I-270 Corridor Improvements Environmental Impact Statement – Traffic Noise Technical Report

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List of Abbreviations and Acronyms

CDOT	Colorado Department of Transportation
CFR	Code of Federal Regulations
dB	Decibels
dBA	A-weighted decibels
DRCOG	Denver Regional Council of Governments
EA	Environmental Assessment
EB	Eastbound
EIS	Environmental Impact Statement
EL	Express Lane
FAQ	Frequently Asked Question
FHWA	Federal Highway Administration
ft^2	Square Feet
GP	General-Purpose
Guidance	FHWA's Highway Traffic Noise: Analysis and Abatement Guidance
HCM	Highway Capacity Manual
I-270	Interstate 270
ID	Identification
Leq	One-Hour Equivalent Sound Level
LOS	Level of Service
mph	miles per hour
NAC	Noise Abatement Criteria
NAAG	Noise Analysis and Abatement Guidelines
NB	Northbound
NEPA	National Environmental Policy Act
OTIS	Online Transportation Information System
SB	Southbound
TNM	FHWA's Traffic Noise Model
WB	Westbound

1 Executive Summary

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This traffic noise technical report has been prepared in support of the Interstate 270 (I-270) Corridor Improvements Environmental Impact Statement (EIS) project. An overview of this project's traffic noise analysis and abatement evaluation is shown in Table 1.

Table 1 Project Overview

Project Location	This project is on I-270 and is located in Commerce City, unincorporated Adams County, and the City and County of Denver, Colorado (see Figure 1).
Type I Status Explanation	This project is Type I because it would include the widening of I-270 between I-25 and I-70, from two to three lanes, for a length of approximately 6.5 miles in each direction.
Reason for Reevaluation Analysis	Jacobs Engineering Group completed a draft Environmental Assessment (EA) in 2020. In 2023, the Colorado Department of Transportation (CDOT) concluded that a more detailed environmental review was needed and requested AtkinsRéalis to conduct an EIS.
Noise Level and Impact Overview	Existing condition (2023) modeled noise levels range from 51.2 to 76.7 A-weighted decibels (dBA) at 111 receivers[1], which represent 119 receptors. Design year (2050) modeled noise levels for the No Action Alternative range from 51.0 dBA to 77.4 dBA at 111 receivers, which represent 119 receptors. Design year (2050) modeled noise levels for the Build Alternative range from 52.9 dBA to 77.3 dBA (General Purpose [GP] Lane option) and 52.1 dBA to 77.3 dBA (Express Lane [EL] option) at 113 receivers, which represent 121 receptors. Two new proposed receivers, R-100 and R-101 will be located at a proposed I-270 multi-use trail underpass that will only be constructed under the Build Alternative. The Build Alternative is expected to impact the following receivers and receptors: 22 Activity Category B receivers/22 receptors for both GP and EL options. 16 Activity Category C receivers/16 receptors for both options. 0 Activity Category E receivers/0 receptors for both options.

[1] A receiver is a modeled point that represents one or more receptors. Receptor types are listed in Table 3, in the column titled "Activity Description." A receiver that represents more than one receptor must represent receptors of the same Activity Category.

Noise Abatement Considerations and Commitments Overview	Three noise barriers were evaluated, as shown on Figure 6 to Figure 9. One noise barrier was found to be feasible and reasonable and is recommended, as shown in Table 10 and Table 12.
Information for Local Officials	This project's Noise Study Zone includes land that is unpermitted and undeveloped (i.e., Activity Category G). Therefore, Part 772.17 of Title 23 of the Code of Federal Regulations (23 CFR 772.17) is applicable, and information needs to be provided to local officials, as described in Chapter 9.

2 Project Introduction

CDOT, in cooperation with the Federal Highway Administration (FHWA), is preparing an EIS to evaluate potential improvements to the I-270 corridor. The improvements, which are described in Table 2 and hereafter called the Build Alternatives, constitute a Type I project because a through-traffic lane will be added in each direction for approximately 6.5 miles on I-270 between I-25 and I-70. Two lane types are being evaluated in the Build Alternatives: a GP lane and an EL. Auxiliary lanes will also be added between interchanges to help accelerating and decelerating traffic. A 12-foot auxiliary lane would extend in both directions of I-270 for approximately 1.8 miles between the I-270/York Street and I-270/Vasquez Boulevard interchanges. FHWA and CDOT are the lead agencies for this National Environmental Policy Act (NEPA) process, which was initiated in 2020, initially anticipating an EA. Moving into 2023, CDOT determined a more detailed environmental review was needed and requested that an EIS be prepared.

Because the project is Type I and because there is at least one Activity Category A, B, C, D, and/or E receptor within the Noise Study Zone, a noise analysis is needed to determine if receptors will be impacted as a result of building the project. AtkinsRéalis, acting on behalf of CDOT, conducted a noise analysis for the project and prepared this report using the CDOT noise report template. Table 2 includes information about this project and provides context for this traffic noise analysis.

Table 2 Project Background

Project Location	Commerce City, unincorporated Adams County, and the City and County of Denver, Colorado (see Figure 1)
Affected Roadways	I-270 mainline. I-76 interchange ramps with I-270. York Street interchange. Vasquez Boulevard interchange. Quebec Street interchange. As part of the background conditions for the No Action and Build models, the following roadway changes are anticipated to occur outside of this project and were thus, modeled as if they were built prior to the Design Year (2050): I-270 and I-25 interchange reconstruction to include direct connect ELs. I-270 and I-70 interchange reconstruction to include direct connect ELs. The direct connect EL projects are not part of the I-270 Corridor Improvements project but are included in the Denver Regional Council of Governments (DRCOG) 2050 Travel Demand Model. Therefore, they are

	assumed to be implemented prior to 2050 as part of projects separate from this project.
Project Purpose	The purpose of the I-270 Corridor Improvements EIS Project is to implement transportation solutions that modernize the I-270 Corridor to accommodate future transportation demands.
Project Need	The project needs include the following: Traveler safety on the corridor. Travel time and reliability on the corridor. Transit on the corridor. Bicycle and pedestrian connectivity across I-270. Freight operations on the corridor.
Build Alternatives Descriptions	Two build alternatives were carried forward for detailed analysis in the EIS. These alternatives would include: Three General-Purpose (GP) Lanes Alternative Operation of a new lane as a GP lane for a total of three GP lanes in each direction between I-25 and I-70. Two GP Lanes and One Express Lane (EL) that Accommodates Transit Alternative Operation of a new lane as an EL resulting in two GP lanes and one EL that would also accommodate transit in each direction between I-25 and I-70. Both alternatives would include: **Mainline Improvements** Providing three general-purpose lanes in each direction Widening shoulders to meet current standards Restriping of the westbound I-270 to northbound I-25 off-ramp to provide dual-exit lane capacity Adding emergency turnouts and turnaround. Adding one continuous auxiliary lane in each direction between the I-76 and Vasquez Boulevard on-ramps and off-ramps **Interchange Improvements** Adding an eastbound collector ramp to consolidate incoming movements from the I-76 on-ramps Separating the westbound I-270 York Street and I-76 off-ramps Improving the Vasquez Boulevard interchange design with improved westbound on-ramp acceleration lanes and the eastbound off-ramp deceleration lanes Improving the Quebec Street interchange ramp acceleration and deceleration lengths **Bridge Improvements** Reconstructing bridges that are at, or will be reaching, the end of their useful life. Bridges carrying travel lanes on I-270 include widening to accommodate additional lanes Replacing the existing York Street bridge over I-270 to meet current bridge standards, accommodate an additional travel lane in each direction on York

	Street, include a 10-foot multi-use path and a 5-foot sidewalk, and enhance lighting
	Replacing the existing I-270 bridges over the South Platte River Trail to meet current bridge standards, accommodate this project's bicycle and pedestrian improvements on the South Platte River Trail, and enhance lighting
	Replacing the existing I-270 bridges over the Burlington Ditch to meet current bridge standards, accommodate future bicycle and pedestrian improvements, and enhance lighting
	Replacing the existing I-270 bridges over Brighton Boulevard to meet current bridge standards, accommodate this project's bicycle and pedestrian improvements on Brighton Boulevard and future bicycle and pedestrian improvements by others, and enhance lighting
	Replacing the existing I-270 bridges over East 60th Avenue and the BNSF crossing to meet current bridge standards, accommodate future bicycle and pedestrian improvements, and enhance lighting
	Replacing the existing I-270 bridges over East 56th Avenue to meet current bridge standards, accommodate this project's bicycle and pedestrian improvements, and enhance lighting
	Replacing the existing Vasquez Boulevard bridge over Sand Creek to meet current bridge standards and accommodate this project's bicycle and pedestrian improvements
	Bicycle and Pedestrian Improvements
	Improving the York Street I-270 ramp terminal intersections with crosswalks, curb ramps, and pedestrian indicators at the ramp terminal traffic signals
	Adding a new 5-foot sidewalk on the west side and reconstructing a 6-foot sidewalk on the east side of Brighton Boulevard under I-270
	Reconstructing East 56th Avenue under I-270 and adding an on-street bicycle lane, a 10-foot multi-use path, and 6-foot sidewalk connecting to existing sidewalks
	Improving the intersection at East 56th Avenue and South Sandcreek Drive to include curb ramps, crosswalks, and lighting that meet current standards
	Improving the intersection at East 56th Avenue and Eudora Street to include curb ramps, crosswalks, and lighting that meet current standards
	Adding attached sidewalks on the west side of South Sandcreek Drive. The new sidewalks would be 8 feet wide from Quebec Street to East 47th Avenue Drive and 6 feet wide from East 47th Avenue Drive to East 49th Avenue, with a pedestrian crosswalk across East 47th Avenue Drive connecting the two segments
	Improving wayfinding at key locations, guiding bicyclists and pedestrians to the nearest RTD bus stops, major road connections, or distances to the next trailhead to avoid out-of-direction travel
	Trail Improvements
	Reconfiguring the South Platte River Trail crossing under I-270 to improve bicycle and pedestrian visibility around tight curves and increase vertical clearance from the I-270 overpass
	Improving bicycle and pedestrian visibility on the Sand Creek Trail by straightening out tight curves, adding a center stripe, and enhancing lighting at the Vasquez Boulevard bridge over the Sand Creek Trail

	Adding a multi-use path with bicycle and pedestrian underpasses crossing under two free-flow interchange ramps on the east side of Vasquez Boulevard through the interchange with enhanced lighting Adding a multi-use path on the east and west sides of the Vasquez Boulevard bridge over Sand Creek, connecting users from the East 56th Avenue and Vasquez Boulevard intersection to a new connection to the Sand Creek Trail Adding a multi-use trail spur, connecting the proposed north-south Vasquez Boulevard multi-use trail to the East 56th Avenue and South Sandcreek Drive intersection Adding a multi-use path in the southeast corner of East 56th Avenue and South Sandcreek Drive Adding a 10-foot-wide bicycle and pedestrian overpass over I-270 and South Sandcreek Drive approximately halfway between East 56th Avenue and Quebec Street **Transit Improvements** Adding four new bus stops with connecting sidewalks and curb ramps on Quebec Street and South Sandcreek Drive near the I-270/Quebec Street interchange to improve access to RTD routes 88 and 37
No Action Alternative Description	The No Action Alternative would maintain the existing highway configuration of two GP lanes in each direction on I-270. Bridges and pavement would continue to be repaired, but underlying infrastructure deficiencies would remain. Separate from this project, the York Street interchange is planned to be replaced and was therefore, modeled as its future configuration for all Design Year scenarios. At the I-25 and I-70 interchanges with I-270, portions of the interchanges will be reconstructed to accommodate a planned direct connect EL from the existing I-25 and I-70 ELs. These improvements are anticipated to occur outside of this project prior to the Design Year and were thus, modeled as if they were built prior to the Design Year. These direct connect lanes would merge with the existing I-270 lanes shortly after the connection point in the No Action Alternative. Improvements within the No Action Alternative for the noise study zone include: Widening of York Street (also included as part of the Build Alternatives). Direct connect ELs to I-25 and I-70 (also included as part of the Build Alternatives).
Prior National Environmental Policy Act (NEPA) Approvals	This project follows prior efforts completed for: Draft I-270 Corridor Improvements Environmental Assessment (2022), prepared by Jacobs Engineering Group. Although the EA was not approved by CDOT, the draft noise analysis was used as a starting point for the existing conditions noise models.

3 Background

This noise analysis was done as required by 23 CFR 772 in accordance with CDOT's *Noise Analysis and Abatement Guidelines* (NAAG) (CDOT, 2020) and FHWA's *Highway Traffic Noise: Analysis and Abatement Guidance* (Guidance) (FHWA, 2011). The analysis determines whether 2050 traffic noise levels from the Build Alternatives will exceed applicable impact thresholds at properties (i.e., receptors) within the Build Alternatives Noise Study Zone (this zone is described in Section 4.1). Traffic noise abatement is evaluated for any such impacted receptors. The analysis was conducted based on roadway design files and traffic volumes provided from Felsburg Holt and Ullevig (performing the design work as part of the project team) and input into

FHWA's Traffic Noise Model (TNM) by AtkinsRéalis. The files were received by the noise analyst in June 2024 and were based on a 15 percent level of design.

This noise analysis included the following tasks:

- Conducting field measurements of existing condition sound levels (see Section 4.3).
- Validating an existing condition noise model using field measurement results (see Section 4.4).
- Modeling existing condition noise levels for existing roadways (see Chapter 5).
- Modeling design year Build Alternatives (GP and EL Build Alternatives) and a design year No Action Alternative noise levels for design roadways (see Chapter 5).
- Evaluating noise abatement (see Chapter 6).
- Modeling noise contour lines for unpermitted, undeveloped land (see Chapter 9).

3.1 Characteristics of Noise

Fundamental information about noise, such as terminology, how sound travels, and sound intensity, is included in Appendix B of The CDOT NAAG. It is incorporated by reference to supplement this report.

3.2 Applicable Regulations, Guidelines, and Tools

The following regulations, guidelines, and tools were used to complete this noise analysis:

- **23 CFR Part 772 (Procedures for Abatement of Highway Traffic Noise and Construction Noise)** (23 CFR §772, 2010): Federal highway noise standard that must be followed in analyzing and abating highway traffic noise. This regulation required states to adopt state-specific guidelines, which included adopting specific parameters such as the noise reduction design goal.
- **CDOT NAAG** (CDOT, 2020): Fulfilled Federal requirement to adopt state-specific guidelines. Provides Colorado's procedural and technical requirements for analyzing highway project traffic noise and evaluating noise abatement.
- **FHWA Guidance** (FHWA, 2011): Provides FHWA guidance for applying 23 CFR Part 772 in the analysis and abatement of highway traffic noise.
- **Noise Measurement Handbook** (FHWA, 2018): Includes procedures for measuring highway noise.
- **FHWA Traffic Noise Model (TNM) Version 2.5** (FHWA, February 2004): Model used to determine existing condition and design year noise levels.

3.3 CDOT Noise Abatement Criteria and Land Use Activity Categories

A traffic noise impact occurs if either of the following conditions is met:

- Predicted design year traffic noise level approaches (i.e., equals) or exceeds CDOT's Noise Abatement Criteria (NAC) at any receptor.
- Predicted design year traffic noise level substantially exceeds the existing condition highway traffic noise level at any receptor. "Substantial" is defined as a noise increase of 10 dB or more between the existing condition and design year noise levels.

Table 3 shows CDOT's NAC. The CDOT NAAG requires that the one-hour equivalent sound level (Leq) be used in the analysis.

The NAC for Activity Category D applies to interior areas of frequent human use. All other NACs apply to exterior areas of frequent human use. Examples of exterior areas include yards for

Activity Category B, park activity areas for Activity Category C, and exterior restaurant dining areas for Activity Category E.

Undeveloped lands for which development has been permitted before the Date of Public Knowledge must be treated as though the development has already been constructed. CDOT considers a proposed development to be permitted when a formal building permit has been issued to the developer.

Table 3 CDOT Noise Abatement Criteria

Activity Category	Activity L_{eq} (dBA)[1, 2]	Evaluation Location	Activity Description
A	56.0	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]	66.0	Exterior	Residential
C[3]	66.0	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, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	51.0	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]	71.0	Exterior	Hotels, motels, time-share resorts[4], offices, restaurants/bars, and other developed lands, properties, or activities not included in A–D or F.
F	Not Applicable	Not Applicable	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, ship yards, utilities (water resources, water treatment, electrical), warehousing, malls[5], stores[5], shops[5], and Government managed land.[4,6]
G	Not Applicable	Not Applicable	Undeveloped lands that are not permitted.

1 Table 1 of 23 CFR 772 allows state highways agencies to use either Leq(h) or L10(h) on a project, but not both. CDOT uses Leq(h), which is an Hourly A-weighted sound level in dBA.
2 NACs are for impact determination only. They are not design standards for noise abatement measures.
3 Includes undeveloped lands permitted for this activity category.
4 This activity description is not listed in Table 1 of 23 CFR 772.
5 This activity description is not listed in Table 1 of 23 CFR 772 but is in FHWA's FAQ D7.
6 Areas of frequent human use within the Government (Federal, State, and County) managed land will be treated as the appropriate land use (e.g., a campground would be Activity Category C, as described in Section 3.5.4 of the CDOT NAAG).

4 Noise Analysis Methods

The noise analysis includes identifying the Noise Study Zone, identifying the land uses within the Noise Study Zone, taking noise measurements within the Noise Study Zone, validating the

existing condition noise model, and inputting several parameters into the noise model. These steps are described in this chapter.

4.1 Noise Study Zone Identification

The Noise Study Zone for this project extends 500 feet in all directions from the proposed edge of travel lanes of freeways or expressways and 300 feet for other types of roads, as shown on Figure 2.

4.2 Land Use Identification

Table 4 identifies the land use categories, receivers, and receptors included in the noise analysis. Figure 2 identifies land uses in the Noise Study Zone.

Table 4 Land Use Considerations

Receiver Activity Category Summary (see Table 9 and Table 10)	Receivers with the following Activity Categories were modeled in the existing condition and design year scenarios: Activity Category B: 93 receivers representing 93 receptors. Activity Category C: Existing and No Action: 17 receivers representing 21 receptors; Build Alternatives: 19 receivers representing 23 receptors. Activity Category E: 1 receiver representing 5 receptors.
Other Considerations	The Noise Study Zone does not contain any permitted receptors that have not been built. The Noise Study Zone contains Activity Category F activities and Activity Category G land. Activity Category F activities and Activity Category G land are not considered noise sensitive, so receivers are not required for these locations. However, contour lines must be provided for Activity Category G lands. These are shown on Figure 7. The Noise Study Zone has 10 Section 4(f) sites with frequent human use, which were modeled as receivers 5–6, 45–53, 67, 100–102, 110–113. The Noise Study Zone has multiple historic properties protected by Section 106, which may require noise information for Section 106 purposes, which may differ from highway traffic noise requirements. A number of noise-sensitive receptors were evaluated for historical significance under the Section 106 process; none of these receptors were determined eligible for listing in the National Register of Historic Places. None of the sites found to be eligible for listing in the National Register of Historic Places were identified as noise-sensitive receptors. Refer to the I-270 Historic Technical Report for additional information.

4.3 Field Noise Measurements

Field noise measurements performed for this analysis are summarized in Tables 5 and 6. Noise measurements were performed at different locations, as shown on Figure 2, to acquire data for validation of the existing condition model. Associated traffic counts and speeds are listed in Table 21 of Appendix A. Field noise measurement data sheets are in Appendix A.

Table 5 Field Noise Measurement Summary

Measurement Location ID	Location	Date	Start Time (a.m. or p.m.)	Stop Time (a.m. or p.m.)	Length (minutes)
Site 1	East 53rd Way and North Sandcreek Drive	4/23/24	10:45 a.m.	11:00 a.m.	15
Site 2	East 68th Avenue, West of York Street (empty lot behind a noise wall)	4/23/24	11:17 a.m.	11:32 a.m.	15
Site 3	Dahlia Trailhead Parking Lot	4/23/24	11:54 a.m.	12:09 am	15

Table 6 Field Noise Measurement Details

Number of Field Measurement Locations	3
Field Measurement Locations	Traffic noise field measurement locations are shown on Figure 2. These measurement locations were selected because they appropriately cover the project limits and represent locations on or around noise-sensitive receptors.
Basis for Measurement Length	Traffic on the road was high-volume and a steady-state reading was obtained after 15 minutes.
Method to Estimate Traffic Volume During Field Measurement	Traffic was counted simultaneously on roadways that contributed to noise using pen and paper.
Method to Estimate Traffic Speed	Drove test vehicle through traffic within 30 minutes of noise measurement; traffic was still representative of when measurements were taken.
Weather Conditions Summary (See Appendix A)	Field measurements were made during weather conditions acceptable according to FHWA guidance (FHWA, 2018). Weather conditions, including wind speed, were monitored during the measurements.
Sound Level Meter Used	Larson Davis 812 SLM; Type I
Sound Level Meter Laboratory Calibration Date	November 2023
Field Calibrator Used	Larson Davis CAL 200 Calibrations traceable to the United States National Institute of Standards and Technology were performed in the field before each set of measurements and checked in the field after each set of measurements.
Height of Noise Measurement Above Grade	5 feet

4.4 *Validation of Existing Condition Model*

Existing condition noise levels were measured in the field, as described in Section 4.3, and compared to computer noise level predictions that were based on traffic data measured in the

field. This was done to verify the accuracy of the existing condition noise model. This process is called validation of the existing condition noise model. The model may be described as being an initial existing condition model during the validation process, because it is not required to include any receivers except those representing the noise measurement locations.

If predicted and measured noise levels are within ±3.0 dB of each other, the existing condition noise model is within the accepted level of accuracy and is considered to have been validated. Measured noise levels, corresponding modeled noise levels, and the differences between the two are presented in Table 7.

Table 7 Existing Condition Model Validation Summary

Noise Measurement Location ID[1]	Location (see Figure 2)	Measured Leq (dBA)	Modeled Leq (dBA)	Difference (dB)
Site 1	East 53rd Way and North Sandcreek Drive	70.8	69.1	-1.7
Site 2	East 68th Avenue, West of York Street (empty lot behind a noise wall)	61.4	60.0	-1.4
Site 3	Dahlia Trailhead Parking Lot	67.3	67.1	-0.2

[1]Noise measurements at Sites 1 and 2 were conducted at new locations, while Site 3 remained consistent with the location used for the 2022 measurements.

Differences between measured and predicted levels are all within the allowable ±3.0 dB tolerance. Therefore, the existing condition noise model is considered to be validated for this project.

The Draft EA Noise analysis completed in 2022 collected nine noise readings along the I-270 corridor as part of the model validation. The existing conditions model from the Draft EA was used for this EIS effort, and the three measurements summarized in Table 7 were collected to ensure conditions had not changed since the previous model was built. The new readings collected for the EIS confirmed that the previous model was still accurate and could therefore, be used for the EIS analysis. The readings were collected in neighborhoods and areas where noise impacts may occur.

4.5 TNM Model Inputs

The noise model software being used on this project was TNM Version 2.5. It was used to analyze existing condition (2023) and design year (2050) noise levels. As part of the analysis, the model calculated noise levels at receivers that are in the Noise Study Zone. Each receiver represented one or more receptors. Modeling results represent predicted traffic conditions during worst-hour noise periods. Table 8 describes model inputs and methods.

Table 8 TNM Model Inputs and Methods

Noise Sensitive Receptors	Noise sensitive receptors are defined according to Table 3. Receivers (modeled points) have been selected to represent these receptors within the Noise Study Zone.
Receivers	Receivers are listed in Tables 9 and 10 and shown on Figures 4–14.

