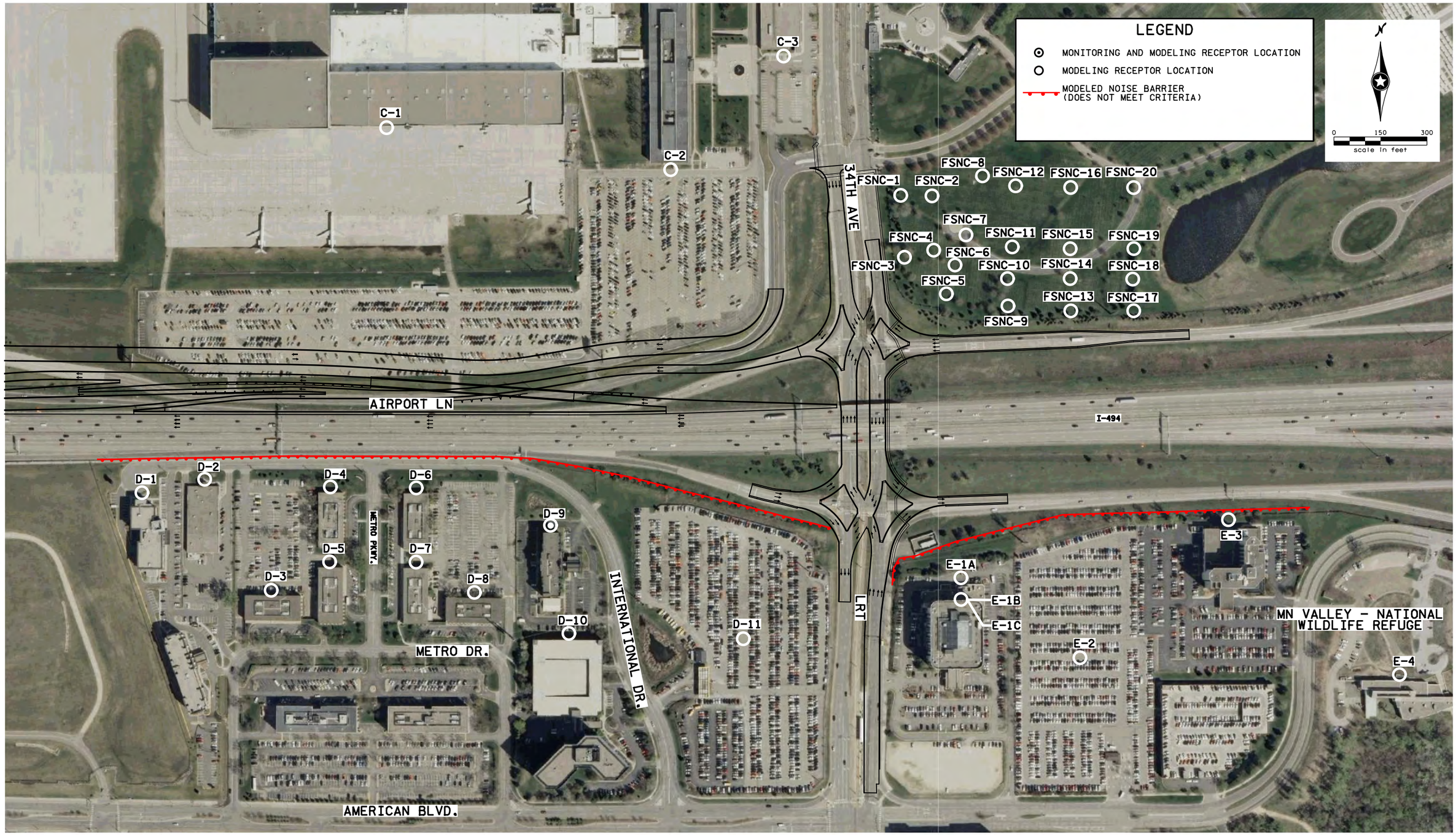
Traffic Noise Analysis

Minneapolis-St. Paul International Airport 2020 Improvements EA

Metropolitan Airports Commission

Figure 1



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Traffic Noise Analysis

