NOISE STUDY REPORT

Prepared by the Nebraska Department of Roads

July 16, 2013

PROJECT NO. 80-9(1189), C.N. 22151

Additional I-80 EB, 126th Street to 96th Street

Omaha, Nebraska

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PROJECT BACKGROUND

This report documents the noise analysis completed in support of the Nebraska Dept. of Roads (NDOR) Additional I-80 EB lane, 126th Street to 96th Street project. The proposed improvements will add an additional eastbound lane on I-80 beginning just east of the Giles Road interchange and continuing to 96th St.

The purpose of this noise report is to:

- Provide a discussion of the fundamentals of noise and traffic noise analysis.
- Evaluate existing traffic noise levels in the corridor.
- Predict the future traffic noise levels (2040) of noise sensitive receivers. Noise sensitive receivers are land uses adjacent to the studied corridor (such as houses, churches or schools) that might be affected by traffic noise.
- Quantify the number of properties that are predicted to experience roadway noise levels that exceed the applicable standards.
- Evaluate potential mitigation measures for sensitive receivers adjacent to the new alignment that approach or exceed the Noise Abatement Criteria (NAC).

NATURE OF NOISE

Noise may be defined as unwanted sound. Sound is the sensation produced when the movement of an object creates vibrations, or waves, that pass through the ears. The relative impact of sound waves depends on the amount of pressure they generate. The unit of measure for sound pressure is the decibel (dB). Decibels are based on a logarithmic scale because the range of sound pressures is too great to be accommodated on a linear scale. The range of sound pressure levels most frequently encountered in evaluating traffic-generated noise on highways is 50 to 95 dB.

The measured noise level from a given source does not necessarily correspond to our perception of “loudness.” For instance, a three (3) decibel increase from a noise source represents a doubling of the noise level (as measured in sound pressure) on the logarithmic scale. However, this change is barely perceptible for human beings. Furthermore, an increase in 10 decibels from a noise source is a tenfold increase in noise pressure, but is only perceived as a doubling in the loudness by the human ear.

For highway traffic noise analysis, the Federal Highway Administration (FHWA) has specified that noise be predicted and evaluated in decibels weighted with the A-level frequency response; this unit of measure is referred to as dBA. Measurements in dBA incorporate a human’s reduced sensitivity to both low frequency and very high frequency noises to better correlate with our subjective impression of loudness.

Table 1 displays noise levels common to everyday activities.

TABLE 1. Common Exterior Noise Levels (dBA)

Common Noise Levels	Noise Level (dBA)
Rock Band at 16 ft	110
Jet Flyover at 985 ft	105
Gas Lawn Mower at 3 ft	95
Diesel Truck at 50 ft	85
Same Truck at 110 ft	80
Gas Lawn Mower at 100 ft	70
Normal Speech at 3 ft	65
Birds Chirping	50
Leaves Rustling	40
Very Quiet Soft Whisper	30
Threshold of Hearing	0

23 CFR Part 772 Standards

23 Code of Federal Regulations (CFR) Part 772 was written by the Federal Highway Administration (FHWA). Its purpose is to provide procedures for noise studies, and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for traffic noise information to be given to those officials who have planning and zoning authority in the project area. 23 CFR 772 contains noise abatement criteria, which are based on the equivalent level (L_{eq}), noise descriptor. L_{eq} (h) is the equivalent steady state sound level, which during the hour under consideration contains the same acoustic energy as the time-varying traffic sound level during that same hour. The following table contains the upper limits of hourly L_{eq} desirable noise levels that are part of the noise abatement criteria established by 23 CFR 772. Any noise levels that approach or exceed these criteria would not be desirable and would be referred to as a noise impact.

TABLE 2. Noise Abatement Criteria, Hourly A-Weighted Sound Level

Activity Category	Activity[1] Leq(h)	Activity Description
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve and important public need where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67 (exterior)	Residential
C[2]	67 (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 structure, radio stations, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, trail crossings.
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structure, radio studios, recording studios, schools, television studios.
E[2]	72 (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

[1] The Leq(h) Activity Criteria values are for impacted determination only, and are not design standards for noise abatement.

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

The selection and analysis of all individual noise sensitive receptors are based on the data included in the above table. Most areas come under Activity Category "B" or "C" and “E”. Activity "E" typically consists of commercial land use or business offices. Category “F” sites are not considered to be noise sensitive areas. Primary consideration is to be given to exterior areas; therefore, all noise levels referred to in this study are exterior noise levels unless otherwise stated. Activity Category "D" is not normally used since interior noise depends on the type of windows, doors or wall structures of each building; however, sometimes a specific receptor might warrant its use. Category “A” sites are extremely rare as only a few exist in the entire nation.

NOISE PREDICTION METHOD

Traffic noise levels associated with three different scenarios were predicted for this noise study:

- ***The Existing Conditions Scenario*** assumed current (2014) traffic volumes, vehicle mix (broken down by autos, medium trucks and heavy trucks) and roadway characteristics.
- ***The 2040 No-Build Scenario*** assumed that future (2040) forecasted traffic would be traveling on the existing alignment without a physical change to the road.
- ***The 2040 Build Scenario*** assumed that future (2040) forecasted traffic would be traveling on the constructed I-80.

Traffic noise levels shown in this study resemble “peak hour” noise levels and are predicted in hourly L_{eq} dBA. The L_{eq} descriptor is reliable for low volume as well as high volume roadways, is simpler in most instances for highway designers to work with, and is more flexible in terms of permitting noise levels from different sources to be included in the analysis of the total ambient noise.

The "FHWA Highway Traffic Noise Prediction Model" is the method used in this report to predict L_{eq} dBA noise levels. This method was developed and approved for use by the U.S. Department of Transportation Federal Highway Administration. The procedures included in the FHWA Model permit an analysis of variations in traffic noises in terms of traffic parameters, roadway and observer characteristics. These parameters are then identified for a particular traffic situation and transformed into noise level estimates through the use of this prediction method, which has been set up on a computer, using the FHWA Traffic Noise Model (TNM) Version 2.5.

NOISE MODEL PARAMETERS

The following parameters were considered when applying the traffic noise prediction methodology:

- Traffic levels, vehicle composition (whether auto, medium truck or heavy truck)
- Posted speed: 60-65 mph on the I-80 mainline with various speeds on other arterial roadways and interchange ramps.
- Plan and profile information for roadways
- Location and elevation of sensitive noise receivers by activity category
- Location of terrain and man-made features that act to shield traffic noise
- Ground cover type

TRAFFIC PARAMETERS

The traffic volume used for this hour time period is usually the Design Hourly Volume (DHV) traffic. However, if the DHV is not that predictable, a peak hour volume that occurs on a regular basis during design year might be used. Heavy trucks include all vehicles having three or more axles, generally having a gross vehicle weight greater than 26,000 lbs. Medium trucks include all vehicles having two axles and six wheels, generally having a gross vehicle weight greater than 10,000 lbs but less than 26,000 lbs. The following diagram shows traffic volumes used on this project.