Modeled Roadways	The following roadways were modeled: I-25 NB. I-25 on- and off-ramps. I-270 EB and WB. I-270 on- and off-ramps. I-76 EB and WB. I-76 on- and off-ramps. York Street. York Street on- and off ramps. US 6/Vasquez NB and southbound (SB). US 6/Vasquez on- and off-ramps. East 56th Avenue. South Sandcreek Drive. Quebec Street NB and SB. Quebec Street on- and off-ramps. I-70 on- and off-ramps. I-25 direct connect ramps to the I-25 ELs (No Action and Build Alternative scenarios, not in existing condition). I-70 direct connect ramps to the I-70 ELs (No Action and Build Alternative scenarios, not in existing condition). For the Build Alternatives, the analysis included roads that would be changed or newly built by the project or would be important local traffic noise sources.
Differences in How Roadways Were Modeled Between Alternatives	The existing and No Action conditions modeled I-270 as two GP lanes in each direction of travel. The No Action model included the planned direct connect lanes from the I-25 ELs and the I-70 ELs on either end of I-270. There were two Build Alternative conditions: the GP and EL Build Alternatives. The former modeled I-270 as three GP lanes, and the latter modeled I-270 as two GP lanes with one Express Lane in each direction of travel. For the three GP lane option, the loudest hourly traffic volumes were evenly distributed across all lanes of traffic. For the two GP lanes with one Express Lane option, the loudest hour GP traffic volumes were equally distributed amongst the outside GP lanes, and the express lane traffic was loaded into the inside express lane. Auxiliary lanes were modeled for both Build Alternative conditions. Solely in the Build Alternatives, the I-270 WB off-ramp to Vasquez Boulevard SB (loop ramp) and the I-270 EB off-ramp to Vasquez boulevard NB (loop ramp) were removed. The Vasquez Boulevard NB to I-270 EB on-ramp was modeled for the Build Alternatives, but not under the existing and No Action conditions.
TNM Objects and Elevations	The following objects were modeled: shoulders modeled as roadways without traffic, terrain lines, buildings modeled as noise barriers, median and shoulder jersey barriers modeled as noise barriers, existing and proposed retaining walls modeled as noise barriers, and pavement and water features modeled as ground zones. These are shown on Figures 3–8 (GP) and Figures 9–14 (EL).

Existing Noise Barriers	The Noise Study Zone includes one existing noise barrier (CDOT Noise Barrier ID N270A000161RRA). The existing noise barrier is 845 feet in length and 15 feet in height. The barrier was constructed in 2001 for a residential development. The primary construction material is block, and the surface texture is reflective. It is located along the ROW for I-270 EB west of York Street and north of 68th Avenue adjacent to the residential development. The project would not impact the existing noise barrier.
Modeled Pavement Type	Average
Default Ground Type	Lawn
Traffic Data (See Appendix B)	Roadway coordinates generated from CAD. Existing conditions was based on survey data and Build Alternative conditions were based on the proposed roadway design. Traffic volumes are from: Calibrated TransCAD PM Peak model outputs developed by Felsburg Holt and Ullevig (2023) were used as a starting point to determine peak volumes, then volumes were reduced to reflect the loudest hour, where needed. Loudest hour volumes were calculated using Highway Capacity Manual (HCM) methodology, using inputs, such as segment speed limits, truck percentages, and roadway geometry, to determine a level of service (LOS) C/D threshold. Calibrated TransCAD PM Peak model outputs developed by Felsburg Holt and Ullevig (2050) were used as a starting point to determine peak volumes, then volumes were reduced to reflect the loudest hour, where needed. Loudest hour volumes were calculated using HCM methodology, based on segment speed limits, truck percentages, and roadway geometry, to determine a LOS C/D threshold. Volumes used in the model were based on the loudest hour volume (either PM peak hour or LOS C/D threshold) for each highway segment, road, or ramp. Traffic was then split equally between lanes. Directional splits were not utilized because during the loudest hour; volumes could be free-flowing equally in both directions. Vehicle mixes are from: CDOT Online Transportation Information System (OTIS) data for available roadways (2023 and 2050). Loudest hour was calculated based on HCM methodology to determine the period when traffic volumes are highest, while vehicles are free-flowing.

5 TNM Results

Modeled noise levels for the existing condition and design year scenarios are shown in Tables 9 and 10. This data was used to identify which, if any, receptors would be impacted as a result of the Build Alternatives.

Table 9 Modeled Noise Levels Not Considering Potential New Abatement for GP Build Alternative

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	GP Build Alternative (2050) L_{eq} (dBA)	GP Build Alternative Change from Existing (dB)	GP Build Alternative Causes Impact?
R-1	Restaurant – Mr. Egg	E/71	5	63.9	64.8	64.5	+0.6	No
R-2	Residence at 940 East 73rd Avenue	B/66	1	60.1	60.3	61.2	+1.1	No
R-3	Residence at 950 East 73rd Avenue	B/66	1	61.2	61.4	62.7	+1.5	No
R-4	Residence at 1310 East 73rd Avenue	B/66	1	57.6	56.9	58.6	+1.0	No
R-5	Trail crossing along Clear Creek Trail	C/66	1	69.8	70.7	71.7	+1.9	**Yes**
R-6	Trail crossing along Clear Creek Trail	C/66	1	72.0	71.4	73.2	+1.2	**Yes**
R-7	Residence at 6881 Race Street	B/66	1	64.0	63.1	65.9	+1.9	No
R-8	Residence at 6851 Race Street	B/66	1	55.7	55.2	57.2	+1.5	No
R-9	Residence at 6841 Race Street	B/66	1	53.9	53.6	55.1	+1.2	No
R-10	Residence at 2031 East 68th Avenue	B/66	1	54.0	54.1	55.1	+1.1	No
R-11	Residence at 6880 Race Street	B/66	1	59.1	58.3	60.9	+1.8	No
R-12	Residence at 6850 Race Street	B/66	1	58.4	58.3	59.9	+1.5	No
R-13	Residence at 6830 Race Street	B/66	1	57.3	57.0	58.9	+1.6	No
R-14	Residence at 2041 East 68th Avenue	B/66	1	51.8	51.8	53.0	+1.2	No
R-15	Residence at 2060 East 68th Place	B/66	1	55.2	54.8	56.5	+1.3	No
R-16	Residence at 2061 East 68th Avenue	B/66	1	51.9	51.9	53.3	+1.4	No
R-17	Residence at 2080 East 68th Place	B/66	1	56.5	56.0	58.0	+1.5	No

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	GP Build Alternative (2050) L_{eq} (dBA)	GP Build Alternative Change from Existing (dB)	GP Build Alternative Causes Impact?
R-18	Residence at 2081 East 68th Avenue	B/66	1	51.2	51	52.7	+1.5	No
R-19	Residence at 2070 East 68th Avenue	B/66	1	52.0	51.9	53.8	+1.8	No
R-20	Residence at 2101 East 68th Avenue	B/66	1	54.9	54.1	56.5	+1.6	No
R-21	Residence at 2100 East 68th Avenue	B/66	1	52.7	52.6	54.6	+1.9	No
R-22	Residence at 2141 East 68th Avenue	B/66	1	57.1	56.4	58.9	+1.8	No
R-23	Residence at 2220 East 68th Avenue	B/66	1	54.9	54.7	57.3	+2.4	No
R-24	Residence at 2161 East 68th Avenue	B/66	1	58.8	58.5	61.7	+2.9	No
R-25	Residence at 2240 East 68th Avenue	B/66	1	56.2	55.9	58.8	+2.6	No
R-26	Residence at 6875 Columbine Street	B/66	1	69.1	70.9	71.2	+2.1	**Yes**
R-27	Residence at 6875 Columbine Street	B/66	1	59.8	60.3	61.0	+1.2	No
R-28	Residence at 6875 Columbine Street	B/66	1	60.7	61.3	62.0	+1.3	No
R-29	Residence at 6875 Columbine Street	B/66	1	54.7	54.9	56.1	+1.4	No
R-30	Residence at 6875 Columbine Street	B/66	1	56.9	56.7	57.9	+1.0	No
R-31	Residence at 2521 East 68th Place	B/66	1	57.0	57.1	58.4	+1.4	No
R-32	Residence at 2521 East 68th Place	B/66	1	58.5	58.8	60.7	+2.2	No
R-33	Residence at 6830 Columbine Street	B/66	1	61.7	61.6	64.8	+3.1	No
R-34	Residence at 6822 Columbine Street	B/66	1	66.1	65.8	70.7	+4.6	**Yes**
R-35	Residence at 2561 East 68th Place	B/66	1	56.4	56.4	58.6	+2.2	No
R-36	Residence at 6840 York Street	B/66	1	56.7	56.7	59.4	+2.7	No
R-37	Residence at 6824 Columbine Street	B/66	1	60.3	60.1	63.9	+3.6	No
R-38	Residence at 6820 York Street	B/66	1	61.6	61.3	65.4	+3.8	No

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	GP Build Alternative (2050) L_{eq} (dBA)	GP Build Alternative Change from Existing (dB)	GP Build Alternative Causes Impact?
R-39	Residence at 6861 Elizabeth Street	B/66	1	53.8	53.6	55.4	+1.6	No
R-40	Residence at 2510 East 68th Place	B/66	1	52.9	52.7	57.1	+4.2	No
R-41	Residence at 6780 York Street	B/66	1	62.3	61.3	66.6	+4.3	**Yes**
R-42	Residence at 6702 York Street	B/66	1	68.3	67.8	70.6	+2.3	**Yes**
R-43	Residence at 6700 York Street	B/66	1	65.6	65.3	68.9	+3.3	**Yes**
R-44	Residence at 6690 York Street	B/66	1	63.3	63.0	67.3	+4.0	**Yes**
R-45	Trail crossing along South Platte River Greenway Trail	C/66	1	67.9	67.3	71.0	+3.1	**Yes**
R-46	Trail crossing along South Platte River Greenway Trail	C/66	1	68.3	68.5	71.7	+3.4	**Yes**
R-47	Trailhead at Sand Creek Greenway (Spur at O'Brian Canal)	C/66	1	68.1	67.9	70.4	+2.3	**Yes**
R-48	Trail pavilion at Sand Creek Greenway	C/66	1	65.3	66.3	68.4	+3.1	**Yes**
R-49	Sand Creek Greenway Trail crossing under Vasquez (west)	C/66	1	68.2	66.5	66.2	-2.0	**Yes**
R-50	Sand Creek Greenway Trail crossing under Vasquez (east)	C/66	1	65.6	65.5	65.5	-0.1	No
R-51	Trail crossing at East 56th Avenue	C/66	1	68.5	69.0	69.3	+0.8	**Yes**
R-52	Trailhead at Sand Creek Greenway	C/66	1	67.1	68.1	67.9	+0.8	**Yes**
R-53	Trail Pavilion at Sand Creek Greenway	C/66	1	68.8	69.3	69.9	+1.1	**Yes**
R-54	Residence at 5471 Krameria Street	B/66	1	56.9	57.7	59.7	+2.8	No
R-55	Residence at 5431 Krameria Street	B/66	1	59.8	61.0	61.0	+1.2	No
R-56	Residence at 5460 Krameria Street	B/66	1	53.2	54.1	55.1	+1.9	No

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	GP Build Alternative (2050) L_{eq} (dBA)	GP Build Alternative Change from Existing (dB)	GP Build Alternative Causes Impact?
R-57	Residence at 5450 Krameria Street	B/66	1	56.9	57.9	58.1	+1.2	No
R-58	Residence at 5410 Krameria Street	B/66	1	66.7	67.6	67.6	+0.9	**Yes**
R-59	Residence at 5451 Leyden Street	B/66	1	54.7	55.7	57.6	+2.9	No
R-60	Residence at 5443 Leyden Street	B/66	1	54.7	55.9	57.5	+2.8	No
R-61	Residence at 5435 Leyden Street	B/66	1	56.0	56.9	58.5	+2.5	No
R-62	Residence at 5411 Leyden Street	B/66	1	60.8	61.9	61.8	+1.0	No
R-63	Residence at 5401 Leyden Street	B/66	1	65.0	65.7	66.3	+1.3	**Yes**
R-64	Residence at 6318 East 54th Avenue	B/66	1	68.1	68.8	69.4	+1.3	**Yes**
R-65	Residence at 5450 Leyden Street	B/66	1	53.1	53.9	55.9	+2.8	No
R-66	Residence at 5440 Leyden Street	B/66	1	54.4	55.3	57.1	+2.7	No
R-67	Leyden Park – Recreational at 5430 Leyden Street	C/66	5	52.0	52.3	54.2	+2.2	No
R-68	Residence at 5420 Leyden Street	B/66	1	55.9	56.5	57.0	+1.1	No
R-69	Residence at 5410 Leyden Street	B/66	1	57.6	58.3	58.6	+1.0	No
R-70	Residence at 5400 Leyden Street	B/66	1	60.2	60.8	61.8	+1.6	No
R-71	Residence at 6320 East 54th Avenue	B/66	1	67.8	68.3	69.2	+1.4	**Yes**
R-72	Residence at 6330 East 54th Avenue	B/66	1	67.6	68.3	69.0	+1.4	**Yes**
R-73	Residence at 5441 Locust Street	B/66	1	52.0	53.1	55.2	+3.2	No
R-74	Residence at 5431 Locust Street	B/66	1	51.8	52.9	55	+3.2	No
R-75	Residence at 5421 Locust Street	B/66	1	53.0	54.0	55.8	+2.8	No
R-76	Residence at 5411 Locust Street	B/66	1	55.1	56.4	58.1	+3.0	No
R-77	Residence at 5401 Locust Street	B/66	1	59.3	59.8	61.2	+1.9	No

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	GP Build Alternative (2050) L_{eq} (dBA)	GP Build Alternative Change from Existing (dB)	GP Build Alternative Causes Impact?
R-78	Residence at 5420 Locust Street	B/66	1	54.2	54.8	57.0	+2.8	No
R-79	Residence at 5412 Locust Street	B/66	1	55.1	55.4	57.6	+2.5	No
R-80	Residence at 5400 Locust Street	B/66	1	57.6	58.4	59.5	+1.9	No
R-81	Residence at 6415 East 53rd Way	B/66	1	65.6	66.2	67.2	+1.6	**Yes**
R-82	Residence at 6411 East 53rd Way	B/66	1	66.5	67.2	68.0	+1.5	**Yes**
R-83	Residence at 5421 Monaco Street	B/66	1	53.3	54.2	56.0	+2.7	No
R-84	Residence at 5401 Monaco Street	B/66	1	55.4	56.2	57.5	+2.1	No
R-85	Residence at 6481 East 53rd Way	B/66	1	62.9	63.5	65.0	+2.1	No
R-86	Residence at 6470 East 53rd Way	B/66	1	68.2	69.1	70.2	+2.0	**Yes**
R-87	Residence at 5406 Monaco Street	B/66	1	54.9	56.0	57.6	+2.7	No
R-88	Residence at 5400 Monaco Street	B/66	1	56.1	56.8	58.9	+2.8	No
R-89	Residence at 5370 Monaco Street	B/66	1	59.6	59.6	62.1	+2.5	No
R-90	Residence at 5360 Magnolia Street	B/66	1	61.5	62.1	64	+2.5	No
R-91	Residence at 5401 Magnolia Street	B/66	1	54.6	54.9	56.4	+1.8	No
R-92	Residence at 5390 Magnolia Street	B/66	1	54.8	55.8	57.6	+2.8	No
R-93	Residence at 5380 Magnolia Street	B/66	1	56.0	56.9	58.4	+2.4	No
R-94	Residence at 5350 Magnolia Street	B/66	1	59.7	60.4	62.1	+2.4	No
R-95	Residence at 5366 Magnolia Street	B/66	1	64.1	65.1	67.3	+3.2	**Yes**
R-96	Residence at 5360 Magnolia Street	B/66	1	67.5	68.8	70.5	+3.0	**Yes**
R-97	Residence at 5371 Niagara Street	B/66	1	53.5	53.6	55.2	+1.7	No
R-98	Residence at 5351 Niagara Street	B/66	1	53.7	54.4	55.6	+1.9	No

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	GP Build Alternative (2050) L_{eq} (dBA)	GP Build Alternative Change from Existing (dB)	GP Build Alternative Causes Impact?
R-99	Residence at 5331 Niagara Street	B/66	1	54.1	54.3	55.9	+1.8	No
R-100*	North I-270 Multi-use Trail Underpass	C/66	1	73.1	73.4	74.9	+1.8	**Yes**
R-101*	South I-270 Multi-use Trail Underpass	C/66	1	64.9	65.8	66.5	+1.6	**Yes**
R-102	Trail pavilion at Wetland Loop	C/66	1	61.4	62.2	64.3	+2.9	No
R-103	Residence at 6800 East 52nd Place	B/66	1	69.4	70.4	71.9	+2.5	**Yes**
R-104	Residence at 6820 East 52nd Place	B/66	1	69.7	70.5	72.0	+2.3	**Yes**
R-105	Residence at 6830 East 52nd Place	B/66	1	69.3	69.7	71.7	+2.4	**Yes**
R-106	Residence at 6860 East 52nd Place	B/66	1	68.4	68.7	70.9	+2.5	**Yes**
R-107	Residence at 5251 Oneida Street	B/66	1	69.0	69.2	70.6	+1.6	**Yes**
R-108	Residence at 6870 East 52nd Place	B/66	1	58.4	59.1	61.0	+2.6	No
R-109	Residence at 5250 Oneida Street	B/66	1	65.9	66.0	68.8	+2.9	**Yes**
R-110	Trail crossing along Sand Creek Greenway Trail	C/66	1	74.4	74.7	74.7	+0.3	**Yes**
R-111	Trail crossing along Sand Creek Greenway Trail	C/66	1	76.7	77.4	77.3	+0.6	**Yes**
R-112	Trail crossing along Sand Creek Greenway Trail	C/66	1	67.9	68.0	68.2	+0.3	**Yes**
R-113	Trail crossing along Sand Creek Greenway Trail	C/66	1	67.5	68.2	67.7	+0.2	**Yes**

* Receptor only present for Build Alternative condition; Existing noise levels included for comparison only.

Table 10 Modeled Noise Levels Not Considering Potential New Abatement for EL Build Alternative

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	EL Build Alternative (2050) L_{eq} (dBA)	EL Build Alternative Change from Existing (dB)	EL Build Alternative Causes Impact?
R-1	Restaurant – Mr. Egg	E/71	5	63.9	64.8	64.4	+0.5	No
R-2	Residence at 940 East 73rd Avenue	B/66	1	60.1	60.3	60.8	+0.7	No
R-3	Residence at 950 East 73rd Avenue	B/66	1	61.2	61.4	62.5	+1.3	No
R-4	Residence at 1310 East 73rd Avenue	B/66	1	57.6	56.9	58.5	+0.9	No
R-5	Trail crossing along Clear Creek Trail	C/66	1	69.8	70.7	69.7	-0.1	**Yes**
R-6	Trail crossing along Clear Creek Trail	C/66	1	72.0	71.4	72.3	+0.3	**Yes**
R-7	Residence at 6881 Race Street	B/66	1	64.0	63.1	65.2	+1.1	No
R-8	Residence at 6851 Race Street	B/66	1	55.7	55.2	57.1	+1.2	No
R-9	Residence at 6841 Race Street	B/66	1	53.9	53.6	54.9	+0.9	No
R-10	Residence at 2031 East 68th Avenue	B/66	1	54.0	54.1	55.0	+0.8	No
R-11	Residence at 6880 Race Street	B/66	1	59.1	58.3	61.4	+1.3	No
R-12	Residence at 6850 Race Street	B/66	1	58.4	58.3	59.5	+0.7	No
R-13	Residence at 6830 Race Street	B/66	1	57.3	57.0	58.4	+0.9	No
R-14	Residence at 2041 East 68th Avenue	B/66	1	51.8	51.8	53.0	+1.0	No
R-15	Residence at 2060 East 68th Place	B/66	1	55.2	54.8	56.7	+1.0	No
R-16	Residence at 2061 East 68th Avenue	B/66	1	51.9	51.9	53.2	+1.0	No
R-17	Residence at 2080 East 68th Place	B/66	1	56.5	56.0	58.1	+1.0	No
R-18	Residence at 2081 East 68th Avenue	B/66	1	51.2	51.0	52.5	+0.9	No
R-19	Residence at 2070 East 68th Avenue	B/66	1	52.0	51.9	53.2	+1.2	No
R-20	Residence at 2101 East 68th Avenue	B/66	1	54.9	54.1	56.9	+1.2	No

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	EL Build Alternative (2050) L_{eq} (dBA)	EL Build Alternative Change from Existing (dB)	EL Build Alternative Causes Impact?
R-21	Residence at 2100 East 68th Avenue	B/66	1	52.7	52.6	54.2	+1.2	No
R-22	Residence at 2141 East 68th Avenue	B/66	1	57.1	56.4	59.3	+1.5	No
R-23	Residence at 2220 East 68th Avenue	B/66	1	54.9	54.7	56.9	+1.8	No
R-24	Residence at 2161 East 68th Avenue	B/66	1	58.8	58.5	61.8	+2.5	No
R-25	Residence at 2240 East 68th Avenue	B/66	1	56.2	55.9	58.8	+2.3	No
R-26	Residence at 6875 Columbine Street	B/66	1	69.1	70.9	71.3	+2.2	**Yes**
R-27	Residence at 6875 Columbine Street	B/66	1	59.8	60.3	61.1	+1.3	No
R-28	Residence at 6875 Columbine Street	B/66	1	60.7	61.3	62.2	+1.5	No
R-29	Residence at 6875 Columbine Street	B/66	1	54.7	54.9	56.1	+1.4	No
R-30	Residence at 6875 Columbine Street	B/66	1	56.9	56.7	57.9	+1.0	No
R-31	Residence at 2521 East 68th Place	B/66	1	57.0	57.1	58.3	+1.3	No
R-32	Residence at 2521 East 68th Place	B/66	1	58.5	58.8	60.5	+2.0	No
R-33	Residence at 6830 Columbine Street	B/66	1	61.7	61.6	65.0	+3.3	No
R-34	Residence at 6822 Columbine Street	B/66	1	66.1	65.8	70.8	+4.7	**Yes**
R-35	Residence at 2561 East 68th Place	B/66	1	56.4	56.4	58.8	+2.4	No
R-36	Residence at 6840 York Street	B/66	1	56.7	56.7	59.5	+2.8	No
R-37	Residence at 6824 Columbine Street	B/66	1	60.3	60.1	63.9	+3.6	No
R-38	Residence at 6820 York Street	B/66	1	61.6	61.3	65.6	+4.0	No
R-39	Residence at 6861 Elizabeth Street	B/66	1	53.8	53.6	55.5	+1.7	No
R-40	Residence at 2510 East 68th Place	B/66	1	52.9	52.7	55.8	+2.9	No
R-41	Residence at 6780 York Street	B/66	1	62.3	61.3	66.6	+4.3	**Yes**