Minneapolis-St. Paul International Airport 2020 Improvements EA

Metropolitan Airports Commission

Figure 2

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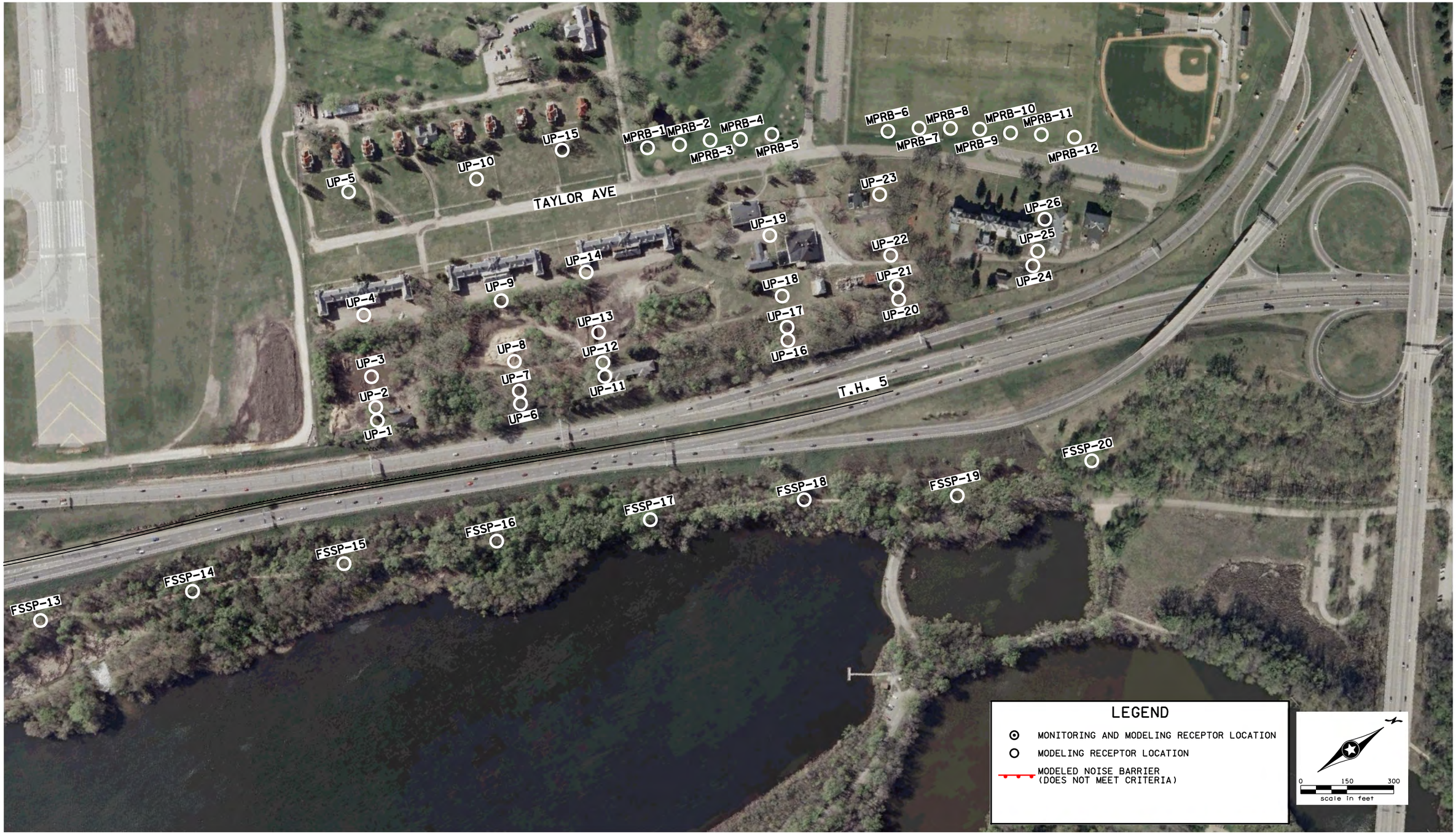
SRF Consulting Group, Inc.