TABLE 3. Existing (2014) Traffic Data

Location		DHV	%HCV*	Cars	Heavy Trucks	Medium Trucks
I-80 (126th St. to Q St.)	WB	5251	11	4673	416	162
	EB	4280	10	3849	310	121
I-80 (east of I-680 interchange)	WB	8460	7	7902	156	402
	EB	6907	7	6424	348	135

HCV = Heavy Commercial Vehicles

TABLE 4. Build Condition (2040) Traffic Data

Location		DHV	%HCV*	Cars	Heavy Trucks	Medium Trucks
I-80 (126th St. to Q St.)	WB	7423	11	6606	588	229
		5411	11	3849	428	167
I-80 (east of I-680 interchange)	WB	9070	7	8477	427	166
	EB	8098	7	6424	394	153

HCV = Heavy Commercial Vehicles

Noise Level Table

The noise level table (Attachment 2) lists all those noise sensitive receptors within the limits of this project. The table details the following: computed noise levels in hourly L_{eq} dBA for the existing system (2014 traffic volumes), and computed noise levels in hourly L_{eq} dBA for future design year 2040 (no-build and build alternatives). Also shown are the hourly L_{eq} dBA noise abatement criteria (NAC) that are part of the 23 CFR Part 772 guidelines used in determining a noise impact.

Table 6. Monitored Noise Levels

Table 6 documents the field measurements used to verify the TNM. The model reasonably reflected the measured noise levels deviating by less than 3 dB(A). The primary noise source for the field and modeled noise levels is I-80. However, noise from other arterial streets and interchange ramps are also included in the model verification.

	Distance to pavement	Measured Leq	Predicted Leq (TNM)	hourly volume	%HCV	speed
Reading 1	130	67.2	68.9	7598	9	65
Reading 2	110	72.3	74.5	8102	10	65
Reading 3	120	72.8	74.3	11750	6	60

TRAFFIC NOISE ANALYSIS

In analyzing the preceding traffic noise table, emphasis will be given to the two main noise criteria of a traffic noise impact as set forth in 23 CFR 772. A comparison will be made between the predicted traffic noise levels and the noise abatement criteria (NAC) to determine if a traffic noise impact exists due to the noise levels approaching or exceeding the criteria. Also, a comparison will be made between existing noise levels and future predicted traffic noise levels to determine if a noise impact occurs due to a substantial increase in noise. Nebraska Department of Roads generally considers that an impact occurs and abatement measures will be considered for receptors if:

1. The predicted design year noise levels approach or exceed the noise abatement criteria (NAC). NDOR has established that a noise level of one decibel less than the NAC in the FHWA Noise Standards constitutes "approaching" the NAC.

2. Predicted future noise levels are 15 dBA or more above existing levels. For purposes of interpreting the FHWA noise standards, this would be considered "substantially exceeding" existing levels.

PREDICTED NOISE LEVELS

The primary tasks for this noise study were to identify receivers that approached or exceeded the NAC and to determine the relative change in traffic noise levels anticipated due to the changed alignment. Noise levels were predicted for existing conditions (2014), 2040 no-build conditions, and 2040 build conditions. TNM was applied using the appropriate roadway, traffic and sensitive receiver information to predict the noise levels for each of the scenarios.
The predicted noise levels are summarized as follows:

- There were no instances of build condition noise levels substantially exceeding no-build condition noise levels in the study area (increase of 15 dBA over the existing levels).
- There were 87 of 248 receivers that experienced noise levels approaching or exceeding the NAC for the future build scenario.
- 2040 no-build noise levels increased between one (1) and two (2) dBA when compared to existing levels (2014).
- The predicted 2040 no-build noise levels increase between one (1) and two (2) dBA when compared to the future build scenario. Some noise level decreased by one (1) dBA on the west side of the I-80 between 126th St. and Q St. This is a result of the added eastbound lane drawing some traffic further away from the receptors on the west side.

NOISE ABATEMENT MEASURES

According to NDOR Policy, noise abatement measures should be considered where predicted traffic noise levels approach or exceed the noise abatement criteria, or when the predicted traffic noise levels substantially exceed the existing noise levels. In this case, abatement measures were considered because future build noise levels along the construction approach or exceed the NAC.

When considering abatement measures, judgments are made in each area, weighing the costs and effects of each abatement measure against the amount of benefit. Even if a noise abatement measure is feasible, it might not be reasonable or warranted for a particular area.

Buffer Zones: The purpose of a buffer zone is to provide enough distance between the noise source and any future developments in order to minimize future noise impacts. Buying substantial right-of-way in undeveloped areas adds that extra distance to allow for more noise reduction. For this specific project there is already a substantial buffer zone between the roadway and receptors.

Alteration of Horizontal and Vertical Alignment: This noise abatement measure can be incorporated into a project to reduce traffic noise impacts where the receptors are typically on one side of the project or where the elevation is relatively constant. Since sound intensity decreases with distance, shifting of the centerline away from the receptors may reduce noise levels. For this specific project altering the vertical or horizontal alignment is not practical for noise abatement.

Traffic Management Measures: These measures must be examined and evaluated as alternative noise abatement measures for reducing or eliminating any noise impact. The prohibition of certain vehicle types, mainly trucks, is an alternative noise abatement measure. Another measure might be to limit trucks to only daylight hours. However, these measures are not reasonable for this project because this is a highway facility, one of whose purposes is to move traffic including trucks, easily through the area.

Earth Berm: An earth berm can be incorporated into a project to help minimize traffic noise levels. The earth berm can be placed between the impacted receivers and the roadway in areas where a structural noise barrier would not be a reasonable option. This type of abatement measure is not only effective for reducing noise levels but can be aesthetically pleasing as well. For this project an earth berm would not be practical for noise abatement on any impacted sites as the setbacks and existing varied terrain does not lend itself to the feasibility of building a berm. In additional berm heights would.

Noise Barriers: Barriers are considered as a possible means of noise abatement where traffic noise from a new or widened roadway is predicted to impact adjacent uses. Barriers are considered effective when blocking the "line of sight" between the noise source and the noise receiver. A noise barrier must be continuous and have substantial length and height to be effective. When possible, noise barriers should be designed to extend approximately four times as far in each direction as the distance from the sensitive receiver to the barrier. Noise barriers are not proposed unless a single barrier at a feasible location can effectively reduce traffic noise at several impacted receptors for a reasonable cost.

FEASIBILITY

Acoustic Feasibility - A noise abatement device is considered acoustically feasible when 60% of the front row impacted receivers located directly behind the noise wall (noise wall must extend entirely across impacted receptor's property line) achieves a 5 dB(A) noise reduction. Other significant noise levels within the project area will not prevent acoustic feasibility as long as TNM demonstrates that a wall achieves the 5 dB(A) noise reduction from traffic alone.

Engineering Feasibility - The determination that it is possible to design and construct a noise abatement measure. The following items will be considered in determining Engineering feasibility:

1. Can the barrier be designed to fit the topography and still be maintained?
2. Can the exposed height of a noise barrier be built at 30 feet high or less?
3. Safety concerns:
   - A. Can the barrier be located beyond the clear recovery zone?
   - B. Can the barrier be incorporated into existing or designed highway barriers?

If any of the feasibility items 1-3 are checked "NO", the site will be considered not feasible. If the site is considered not feasible, a reasonable analysis will not be done.

REASONABLENESS

There are three reasonableness factors or "tests" that must be met for a noise abatement measure to be considered reasonable.