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	EL Build Alternative (2050) L_{eq} (dBA)	EL Build Alternative Change from Existing (dB)	EL Build Alternative Causes Impact?
R-42	Residence at 6702 York Street	B/66	1	68.3	67.8	69.5	+1.2	**Yes**
R-43	Residence at 6700 York Street	B/66	1	65.6	65.3	68.0	+2.4	**Yes**
R-44	Residence at 6690 York Street	B/66	1	63.3	63.0	66.7	+3.4	**Yes**
R-45	Trail crossing along South Platte River Greenway Trail	C/66	1	67.9	67.3	71	+3.1	**Yes**
R-46	Trail crossing along South Platte River Greenway Trail	C/66	1	68.3	68.5	71.5	+3.2	**Yes**
R-47	Trailhead at Sand Creek Greenway (Spur at O'Brian Canal)	C/66	1	68.1	67.9	70.7	+2.6	**Yes**
R-48	Trail pavilion at Sand Creek Greenway	C/66	1	65.3	66.3	68	+2.7	**Yes**
R-49	Sand Creek Greenway Trail crossing under Vasquez (west)	C/66	1	68.2	66.5	66.2	-2.0	**Yes**
R-50	Sand Creek Greenway Trail crossing under Vasquez (east)	C/66	1	65.6	65.5	65.5	-0.1	No
R-51	Trail crossing at East 56th Avenue	C/66	1	68.5	69.0	69.3	+0.8	**Yes**
R-52	Trailhead at Sand Creek Greenway	C/66	1	67.1	68.1	67.9	+0.8	**Yes**
R-53	Trail Pavilion at Sand Creek Greenway	C/66	1	68.8	69.3	69.9	+1.1	**Yes**
R-54	Residence at 5471 Krameria Street	B/66	1	56.9	57.7	59.7	+2.8	No
R-55	Residence at 5431 Krameria Street	B/66	1	59.8	61.0	61.0	+1.2	No
R-56	Residence at 5460 Krameria Street	B/66	1	53.2	54.1	55.1	+1.9	No
R-57	Residence at 5450 Krameria Street	B/66	1	56.9	57.9	58.1	+1.2	No
R-58	Residence at 5410 Krameria Street	B/66	1	66.7	67.6	67.6	+0.9	**Yes**
R-59	Residence at 5451 Leyden Street	B/66	1	54.7	55.7	57.6	+2.9	No

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	EL Build Alternative (2050) L_{eq} (dBA)	EL Build Alternative Change from Existing (dB)	EL Build Alternative Causes Impact?
R-60	Residence at 5443 Leyden Street	B/66	1	54.7	55.9	57.5	+2.8	No
R-61	Residence at 5435 Leyden Street	B/66	1	56.0	56.9	58.5	+2.5	No
R-62	Residence at 5411 Leyden Street	B/66	1	60.8	61.9	61.8	+1.0	No
R-63	Residence at 5401 Leyden Street	B/66	1	65.0	65.7	66.3	+1.3	**Yes**
R-64	Residence at 6318 East 54th Avenue	B/66	1	68.1	68.8	69.4	+1.3	**Yes**
R-65	Residence at 5450 Leyden Street	B/66	1	53.1	53.9	55.9	+2.8	No
R-66	Residence at 5440 Leyden Street	B/66	1	54.4	55.3	57.1	+2.7	No
R-67	Leyden Park - Recreational at 5430 Leyden Street	C/66	5	52.0	52.3	54.2	+2.2	No
R-68	Residence at 5420 Leyden Street	B/66	1	55.9	56.5	57.0	+1.1	No
R-69	Residence at 5410 Leyden Street	B/66	1	57.6	58.3	58.6	+1.0	No
R-70	Residence at 5400 Leyden Street	B/66	1	60.2	60.8	61.8	+1.6	No
R-71	Residence at 6320 East 54th Avenue	B/66	1	67.8	68.3	69.2	+1.4	**Yes**
R-72	Residence at 6330 East 54th Avenue	B/66	1	67.6	68.3	69.0	+1.4	**Yes**
R-73	Residence at 5441 Locust Street	B/66	1	52.0	53.1	55.2	+3.2	No
R-74	Residence at 5431 Locust Street	B/66	1	51.8	52.9	55	+3.2	No
R-75	Residence at 5421 Locust Street	B/66	1	53.0	54.0	55.8	+2.8	No
R-76	Residence at 5411 Locust Street	B/66	1	55.1	56.4	58.1	+3.0	No
R-77	Residence at 5401 Locust Street	B/66	1	59.3	59.8	61.2	+1.9	No
R-78	Residence at 5420 Locust Street	B/66	1	54.2	54.8	57.0	+2.8	No
R-79	Residence at 5412 Locust Street	B/66	1	55.1	55.4	57.6	+2.5	No
R-80	Residence at 5400 Locust Street	B/66	1	57.6	58.4	59.5	+1.9	No

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	EL Build Alternative (2050) L_{eq} (dBA)	EL Build Alternative Change from Existing (dB)	EL Build Alternative Causes Impact?
R-81	Residence at 6415 East 53rd Way	B/66	1	65.6	66.2	67.2	+1.6	**Yes**
R-82	Residence at 6411 East 53rd Way	B/66	1	66.5	67.2	68.0	+1.5	**Yes**
R-83	Residence at 5421 Monaco Street	B/66	1	53.3	54.2	56.0	+2.7	No
R-84	Residence at 5401 Monaco Street	B/66	1	55.4	56.2	57.5	+2.1	No
R-85	Residence at 6481 East 53rd Way	B/66	1	62.9	63.5	65.0	+2.1	No
R-86	Residence at 6470 East 53rd Way	B/66	1	68.2	69.1	70.2	+2.0	**Yes**
R-87	Residence at 5406 Monaco Street	B/66	1	54.9	56.0	57.6	+2.7	No
R-88	Residence at 5400 Monaco Street	B/66	1	56.1	56.8	58.9	+2.8	No
R-89	Residence at 5370 Monaco Street	B/66	1	59.6	59.6	62.1	+2.5	No
R-90	Residence at 5360 Magnolia Street	B/66	1	61.5	62.1	64.0	+2.5	No
R-91	Residence at 5401 Magnolia Street	B/66	1	54.6	54.9	56.4	+1.8	No
R-92	Residence at 5390 Magnolia Street	B/66	1	54.8	55.8	57.6	+2.8	No
R-93	Residence at 5380 Magnolia Street	B/66	1	56.0	56.9	58.4	+2.4	No
R-94	Residence at 5350 Magnolia Street	B/66	1	59.7	60.4	62.1	+2.4	No
R-95	Residence at 5366 Magnolia Street	B/66	1	64.1	65.1	67.3	+3.2	**Yes**
R-96	Residence at 5360 Magnolia Street	B/66	1	67.5	68.8	70.5	+3.0	**Yes**
R-97	Residence at 5371 Niagara Street	B/66	1	53.5	53.6	55.2	+1.7	No
R-98	Residence at 5351 Niagara Street	B/66	1	53.7	54.4	55.6	+1.9	No
R-99	Residence at 5331 Niagara Street	B/66	1	54.1	54.3	55.9	+1.8	No
R-100*	North I-270 Multi-use Trail Underpass	C/66	1	73.1	73.4	74.9	+1.8	**Yes**
R-101*	South I-270 Multi-use Trail Underpass	C/66	1	64.9	65.8	66.5	+1.6	**Yes**

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2023) L_{eq} (dBA)	No Action (2050) L_{eq} (dBA)	EL Build Alternative (2050) L_{eq} (dBA)	EL Build Alternative Change from Existing (dB)	EL Build Alternative Causes Impact?
R-102	Trail pavilion at Wetland Loop	C/66	1	61.4	62.2	64.3	+2.9	No
R-103	Residence at 6800 East 52nd Place	B/66	1	69.4	70.4	71.9	+2.5	**Yes**
R-104	Residence at 6820 East 52nd Place	B/66	1	69.7	70.5	72.0	+2.3	**Yes**
R-105	Residence at 6830 East 52nd Place	B/66	1	69.3	69.7	71.7	+2.4	**Yes**
R-106	Residence at 6860 East 52nd Place	B/66	1	68.4	68.7	70.9	+2.5	**Yes**
R-107	Residence at 5251 Oneida Street	B/66	1	69.0	69.2	70.6	+1.6	**Yes**
R-108	Residence at 6870 East 52nd Place	B/66	1	58.4	59.1	61.0	+2.6	No
R-109	Residence at 5250 Oneida Street	B/66	1	65.9	66.0	68.8	+2.9	**Yes**
R-110	Trail crossing along Sand Creek Greenway Trail	C/66	1	74.4	74.7	74.7	+0.3	**Yes**
R-111	Trail crossing along Sand Creek Greenway Trail	C/66	1	76.7	77.4	77.3	+0.6	**Yes**
R-112	Trail crossing along Sand Creek Greenway Trail	C/66	1	67.9	68.0	68.2	+0.3	**Yes**
R-113	Trail crossing along Sand Creek Greenway Trail	C/66	1	67.5	68.2	67.7	+0.2	**Yes**

* Receptor only present for Build Alternative condition; Existing noise levels included for comparison only.

5.1 Existing Conditions Summary

Under existing conditions (2023), modeled noise levels at 111 receivers range from 51.2 to 76.7 dBA. Figures 4 through 14 show the locations of all modeled receivers. Tables 9 and 10 show the modeled noise level at each receiver. Existing conditions are not described as having noise impacts. If the project was not built, the project would not be responsible to mitigate noise via an abatement measure, regardless of if existing condition noise levels exceeded NACs.

5.2 No Action Alternative Summary

Under the No Action Alternative (2050), modeled noise levels at 111 receivers range from 51.0 to 77.4 dBA modeled noise level at each receiver. The No Action Alternative is not described as having noise impacts. If the project was not built, the project would not be responsible to mitigate noise via an abatement measure, regardless of if No Action Alternative noise levels exceeded NACs.

5.3 GP Build Alternative Summary

Under the GP Build Alternative (2050), modeled noise levels at 113 receivers range from 52.7 to 77.3 dBA 38 receivers (representing 38 receptors) would exceed the NAC. No receivers would experience a substantial noise increase of at least 10 dB. Therefore, a total of 38 receivers (representing 38 receptors) would be impacted during the 2050 worst-hour noise period (see Figures 29 through 42).

Table 9 above shows the modeled noise level at each receiver.

5.4 EL Build Alternative Summary

Under the EL Build Alternative (2050), modeled noise levels at 113 receivers range from 52.1 to 77.3 dBA 38 receivers (representing 38 receptors) would exceed the NAC. No receivers would experience a substantial noise increase of at least 10 dB. Therefore, a total of 38 receivers (representing 38 receptors) would be impacted during the 2050 worst-hour noise period (see Figures 43 through 56).

Table 10 above shows the modeled noise level at each receiver.

6 Noise Abatement Evaluation

As described in Chapter 5, 38 receptors under both the GP and EL alternatives in the Noise Study Zone would be impacted by noise in 2050 under the Build Alternatives. Therefore, abatement for the impacted receptors was evaluated, in accordance with guidelines from the CDOT NAAG and FHWA's Guidelines. Although abatement was required to be evaluated, it is only recommended for inclusion in the project, when determined, to be both feasible and reasonable.

Abatement is feasible if it:

- Provides at least 5 dB of noise reduction for at least three impacted receptors.
- Does not have any design and construction factors that are "fatal flaw" issues (e.g., safety, barrier height, topography, drainage, utilities, abatement maintenance, maintenance access to adjacent properties, and access to adjacent properties [i.e., arterial widening projects]).

If abatement is not feasible, further evaluation is not needed. However, if it is feasible, reasonableness is evaluated. Abatement is reasonable if it/the:

- Meets the minimum noise reduction design goal of at least 7 dB for at least two benefited receptors.
- Cost Benefit ($/receptor) equals or is less than the Cost Benefit Index ($34,000/receptor).
- Has support from more than 50 percent of the potentially benefited receptors[2]

6.1 Noise Abatement Options Considered

Noise barriers (walls and, to a lesser extent, berms) are commonly used as noise abatement and must be evaluated when doing a mitigation analysis for impacted receptors, per 23 CFR 772.13(c)(1). Other mitigation measures may also be considered, including traffic management measures (e.g., 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; and acquisition of real property or interests therein to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise. However, these mitigation measures are generally not feasible and/or reasonable. For this project, noise walls were the only abatement evaluated.

6.2 Noise Abatement: Noise Insulation

The Noise Study Zone does not have any Activity Category D receptors. Therefore, noise insulation was not considered as abatement for this project.

6.3 Noise Barrier Evaluation – GP Build Alternative

The GP Build Alternative has 18 impacted areas. Fifteen of the impacted areas have fewer than three impacted receptors together that would benefit from a noise wall. In those instances, a noise wall was not analyzed, as it would not meet feasibility criteria. The following areas and associated impacted receivers were identified as impacted, but not needing to be analyzed for a noise wall; Figures 29 through 42 show the locations of each impacted receiver:

- Trail crossing along Clear Creek Trail west of I-76: there are two impacted areas, one on either side of I-270 (R-5 and R-6), each with only one receptor.
- Homes north of I-270 and east of York Street: there are two impacted areas in this neighborhood; one represents R-26 adjacent to York Street, and a second area, located over 500 feet from the first area, representing R-34 and R-41. Each receiver represents one receptor.
- Trail crossing at South Platte River Greenway and trailhead at Sand Creek Greenway: there are two impacted areas; one on either side of I-270 (R-45 north of I-270; R-46 and R-47 south of I-270), each representing one receptor.
- Pavilion at Sand Creek Greenway: there is one impacted area south of I-270 with one receiver (R-48), representing one receptor.
- Sand Creek Greenway trail crossing under Vasquez: there is one impacted area west of Vasquez (R-49), representing one receptor.
- Sand Creek Greenway trail crossing at 56th Avenue and trailhead at Sand Creek Greenway: there is one impacted area south of I-270 (R-51 and R-52), representing two impacted receptors.
- Pavilion at Sand Creek Greenway: there is one impacted area south of I-270 with one receiver (R-53), representing one receptor.
- Sand Creek Greenway multi-use trail underpass under I-270: there is one impacted area south of I-270 with one receiver (R-101), representing one receptor.

[2] Support determined through Benefited Receptor Preference Survey, which will be conducted after the NEPA process and will be documented in a separate report.

- Trail crossing along Sand Creek Greenway Trail (over I-270): there are two impacted areas; one on either side of I-270 (R-110 and R-111), each with one receptor.
- Trail crossing along Sand Creek Greenway Trail (under Quebec Street): there are two impacted areas; one on either side of Quebec Street (R-112 and R-113), each with one receptor.

Of the three areas with three or more impacted receptors, barrier placement for each impacted area was considered in multiple locations. The location determined to be the best performer for each set of impacted receivers was optimized, and those results are described in Table 11. Figures 57–59 show the best performing evaluated barrier location, as determined by modeling in TNM at various locations. Appendix D has three CDOT Noise Abatement Determination Worksheets (CDOT Form 1209); one was completed for each impacted area. Of these three evaluated noise barriers, one barrier was found to be feasible and reasonable, as described in Table 11.

Table 11 Noise Barrier Evaluation[31] – GP Build Alternative

Barrier ID	**Wall 1**	**Wall 2**	**Wall 3**
Barrier Location (general)	Along the south side of the EB York Street on-ramp	North of I-270 and south of North Sandcreek Drive in Commerce City residential area	North of I-270 and south of East 52nd Place in Commerce City residential area
Barrier Location: Distance from Proposed Edge of Roadway (feet)	2–4 ft from edge of shoulder	2 ft from edge of shoulder	2 ft from edge of shoulder
Barrier Location Justification	Located adjacent to the on-ramp to minimize impacts from highway and ramp traffic	Located alongside the highway shoulder at a distance to optimize noise reduction	Located alongside the highway shoulder at a distance to optimize noise reduction
Impacted Receiver IDs	R-42 R-43 R-44	Refer to Figure 58	Refer to Figure 59
Benefited Receiver IDs	R-42 R-43 R-44	Refer to Table 12	Refer to Table 13
Figure #	57	58	59
Fatal Flaw(s)?	No	No	No
Reduces Noise ≥5.0 dB for ≥3 impacted receptors	Yes	Yes	Yes
Reduces Noise ≥7.0 dB for ≥2 benefited receptors	Yes	Yes	Yes

[31] In cases where a prospective barrier cannot benefit at least three impacted receptors because there are fewer than three impacted receptors behind the prospective barrier, the barrier does not need to be modeled to be determined that it is not feasible.

Barrier ID	Wall 1	Wall 2	Wall 3
Recommended Barrier Height & Length (feet)1	20 high x 1,380 long	13 high x 1,682 long	14 high x 968 long
Barrier Area2 (square feet)	27,600	21,866	13,552
Unit Cost	$45/ft^2	$45/ft^2	$45/ft^2
Total Cost3	$1,242,000	$983,970	$609,840
No. Benefited Receptors	3	29	6
Total Decibels of Benefit Provided	21.1	193.0	55.8
Average Benefit (dB/receptor)	7.03	6.66	9.30
Cost Benefit($/receptor)3	$414,000	$33,930.00	$101,640
Design year Leq Range Without Abatement (dBA)	67.3 to 70.7	54.0 to 74.8	61.0 to 72.0
Design year Leq Range With Abatement (dBA)	61.4 to 62.3	49.8 to 64.7	57.2 to 63.5
Feasible?	**Yes**	**Yes**	**Yes**
Reasonable?	No	**Yes**	No
Recommended?	No	**Yes**	No

Notes:

1. The barrier heights and/or lengths listed in this table are rounded. Therefore, if they are used to calculate the barrier area, the resulting area may be slightly different than the reported barrier area due to round-off error.
2. The barrier areas listed in this table are rounded. Therefore, if they are used to calculate the total cost, the resulting cost may be slightly different than the reported cost due to round-off error.
3. The total cost listed in this table is rounded. Therefore, when used to calculate the cost benefit, the resulting cost benefit may be slightly different than the reported cost benefit due to round-off error.

Table 12 Modeled Noise Levels With and Without Potential New Abatement for GP Build Alternative (Wall 1)

Receiver ID (Behind Abatement)	Receiver Description	Number of Receptors per Receiver	Are Receptors Benefited? (Yes or No)	GP Build Alternative (2050) L_{eq} Without Abatement (dBA)	GP Build Alternative (2050) L_{eq} With Abatement (dBA)	GP Build Alternative Insertion Loss (dB)
R-42	Residence at 6702 York Street	1	**Yes**	70.7	62.2	8.5
R-43	Residence at 6700 York Street	1	**Yes**	69.0	61.4	7.6
R-44	Residence at 6690 York Street	1	**Yes**	67.3	62.3	5.0

Table 1 Modeled Noise Levels With and Without Potential New Abatement for GP Build Alternative (Wall 2)

Receiver ID (Behind Abatement)	Receiver Description	Number of Receptors per Receiver	Are Receptors Benefited? (Yes or No)	GP Build Alternative (2050) L_{eq} without Abatement (dBA)	GP Build Alternative (2050) L_{eq} with Abatement (dBA)	GP Build Alternative Insertion Loss (dB)
R-54	Residence at 5471 Krameria Street	1	No	59.7	58.8	0.9
R-55	Residence at 5431 Krameria Street	1	No	61.3	57.6	3.7
R-56	Residence at 5460 Krameria Street	1	No	55.0	51.3	3.7
R-57	Residence at 5450 Krameria Street	1	No	58.5	53.9	4.6
R-58	Residence at 5410 Krameria Street	1	**Yes**	67.8	62.2	5.6
R-59	Residence at 5451 Leyden Street	1	No	57.4	54.5	2.9
R-60	Residence at 5443 Leyden Street	1	No	57.5	54.4	3.1
R-61	Residence at 5435 Leyden Street	1	No	58.5	56.3	2.2
R-62	Residence at 5411 Leyden Street	1	No	62.0	57.2	4.8
R-63	Residence at 5401 Leyden Street	1	**Yes**	66.3	60.2	6.1
R-64	Residence at 6318 East 54th Avenue	1	**Yes**	69.4	61.2	8.2

Receiver ID (Behind Abatement)	Receiver Description	Number of Receptors per Receiver	Are Receptors Benefited? (Yes or No)	GP Build Alternative (2050) L_{eq} without Abatement (dBA)	GP Build Alternative (2050) L_{eq} with Abatement (dBA)	GP Build Alternative Insertion Loss (dB)
R-65	Residence at 5450 Leyden Street	1	No	55.6	51.6	4.0
R-66	Residence at 5440 Leyden Street	1	No	56.8	52.7	4.1
R-67	Leyden Park - Recreational at 5430 Leyden Street	5	No	54.0	51.9	2.1
R-68	Residence at 5420 Leyden Street	1	No	57.0	52.4	4.6
R-69	Residence at 5410 Leyden Street	1	**Yes**	58.7	52.8	5.9
R-70	Residence at 5400 Leyden Street	1	No	61.9	57.2	4.7
R-71	Residence at 6320 East 54th Avenue	1	**Yes**	69.3	60.7	8.6
R-72	Residence at 6330 East 54th Avenue	1	**Yes**	69.2	60.7	8.5
R-73	Residence at 5441 Locust Street	1	No	55.1	51.7	3.4
R-74	Residence at 5431 Locust Street	1	No	55.0	52.2	2.8
R-75	Residence at 5421 Locust Street	1	**Yes**	55.6	49.8	5.8
R-76	Residence at 5411 Locust Street	1	**Yes**	57.8	51.6	6.2
R-77	Residence at 5401 Locust Street	1	**Yes**	61.1	55.2	5.9
R-78	Residence at 5420 Locust Street	1	**Yes**	56.5	50.4	6.1
R-79	Residence at 5412 Locust Street	1	**Yes**	57.4	51.4	6
R-80	Residence at 5400 Locust Street	1	**Yes**	59.6	54.1	5.5
R-81	Residence at 6415 East 53rd Way	1	**Yes**	67.2	60.1	7.1
R-82	Residence at 6411 East 53rd Way	1	**Yes**	68.2	60.4	7.8
R-83	Residence at 5421 Monaco Street	1	**Yes**	56.0	50.0	6.0

Receiver ID (Behind Abatement)	Receiver Description	Number of Receptors per Receiver	Are Receptors Benefited? (Yes or No)	GP Build Alternative (2050) L_{eq} without Abatement (dBA)	GP Build Alternative (2050) L_{eq} with Abatement (dBA)	GP Build Alternative Insertion Loss (dB)
R-84	Residence at 5401 Monaco Street	1	No	57.5	52.7	4.8
R-85	Residence at 6481 East 53rd Way	1	**Yes**	65.2	57.3	7.9
R-86	Residence at 6470 East 53rd Way	1	**Yes**	70.2	61.9	8.3
R-87	Residence at 5406 Monaco Street	1	**Yes**	57.3	52.0	5.3
R-88	Residence at 5400 Monaco Street	1	**Yes**	59.0	52.5	6.5
R-89	Residence at 5370 Monaco Street	1	**Yes**	62.2	54.7	7.5
R-90	Residence at 5360 Magnolia Street	1	**Yes**	64.0	56.3	7.7
R-91	Residence at 5401 Magnolia Street	1	**Yes**	56.5	50.6	5.9
R-92	Residence at 5390 Magnolia Street	1	**Yes**	57.5	51.6	5.9
R-93	Residence at 5380 Magnolia Street	1	**Yes**	58.2	52.2	6.0
R-94	Residence at 5350 Magnolia Street	1	**Yes**	62.1	55.4	6.7
R-95	Residence at 5366 Magnolia Street	1	**Yes**	67.2	58.7	8.5
R-96	Residence at 5360 Magnolia Street	1	**Yes**	70.5	64.7	5.8
R-97	Residence at 5371 Niagara Street	1	No	55.2	52.7	2.5
R-98	Residence at 5351 Niagara Street	1	No	55.6	51.8	3.8
R-99	Residence at 5331 Niagara Street	1	No	55.7	52.9	2.8
R-100*	North I-270 Multi-use Trail Underpass	1	**Yes**	74.8	63.1	11.7

Table 14 Modeled Noise Levels With and Without Potential New Abatement for GP Build Alternative (Wall 3)

Receiver ID (Behind Abatement)	Receiver Description	Number of Receptors per Receiver	Are Receptors Benefited? (Yes or No)	GP Build Alternative (2050) L_{eq} without Abatement (dBA)	GP Build Alternative (2050) L_{eq} with Abatement (dBA)	GP Build Alternative Insertion Loss (dB)
R-103	Residence at 6800 East 52nd Place	1	**Yes**	71.9	63.5	8.4
R-104	Residence at 6820 East 52nd Place	1	**Yes**	72.0	61.8	10.2
R-105	Residence at 6830 East 52nd Place	1	**Yes**	71.7	61.9	9.8
R-106	Residence at 6860 East 52nd Place	1	**Yes**	70.9	60.9	10.0
R-107	Residence at 5251 Oneida Street	1	**Yes**	70.4	60.6	9.8
R-108	Residence at 6870 East 52nd Place	1	No	61.0	57.2	3.8
R-109	Residence at 5250 Oneida Street	1	**Yes**	68.8	61.2	7.6

6.4 *Noise Barrier Evaluation – EL Build Alternative*

The EL Build Alternative has 18 impacted areas. Fifteen of the impacted areas have fewer than three impacted receptors together that would benefit from a noise wall. In those instances, a noise wall was not analyzed, as it would not meet feasible and reasonable criteria. The following areas and associated impacted receivers were identified as impacted, but not needing to be analyzed for a noise wall; Figures 43 through 56 show the locations of each impacted receiver:

- Trail crossing along Clear Creek Trail west of I-76: there are two impacted areas, one on either side of I-270 (R-5 and R-6), each with only one receptor.
- Homes north of I-270 and east of York Street: there are two impacted areas in this neighborhood; one represents R-26 adjacent to York Street, and a second area, located 500 feet from the first area, representing R-34 and R-41. Each receiver represents one receptor.
- Trail crossing at South Platte River Greenway and trailhead at Sand Creek Greenway: there are two impacted areas; one on either side of I-270 (R-45 north of I-270; R-46 and R-47 south of I-270), each representing only one receptor.
- Pavilion at Sand Creek Greenway: there is one impacted area south of I-270 with one receiver (R-48), representing one receptor.
- Sand Creek Greenway trail crossing under Vasquez: there is one impacted area west of Vasquez (R-49), representing one receptor.
- Sand Creek Greenway trail crossing at East 56th Avenue and trailhead at Sand Creek Greenway: there is one impacted area south of I-270 (R-51 and R-52), representing two impacted receptors.
- Pavilion at Sand Creek Greenway: there is one impacted area south of I-270 with one receiver (R-53), representing one receptor.

