Memorandum

SRF No. 12818.00

To: Jeremy Larson, Executive Vice President
Hampton Companies, LLC

From: Justin Sebens, PE, Senior Engineer
Brett Danner, Senior Associate

Date: June 26, 2019

Subject: Hampton Companies Assisted Living/Extended Care Facility
Traffic Noise Analysis
Ramsey, Minnesota

Introduction

As requested, a traffic noise study was completed for a proposed assisted living/extended care facility in the City of Ramsey, Minnesota. The proposed facility is located on the south side of Highway 10, east of Ramsey Boulevard (County State Aid Highway 56). The site is currently undeveloped. The concept plan for the proposed development site with the assisted living/extended care facility is attached.

The purpose of this study was to identify existing noise levels at the proposed assisted living/extended care facility and complete a traffic noise analysis for the proposed development consistent with the requirements identified in Minnesota Rules 7030.0030 (Noise Control Requirement).

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. 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 (e.g., 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 the sound energy increases by a factor of ten times, the resulting sound level will increase by about 10 dBA and be heard to be twice as loud.

In Minnesota, traffic noise impacts are evaluated by measuring and/or modeling the 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.

Minnesota State Noise Standards

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The Minnesota Pollution Control Agency (MPCA) is empowered to enforce the State noise rules. Minnesota state noise standards are defined in Minnesota Rules 7030.0040 (Noise Standards). Minnesota state noise standards have been established for daytime and nighttime periods. For residential land uses (identified as Noise Area Classification 1 or NAC-1), the limits are 65 dBA (L_{10}) and 60 dBA (L_{50}) during the daytime, and 55 dBA (L_{10}) and 50 dBA (L_{50}) during the 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. Table 1 lists State noise standards by noise area classification. Minnesota state noise standards apply to the outdoor atmosphere (i.e., exterior noise levels).

Table 1. Minnesota State Noise Standards

Land Uses	Noise Area Classification	Daytime L_{10}	Daytime L_{50}	Nighttime L_{10}	Nighttime L_{50}
Residential	NAC-1 (1)	65	60	55	50
Commercial	NAC-2 (2)	70	65	70	65
Industrial	NAC-3 (3)	80	75	80	75
Undeveloped	NAC-4 (4)	--	--	--	--

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

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

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

(4) There are no noise standards for undeveloped areas.

Minnesota Rules 7030.0030 Noise Control Requirement

Under Minnesota Rules 7030.0030 (Noise Control Requirement), local units of government are required to take reasonable measures to prevent the approval of land use activities that will violate the state noise standard immediately upon establishment of the land use. Local units of government responsible for land use decisions should consider the state noise standard when reviewing and approving new projects in their jurisdiction. Minnesota Rules 7030.0030 states the following:

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

Analysis Methodology

Noise Monitoring

Field measurements of existing noise levels were collected at the proposed assisted living/extended care facility site on May 30, 2019. Noise levels were monitored for one hour during the nighttime period (6:00 a.m. to 7:00 a.m.) and one hour during the daytime period (7:00 a.m. to 8:00 a.m.). A trained noise monitoring technician was present for the entire field measurement session to ensure correct operation of the sound level meter (SLM). The field measurement datasheet is attached.

Noise Modeling

The proposed assisted living/extended care facility is on the south side of Highway 10, east of Ramsey Boulevard. Existing land uses adjacent to the site include commercial and residential uses. The dominant source of noise at the site is from vehicles traveling on Highway 10. Therefore, modeling was completed to identify traffic noise levels at the proposed assisting living/extended care facility site and to evaluate noise abatement measures.

Noise modeling was done using the noise prediction program "MINNOISEV31", a version of the FHWA "STAMINA" model adapted by MnDOT for use in Minnesota. This model uses traffic volumes, speed, class of vehicle, and the typical characteristics of the roadway being analyzed (e.g., roadway horizontal and vertical alignment). The noise modeling assumed free flow conditions through the Highway 10/Ramsey Boulevard intersection.