1. **Noise reduction design goal of 7 dB(A)**. A minimum of 40% of benefited front row receptors directly behind the noise wall (noise wall must extend entirely across benefited receptor's property line) must achieve a 7 dB(A) noise reduction in order for noise abatement to be reasonable.
2. **Cost Effectiveness.** Noise abatement must be cost effective. NDOR defines cost effectiveness as dollars per benefited receiver. Based on construction price estimates for 2010, NDOR will use $44/ft^2 (re-evaluated every 5 years) for barrier costs. If the cost per benefited receiver is greater than $40,000, the site will be considered not reasonable. The cost of utility relocation, drainage control, and ROW acquisition will be factored into the cost effectiveness of noise abatement. Aesthetic treatment is not factored into cost.
3. **Viewpoints of the property owners and residents of the benefited receptors**. When it is determined that it would be feasible to provide noise abatement for a site, and a preliminary determination has been made that abatement would be reasonable, a noise abatement public informational meeting will be held as part of the process for a final determination of whether abatement would be reasonable. (See NDOR Noise Analysis and Abatement Policy for more detailed information of the voting process.)

A noise barrier was evaluated for one noise sensitive area adjacent to the project. The following section documents the noise barrier evaluation for the impacted site.

ASSESSMENT BY LOCATION

There are several areas along the project corridor where predicted noise levels would approach or exceed the Noise Abatement for the year 2040. A total of 7 barriers were analyzed for feasibility and reasonableness. An aerial map of the receptors and barrier locations are located in attachment 1. The following are the results of the barrier analysis:

Barrier 1: The first location includes the analysis of residential receptors E73 through E81 located on the east side of I-80 on South 115th Circle. There are 3 impacted receivers at this location (E79, E80, and E81). A noise wall with a total length of 1200 feet and an average height of 30 feet could not meet the feasibility requirement of a 5 dBA reduction to 60% of the front row impacted receptors (≥66 dBA). A noise wall at this location would not be considered feasible.

Barrier 2: The second location includes the analysis of residential receptors E82 through E105 located on the east side of I-80 along South 116th St. There are 19 impacted receptors at this location (E86, E87, and E89-E105). A noise wall with a total length of 1350 feet and an average height of 30 feet met the feasibly requirement of a 5 dBA reduction to 60% of the front row impacted receptors. However, the barrier could not meet the reasonableness requirement of a 7 dBA noise reduction to 40% of front row benefited receptors (benefited = 5dBA reduction). A noise barrier at this location is not considered reasonable.

Barrier 3: The third location includes the analysis of residential receptors E98 through E105 located on the east side of I-80 along South 116th St. All 8 receivers are impacted. Although these receptors were included in the analysis of barrier 2, a smaller separate wall was analyzed to attenuate noise from Q street noise. A noise wall with a total length of 1200 feet and an average height of 30 feet could not meet the feasibility requirement of a 5 dBA reduction to 60% of the front row impacted receptors (≥66 dBA). A noise wall at this location would not be feasible.

Barrier 4: The fourth location includes the analysis of residential receptors G1 through G24 located on the west side of I-80 adjacent to the golf course. There are 15 impacted receptors at this location (G3-G17). A noise wall with a total length of 3060 feet and an average height of 27 feet met both the feasibility and reasonableness noise reduction requirements. The cost of the noise wall would be $3,635,280. There are a total of 15 benefited receptors. The cost/benefited receptor is $242,352, well above the cost/benefited limit of 40,000/benefited receptor. A noise barrier at this location is not cost effective and therefore not considered reasonable.

Barrier 5: The fifth location includes the analysis of residential receptors G25 through G39 located on the west side of I-80 adjacent to the golf course. There are 8 impacted receivers at this location. A noise wall with a total length of 1600 feet and an average height of 18 feet met both the feasibility and reasonableness noise reduction requirements. The cost of the noise barrier would be $1,267,200. There are a total of 15 benefited receptors. The cost/benefited receptor is $211,200, well above the cost/benefited limit of 40,000/benefited receptor. A noise barrier at this location is not cost effective and therefore not considered reasonable.

Barrier 6: The sixth location includes the analysis of residential receptors A1 through A49 located on the north side of I-80 east of the I-680 interchange. There are 25 impacted receivers at this location. A noise wall with a total length of 2120 feet and an average height of 20 feet met both the feasibility and reasonableness noise reduction requirements. The cost of the noise barrier would be $1,865,600. There are a total of 19 benefited receptors. The cost/benefited receptor is $98,189, well above the cost/benefited limit of 40,000/benefited receptor. A noise barrier at this location is not cost effective and therefore not considered reasonable.

Barrier 7: The seventh location includes the analysis of residential receptors AC1 through AC8 and A50 through A77 located on the north side of I-80 east of the I-680 interchange. There are 25 impacted receivers at this location. A noise wall with a total length of 1068 feet and a height between 20 and 27 feet met both the feasibility and reasonableness noise reduction requirements. The cost of the noise barrier would be $1,103,080. There are a total of 19 benefited receptors. The cost/benefited receptor is $84,852, well above the cost/benefited limit of 40,000/benefited receptor. A noise barrier at this location is not cost effective and therefore not considered reasonable.

DETOUR NOISE

The project will utilize the existing alignment as a detour for any future build scenarios. Noise levels would remain the same as traffic numbers and flow will not be significantly changed.

CONSTRUCTION NOISE

The evaluation and control of construction noise must be considered as well as the traffic noise. The noise sensitive receptors that are located directly adjacent to this project are those that are of major concern in this study of construction noise. These same receptors were also of concern in the traffic noise study.

The following are some basic categories of mitigation measures for construction noise.

Design Considerations: This includes measures in the plans and specifications to minimize or eliminate adverse impacts. Because the existing noise sensitive receptors are on both sides of the roadway, nothing can be done to minimize or eliminate construction noise through changes in design.

Community Awareness: It is important for people to be made aware of the possible inconvenience and to know its approximate duration so they can plan their activities accordingly. It is the policy of the Nebraska Department of Roads that information concerning the upcoming project construction be submitted to all local news media.

Source Control: This involves reducing noise impacts from construction by controlling the noise emissions at their source. This can be accomplished by specifying proper muffler systems, either as a requirement in the plans and specifications on this project or through an established local noise ordinance requiring mufflers. Contractors generally maintain proper muffler systems on their equipment to ensure efficient operation and to minimize noise for the benefit of their own personnel as well as the adjacent receptors.

Site Control: Site control involves the specification of certain areas where extra precautions should be taken to minimize construction noise. One way to reduce construction noise impact at sensitive receptors is to operate stationary equipment, such as air compressors or generators, as far away from the sensitive receptors as possible. Another method might be placing a temporary noise barrier in front of the equipment. As a general rule, good coordination between the project engineer, the contractor, and the affected receptors is less confusing, less likely to increase the cost of the project, and is a more personal approach to work out ways to minimize construction noise impacts in the more noise-sensitive areas. No specific construction-noise, site-control specifications will be included in the plans.

Time and Activity Constraints: Limiting work hours on a construction site can be very beneficial during the hours of sleep or on Sundays and holidays. However, most construction activities do not occur at night and usually not on Sundays. Exceptions due to weather, schedule, and a time-related phase of construction work could occur. No specific constraints will be incorporated in the plans of this improvement. Enforcement of these constraints could be handled through a general city or county ordinance, either listing the exceptions or granting them on a case-by-case basis.