- Sand Creek Greenway multi-use trail underpass under I-270: there is one impacted area south of I-270 with one receiver (R-101), representing one receptor.
- Trail crossing along Sand Creek Greenway Trail (over I-270): there are two impacted areas; one on either side of I-270 (R-110 and R-111), each with only one receptor.
- Trail crossing along Sand Creek Greenway Trail (under Quebec Street): there are two impacted areas; one on either side of Quebec Street (R-112 and R-113), each with only one receptor.

Of the three areas with three or more impacted receptors, barrier placement for each impacted area was considered in multiple locations. The location determined to be the best performer for each set of impacted receivers was optimized, and those results are described in Table 15. Figures 60 through 62 show the best performing evaluated barrier location, as determined by modeling in TNM at various locations. Appendix D has three CDOT Noise Abatement Determination Worksheets (CDOT Form 1209); one was completed for each impacted area. Of these three evaluated noise barriers, one barrier was found to be feasible and reasonable, as described in Table 15.

The EL Build Alternative requires a slightly larger footprint of the I-270 compared to the GP Build Alternative mainline, so Walls 2 and 3 are located approximately 5 feet farther north. Wall 1 was analyzed at the same location for both the GP and EL Build Alternatives.

Table 15 Noise Barrier Evaluation[41] – EL Build Alternative

Barrier ID	Wall 1	Wall 2	Wall 3
Barrier Location (general)	Along the north side of the WB York Street off-ramp	North of I-270 and south of North Sandcreek Drive in Commerce City residential area	North of I-270 and south of East 52nd Place in Commerce City residential area
Barrier Location: Distance from Proposed Edge of Roadway (feet)	1–2 ft from edge of shoulder	2 ft from edge of shoulder	2 ft from edge of shoulder
Barrier Location Justification	Only feasible location due to a proposed retaining wall immediately to the north	Located alongside the highway shoulder at a distance to optimize noise reduction	Located alongside the highway shoulder at a distance to optimize noise reduction
Impacted Receiver IDs	R-42 R-43 R-44	Refer to Figure 61	Refer to Figure 62
Benefited Receiver IDs	R-42 R-43 R-44	Refer to Table 17	Refer to Table 18
Figure #	60	61	62
Fatal Flaw(s)?	No	No	No

[41] In cases where a prospective barrier cannot benefit at least three impacted receptors because there are fewer than three impacted receptors behind the prospective barrier, the barrier does not need to be modeled to be determined that it is not feasible.

Barrier ID	Wall 1	Wall 2	Wall 3
Reduces Noise ≥5.0 dB for ≥3 impacted receptors	Yes	Yes	Yes
Reduces Noise ≥7.0 dB for ≥2 benefited receptors	Yes	Yes	Yes
Recommended Barrier Height & Length (feet)[1]	20 high x 1,380 long	14 high x 2,029 long	14 high x 926 long
Barrier Area[2] (square feet)	27,600	28,406	12,964
Unit Cost	$45/ft^2	$45/ft^2	$45/ft^2
Total Cost[3]	$1,242,000	$1,278,270	$583,380
No. Benefited Receptors	3	39	6
Total Decibels of Benefit Provided	20.1	294.2	57.8
Average Benefit (dB/receptor)	6.70	7.54	9.63
Cost Benefit($/receptor)[3]	$414,000	$32,776	$97,230
Design year Leq Range Without Abatement (dBA)	66.7 to 69.4	54.1 to 75.0	61.2 to 72.2
Design year Leq Range With Abatement (dBA)	60.7 to 61.7	48.8 to 62.2	58.0 to 63.3
Feasible?	**Yes**	**Yes**	**Yes**
Reasonable?	No	**Yes**	No
Recommended?	No	**Yes**	No

Notes:

1. The barrier heights and/or lengths listed in this table are rounded. Therefore, if they are used to calculate the barrier area, the resulting area may be slightly different than the reported barrier area due to round-off error.
2. The barrier areas listed in this table are rounded. Therefore, if they are used to calculate the total cost, the resulting cost may be slightly different than the reported cost due to round-off error.
3. The total cost listed in this table is rounded. Therefore, when used to calculate the cost benefit, the resulting cost benefit may be slightly different than the reported cost benefit due to round-off error.

Table 16 Modeled Noise Levels With and Without Potential New Abatement for EL Build Alternative (Wall 1)

Receiver ID (Behind Abatement)	Receiver Description	Number of Receptors per Receiver	Are Receptors Benefited? (Yes or No)	EL Build Alternative (2050) L_{eq} without Abatement (dBA)	EL Build Alternative (2050) L_{eq} with Abatement (dBA)	EL Build Alternative Insertion Loss (dB)
R-42	Residence at 6702 York Street	1	**Yes**	69.4	61.6	7.8
R-43	Residence at 6700 York Street	1	**Yes**	68.0	60.7	7.3
R-44	Residence at 6690 York Street	1	**Yes**	66.7	61.7	5.0

Table 2 Modeled Noise Levels With and Without Potential New Abatement for EL Build Alternative (Wall 2)

Receiver ID (Behind Abatement)	Receiver Description	Number of Receptors per Receiver	Are Receptors Benefited? (Yes or No)	EL Build Alternative (2050) L_{eq} without Abatement (dBA)	EL Build Alternative (2050) L_{eq} with Abatement (dBA)	EL Build Alternative Insertion Loss (dB)
R-54	Residence at 5471 Krameria Street	1	No	59.0	56.8	2.2
R-55	Residence at 5431 Krameria Street	1	**Yes**	60.5	53.5	7.0
R-56	Residence at 5460 Krameria Street	1	**Yes**	55.2	49.5	5.7
R-57	Residence at 5450 Krameria Street	1	**Yes**	57.8	50.8	7.0
R-58	Residence at 5410 Krameria Street	1	**Yes**	67.6	60.0	7.6
R-59	Residence at 5451 Leyden Street	1	No	57.0	52.3	4.7
R-60	Residence at 5443 Leyden Street	1	**Yes**	56.9	51.5	5.4
R-61	Residence at 5435 Leyden Street	1	No	57.9	53.4	4.5
R-62	Residence at 5411 Leyden Street	1	**Yes**	61.5	55.7	5.8
R-63	Residence at 5401 Leyden Street	1	**Yes**	66.1	58.3	7.8

Receiver ID (Behind Abatement)	Receiver Description	Number of Receptors per Receiver	Are Receptors Benefited? (Yes or No)	EL Build Alternative (2050) L_{eq} without Abatement (dBA)	EL Build Alternative (2050) L_{eq} with Abatement (dBA)	EL Build Alternative Insertion Loss (dB)
R-64	Residence at 6318 East 54th Avenue	1	**Yes**	69.1	60.1	9.0
R-65	Residence at 5450 Leyden Street	1	**Yes**	55.5	50.4	5.1
R-66	Residence at 5440 Leyden Street	1	**Yes**	56.6	51.5	5.1
R-67	Leyden Park - Recreational at 5430 Leyden Street	5	No	54.1	50.1	4.0
R-68	Residence at 5420 Leyden Street	1	**Yes**	57.0	51.2	5.8
R-69	Residence at 5410 Leyden Street	1	**Yes**	58.5	51.8	6.7
R-70	Residence at 5400 Leyden Street	1	**Yes**	61.3	55.3	6.0
R-71	Residence at 6320 East 54th Avenue	1	**Yes**	69.2	59.8	9.4
R-72	Residence at 6330 East 54th Avenue	1	**Yes**	69.0	59.9	9.1
R-73	Residence at 5441 Locust Street	1	No	55.2	50.6	4.6
R-74	Residence at 5431 Locust Street	1	No	55.1	50.7	4.4
R-75	Residence at 5421 Locust Street	1	**Yes**	55.8	48.8	7.0
R-76	Residence at 5411 Locust Street	1	**Yes**	57.8	50.7	7.1
R-77	Residence at 5401 Locust Street	1	**Yes**	60.4	53.9	6.5
R-78	Residence at 5420 Locust Street	1	**Yes**	56.7	49.6	7.1
R-79	Residence at 5412 Locust Street	1	**Yes**	57.4	50.4	7.0
R-80	Residence at 5400 Locust Street	1	**Yes**	59.8	53.2	6.6
R-81	Residence at 6415 East 53rd Way	1	**Yes**	67.5	59.0	8.5
R-82	Residence at 6411 East 53rd Way	1	**Yes**	68.3	59.3	9.0

Receiver ID (Behind Abatement)	Receiver Description	Number of Receptors per Receiver	Are Receptors Benefited? (Yes or No)	EL Build Alternative (2050) L_{eq} without Abatement (dBA)	EL Build Alternative (2050) L_{eq} with Abatement (dBA)	EL Build Alternative Insertion Loss (dB)
R-83	Residence at 5421 Monaco Street	1	**Yes**	56.2	49.2	7.0
R-84	Residence at 5401 Monaco Street	1	**Yes**	57.6	51.3	6.3
R-85	Residence at 6481 East 53rd Way	1	**Yes**	65.4	56.6	8.8
R-86	Residence at 6470 East 53rd Way	1	**Yes**	71.1	60.8	10.3
R-87	Residence at 5406 Monaco Street	1	**Yes**	57.9	50.9	7.0
R-88	Residence at 5400 Monaco Street	1	**Yes**	59.1	51.3	7.8
R-89	Residence at 5370 Monaco Street	1	**Yes**	62.0	54.1	7.9
R-90	Residence at 5360 Magnolia Street	1	**Yes**	64.2	55.6	8.6
R-91	Residence at 5401 Magnolia Street	1	**Yes**	57.3	49.6	7.7
R-92	Residence at 5390 Magnolia Street	1	**Yes**	57.6	50.4	7.2
R-93	Residence at 5380 Magnolia Street	1	**Yes**	58.9	51.1	7.8
R-94	Residence at 5350 Magnolia Street	1	**Yes**	62.5	54.2	8.3
R-95	Residence at 5366 Magnolia Street	1	**Yes**	66.9	56.3	10.6
R-96	Residence at 5360 Magnolia Street	1	**Yes**	70.3	61.1	9.2
R-97	Residence at 5371 Niagara Street	1	No	55.3	51.8	3.5
R-98	Residence at 5351 Niagara Street	1	**Yes**	56.0	50.4	5.6
R-99	Residence at 5331 Niagara Street	1	No	56.3	51.7	4.6
R-100*	North I-270 Multi-use Trail Underpass	1	**Yes**	75.0	62.2	12.8

Table 18 Modeled Noise Levels With and Without Potential New Abatement (Wall 3)

Receiver ID (Behind Abatement)	Receiver Description	Number of Receptors per Receiver	Are Receptors Benefited? (Yes or No)	EL Build Alternative (2050) L_{eq} without Abatement (dBA)	EL Build Alternative (2050) L_{eq} with Abatement (dBA)	EL Build Alternative Insertion Loss (dB)
R-103	Residence at 6800 East 52nd Place	1	**Yes**	72.2	63.3	8.9
R-104	Residence at 6820 East 52nd Place	1	**Yes**	72.2	61.8	10.4
R-105	Residence at 6830 East 52nd Place	1	**Yes**	71.8	61.9	9.9
R-106	Residence at 6860 East 52nd Place	1	**Yes**	71.0	60.7	10.3
R-107	Residence at 5251 Oneida Street	1	**Yes**	71.2	60.3	10.9
R-108	Residence at 6870 East 52nd Place	1	No	61.2	58.0	3.2
R-109	Residence at 5250 Oneida Street	1	**Yes**	68.8	61.4	7.4

7 Statement of Likelihood

The noise abatement evaluation for the Build Alternatives is described in Chapter 6. In the GP alternative, 38 receivers (representing 38 receptors) were determined to be impacted by traffic noise in 2050 for the Build Alternative. For the EL alternative, 38 receivers (representing 38 receptors) were determined to be impacted by traffic noise in 2050 for the Build Alternative.

In 15 (for both GP and EL) locations along the corridor, there were fewer than three impacted receptors together that would benefit from a noise wall. In those instances, a noise wall was not analyzed, as it would not meet feasible and reasonable criteria. However, if during final design it is determined that at least three receptors behind the prospective barrier are impacted, abatement measures will be evaluated and may be constructed.

Noise abatement was determined to be feasible and reasonable in one location for 11 impacted receptors. Therefore, the following noise wall is recommended to be constructed:

- Wall 2: North of I-270 and south of North Sandcreek Drive.
    - For the GP option, Wall 2 would be 13 feet high by 1,682 feet long; Cost Benefit of $33,930 evaluated for impacted receivers, as shown in Figure 58.
    - For the EL option, Wall 2 would be 14 feet high by 2,029 feet long; Cost Benefit of $32,776 evaluated for impacted receivers, as shown in Figure 61.

Within this area of Commerce City, six of the eleven impacted receptors are located on parcels currently zoned with industrial land uses, although the homes are currently occupied as residences. Additionally, the entire neighborhood that Wall 2 would benefit has a future zoning code of industrial. Prior to carrying the recommended Wall 2 design forward, a meeting with Commerce City staff should be coordinated to determine if the existing residences will remain in place to benefit from a potential noise wall.

Noise abatement at two locations for nine (GP and EL) impacted receptors were determined not to be feasible and/or reasonable, as described in Section 6.3 and Section 6.4 and Tables 10 and 12.

Note the following:

- The final noise abatement decision will be made during the project's final design. Feasibility and reasonableness determinations for this project may change if there are changes in final design after approval of the NEPA documentation.
- A Benefited Receptor Preference Survey will be conducted at the recommended barrier, at the time of final design of the construction project. Abatement will not be built if the Benefited Receptor Preference Survey results in 50 percent or less support for the abatement.
- Information for construction contractors, as identified in Section 9.8 of the NAAG, should be included in all plan sets and/or specifications and clearly documented in the Bid Package.

8 Construction Noise

This chapter describes construction noise implications, construction noise mitigation strategies, and whether the project is in an area that is subject to local noise ordinances.

8.1 Construction Noise Implications

Properties adjoining project construction may be exposed to noise caused by construction activities of the Build Alternatives. Examples of construction equipment noise are shown in Table 19. Construction noise differs from traffic noise in several ways:

- Construction noise lasts only for the duration of construction, with most construction activities in noise-sensitive areas being conducted during hours that are least disturbing to most nearby residents, when feasible.
- Construction activities generally are short-term and, depending on the nature of the construction operations, last from seconds (e.g., a truck passing a receptor) to months (e.g., bridge construction).
- Construction equipment noise is intermittent and depends on the type of operation, location, and function of the equipment, as well as the equipment usage cycle.
- As opposed to operational traffic noise, construction noise is not analyzed; there are no FHWA or CDOT construction NACs. However, construction noise is subject to relevant local regulations and ordinances (see Section 8.3).

Table 19 Typical Construction Equipment Noise

Equipment	Maximum Noise Level (dBA at 50 feet)[1]
Scraper	89
Dozer (Bulldozer)	85
Truck (Heavy Truck)	88[2]
Pickup Truck	55
Concrete Pump Truck	82
Backhoe	80
Pneumatic Tools	85

Notes:

1. Noise levels are from Table 9.1 of FHWA's 2006 Construction Noise Handbook (FHWA, 2006), unless otherwise noted.
2. This noise level is from Table 9.9 of FHWA's 2006 Construction Noise Handbook (FHWA, 2006), which is taken from Chapter 12 of the FTA Transit Noise and Vibration Guidance Handbook.

8.2 Construction Noise Mitigation Strategies

To minimize construction noise levels, typical best management practices will be incorporated into construction contracts, plans, and specifications, where it is appropriate to do so. The determination of practices weighs the benefits achieved and the overall adverse social, economic, and environmental effects and costs of abatement measures. These may include:

- Notify neighbors in advance when construction noise may occur.
- Keep noisy activities as far from sensitive receptors as possible.
- Keep exhaust systems on equipment in good working order. It should be subject to inspection by the construction project manager to ensure maintenance is being conducted.
- Use properly designed engine enclosures and intake silencers, if appropriate.
- Place stationary equipment as far from sensitive receptors as possible.
- Perform construction activities in noise sensitive areas during hours that are least disturbing to nearby residents, generally daytime hours, as feasible.
- Locate haul roads so that they are as least disruptive as possible.
- Provide mechanisms for complaints.

Mitigation measures for construction noise are detailed in Table 20 in Chapter 10, Impacts and Mitigation Commitments.

8.3 Local Noise Ordinances

The project occurs in unincorporated Adams County, Commerce City, and the City and County of Denver. While unincorporated Adams County does not have a noise ordinance, local noise ordinances exist for Commerce City and the City and County of Denver. When the local ordinance and State statute both apply, at any given time of day, the more stringent requirement applies.

Under the Commerce City noise ordinance (Section 6-2011), city codes agents determine what constitutes "unreasonable noise." Construction equipment operating between the hours of 7:00 a.m. and 8:00 p.m. is exempt under the Commerce City noise ordinance.

The City and County of Denver noise ordinance (Section 36-7) prohibits noise from construction equipment and activities on weekdays between the hours of 9:00 p.m. and 7:00 a.m. and weekends between the hours of 5:00 p.m. and 8:00 a.m. in a manner that exceeds the sound pressure limits specified in the ordinance. Under Table A of the ordinance, Allowable Sound Pressure Levels (in dB(A)) with Time of Day Allowances for different source and receptor types are included.

Nighttime construction activities are anticipated with this project. Per City and County of Denver, a variance may be granted from construction restrictions, if it can be demonstrated that a construction project will interfere with traffic or jeopardize public safety, if completed during daytime hours. Coordination should be conducted with Commerce City and City and County of Denver prior to commencement of any construction activities outside of allowable hours.

In addition, the Colorado Noise Statute 25-12-103 applies. This means that noise at 25 feet from the project boundary may not exceed 80 dBA from 7:00 a.m. until 7:00 p.m. and 75 dBA from 7:00 p.m. until 7:00 a.m.

The information provided from the local ordinances is current at the time this report was prepared. Local ordinances should be reviewed prior to construction to confirm any potential changes to the information provided in this report.

9 Information for Local Officials

This project's Noise Study Zone includes land that is unpermitted and undeveloped (i.e., Activity Category G) (see Figure 63). Therefore, 23 CFR 772.17 is applicable, and noise-related information needs to be provided to local officials to support local land use planning decisions and future development, as described in Section 6.3 of the NAAG.

Contour lines represent distances from the edge of the nearest travel lane of the highway improvement to where the design year (2050) noise levels reach the Activity Category B and C NAC (66 dBA) and Activity Category E's NAC (71 dBA). These were developed for Activity Category G land within the Noise Study Zone and are shown on Figure 63.

Distances may vary somewhat over the corridor due to topography and changing road alignments, but, in general, land within approximately 425 feet from the proposed new edge of the nearest travel lane are predicted to exceed 66 dBA during worst-hour traffic noise hours. The distance to 71 dBA for sensitive commercial properties is predicted to be approximately 200 feet from the proposed new edge of the nearest travel lane. Properties developed in those areas would not be compatible with Activity Category B or C (66 dBA) or Activity Category E (71 dBA) uses, respectively.

Each state highway agency is required to identify when the public is officially notified of a proposed highway project location. The CDOT NAAG defines the Date of Public Knowledge as the date on which the final environmental project document is approved (for this project, a Record of Decision). After this date, CDOT and FHWA will be responsible for analyzing and documenting existing condition and design year noise levels for these lands as part of Type I noise analyses but will not be required to provide noise abatement for development on these lands, if it was permitted after the Date of Public Knowledge. In addition, these areas would not be eligible for Federal-aid participation for Type II projects, if funding to the Type II program were to be reinstated in Colorado. Colorado does not currently have a Type II program. Decisions concerning such noise abatement are left to local government agencies and private developers.

Noise compatible planning concepts should be considered by local agencies. Examples are available in the following documents. Additional material and technical support are available from CDOT, upon request.

- The Audible Landscape: A Manual for Highway Noise and Land Use (Urban Systems Research and Engineering, Inc.; 1974),
- Guidelines for Considering Noise in Land Use Planning and Control (Federal Interagency Committee on Urban Noise; 1980), and
- Entering the Quiet Zone: Noise Compatible Land Use Planning (FHWA brochure; 2002).

CDOT will continue coordinating with local officials on noise related information, including compliance with local ordinances, planning, and mitigation throughout the project lifecycle.

10 Impacts and Mitigation Commitments

Because this project is an EIS, the following table (Table 20) that describes the impacts on noise resources and mitigation commitments for noise resources is being provided. Information from this table is generally copied into the NEPA document table, which lists the impacts and mitigation commitments for all resources. The impacts and mitigation commitments are identical for both Build Alternatives.