Traffic data for noise model input files included year 2021 estimated traffic volumes for Highway 10. Existing (2018) traffic volumes for Highway 10 were obtained from Minnesota Department of Transportation (MnDOT) Metro District intersection traffic counts for Highway 10 and Ramsey Boulevard.[1] Year 2021 traffic volumes were estimated based on a historical growth rate on Highway 10 of one percent. Year 2021 was identified as the year for analysis because this is the assumed year that construction of the proposed assisted living/extended care facility would be complete.

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[1] Minnesota Department of Transportation. Metro Intersection Traffic Counts Website. Intersection Approach Counts and Turning Movement Information accessed on May 28, 2019 at http://www.dot.state.mn.us/metro/warrant/index.html.

The daytime hour of analysis was the morning rush hour (7:00 a.m. to 8:00 a.m.). The nighttime hour of analysis was 6:00 a.m. to 7:00 a.m., just prior to the start of the morning rush hour period. The modeled speed on Highway 10 was 60 miles per hour (MPH). The vehicle mix was 98 percent passenger vehicles and 2 percent heavy commercial vehicles on eastbound Highway 10, and 94 percent passenger vehicles and 6 percent heavy commercial vehicles on westbound Highway 10.

Noise Analysis Results

Existing Noise Levels

Existing noise levels were measured at the site during the daytime and nighttime on May 30, 2019. Table 2 summarizes field measurement results. Existing noise levels exceed State daytime and nighttime standards for residential uses (NAC-1). For residential uses, the State limits are 65 dBA (L_{10}) and 60 dBA (L_{50}) during the daytime, and 55 dBA (L_{10}) and 50 dBA (L_{50}) during the nighttime.

Table 2. Field Measurement Summary Table

	Measurement Start Time	Measurement End Time	Measured Level, L_{10}, dBA	Measured Level, L_{50}, dBA
Daytime	6:00 a.m.	7:00 a.m.	69.23	66.23
Nighttime	7:00 a.m.	8:00 a.m.	66.11	63.08

Modeled Noise Levels

Noise levels were assessed by modeling traffic noise at receptors representing proposed outdoor use areas at the assisted living/extended care facility. One receptor was placed on the north side of the assisted living/extended care facility building representing a proposed outdoor use area, and one receptor was placed on the south side of the building adjacent to the entrance. A figure illustrating the modeled receptor locations is attached.

Table 3 tabulates the traffic noise modeling results during the daytime and nighttime. Modeled traffic noise levels at the assisted living/extended care facility on the south side of the building (Receptor 1-1) are below State daytime standards (L_{10} and L_{50}) for NAC-1, but above State nighttime standards (L_{10} and L_{50}) for NAC-1. Modeled traffic noise levels at the assisted living/extended care facility on the north side of the building facing Highway 10 (Receptor 1-2) exceed State daytime and nighttime standards (L_{10} and L_{50}) for NAC-1.

Table 3. Traffic Noise Analysis Results (Daytime and Nighttime)

Receptor ID	Land Use	State NAC	Daytime L_{10}, dBA	Daytime L_{50}, dBA	Nighttime L_{10}, dBA	Nighttime L_{50}, dBA
1-1	Residential	NAC-1	58.8	55.7	**58.4**	**55.2**
1-2	Residential	NAC-1	**71.8**	**67.1**	**71.5**	**66.6**
State Standard	Residential	NAC-1	65	60	55	50

Bold numbers are above State daytime and nighttime noise standards.

Noise Abatement Recommendations

An outdoor use area is planned on the north side of the assisted living/extended care facility on the north side of the building facing Highway 10 (Receptor 1-2). This area is expected to see limited use. Modeled daytime noise levels at this location are 71.8 dBA (L_{10}) and 67.1 dBA (L_{50}), above State limits for NAC-1. Modeled nighttime noise levels at this location are 71.5 dBA (L_{10}) and 66.6 dBA (L_{50}), above State limits for NAC-1.