Traffic Noise Analysis

Minneapolis-St. Paul International Airport 2020 Improvements EA

Metropolitan Airports Commission

Figure 3



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SRF Consulting Group, Inc.

Traffic Noise Analysis

Minneapolis-St. Paul International Airport 2020 Improvements EA

Metropolitan Airports Commission

Figure 4

Attachment B

Noise Barrier Cost Effectiveness Results

LIST OF TABLES

NOISE BARRIER COST-EFFECTIVENESS RESULTS

Table B-1
Noise Mitigation Cost Effectiveness Results (Daytime)
Area B: south of I-494, between TH 77 and 24th Avenue South

Receptors	Daytime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
20-foot high modeled barrier										
B-1B (H)	**74.1**	64.4	9.7	1	1	1	2,290	45,100	$902,000	$451,000
B-2B (H)	**70.3**	64.8	5.5	1	1	0				

(H) – hotel
Bold numbers are above State daytime standards (L_{10}). Underlined numbers approach/exceed Federal noise abatement criteria.
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-1 continued
Noise Mitigation Cost Effectiveness Results (Daytime)
Area B: south of I-494, between TH 77 and 24th Avenue South

Receptors	Daytime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
16-foot high modeled barrier										
B-1B (H)	**74.1**	66.5	7.6	1	1	1	2,290	36,140	$722,800	$722,800
B-2B (H)	**70.3**	66.7	3.6	0	0	0				

(H) – hotel
Bold numbers are above State daytime standards (L_{10}). Underlined numbers approach/exceed Federal noise abatement criteria.
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-1 continued
Noise Mitigation Cost Effectiveness Results (Daytime)
Area B: south of I-494, between TH 77 and 24th Avenue South

Receptors	Daytime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
14-foot high modeled barrier										
B-1B (H)	**74.1**	67.7	6.4	1	0	0	2,290	31,660	$633,200	N/A
B-2B (H)	**70.3**	67.7	2.6	1	0	0				

(H) – hotel
Bold numbers are above State daytime standards (L_{10}). Underlined numbers approach/exceed Federal noise abatement criteria.
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-2
Noise Mitigation Cost Effectiveness Results (Nighttime)
Area B: south of I-494, between TH 77 and 24th Avenue South

Receptors	Nighttime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
20-foot high modeled barrier										
B-1B (H)	**72.3**	62.7	9.6	1	1	1	2,290	45,100	$902,000	$451,000
B-2B (H)	68.6	63.1	5.5	1	1	0				

(H) – hotel
Bold numbers are above State nighttime standards (L_{10}).
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-2 continued
Noise Mitigation Cost Effectiveness Results (Nighttime)
Area B: south of I-494, between TH 77 and 24th Avenue South

Receptors	Nighttime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
16-foot high modeled barrier										
B-1B (H)	**72.3**	64.8	7.5	1	1	1	2,290	36,140	$722,800	$722,800
B-2B (H)	68.6	65.0	3.6	1	0	0				

(H) – hotel
Bold numbers are above State nighttime standards (L_{10}).
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-2 continued
Noise Mitigation Cost Effectiveness Results (Nighttime)
Area B: south of I-494, between TH 77 and 24th Avenue South

Receptors	Nighttime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
14-foot high modeled barrier										
B-1B (H)	**72.3**	66.0	6.3	1	1	0	2,290	31,660	$633,200	N/A
B-2B (H)	68.6	66.0	2.6	1	0	0				

(H) – hotel
Bold numbers are above State nighttime standards (L_{10}).
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-3
Noise Mitigation Cost Effectiveness Results (Daytime)
Area D: south of I-494, between Avenue South and 34th Avenue South (20-foot high modeled barrier)