Table 20 Summary of Impacts and Mitigation Table for NEPA Documents

Impact	Location	Mitigation Commitment	Responsible Branch	Mitigation Timing / Phase
Exceedances of the CDOT Noise Abatement Criteria (NAC)	North of I-270 and south of North Sandcreek Drive in City of Commerce City (Commerce City) residential area	The Design Engineer will complete the noise wall design during final design.	CDOT Engineering and Environmental	Final Design
Exceedances of the NAC	North of I-270 and south of North Sandcreek Drive in Commerce City residential area	CDOT will conduct a Benefited Receptor Survey of those who would receive the benefits of the recommended noise wall during final design.	CDOT Engineering and Environmental	Final Design
Construction Noise	Study Area	The Contractor shall follow local noise ordinances, the Colorado Noise Statute 25-12-103, and apply for variances, as necessary.	CDOT Engineering and Contractor	Pre-Construction and Construction
Construction Noise	Study Area	Notify neighbors as far in advance as reasonably possible when construction noise may occur.	CDOT Engineering and Contractor	Pre-Construction and Construction
Construction Noise	Study Area	Keep noisy activities as far from sensitive receptors as possible. Coordinate with the Project Engineer.	CDOT Engineering and Contractor	Construction
Construction Noise	Study Area	Keep exhaust systems on equipment in good working order. It should be subject to inspection by the construction project manager to ensure maintenance is being conducted.	CDOT Engineering and Contractor	Construction
Construction Noise	Study Area	Use properly designed engine enclosures and intake silencers, if appropriate. Documentation will be provided by the Contractor to show what is used.	CDOT Engineering and Contractor	Construction
Construction Noise	Study Area	Place stationary equipment as far from sensitive receptors as possible. Coordinate with Project Engineer.	CDOT Engineering and Contractor	Construction

Impact	Location	Mitigation Commitment	Responsible Branch	Mitigation Timing / Phase
Construction Noise	Study Area	Perform construction activities in noise sensitive areas during hours that are least disturbing to nearby residents, generally daytime hours, as feasible.	CDOT Engineering and Contractor	Construction
Construction Noise	Study Area	Locate haul roads so that they are as least disruptive as possible. Coordinate with Project Engineer.	CDOT Engineering and Contractor	Construction
Construction Noise	Study Area	Provide mechanisms for complaints. Mechanism will be determined during final design and may include a project hotline number or other mechanism.	CDOT Engineering and Contractor	Final Design, Pre-Construction, and Construction

11 Sources and References

CDOT. 2020. *Noise Analysis and Abatement Guidelines*, September.

FHWA. 2006. *Construction Noise Handbook*, August.

FHWA. 2010. *Procedures for Abatement of Highway Traffic Noise and Construction Noise, 23 C.F.R. § 772.*

FHWA. 2011. *Highway Traffic Noise: Analysis and Abatement Guidance*, December.

FHWA. 2018. *Noise Measurement Handbook*, FHWA-HEP-18-065, June.

Figure 1 I-270 Corridor Improvements EIS Project Vicinity

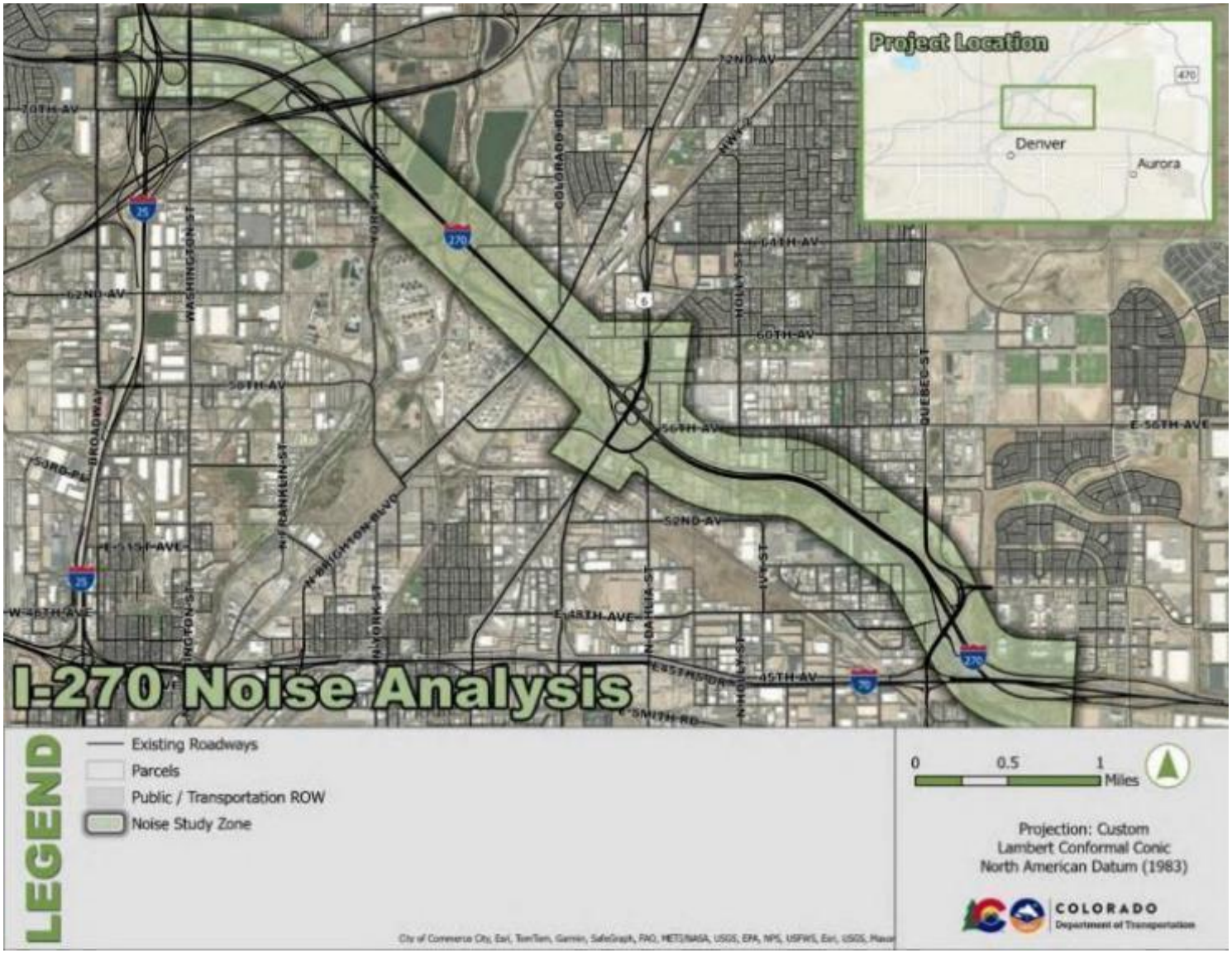
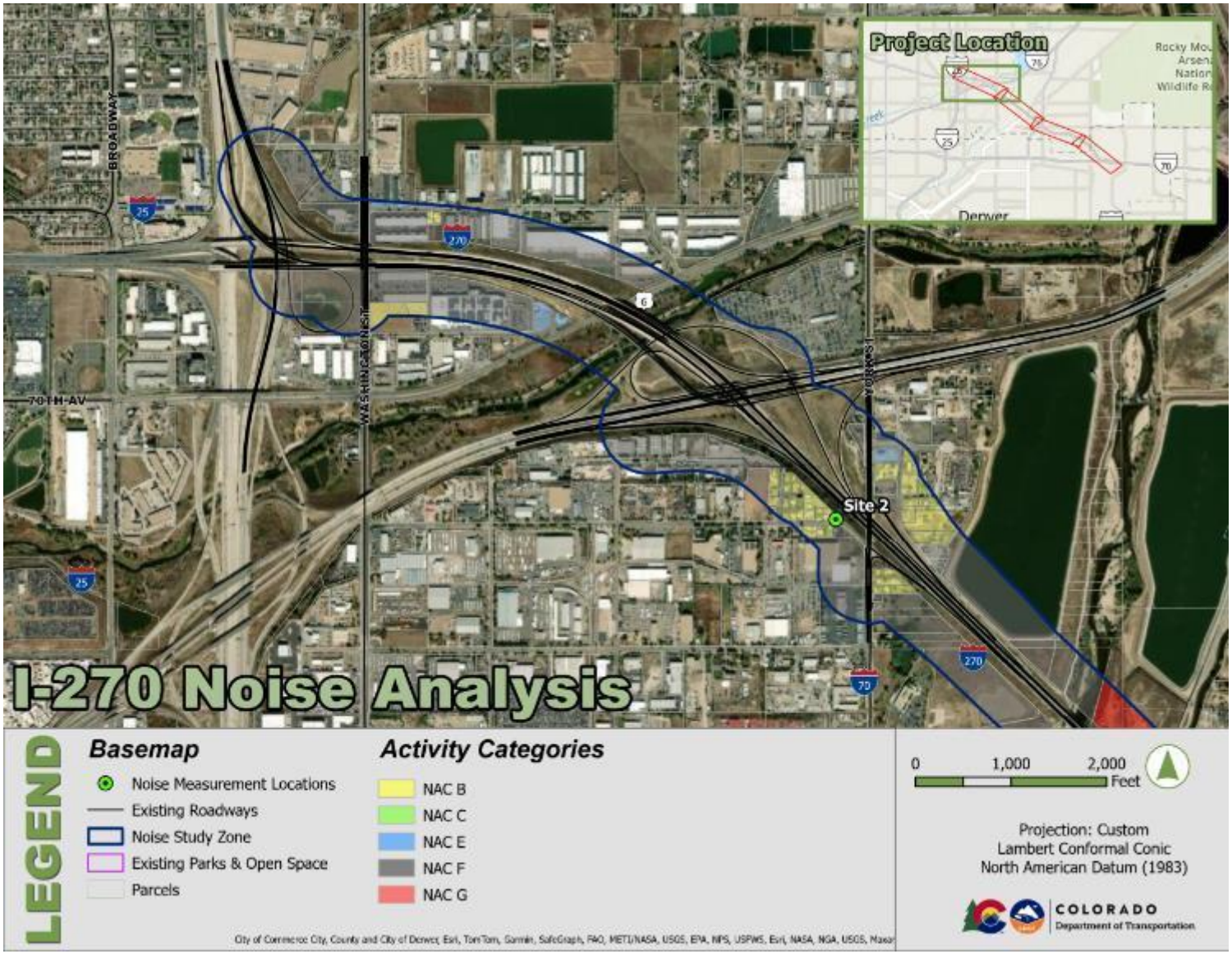
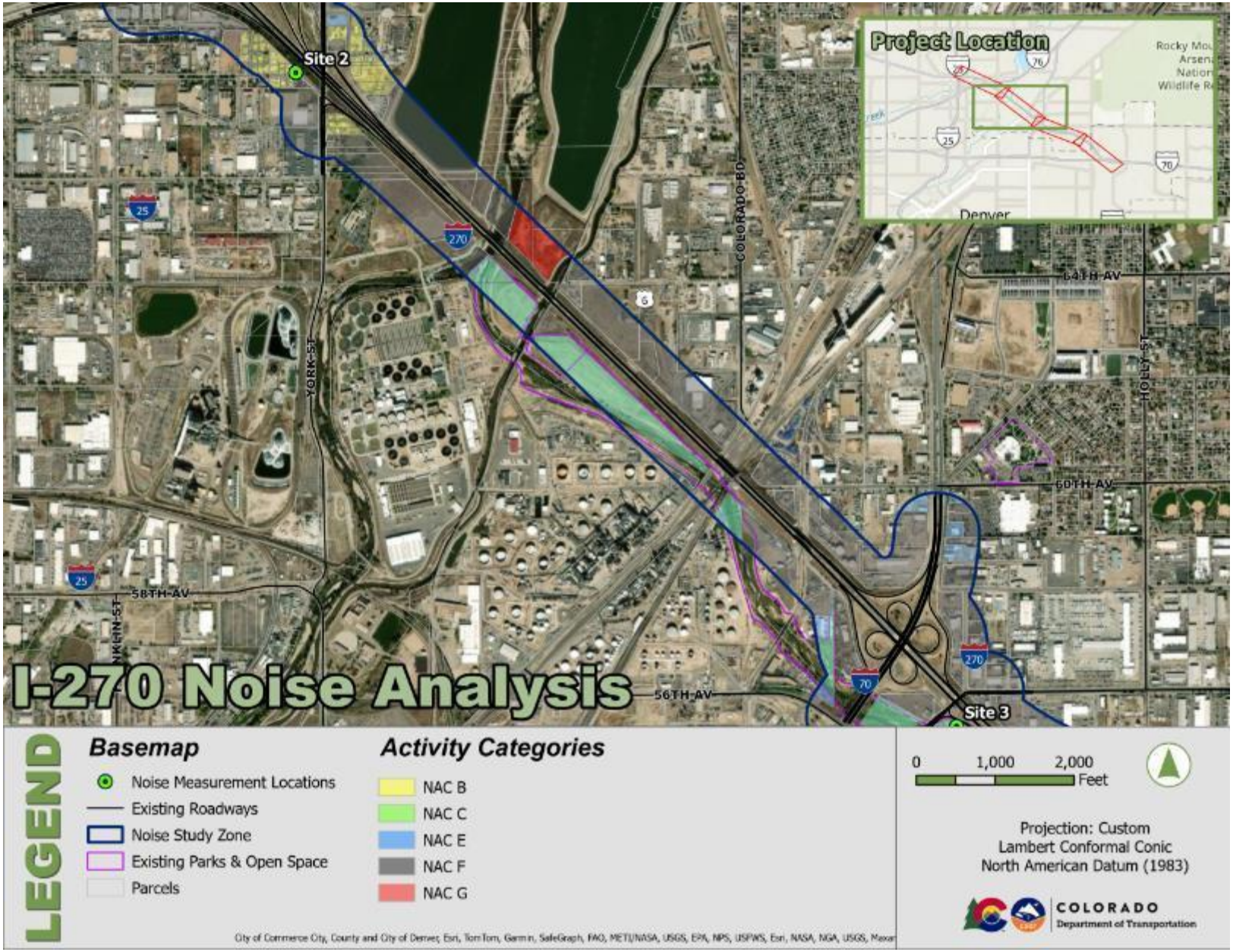
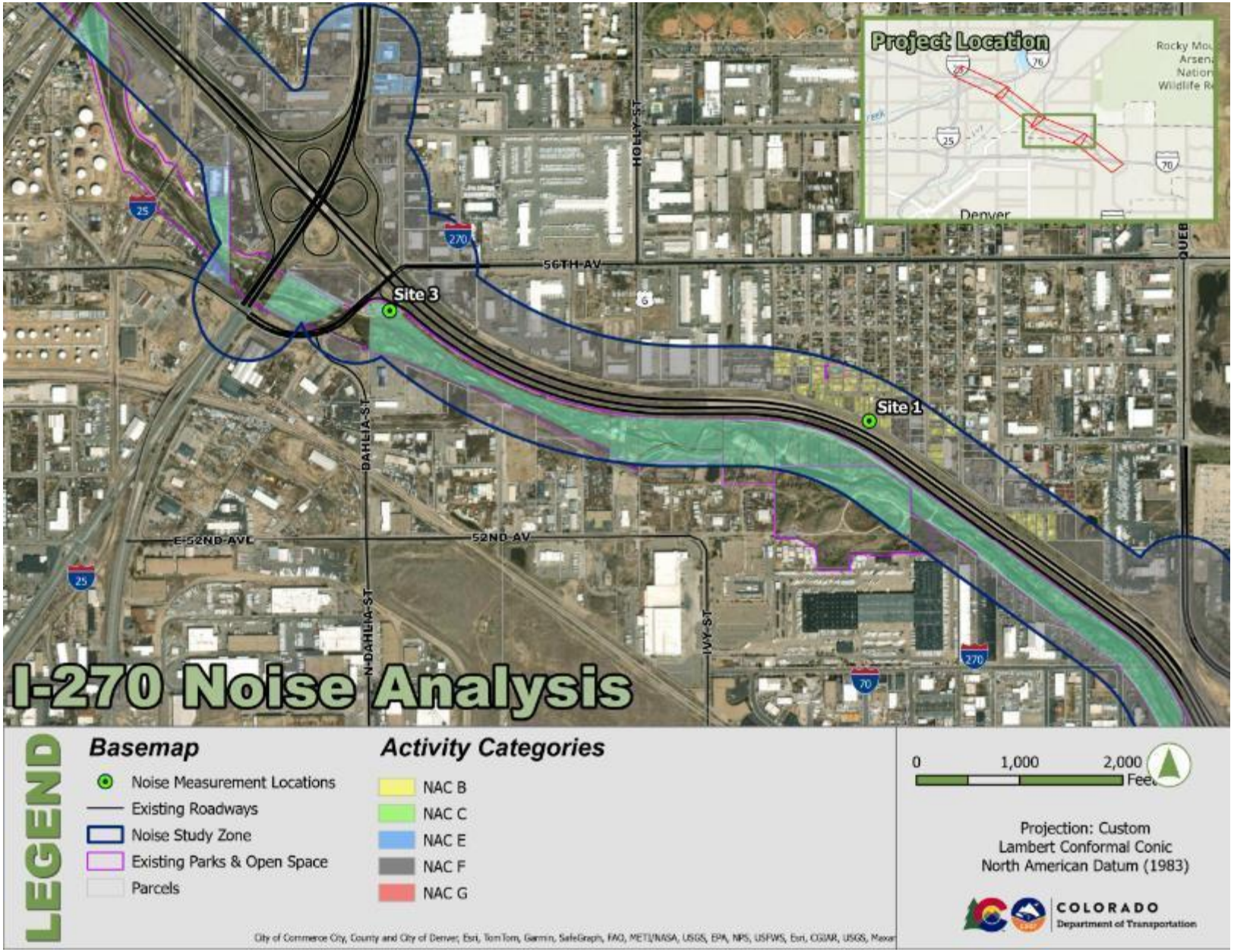


Figure 2 Noise Study Zone, Activity Categories, and Noise Measurement Locations




Project Location
Site 2
Site 3
I-270 Noise Analysis
YORK ST
COLORADO BD
HOLLY ST
64TH AV
60TH AV
58TH AV
56TH AV
NIKLIN ST
LEGEND
Basemap
Noise Measurement Locations
Existing Roadways
Noise Study Zone
Existing Parks & Open Space
Parcels
Activity Categories
NAC B
NAC C
NAC E
NAC F
NAC G
0 1,000 2,000
Feet
Projection: Custom
Lambert Conformal Conic
North American Datum (1983)
COLORADO
Department of Transportation


Project Location
Denver
Site 3
Site 1
56TH-AV
52ND-AV
E-52ND-AVE
DAHLIA-ST
N-DAHLIA-ST
IVY-ST
HOLLY-ST
I-270 Noise Analysis
LEGEND
Basemap
Noise Measurement Locations
Existing Roadways
Noise Study Zone
Existing Parks & Open Space
Parcels
Activity Categories
NAC B
NAC C
NAC E
NAC F
NAC G
0
1,000
2,000
Projection: Custom
Lambert Conformal Conic
North American Datum (1983)
COLORADO
Department of Transportation

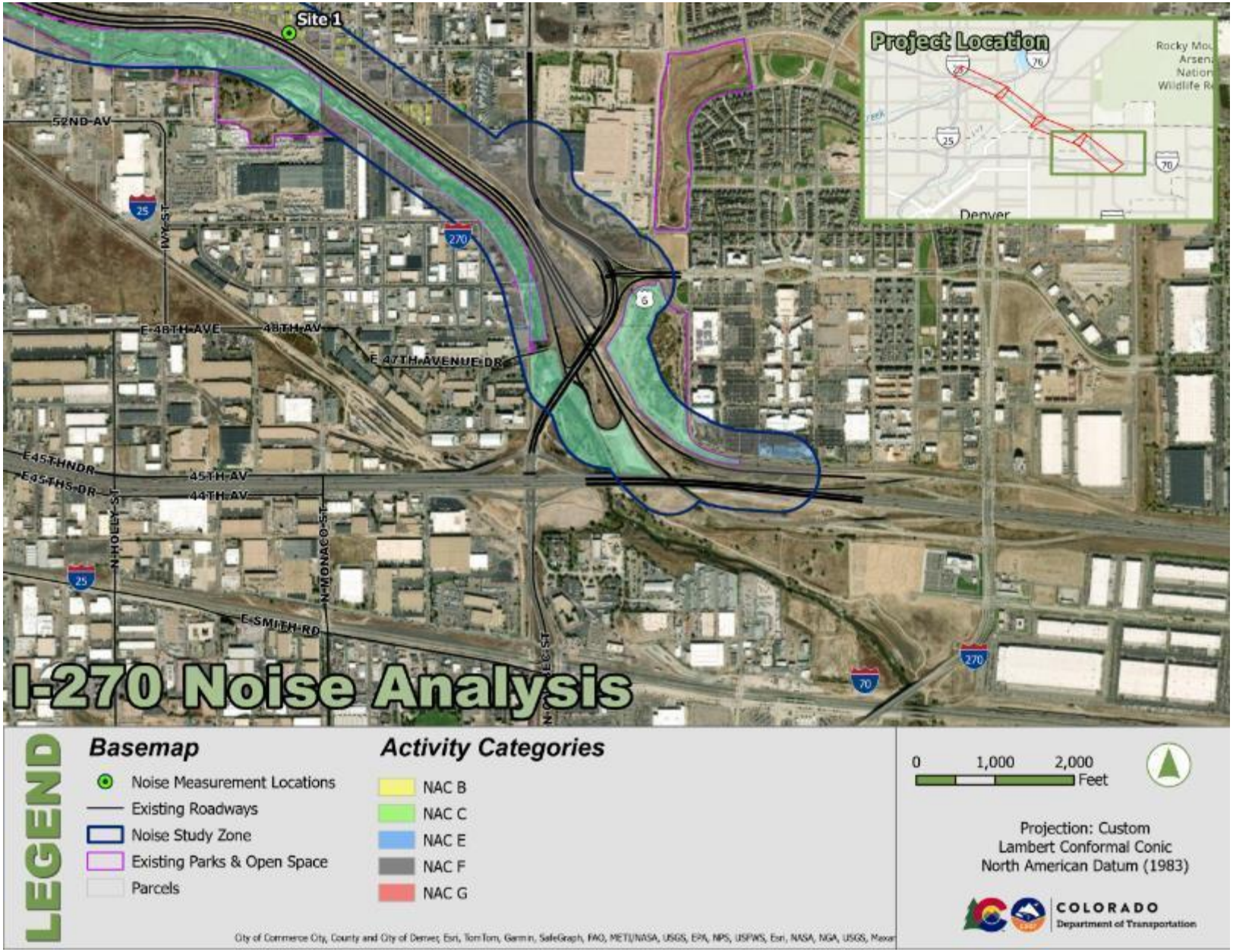

Site 1
Project Location
Denver
52ND-AV
W-47TH-ST
E-48TH-AVE
48TH-AV
E-47TH-AVENUE-DR
E-45TH-DR
E-45THS-DR
45TH-AV
44TH-AV
N-HOLLY-ST
N-MONACO-ST
N-LEE-ST
E-SMITH-RD
I-270 Noise Analysis
LEGEND
Basemap
Noise Measurement Locations
Existing Roadways
Noise Study Zone
Existing Parks & Open Space
Parcels
Activity Categories
NAC B
NAC C
NAC E
NAC F
NAC G
0
1,000
2,000
Feet
Projection: Custom
Lambert Conformal Conic
North American Datum (1983)
COLORADO
Department of Transportation