It is recommended to consider removing planned outdoor use areas from the north side of the assisted living/extended care building, and locate outdoor use areas on the south side of structure. Under this scenario, the building itself functions as a barrier. Noise levels were modeled on the south side of the building near the proposed entrance location (Receptor 1-1). Modeled daytime noise levels at this location are 58.8 dBA (L_{10}) and 55.7 dBA (L_{50}), below State limits for NAC-1. Modeled nighttime noise levels at this location are 58.4 dBA (L_{10}) and 55.2 dBA (L_{50}), above State limits for NAC-1.

There is no reasonable noise abatement measure to reduce modeled noise levels on the south side of the assisted living/extended care building (Receptor 1-1) below State nighttime limits for residential uses (NAC-1). A 20-foot tall noise wall was modeled along the Highway 10 right of way adjacent to the proposed assisted living/extended care facility. The modeled wall location is illustrated in the attached figure. Table 4 tabulates the noise wall effectiveness results. The modeled noise wall results in a 0.4 dBA (L_{10}) reduction in nighttime noise levels at Receptor 1-1, and is not considered acoustically effective.

Table 4. Noise Wall Effectiveness (Nighttime Results)

Receptor ID	Land Use	State NAC	No Noise Wall (L_{10}, dBA)	With Noise Wall (L_{10}, dBA)	Noise Wall Effectiveness (L_{10}, dBA)
1-1	Residential	NAC-1	**58.4**	**58.0**	0.4
State Standard	Residential	NAC-1	55	50	N/A

Bold numbers are above State nighttime standards.

Attachments

Field Measurement Datasheet

Site Plan

Assisted Living/Extended Care Facility Modeled Receptor Locations

FIELD MEASUREMENT DATA SHEET

Sound Level Meter (SLM) Settings			Name:	SRF Consulting Group
Time:	**Fast**	Slow	Date:	May 30th, 2019
Weighting:	Lin.	**A**	Project Name:	Ramsey Traffic Noise Anlaysis
Mic. Setting:	Fr.	**Rnd**	Project Number:	12818.00

Sound Level Meter (SLM)		**Calibrator**		
Manufacturer	Bruel & Kjær	Manufacturer	Bruel & Kjær	
Model	Type 2250	Model	4231	
Serial No.	3000540	Serial No.	2725243	
Microphone	Type 4189 (Serial No. 2933208)	Calibrator Frequency (Hz)		1000 Hz

Calibration

Initial Calibration	-0.07	Time	5:54 AM
Final Calibration	0.01	Time	8:05 AM

Monitor Location and Terrain Conditions: Next to TH 10 on the southside of the roadway

Dominant and Observed Noise Sources: TH 10

MEASURMENT INFORMATION					
Test Number	1	2	3	4	5
Date	5/30/2019	5/30/2019			
Start Time	6:00 AM	7:00 AM			
End Time	7:00 AM	8:00 AM			
Weather	Sunny	Cloudy			
Temp (^{o} F)	69	74			
Rel. Humidity (%)	45	45			
Wind (mph)	3	3			
Wind direction	N	N			
Road conditions	Dry	Dry			

TRAFFIC					
Test Number	1	2	3	4	5
Autos	--	--			
Med Trucks	--	--			
Heavy Trucks	--	--			
Buses	--	--			
Motorcycles	--	--			
Total	--	--			
Speed Limit	60 mph	60 mph			

MONITOR RESULTS (dBA)					
Test Number	1	2	3	4	5
L1	71.58	67.97			
L5	69.98	66.82			
L10	69.23	66.11			
L50	66.23	63.08			
L90	58.62	56.94			
L99	52.22	51.92			
Leq	66.52	63.45			
Lmax	80.31	75.07			
Lmin	48.48	48.85			

(See other side for plan view and cross section images)