SUMMARY

The noise level table in attachment 2 of this report shows that 87 of 248 receptors analyzed have a noise impact in the 2040 build scenario due to noise levels approaching or exceeding the NAC. The 87 receivers were grouped into 7 noise barrier analysis sites based on location. Each site was assessed for feasibility and reasonability of a noise wall. Barriers 1 and 3 did not pass the feasibility requirement of a 5 dBA noise level reduction at 60% of front row impacted receptors. Barrier 2 passed the feasibly test but could not achieve a 7 dBA noise level reduction at 40% of front row benefited receptors. Barriers 4, 5, 6 and 7 passed both feasibility and reasonableness noise reduction requirements but were above 40,000/benefited receptor as required in item 2 of reasonableness. As a result of the barrier analysis, there are no noise barriers are that are feasible and reasonable within the project corridor.

In the event that any changes in the nature, design, or location of the project are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

REFERENCES

23 Code of Federal Regulations (CFR) Part 772 was used throughout the study.

Predicted noise levels were based upon the method presented in FHWA-RD-77-108 "FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL."

Nebraska Department of Roads "Noise Analysis and Abatement Policy," July, 2011.

The introductory section of this study was taken in part from "Guide on Evaluation and Attenuation of Traffic Noise" prepared by American Association of State Highway and Transportation Officials. It is included to familiarize the reader with some of the basic technical terminology and to discuss the guidelines and standards used in the development of the report.

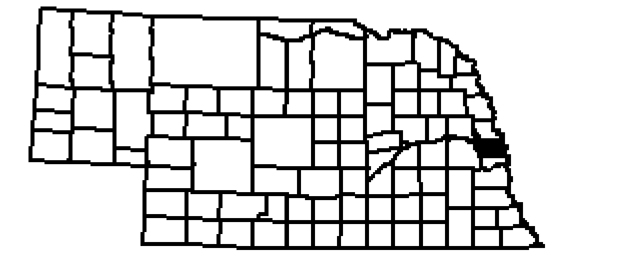
Methods for evaluation and control of construction noise were taken from the FHWA Special Report - 'Highway Construction Noise: Measurement, Prediction and Mitigation'.

Attachment 1

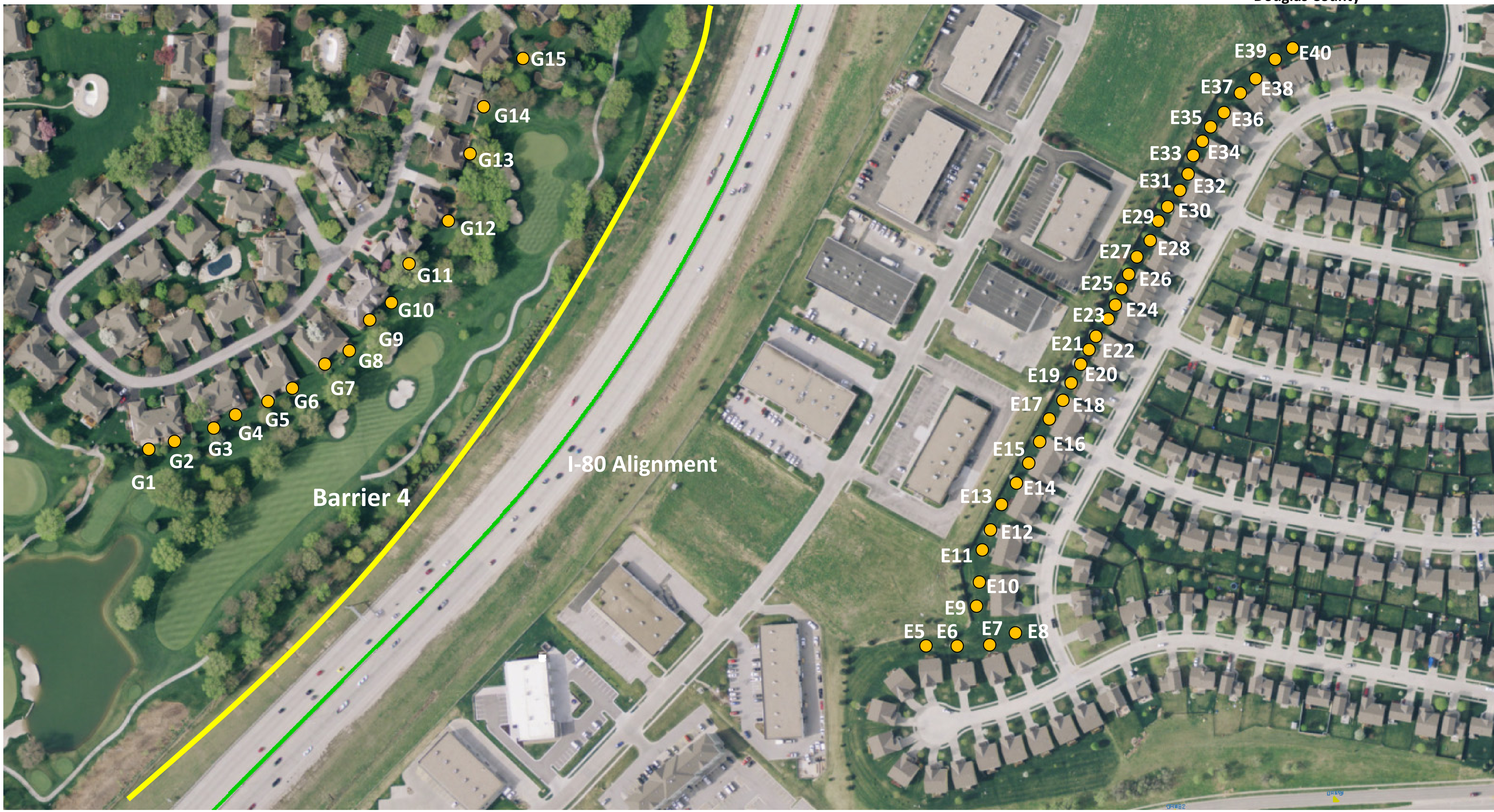
Receptor and Barrier Locations

Receptor Location Map

Additional I-80 eastbound, 126th St. to 96th - Omaha, NE
C.N. 22151, 80-9(1189)



Douglas County



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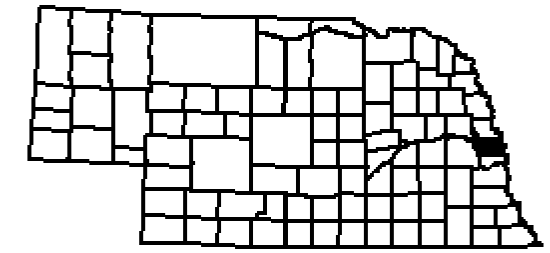