Figure 3 TNM Model Objects for Design Year (2050) GP Build Alternative

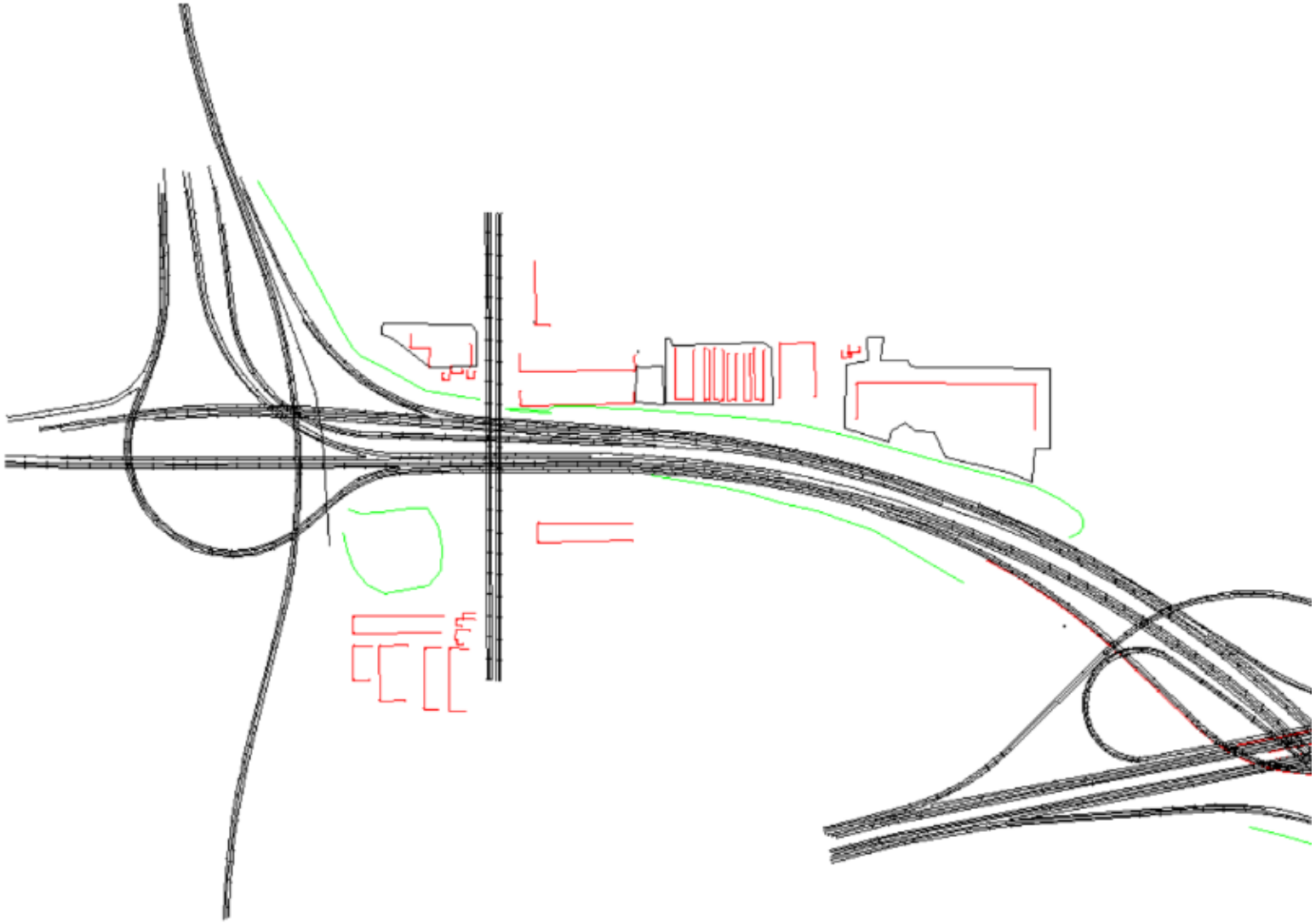


Figure 4 TNM Model Objects for Design Year (2050) GP Build Alternative

Figure 5 TNM Model Objects for Design Year (2050) GP Build Alternative

Figure 6 TNM Model Objects for Design Year (2050) GP Build Alternative

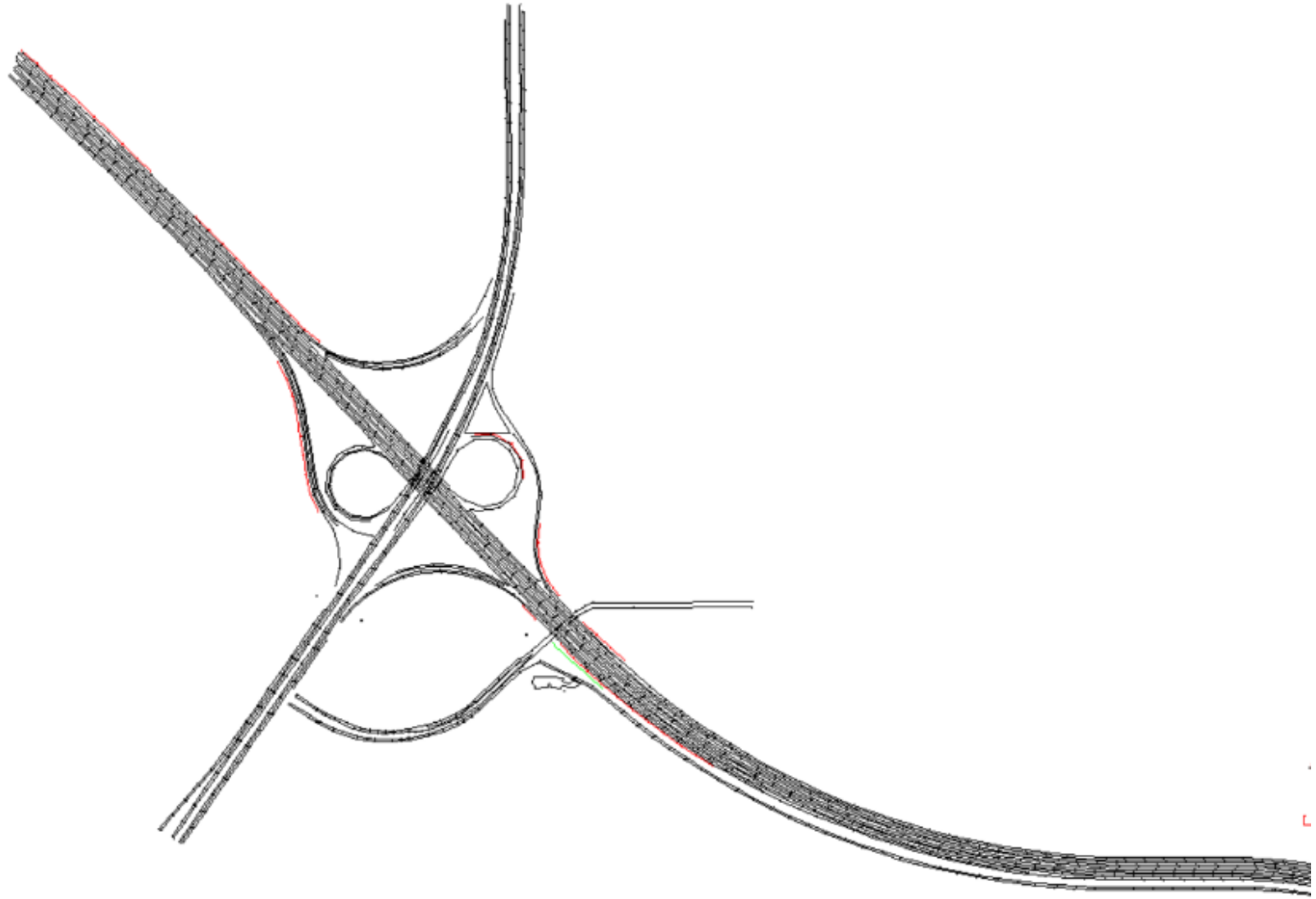


Figure 7 TNM Model Objects for Design Year (2050) GP Build Alternative

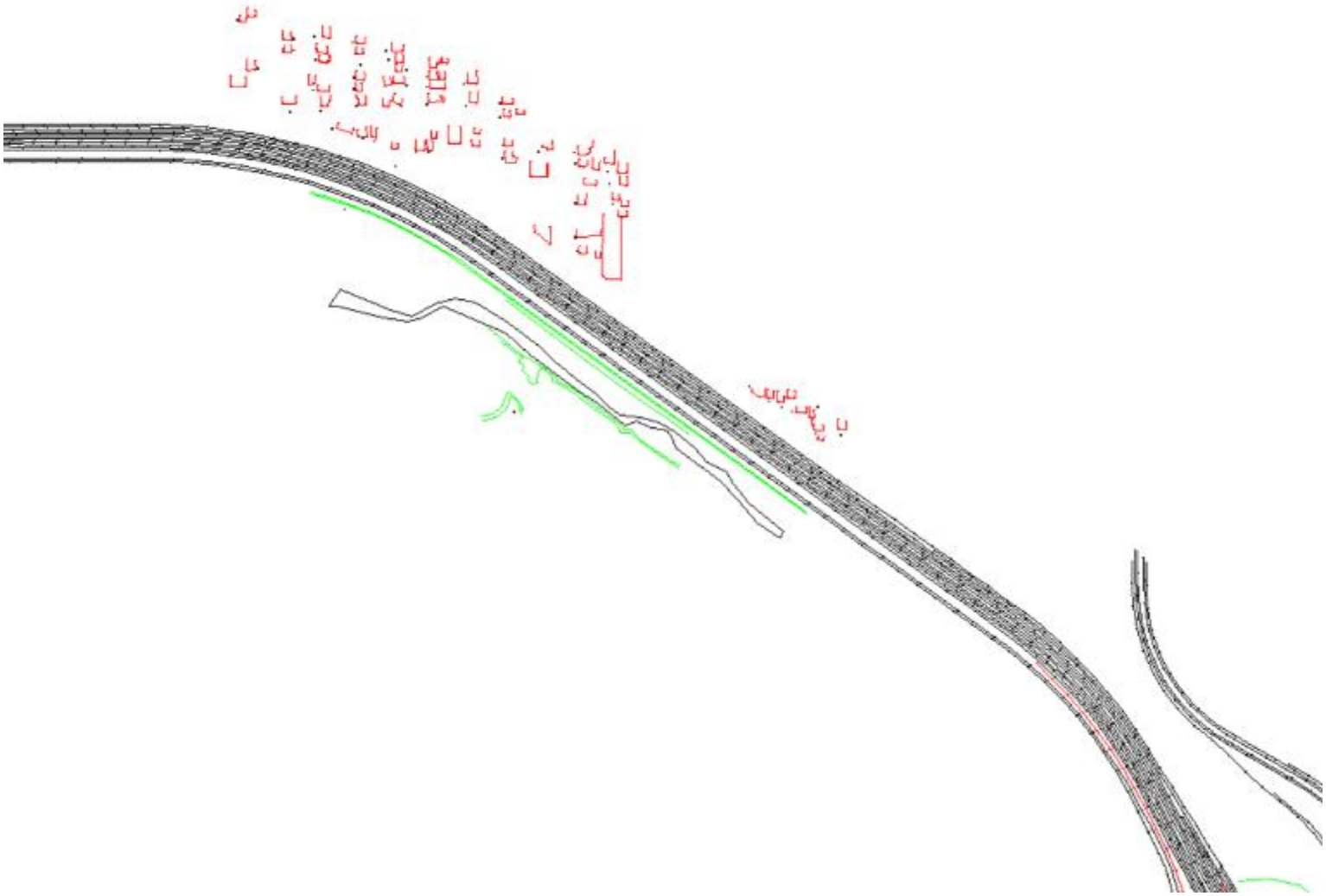


Figure 8 TNM Model Objects for Design Year (2050) GP Build Alternative

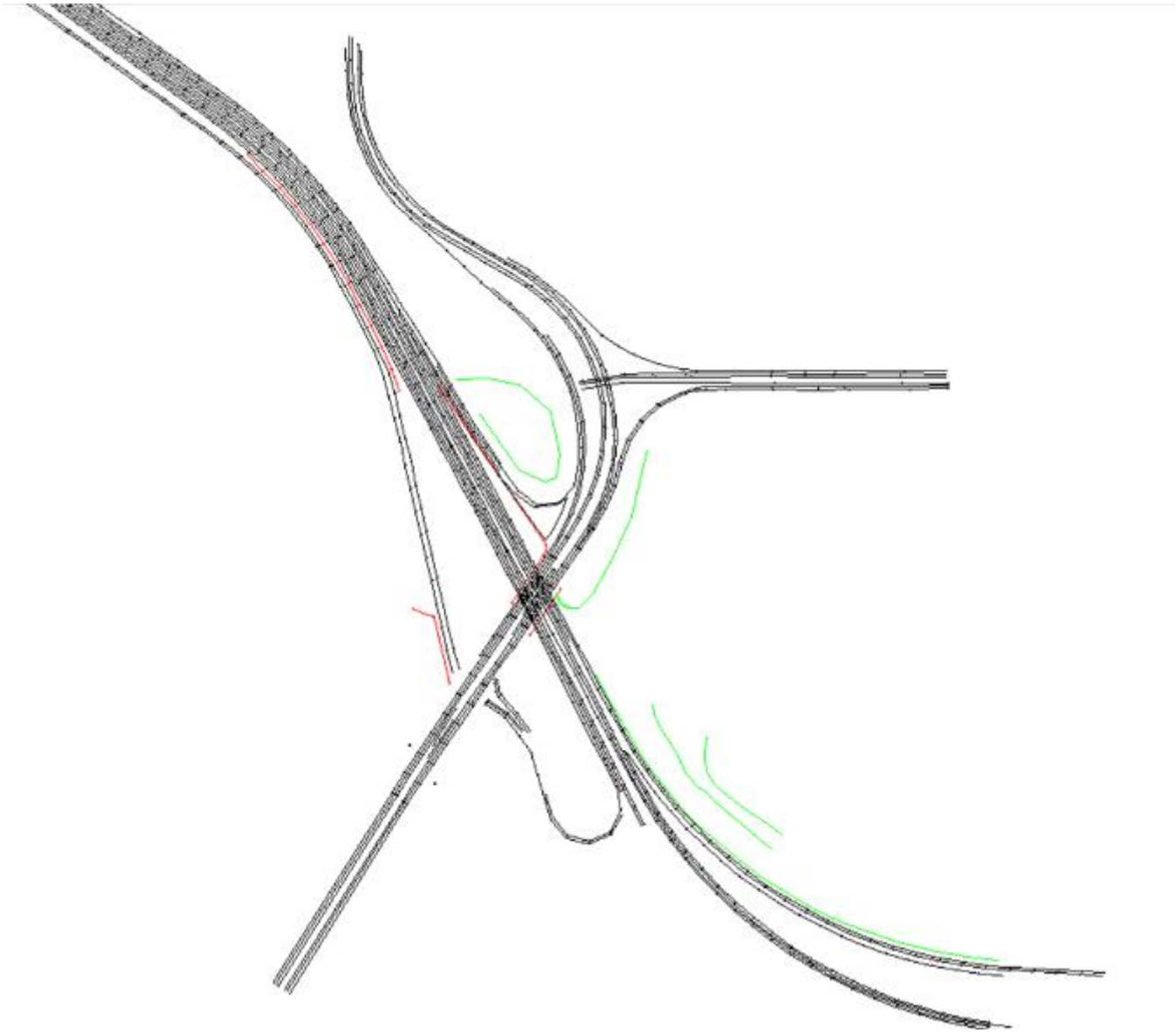


Figure 9 TNM Model Objects for Design Year (2050) EL Build Alternative

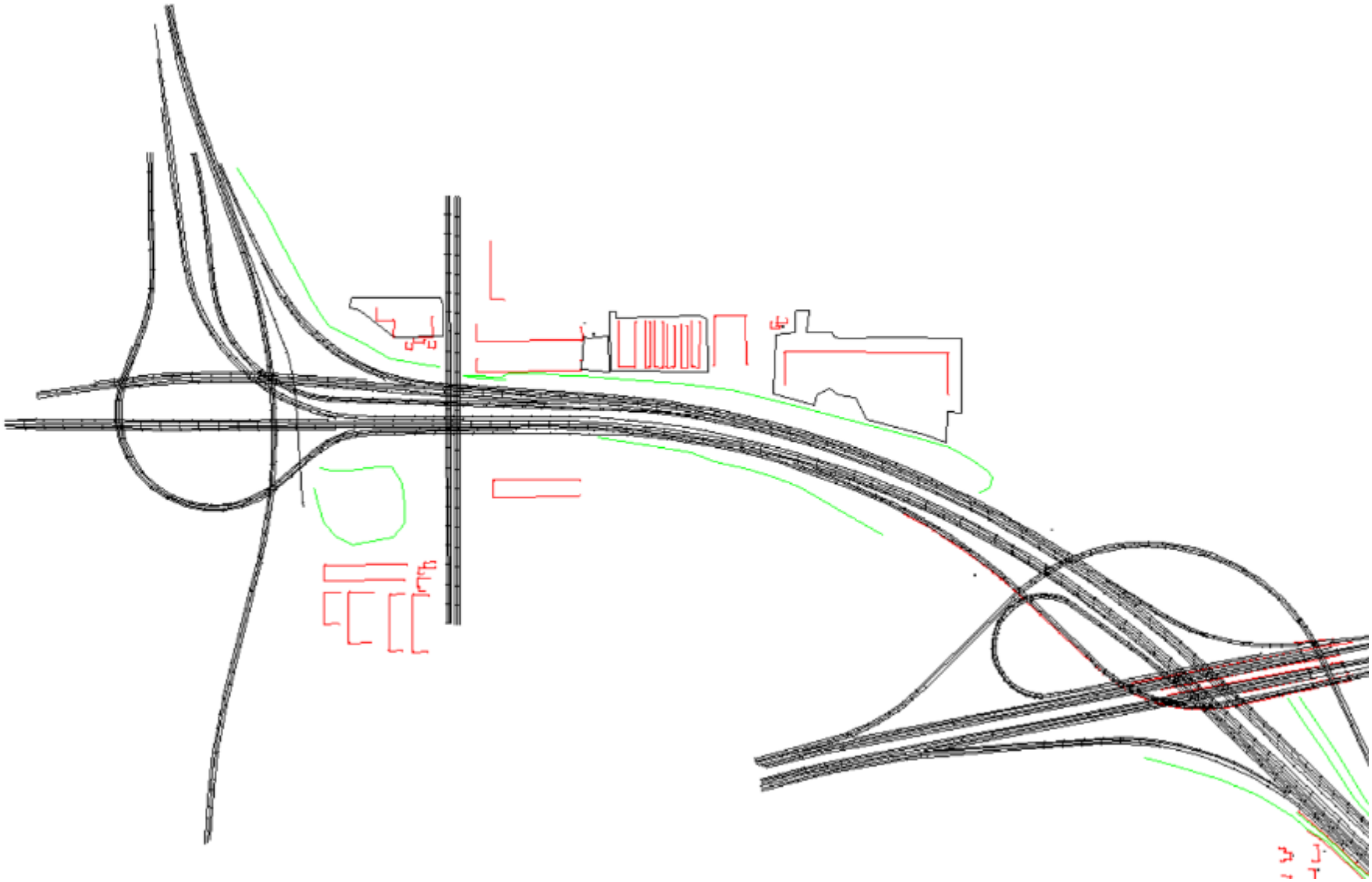


Figure 10 TNM Model Objects for Design Year (2050) EL Build Alternative