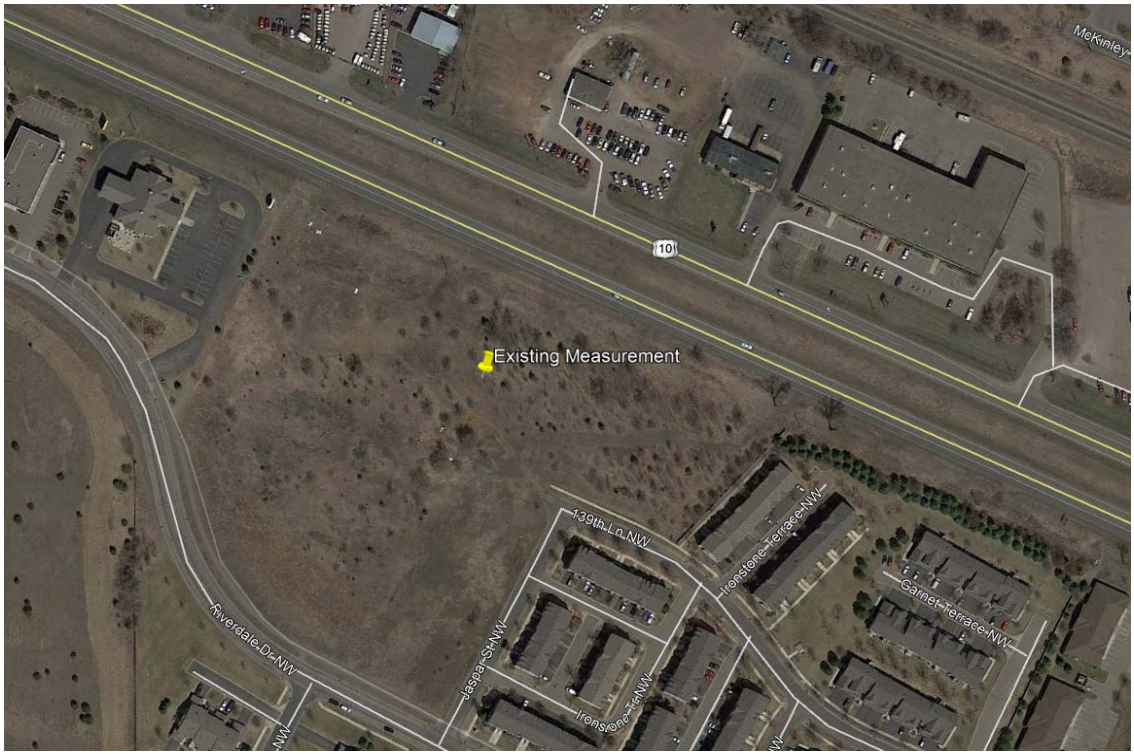
Plan view and cross section images

(Include noise source, receiver, microphone location, reflecting objects, obstructions, landmarks and approximate distances)