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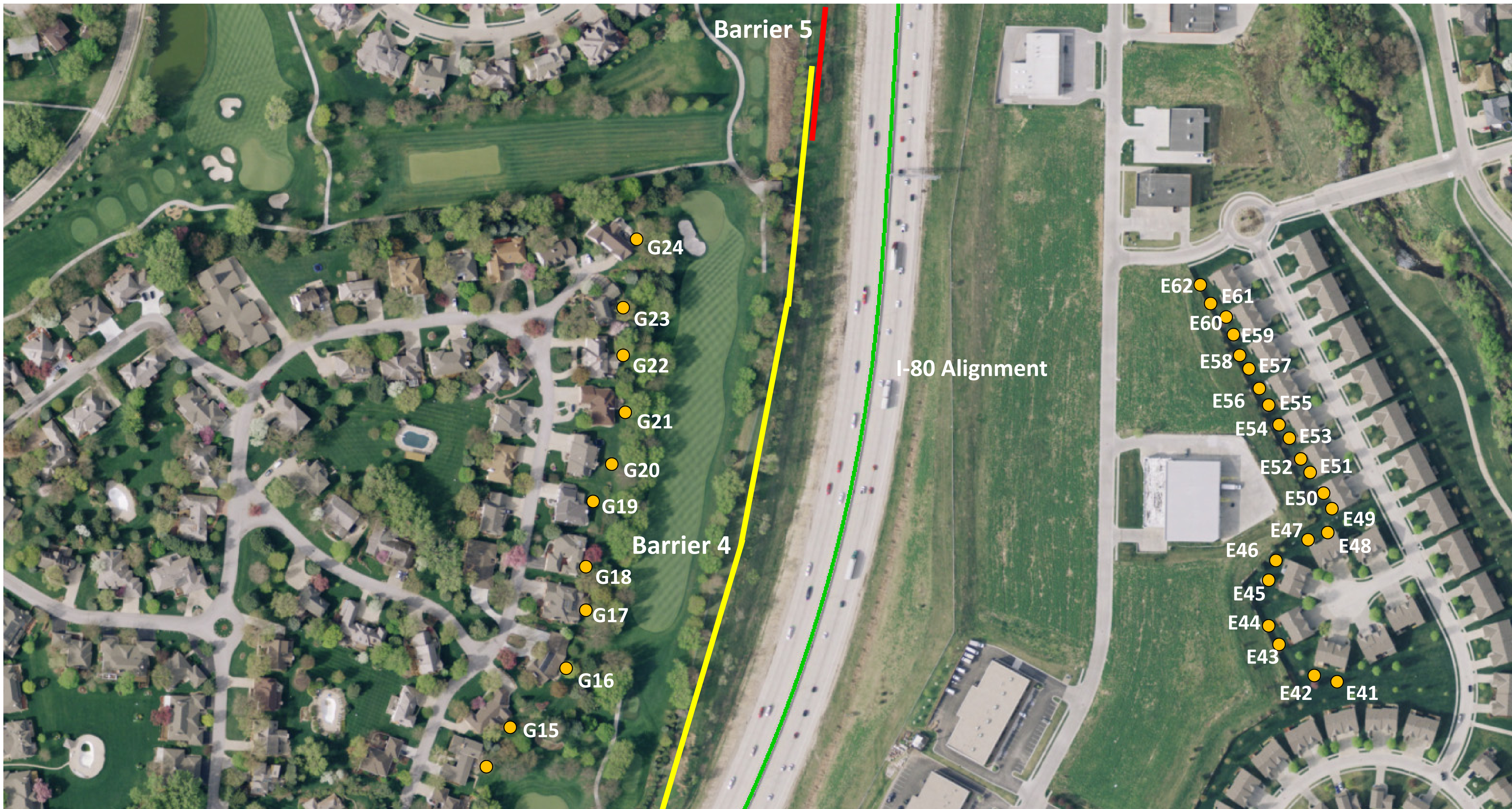

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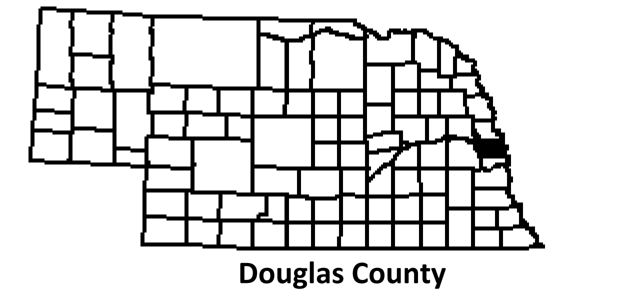

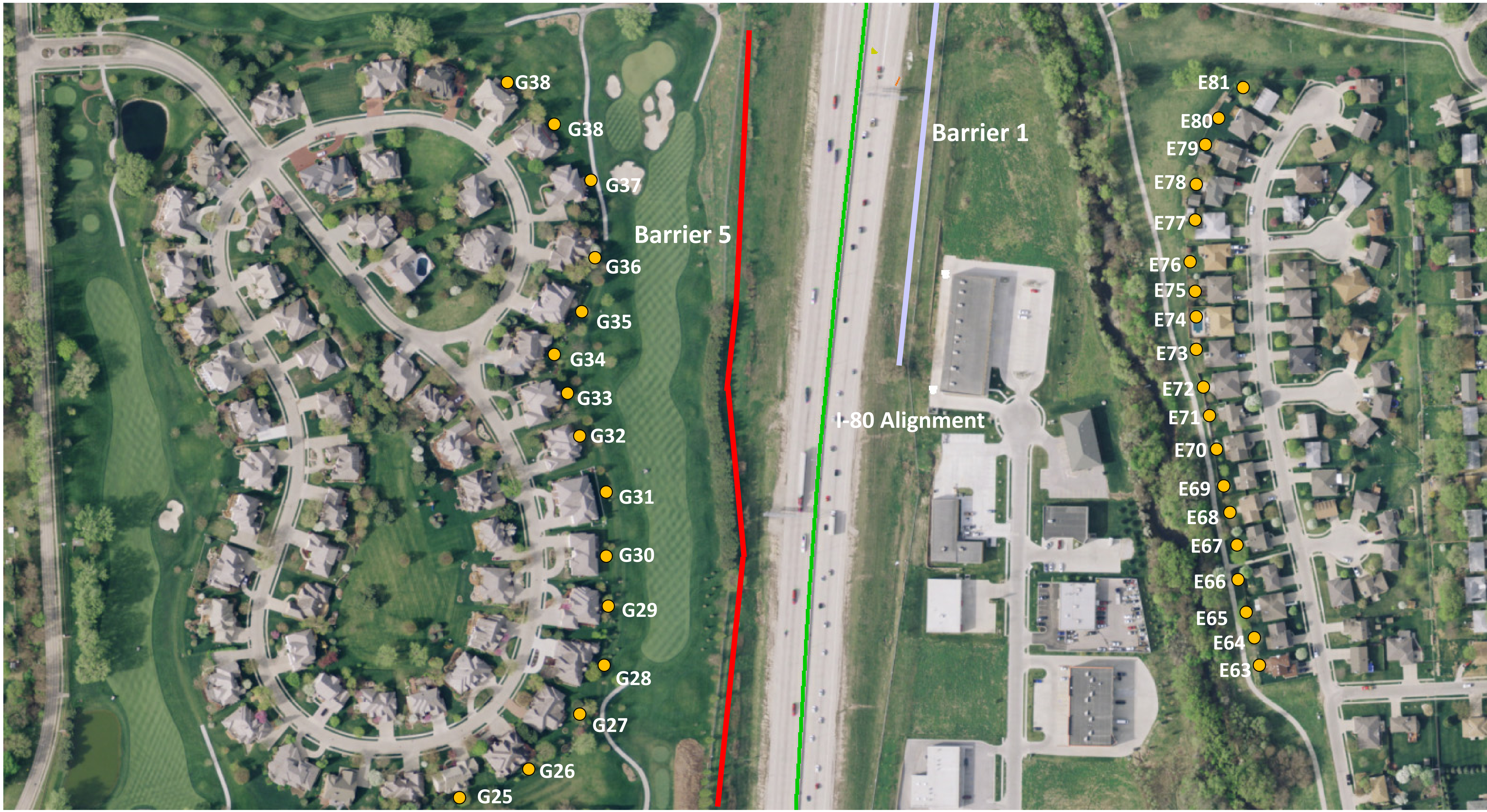

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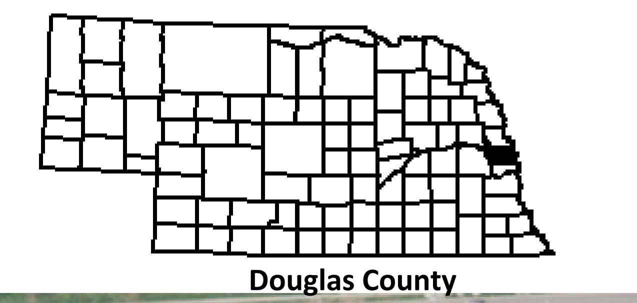