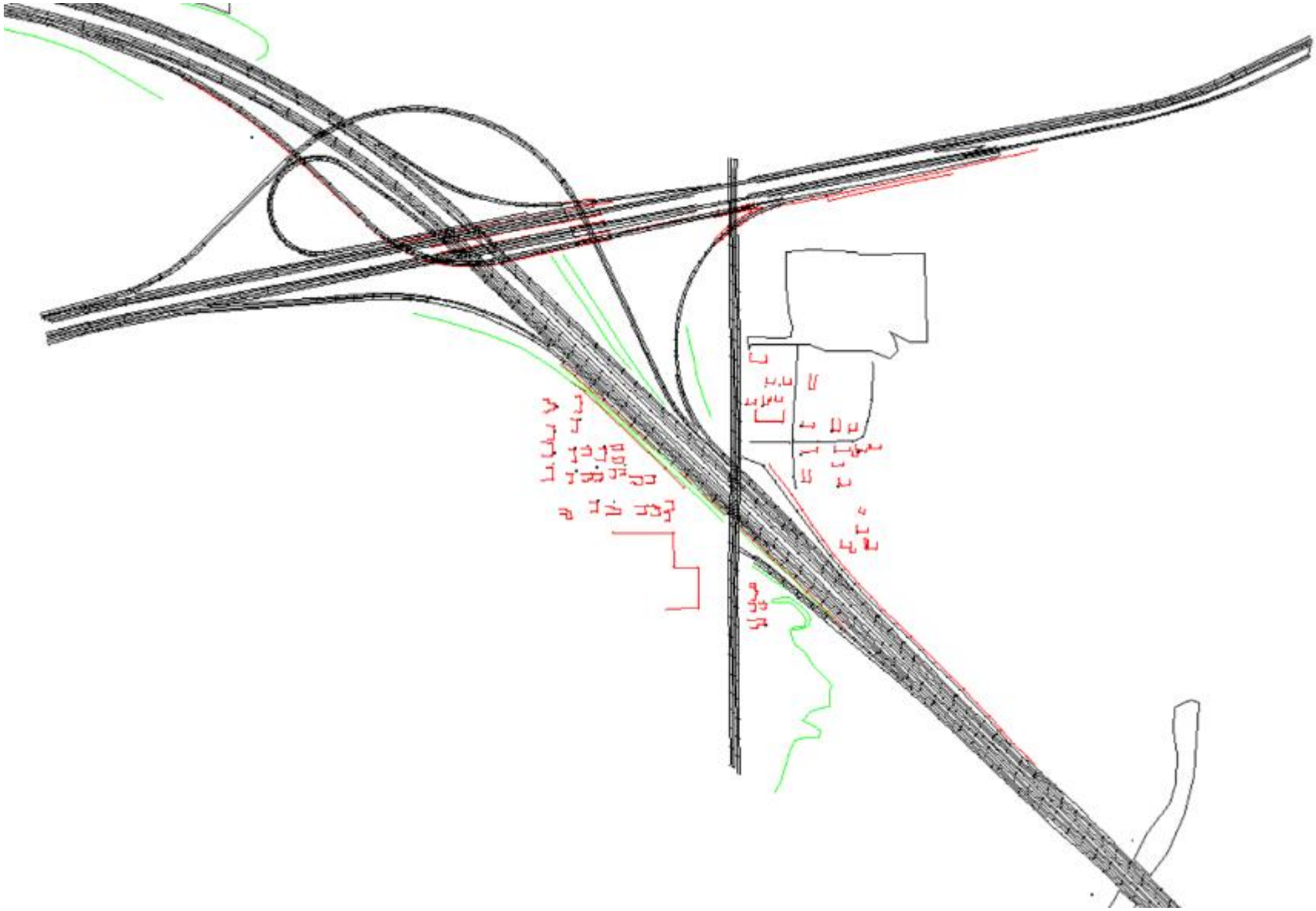


Figure 11 TNM Model Objects for Design Year (2050) EL Build Alternative

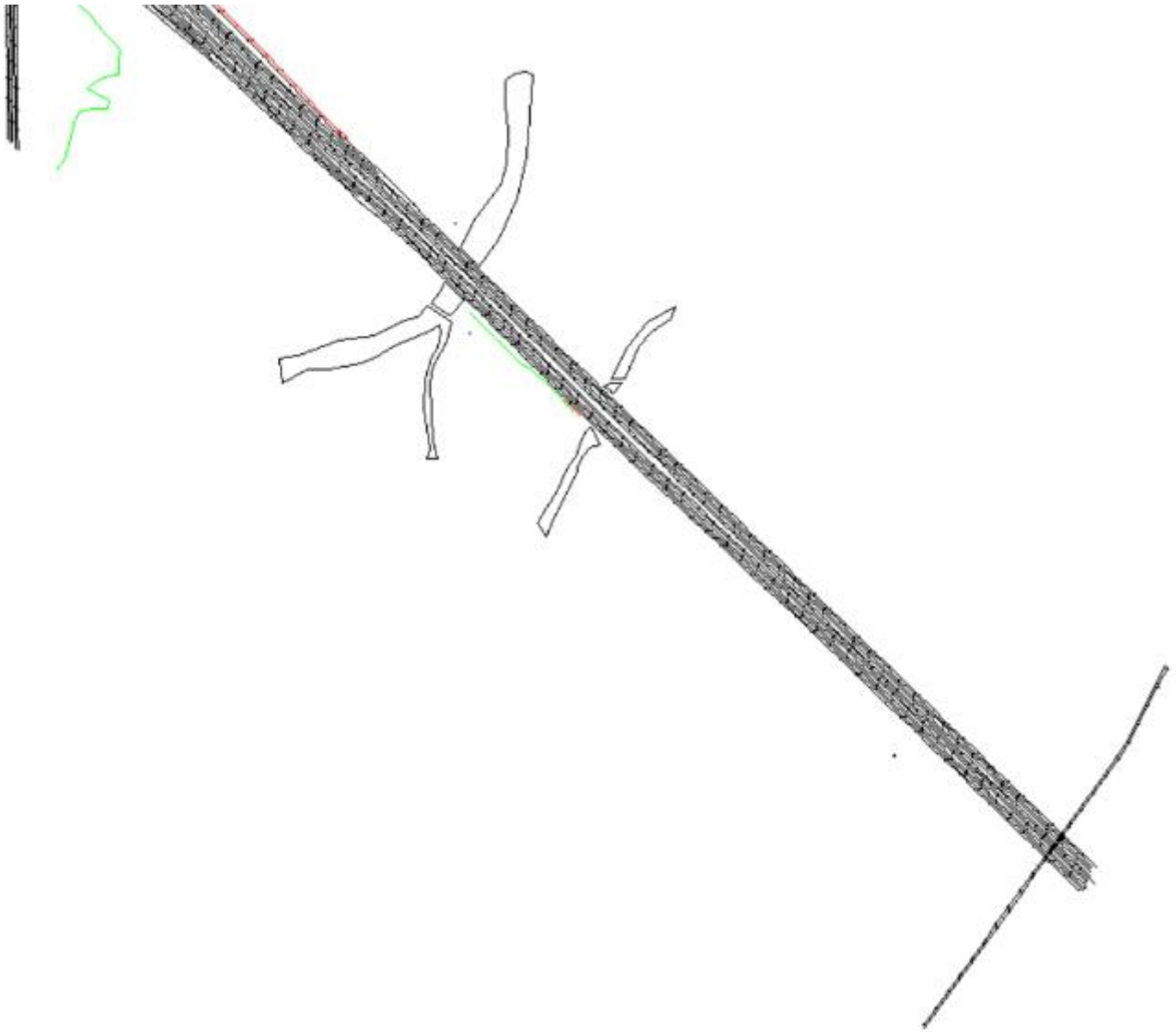


Figure 12 TNM Model Objects for Design Year (2050) EL Build Alternative

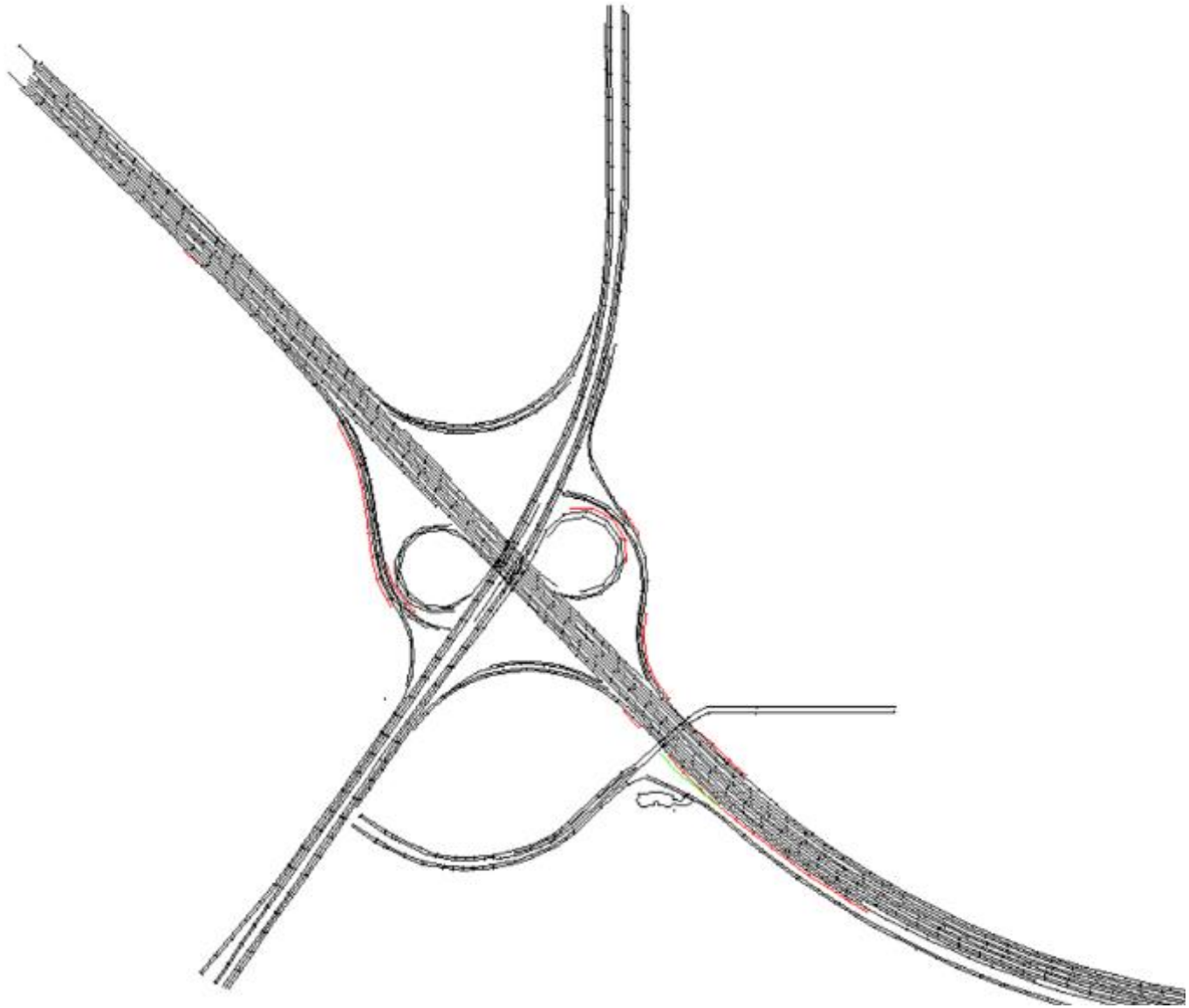


Figure 13 TNM Model Objects for Design Year (2050) EL Build Alternative

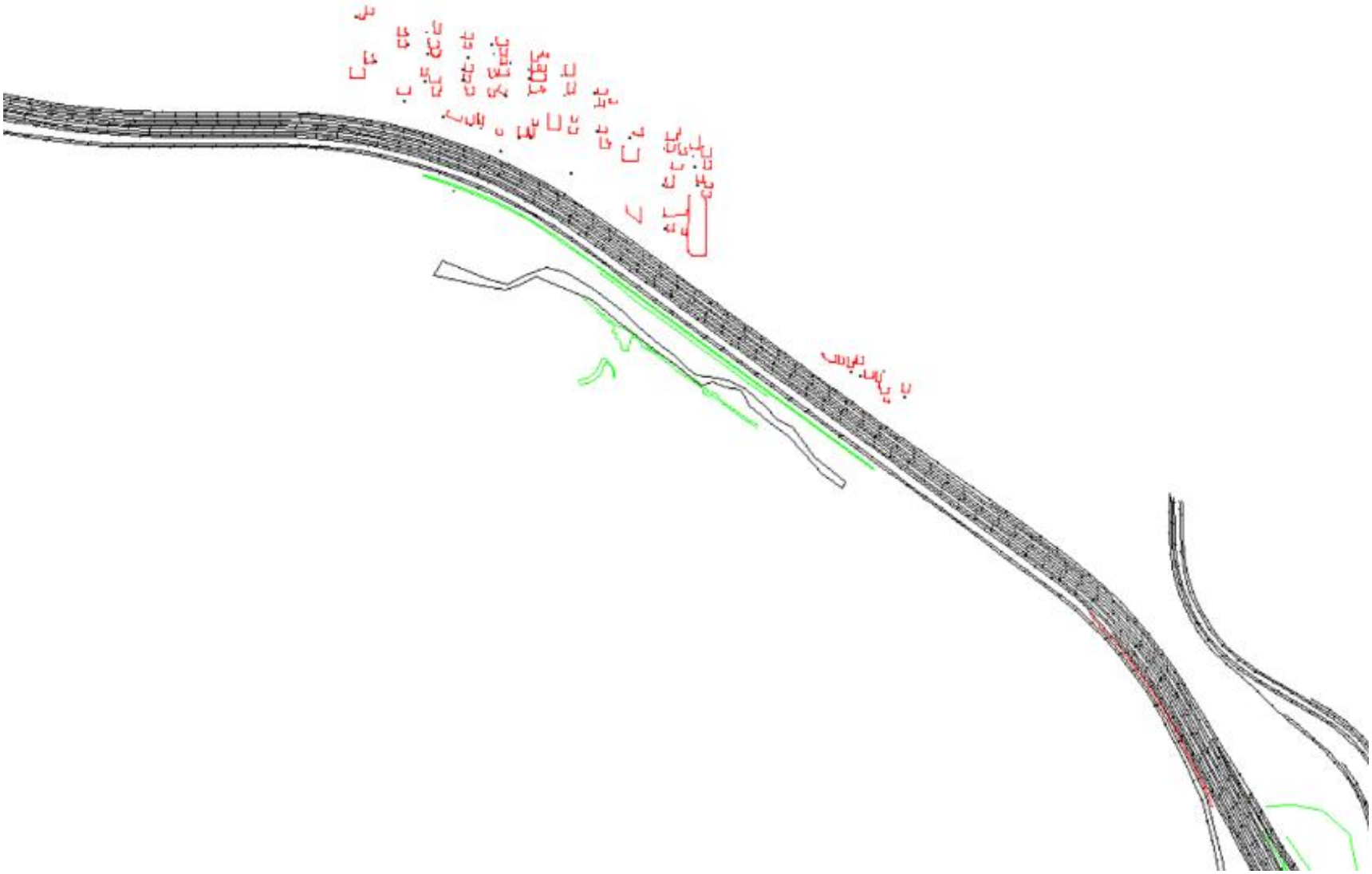


Figure 14 TNM Model Objects for Design Year (2050) EL Build Alternative

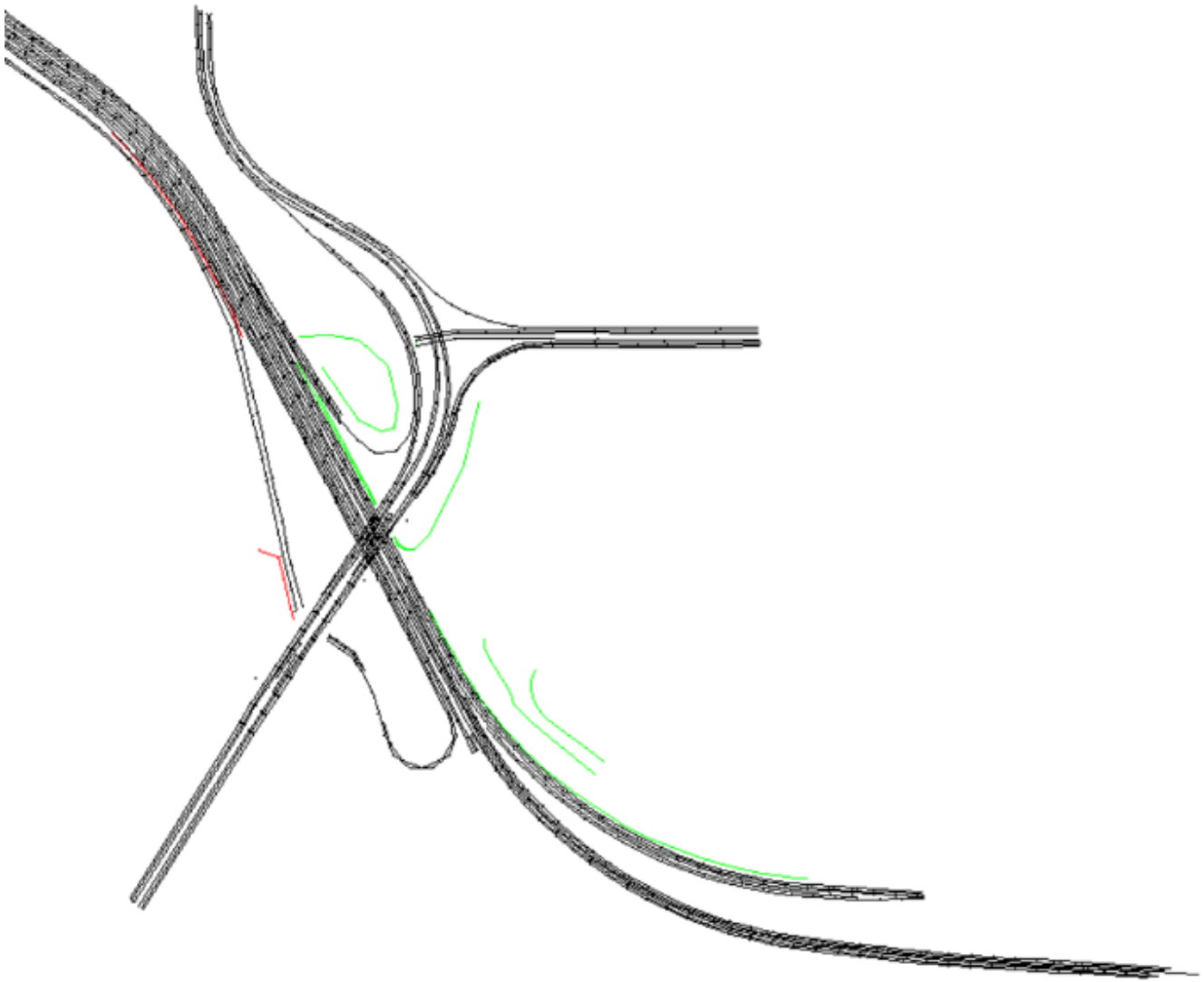


Figure 15 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

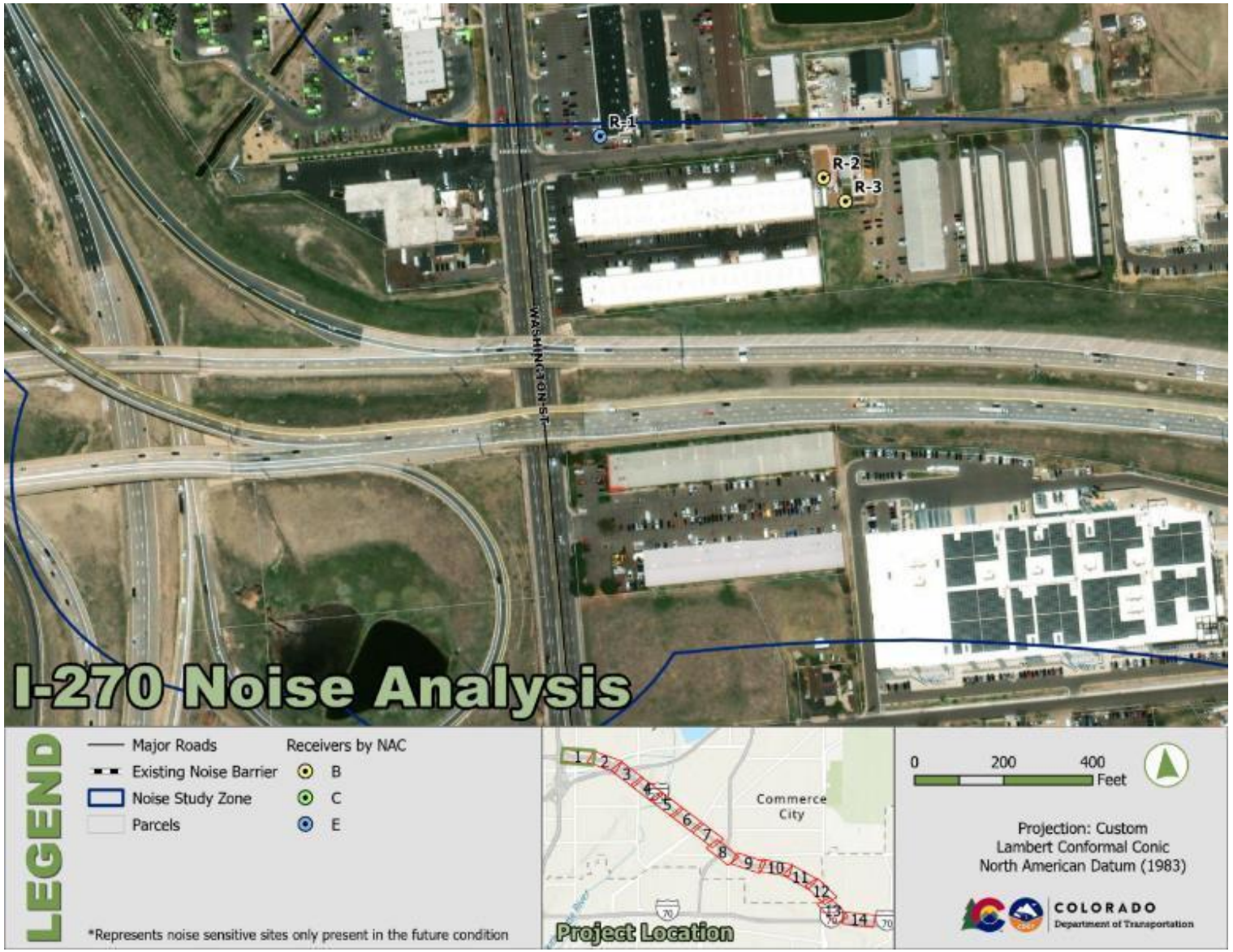


Figure 16 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

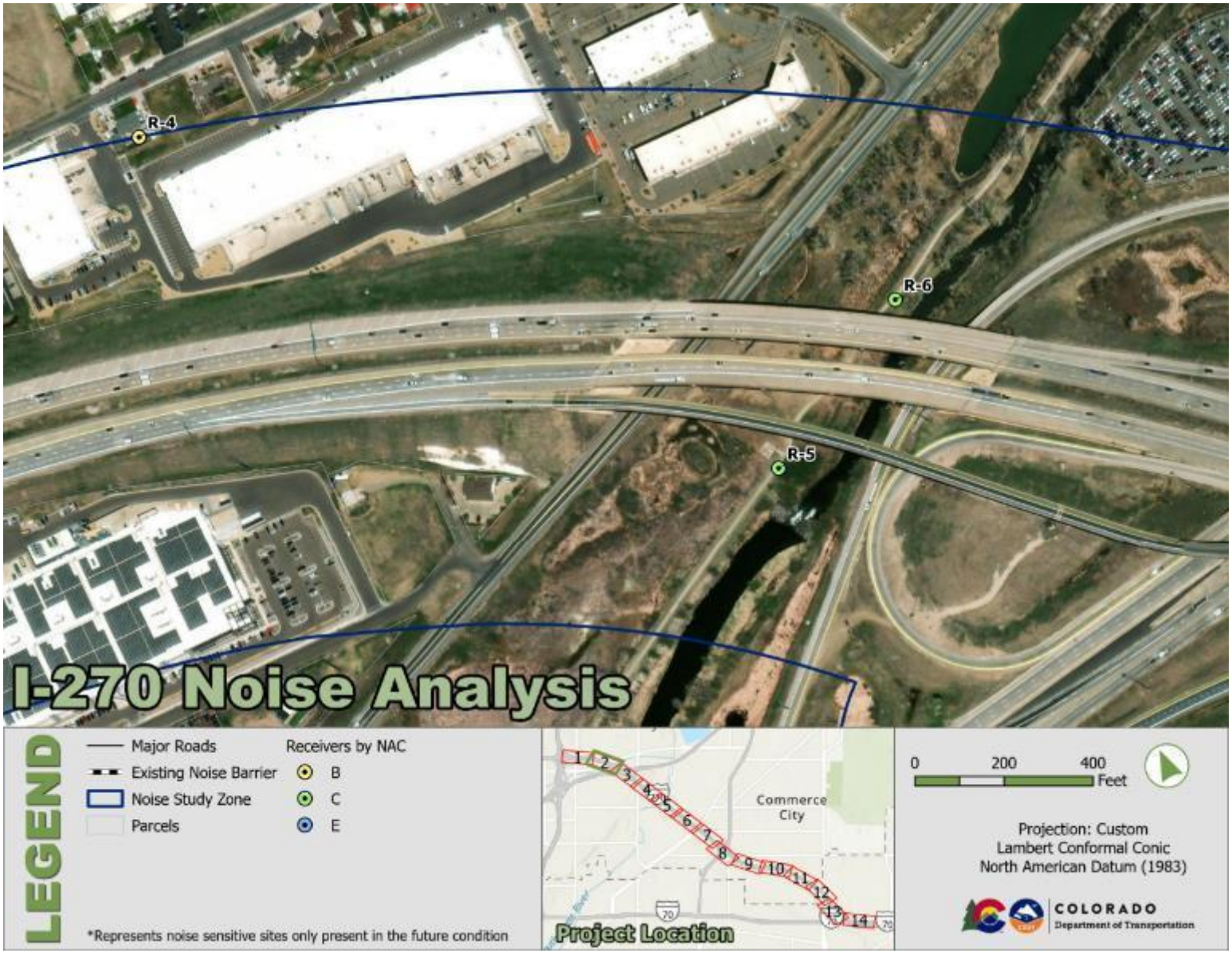


Figure 17 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