Receptors	Daytime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
20-foot high modeled barrier [4]										
D-1 (H)	**75.9**	69.2	6.7	1	1	0	2,390	43,680	$873,600	$124,800
D-2 (C)	**78.3**	68.6	9.7	1	1	1				
D-3 (C)	66.7	61.6	5.1	1	1	0				
D-4 (C)	**76.7**	66.4	10.3	1	1	1				
D-5 (C)	62.5	58.7	3.8	1	0	0				
D-6 (C)	**76.6**	66.5	10.1	1	1	1				
D-7 (C)	64.4	61.1	3.3	1	0	0				
D-8 (C)	67.4	60.6	6.8	1	1	0				
D-9 (H)	**73.1**	65.6	7.5	1	1	1				
D-10 (C)	65.9	63.3	2.6	1	0	0				
D-11 (C)	67.4	66.4	1.0	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State daytime standards (L_{10}). Underlined numbers approach/exceed Federal noise abatement criteria.
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.
(4) Variable height barrier. 315-foot long, 20-foot high barrier adjacent to receptor D-1. 855-foot long, 16-foot high barrier adjacent to receptors D-2 through D-7. 1,220-foot long, 20-foot high barrier adjacent to receptors D-8 through D-11.

Table B-3 continued
Noise Mitigation Cost Effectiveness Results (Daytime)
Area D: south of I-494, between Avenue South and 34th Avenue South (16-foot high modeled barrier)

Receptors	Daytime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
16-foot high modeled barrier [4]										
D-1 (H)	**75.9**	**70.1**	5.8	1	1	0				
D-2 (C)	**78.3**	**71.4**	6.9	1	1	0				
D-3 (C)	66.7	63.2	3.5	1	0	0				
D-4 (C)	**76.7**	68.8	7.9	1	1	1				
D-5 (C)	62.5	59.8	2.7	1	0	0				
D-6 (C)	**76.6**	68.9	7.7	1	1	1	2,390	34,320	$686,400	$114,400
D-7 (C)	64.4	62.0	2.4	1	0	0				
D-8 (C)	67.4	62.4	5.0	1	1	0				
D-9 (H)	**73.1**	67.6	5.5	1	1	0				
D-10 (C)	65.9	64.3	1.6	1	0	0				
D-11 (C)	67.4	66.9	0.5	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State daytime standards (L_{10}). Underlined numbers approach/exceed Federal noise abatement criteria.
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
[1] Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
[2] Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
[3] Barrier surface area includes tapers at barrier ends.
[4] Variable height barrier. 315-foot long, 16-foot high barrier adjacent to receptor D-1. 855-foot long, 12-foot high barrier adjacent to receptors D-2 through D-7. 1,220-foot long, 16-foot high barrier adjacent to receptors D-8 through D-11.

Table B-3 continued
Noise Mitigation Cost Effectiveness Results (Daytime)
Area D: south of I-494, between Avenue South and 34th Avenue South (14-foot high modeled barrier)

Receptors	Daytime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
14-foot high modeled barrier [4]										
D-1 (H)	**75.9**	**70.7**	5.2	1	1	0				
D-2 (C)	**78.3**	**72.9**	5.4	1	1	0				
D-3 (C)	66.7	64.1	2.6	1	0	0				
D-4 (C)	**76.7**	**70.4**	6.3	1	1	0				
D-5 (C)	62.5	60.4	2.1	1	0	0				
D-6 (C)	**76.6**	**70.3**	6.3	1	1	0	2,390	29,640	$592,800	N/A
D-7 (C)	64.4	62.5	1.9	1	0	0				
D-8 (C)	67.4	63.6	3.8	1	0	0				
D-9 (H)	**73.1**	68.7	4.4	1	0	0				
D-10 (C)	65.9	64.8	1.1	1	0	0				
D-11 (C)	67.4	67.1	0.3	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State daytime standards (L_{10}). Underlined numbers approach/exceed Federal noise abatement criteria.
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.
(4) Variable height barrier. 315-foot long, 14-foot high barrier adjacent to receptor D-1. 855-foot long, 10-foot high barrier adjacent to receptors D-2 through D-7. 1,220-foot long, 14-foot high barrier adjacent to receptors D-8 through D-11.