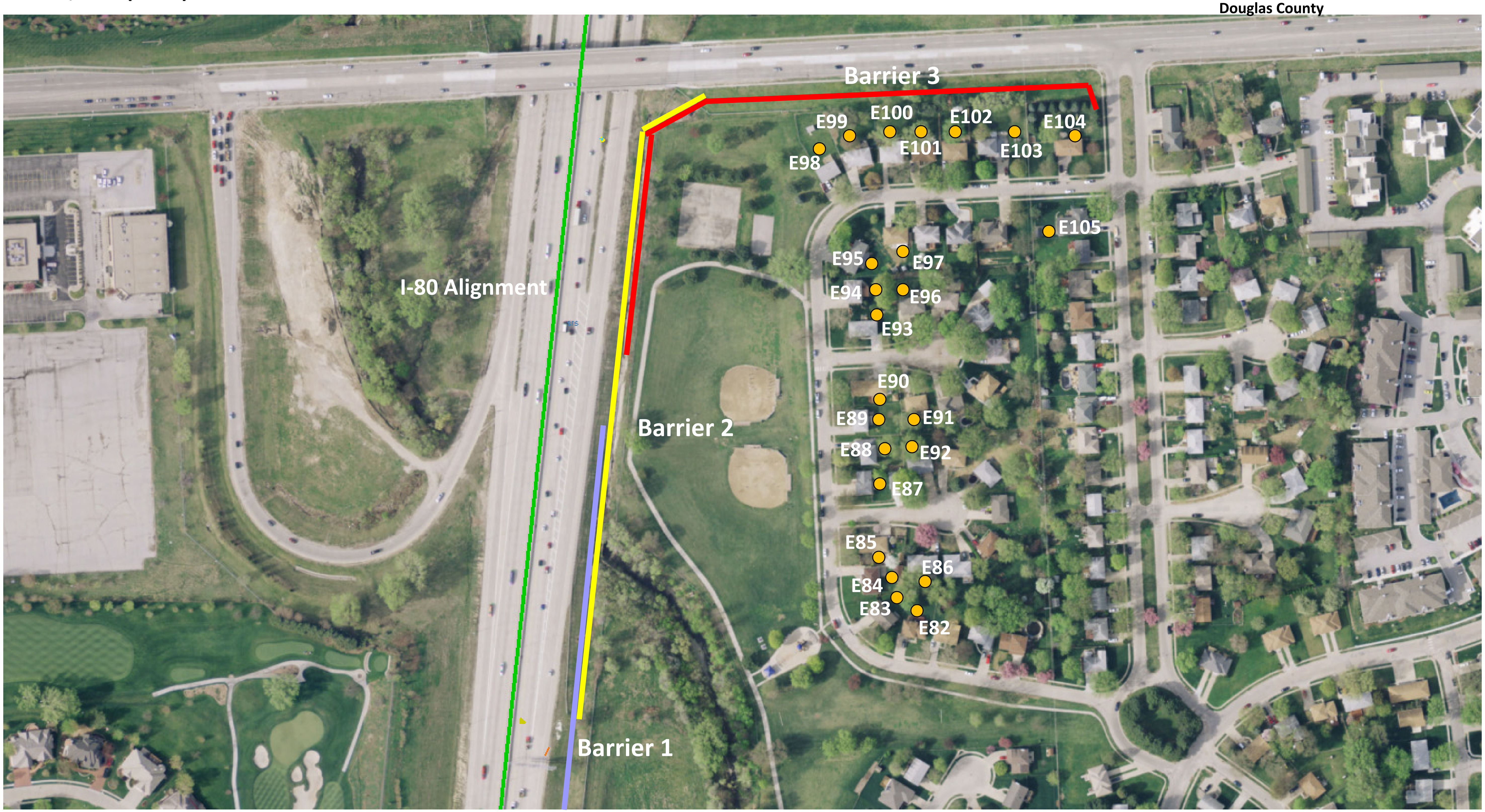

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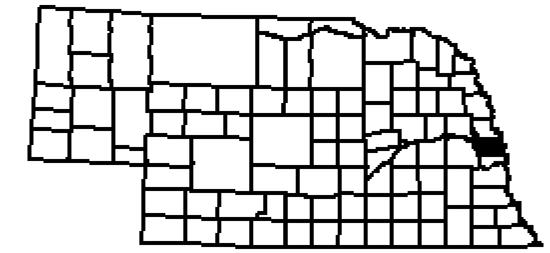