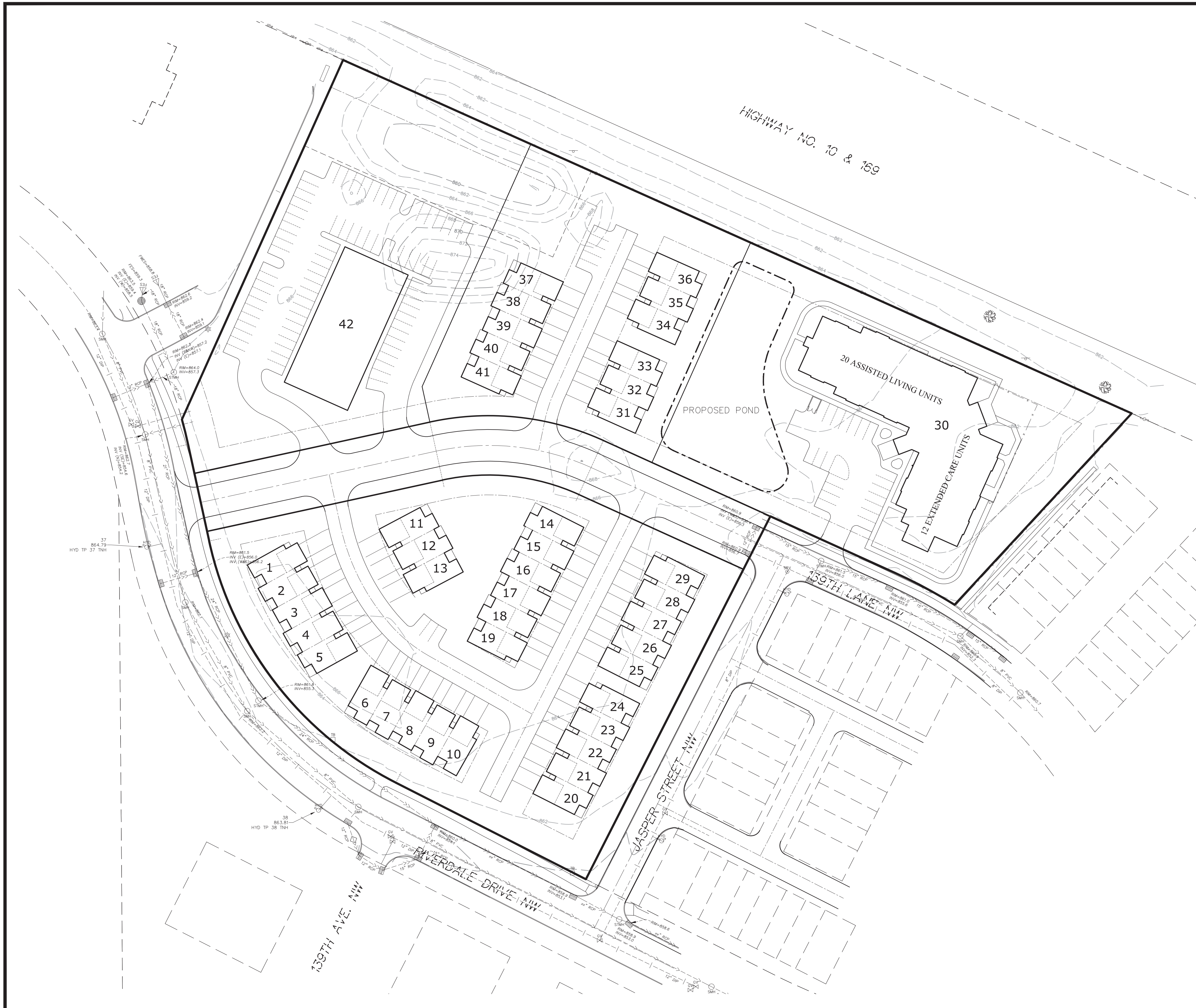
GPS Coordinates: X: 45.22465 Y: -93.4456305

Comments:

PLAN VIEW



CROSS SECTION

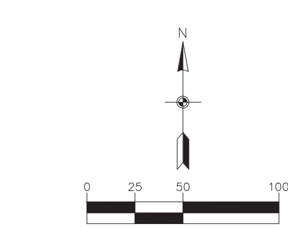


SITE DATA

TOTAL BOUNDARY AREA	±9.34 AC.
TOTAL ROW AREA	±0.81 AC.
TOTAL COMMERCIAL AREA	±1.85 AC.
TOTAL RESIDENTIAL AREA	±6.68 AC.
ASSISTED/EXTENDED CARE FACILITY LOT	±2.14 AC.
TOWNHOME LOTS	±4.54 AC.
TOTAL NUMBER OF LOTS	42
COMMERCIAL LOTS (LOT 42)	1
RESIDENTIAL LOTS	41
ASSISTED/EXTENDED CARE FACILITY LOT	1
TOWNHOME LOTS	40

GENERAL NOTES:

1. No field work has been completed at this time.
2. Topography shown taken from Anoka County GIS.



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CONCEPT PLAN J

RIVENWICK
Ramsey, Minnesota

PAXMAR
2850 Cutters Grove Ave. - Suite 207
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REVISIONS	
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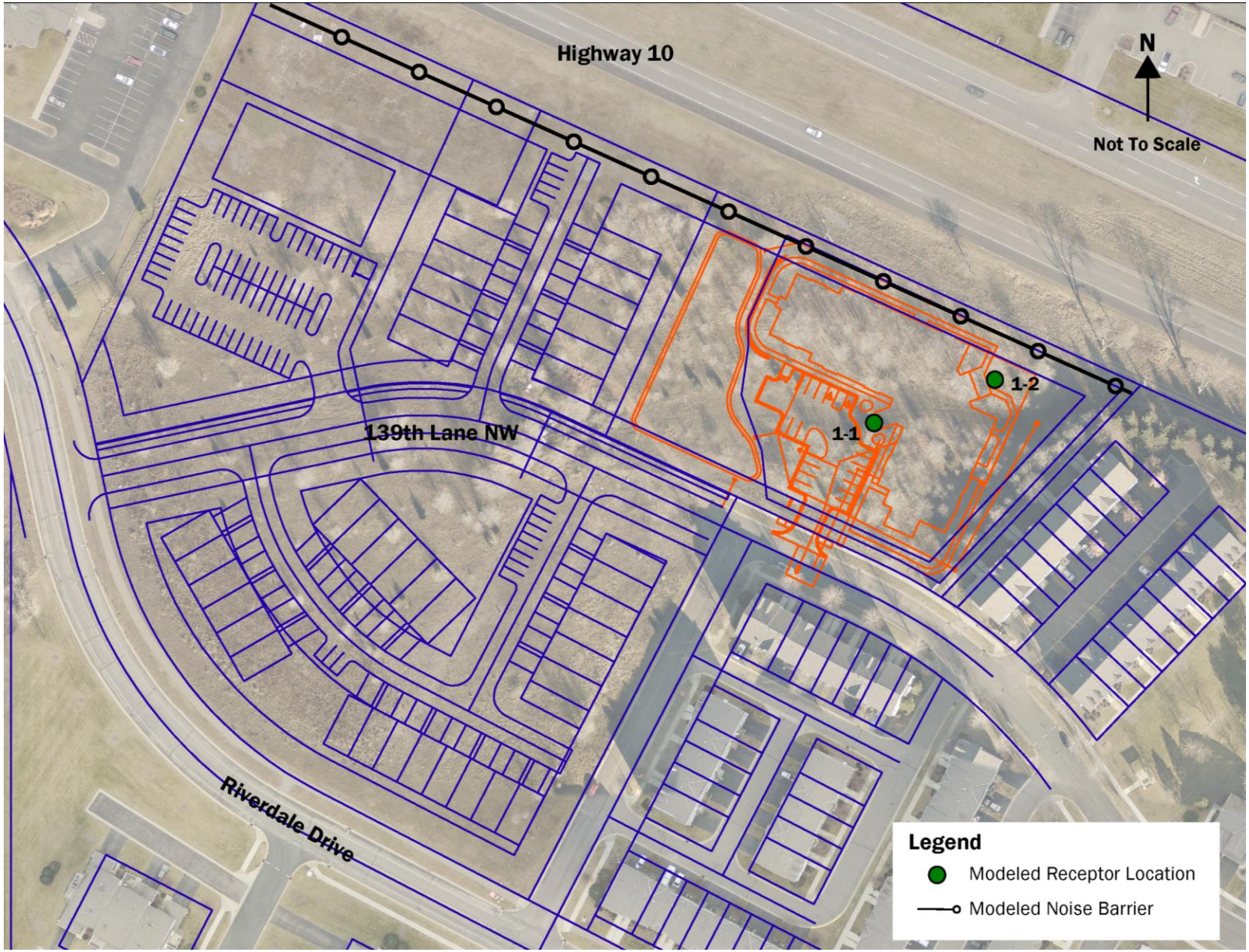
DRAWN BY:	C#
ISSUE DATE:	03/29/19
FILE NO:	XXX



Assisted Living/Extended Care Facility Modeled Receptor Locations

Figure 1

Hampton Companies Assisted Living/Extended Care Facility Traffic Noise Analysis
Ramsey, Minnesota

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