Table B-4
Noise Mitigation Cost Effectiveness Results (Nighttime)
Area D: south of I-494, between Avenue South and 34th Avenue South (20-foot high modeled barrier)

Receptors	Nighttime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
20-foot high modeled barrier [4]										
D-1 (H)	**74.2**	67.5	6.7	1	1	0				
D-2 (C)	**76.5**	66.9	9.6	1	1	1				
D-3 (C)	65.1	60.0	5.1	1	1	0				
D-4 (C)	**74.9**	64.6	10.3	1	1	1				
D-5 (C)	60.9	57.0	3.9	1	0	0				
D-6 (C)	**74.7**	64.8	9.9	1	1	1	2,390	43,680	$873,600	$124,800
D-7 (C)	62.7	59.3	3.4	1	0	0				
D-8 (C)	65.7	59.0	6.7	1	1	0				
D-9 (H)	**71.4**	63.9	7.5	1	1	1				
D-10 (C)	64.2	61.6	2.6	1	0	0				
D-11 (C)	65.7	64.7	1.0	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State nighttime standards (L_{10}).
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
[1] Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
[2] Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
[3] Barrier surface area includes tapers at barrier ends.
[4] Variable height barrier. 315-foot long, 20-foot high barrier adjacent to receptor D-1. 855-foot long, 16-foot high barrier adjacent to receptors D-2 through D-7. 1,220-foot long, 20-foot high barrier adjacent to receptors D-8 through D-11.

Table B-4 continued
Noise Mitigation Cost Effectiveness Results (Nighttime)
Area D: south of I-494, between Avenue South and 34th Avenue South (16-foot high modeled barrier)

Receptors	Nighttime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
16-foot high modeled barrier [4]										
D-1 (H)	**74.2**	68.4	5.8	1	1	0				
D-2 (C)	**76.5**	69.7	6.8	1	1	0				
D-3 (C)	65.1	61.6	3.5	1	0	0				
D-4 (C)	**74.9**	67.0	7.9	1	1	1				
D-5 (C)	60.9	58.2	2.7	1	0	0				
D-6 (C)	**74.7**	67.1	7.6	1	1	1	2,390	34,320	$686,400	$137,280
D-7 (C)	62.7	60.3	2.4	1	0	0				
D-8 (C)	65.7	60.9	4.8	1	0	0				
D-9 (H)	**71.4**	65.9	5.5	1	1	0				
D-10 (C)	64.2	62.6	1.6	1	0	0				
D-11 (C)	65.7	65.2	0.5	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State nighttime standards (L_{10}).
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
[1] Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
[2] Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
[3] Barrier surface area includes tapers at barrier ends.
[4] Variable height barrier. 315-foot long, 16-foot high barrier adjacent to receptor D-1. 855-foot long, 12-foot high barrier adjacent to receptors D-2 through D-7. 1,220-foot long, 16-foot high barrier adjacent to receptors D-8 through D-11.

Table B-4 continued
Noise Mitigation Cost Effectiveness Results (Nighttime)
Area D: south of I-494, between Avenue South and 34th Avenue South (14-foot high modeled barrier)

Receptors	Nighttime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
14-foot high modeled barrier [4]										
D-1 (H)	**74.2**	**70.7**	3.5	1	0	0				
D-2 (C)	**76.5**	**72.0**	4.5	1	0	0				
D-3 (C)	65.1	62.6	2.5	1	0	0				
D-4 (C)	**74.9**	68.6	6.3	1	1	0				
D-5 (C)	60.9	59.1	1.8	1	0	0				
D-6 (C)	**74.7**	68.9	5.8	1	1	0	2,390	29,640	$592,800	N/A
D-7 (C)	62.7	61.8	0.9	1	0	0				
D-8 (C)	65.7	63.4	2.3	1	0	0				
D-9 (H)	**71.4**	68.9	2.5	1	0	0				
D-10 (C)	64.2	63.7	0.5	1	0	0				
D-11 (C)	65.7	65.5	0.2	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State nighttime standards (L_{10}).
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
[1] Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
[2] Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
[3] Barrier surface area includes tapers at barrier ends.
[4] Variable height barrier. 315-foot long, 14-foot high barrier adjacent to receptor D-1. 855-foot long, 10-foot high barrier adjacent to receptors D-2 through D-7. 1,220-foot long, 14-foot high barrier adjacent to receptors D-8 through D-11.