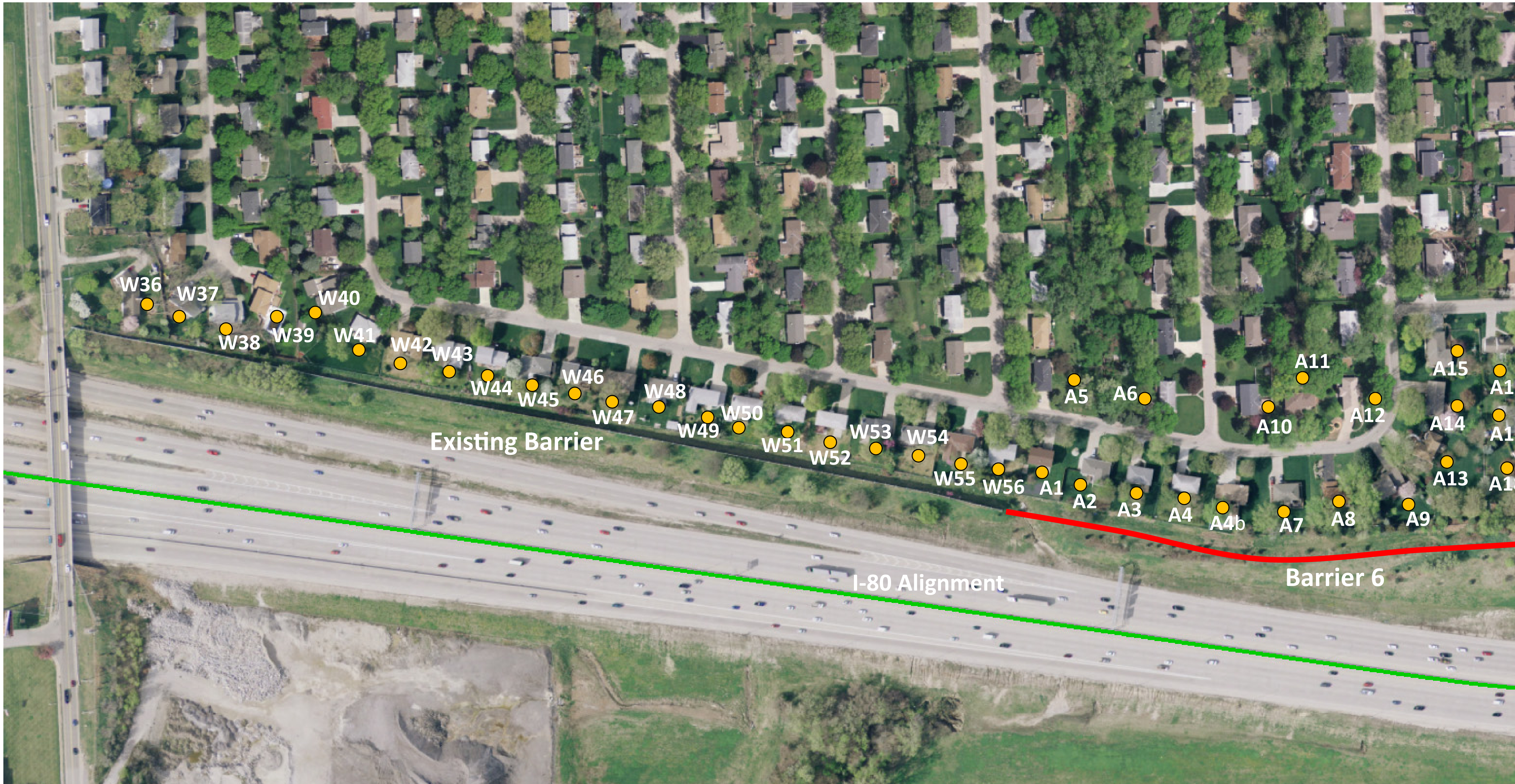

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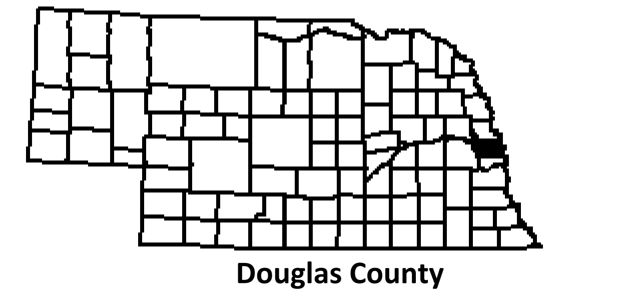

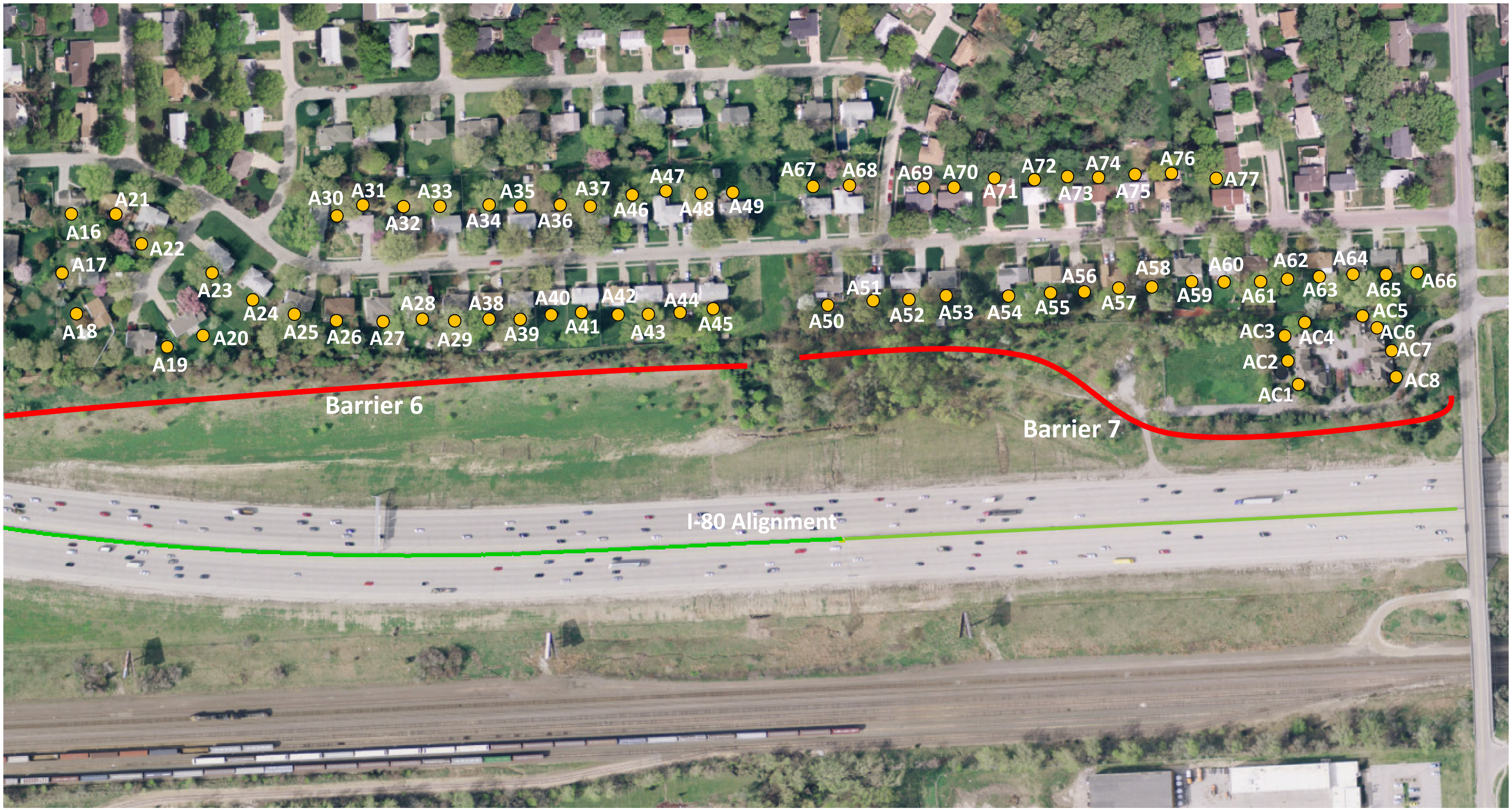

Attachment 2

Noise Level Table

Noise Level Table

Additional Eastbound Lane, 126th St. to 96th St.