Table B-5
Noise Mitigation Cost Effectiveness Results (Daytime)
Area E: south of I-494, east of 34th Avenue South (20-foot high modeled barrier)

Receptors	Daytime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [(3)]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
20-foot high modeled barrier										
E-1A (H)	69.9	65.6	4.3	1	0	0	1,430	27,900	$558,000	$558,000
E-2 (C)	66.3	63.8	2.5	1	0	0				
E-3 (H)	**73.1**	63.3	9.8	1	1	1				
E-4 (C)	65.6	65.2	0.4	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State daytime standards (L_{10}). Underlined numbers approach/exceed Federal noise abatement criteria.
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-5 continued
Noise Mitigation Cost Effectiveness Results (Daytime)
Area E: south of I-494, east of 34th Avenue South (16-foot high modeled barrier)

Receptors	Daytime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
16-foot high modeled barrier										
E-1A (H)	69.9	67.3	2.6	1	0	0	1,430	22,380	$447,600	$447,600
E-2 (C)	66.3	65.1	1.2	1	0	0				
E-3 (H)	**73.1**	65.7	7.4	1	1	1				
E-4 (C)	65.6	65.4	0.2	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State daytime standards (L_{10}). Underlined numbers approach/exceed Federal noise abatement criteria.
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-5 continued
Noise Mitigation Cost Effectiveness Results (Daytime)
Area E: south of I-494, east of 34th Avenue South (14-foot high modeled barrier)

Receptors	Daytime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
14-foot high modeled barrier										
E-1A (H)	69.9	68.2	1.7	1	0	0	1,430	19,620	$392,400	N/A
E-2 (C)	66.3	65.6	0.7	1	0	0				
E-3 (H)	**73.1**	67.1	6.0	1	1	0				
E-4 (C)	65.6	65.4	0.2	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State daytime standards (L_{10}). Underlined numbers approach/exceed Federal noise abatement criteria.
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-6
Noise Mitigation Cost Effectiveness Results (Nighttime)
Area E: south of I-494, east of 34th Avenue South (20-foot high modeled barrier)

Receptors	Nighttime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
20-foot high modeled barrier										
E-1A (H)	68.1	63.9	4.2	1	0	0	1,430	27,900	$558,000	$558,000
E-2 (C)	64.5	62.0	2.5	1	0	0				
E-3 (H)	**71.4**	61.5	9.9	1	1	1				
E-4 (C)	63.7	63.4	0.3	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State nighttime standards (L_{10}).
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-6 continued
Noise Mitigation Cost Effectiveness Results (Nighttime)
Area E: south of I-494, east of 34th Avenue South (16-foot high modeled barrier)

Receptors	Nighttime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
16-foot high modeled barrier										
E-1A (H)	68.1	65.5	2.6	1	0	0	1,430	22,380	$447,600	$447,600
E-2 (C)	64.5	63.2	1.3	1	0	0				
E-3 (H)	**71.4**	63.8	7.6	1	1	1				
E-4 (C)	63.7	63.5	0.2	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State nighttime standards (L_{10}).
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.

Table B-6 continued
Noise Mitigation Cost Effectiveness Results (Nighttime)
Area E: south of I-494, east of 34th Avenue South (14-foot high modeled barrier)

Receptors	Nighttime L_{10} Noise Level (dBA)		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)	Barrier Area (sq ft) [3]	Total cost of barrier $20/sq ft	Cost/ Benefited Receptor
	Build year 2030 (no barrier)	Build year 2030 (with noise barrier)								
14-foot high modeled barrier										
E-1A (H)	68.1	66.4	1.7	1	0	0	1,430	19,620	$392,400	N/A
E-2 (C)	64.5	63.8	0.7	1	0	0				
E-3 (H)	**71.4**	65.3	6.1	1	1	0				
E-4 (C)	63.7	63.6	0.1	1	0	0				

(H) – hotel; (C) – commercial/business/office
Bold numbers are above State nighttime standards (L_{10}).
N/A = not applicable because none of the receptors adjacent to the modeled barrier meet the noise reduction design goal of at least 7 dBA.
(1) Number of benefited residences, commercial or industrial establishments with a minimum 5 dBA reduction.
(2) Noise barrier must meet MnDOT's noise reduction design goal of at least 7 dBA at a minimum of one benefited receptor behind each noise barrier.
(3) Barrier surface area includes tapers at barrier ends.