Receiver ID	Exisiting Conditions	No-build Scenario	Build Scenario	Impacts (≥ 66 dBA)
E5	64	65	65	–
E6	63	65	65	–
E7	63	64	64	–
E8	63	64	64	–
E9	63	64	64	–
E10	63	64	64	–
E11	63	64	64	–
E12	63	64	64	–
E13	62	64	64	–
E14	62	64	63	–
E15	62	63	63	–
E16	61	63	63	–
E17	61	62	62	–
E18	60	62	62	–
E19	60	62	62	–
E20	59	61	61	–
E21	58	60	60	–
E22	58	60	60	–
E23	58	60	60	–
E24	59	60	60	–
E25	59	60	60	–
E26	59	60	60	–
E27	59	60	60	–
E28	58	60	60	–
E29	58	59	59	–
E30	57	59	59	–
E31	57	58	58	–
E32	57	58	58	–
E33	57	58	58	–
E34	56	57	57	–
E35	56	57	57	–
E36	56	57	57	–
E37	55	56	56	–
E38	55	56	56	–
E39	55	57	56	–
E40	55	56	56	–

Receiver ID	Exisiting Conditions	No-build Scenario	Build Scenario	Impacts (≥ 66 dBA)
E41	54	55	56	–
E42	54	56	56	–
E43	55	56	57	–
E44	55	56	57	–
E45	55	57	57	–
E46	56	57	57	–
E47	56	57	57	–
E48	56	57	57	–
E49	56	57	57	–
E50	56	57	57	–
E51	56	58	58	–
E52	56	58	58	–
E53	57	58	58	–
E54	57	58	58	–
E55	57	58	59	–
E56	57	59	59	–
E57	58	59	59	–
E58	58	59	59	–
E59	58	60	60	–
E60	58	60	60	–
E61	59	60	60	–
E62	59	60	60	–
E63	59	61	61	–
E64	60	62	61	–
E65	60	61	61	–
E66	60	62	62	–
E67	61	62	62	–
E68	61	62	62	–
E69	62	63	63	–
E70	61	63	63	–
E71	62	63	63	–
E72	62	63	63	–
E73	62	63	64	–
E74	63	64	64	–
E75	63	64	65	–
E76	64	65	65	–

Receiver ID	Exisiting Conditions	No-build Scenario	Build Scenario	Impacts (≥ 66 dBA)
E77	64	65	65	–
E78	64	65	65	–
E79	64	65	66	–
E80	65	66	66	impacted
E81	64	66	66	impacted
E82	63	65	65	–
E83	62	64	64	–
E84	62	63	64	–
E85	64	65	65	–
E86	64	65	66	impacted
E87	65	66	67	impacted
E88	64	65	65	–
E89	64	66	66	impacted
E90	65	66	66	impacted
E91	65	66	67	impacted
E92	66	67	67	impacted
E93	66	67	67	impacted
E94	65	66	66	impacted
E95	65	67	67	impacted
E96	66	67	68	impacted
E97	67	68	68	impacted
E98	69	70	71	impacted
E99	68	69	70	impacted
E100	68	69	69	impacted
E101	67	69	69	impacted
E102	67	68	68	impacted
E103	66	67	67	impacted
E104	66	67	67	impacted
E105	65	66	66	impacted
G1	63	65	65	–
G2	64	65	65	–
G3	64	66	66	impacted
G4	65	66	66	impacted
G5	65	67	66	impacted
G6	65	67	67	impacted
G7	66	68	68	impacted

Receiver ID	Exisiting Conditions	No-build Scenario	Build Scenario	Impacts (≥ 66 dBA)
G8	68	70	70	impacted
G9	69	70	70	impacted
G10	69	70	70	impacted
G11	69	71	70	impacted
G12	69	71	71	impacted
G13	68	70	69	impacted
G14	67	69	68	impacted
G15	67	68	68	impacted
G16	67	68	68	impacted
G17	65	66	66	impacted
G18	63	64	64	–
G19	61	63	62	–
G20	61	62	61	–
G21	60	62	61	–
G22	60	61	61	–
G23	60	61	61	–
G24	61	62	62	–
G25	61	62	62	–
G26	63	65	64	–
G27	67	68	67	impacted
G28	68	69	69	impacted
G29	69	71	70	impacted
G30	70	71	70	impacted
G31	68	69	69	impacted
G32	67	68	68	impacted
G33	66	67	67	impacted
G34	64	65	65	–
G35	64	66	66	impacted
G36	64	65	65	–
G37	64	65	65	–
G38	64	65	65	–
G39	64	65	65	–
W36	67	67	69	impacted
W37	62	62	63	–
W38	62	62	62	–
W39	61	61	62	–

Receiver ID	Exisiting Conditions	No-build Scenario	Build Scenario	Impacts (≥ 66 dBA)
W40	61	62	62	–
W41	62	62	63	–
W42	62	62	62	–
W43	63	63	64	–
W44	64	64	64	–
W45	64	64	64	–
W46	65	65	65	–
W47	65	65	66	impacted
W48	65	65	66	impacted
W49	65	65	66	impacted
W50	65	65	65	–
W51	66	66	66	impacted
W52	66	66	67	impacted
W53	67	67	67	impacted
W54	67	67	68	impacted
W55	65	65	65	–
W56	67	67	67	impacted
A1	67	67	67	impacted
A2	65	65	65	–
A3	66	66	66	impacted
A4	68	68	68	impacted
A4B	68	68	68	impacted
A5	62	62	61	–
A6	63	63	63	–
A7	70	70	71	impacted
A8	70	71	71	impacted
A9	68	68	68	impacted
A10	65	65	65	–
A11	66	66	66	impacted
A12	67	67	67	impacted
A13	65	65	64	–
A14	63	64	62	–
A15	62	62	60	–
A16	63	63	63	–
A17	65	65	65	–
A18	66	66	66	impacted

Receiver ID	Exisiting Conditions	No-build Scenario	Build Scenario	Impacts (≥ 66 dBA)
A19	74	74	74	impacted
A20	70	71	71	impacted
A21	63	63	63	–
A22	63	63	63	–
A23	62	62	62	–
A24	63	63	64	–
A25	66	66	66	impacted
A26	66	67	67	impacted
A27	66	66	66	impacted
A28	67	67	67	impacted
A29	67	67	67	impacted
A30	61	62	62	–
A31	63	64	64	–
A32	64	64	64	–
A33	64	65	65	–
A34	64	65	65	–
A35	65	65	65	–
A36	65	65	65	–
A37	65	65	65	–
A38	67	67	67	impacted
A39	67	67	67	impacted
A40	66	67	67	impacted
A41	68	68	68	impacted
A42	67	68	68	impacted
A43	68	69	68	impacted
A44	68	68	68	impacted
A45	67	67	67	impacted
A46	65	66	66	impacted
A47	65	65	65	–
A48	65	65	65	–
A49	64	64	64	–
A50	66	66	66	impacted
A51	65	66	66	impacted
A52	65	66	66	impacted
A53	65	65	65	–
A54	63	64	64	–

Receiver ID	Exisiting Conditions	No-build Scenario	Build Scenario	Impacts (≥ 66 dBA)
A55	62	63	63	–
A56	62	62	62	–
A57	61	62	62	–
A58	61	61	61	–
A59	61	62	62	–
A60	62	63	63	–
A61	63	63	63	–
A62	62	63	63	–
A63	63	64	64	–
A64	64	64	64	–
A65	64	64	65	impacted
A66	67	67	69	impacted
A67	63	64	64	–
A68	63	63	63	–
A69	61	62	62	–
A70	58	58	59	–
A71	54	54	55	–
A72	54	54	55	–
A73	53	54	55	–
A74	53	54	54	–
A75	54	54	55	–
A76	53	53	54	–
A77	54	54	56	–
AC1	70	70	70	impacted
AC2	66	67	67	impacted
AC3	65	66	66	–
AC4	60	60	60	–
AC5	57	57	58	–
AC6	66	66	66	–
AC7	67	67	67	–
AC8	71	72	72	–