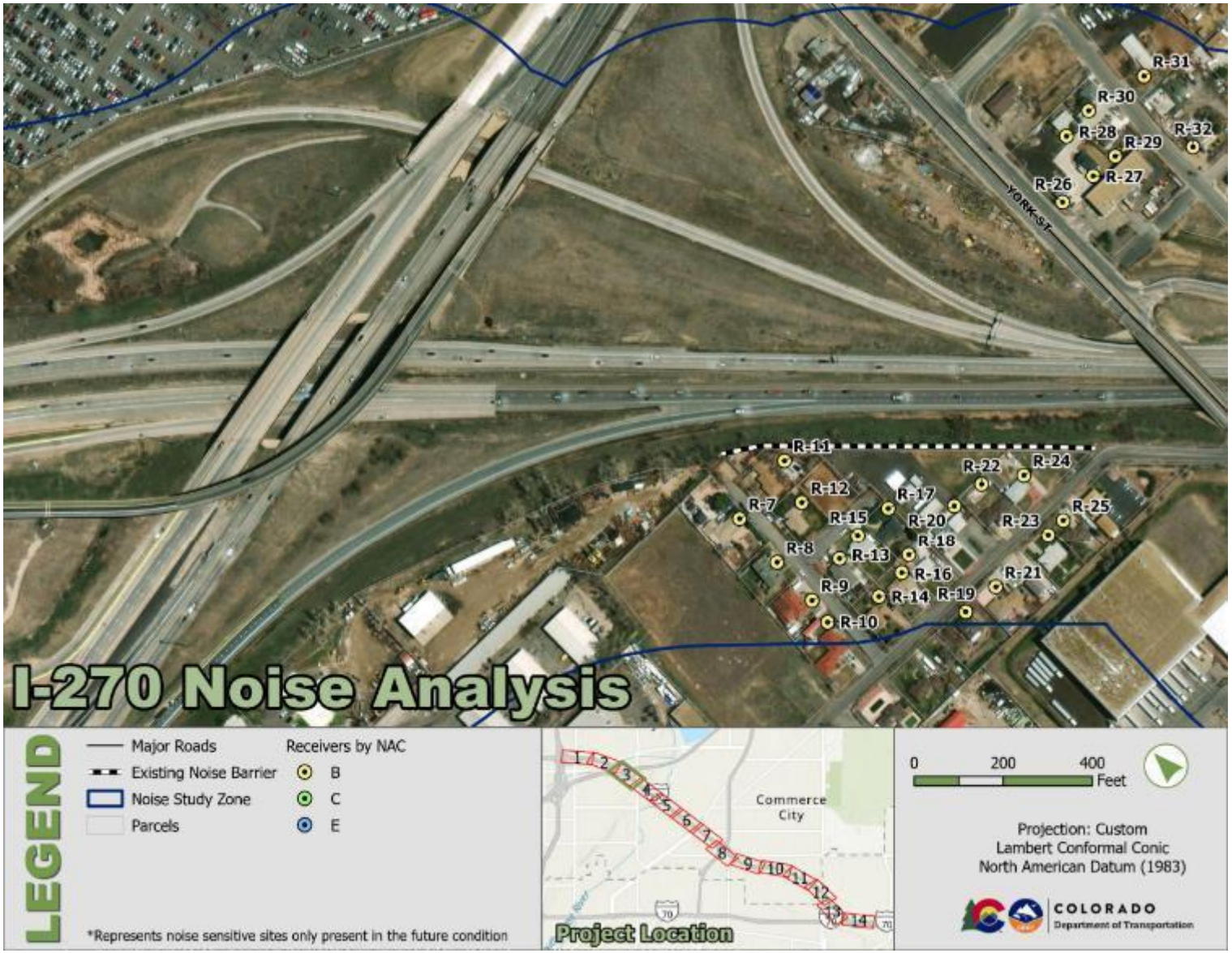


Figure 18 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

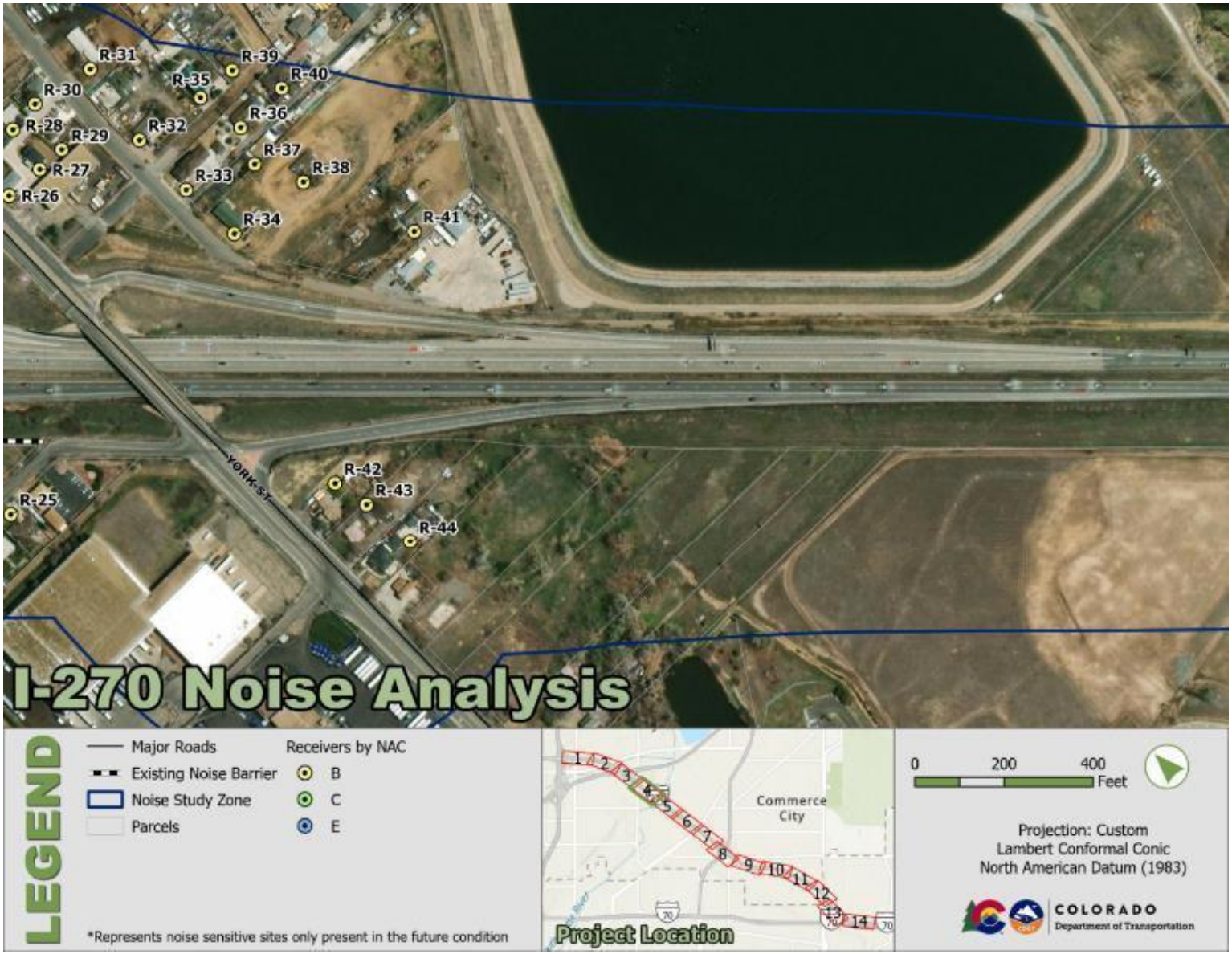


Figure 19 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

Figure 20 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

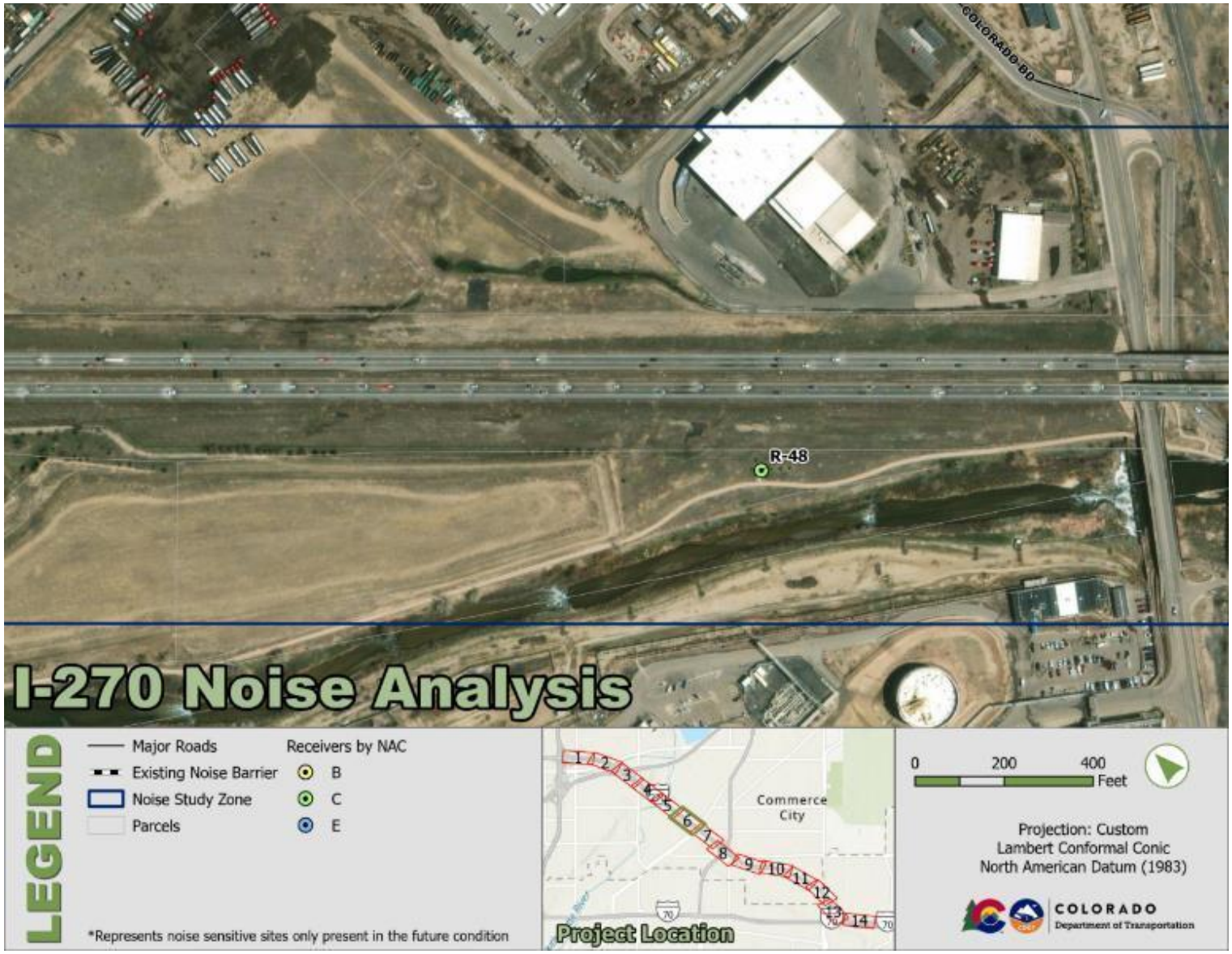


Figure 21 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

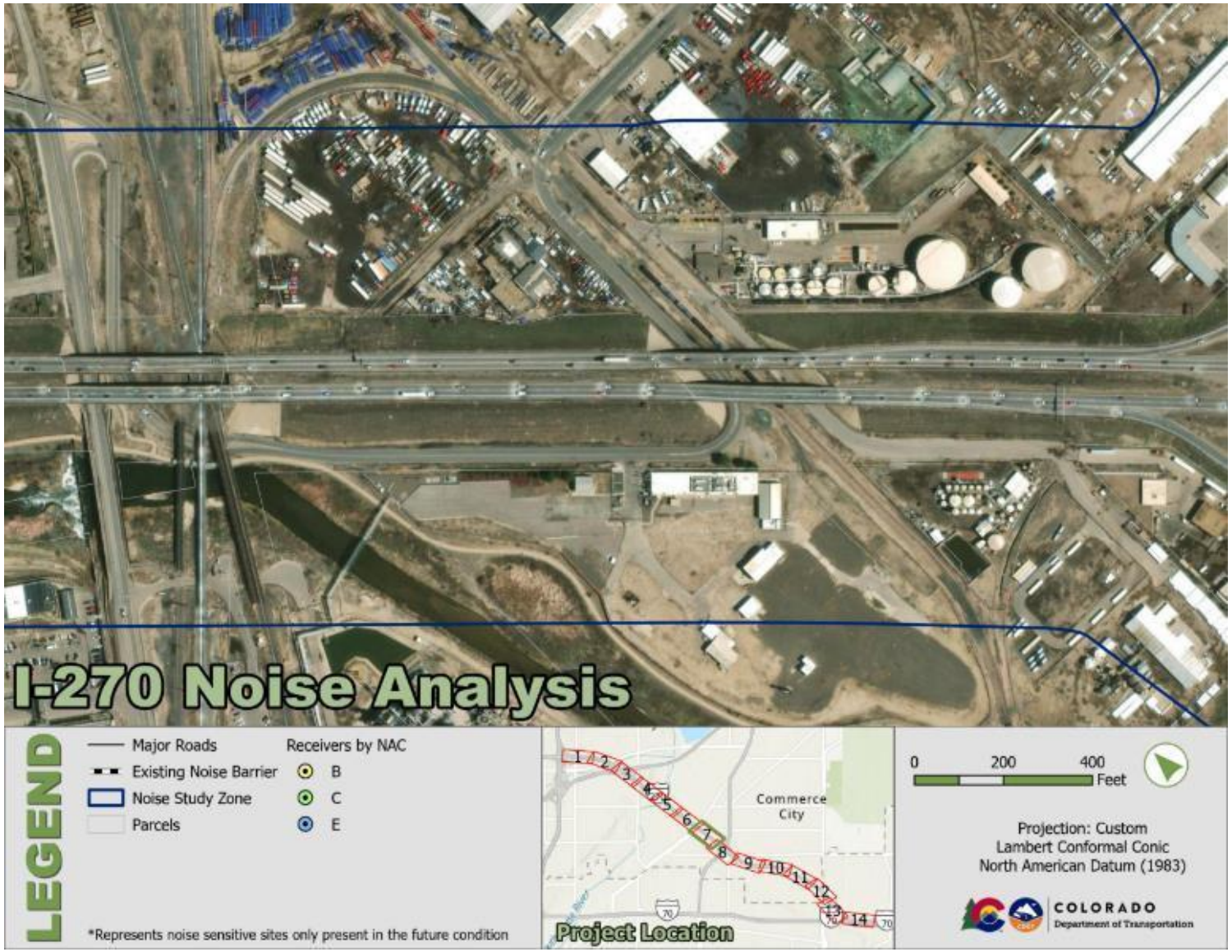


Figure 22 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

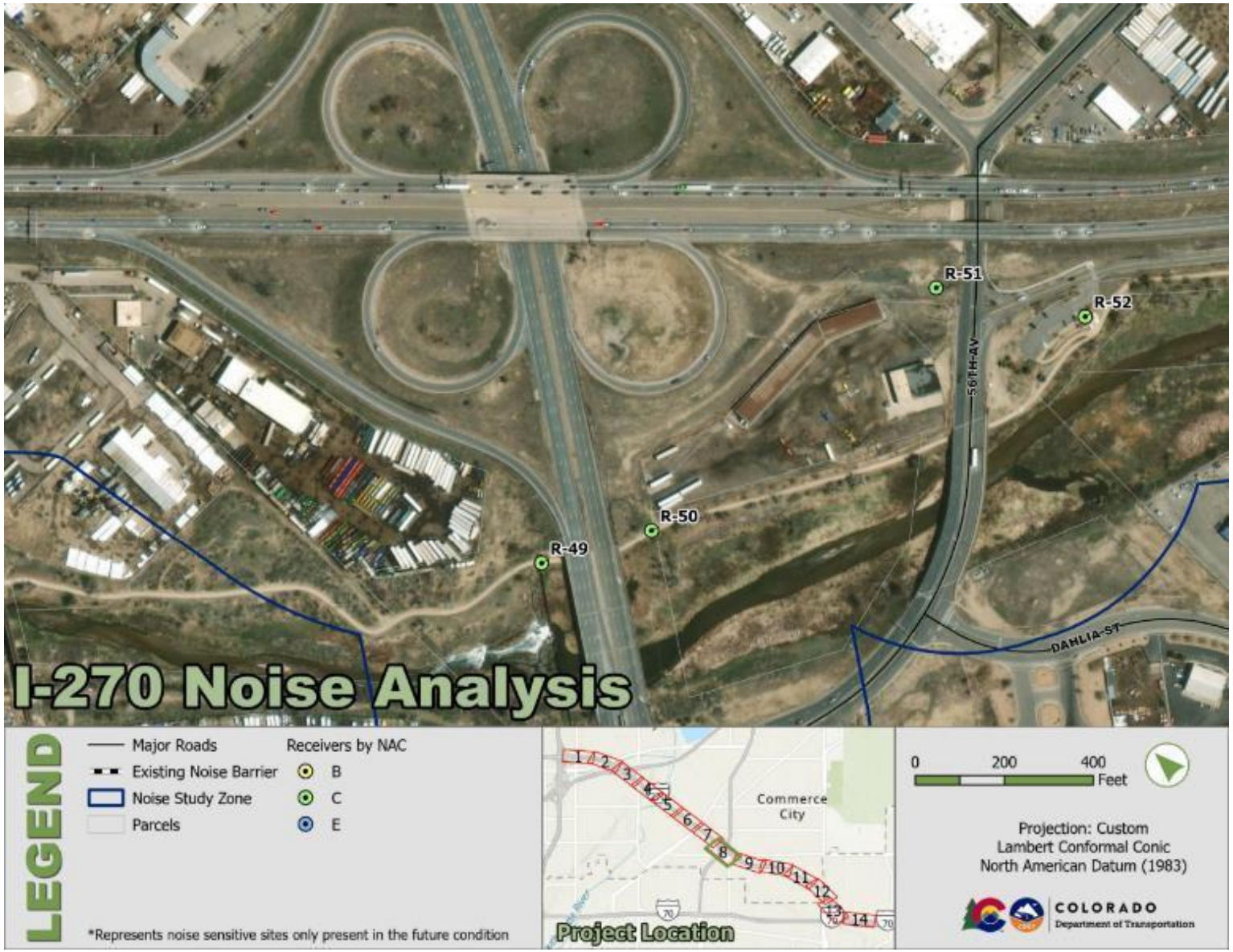


Figure 23 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

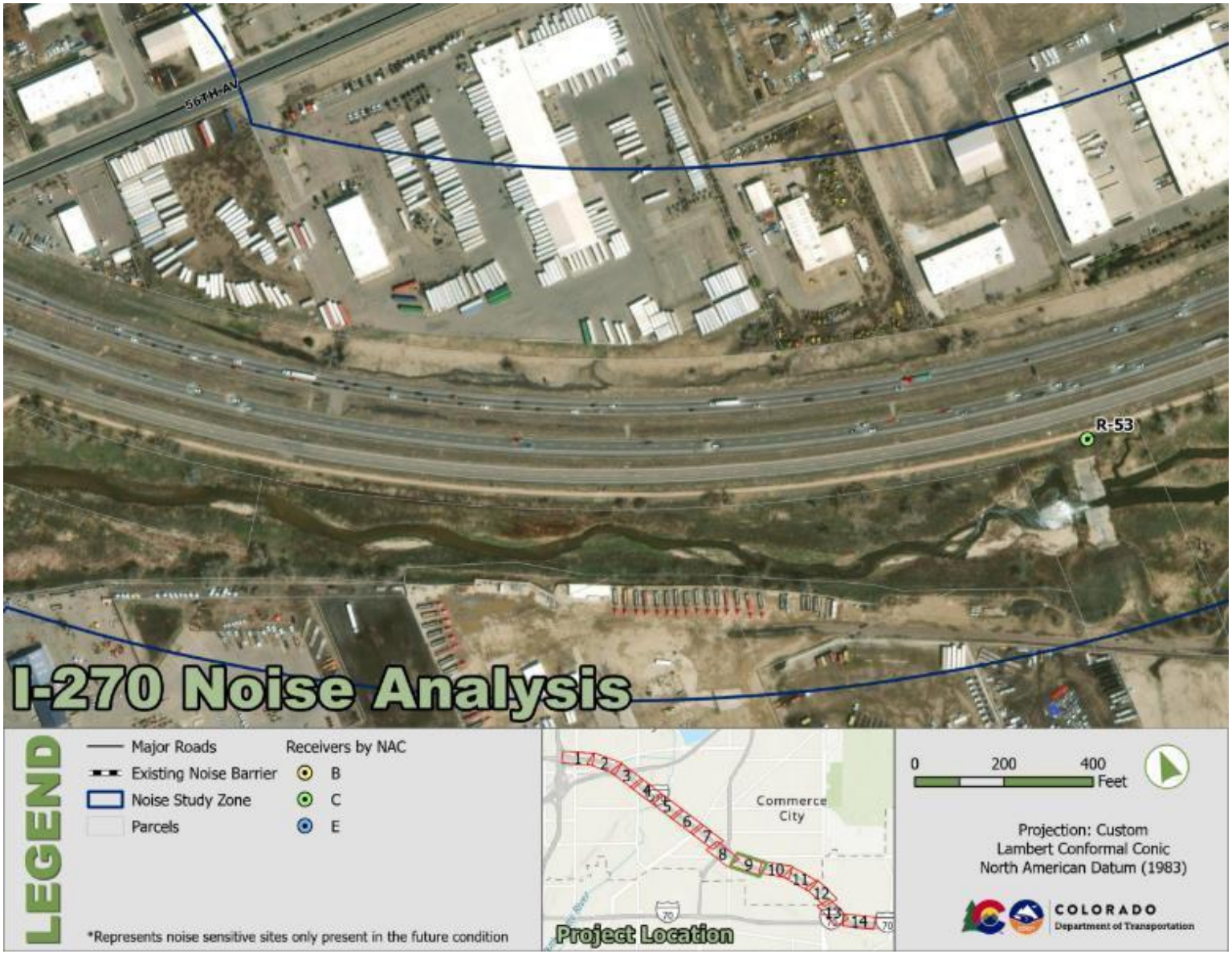
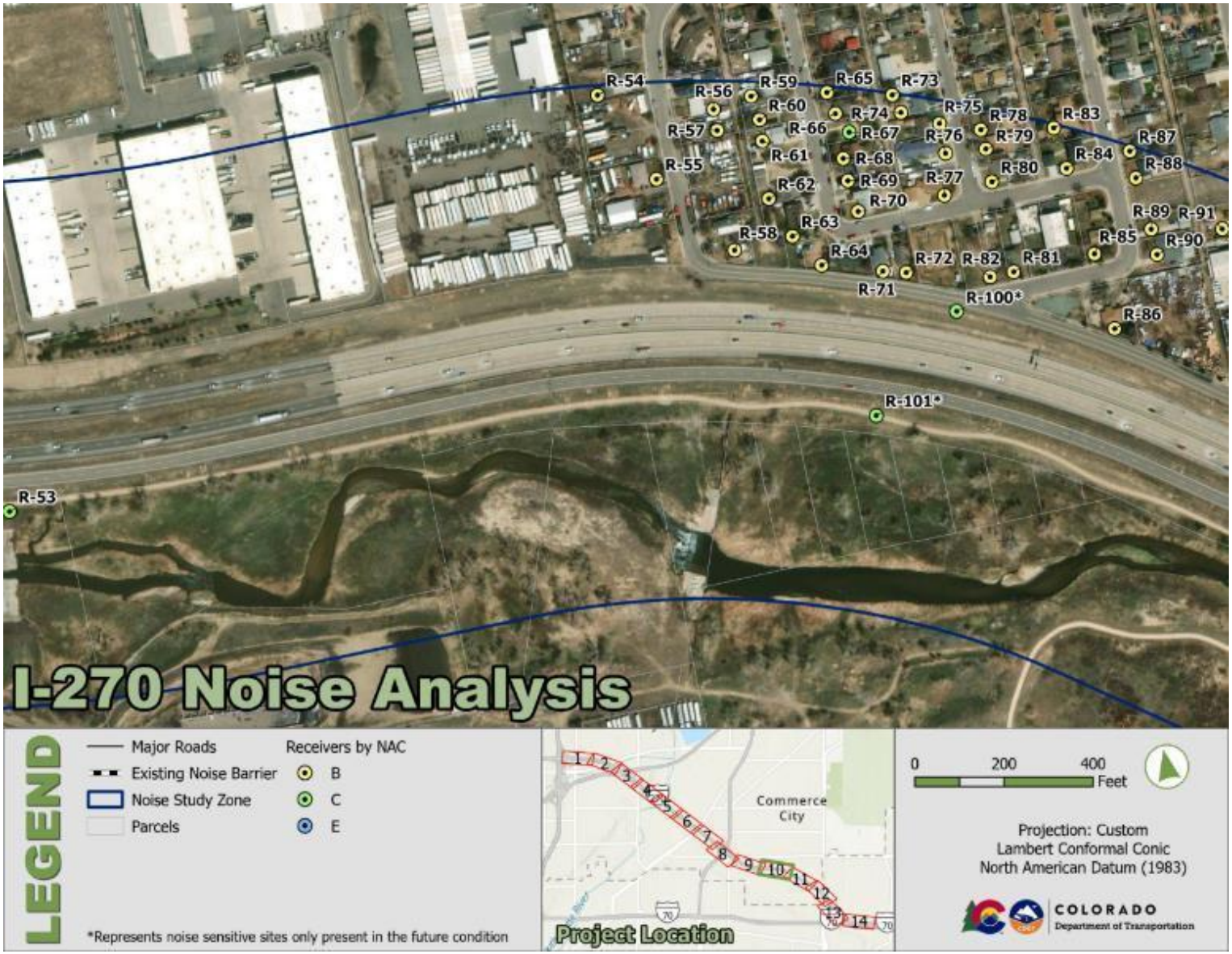


Figure 24 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative



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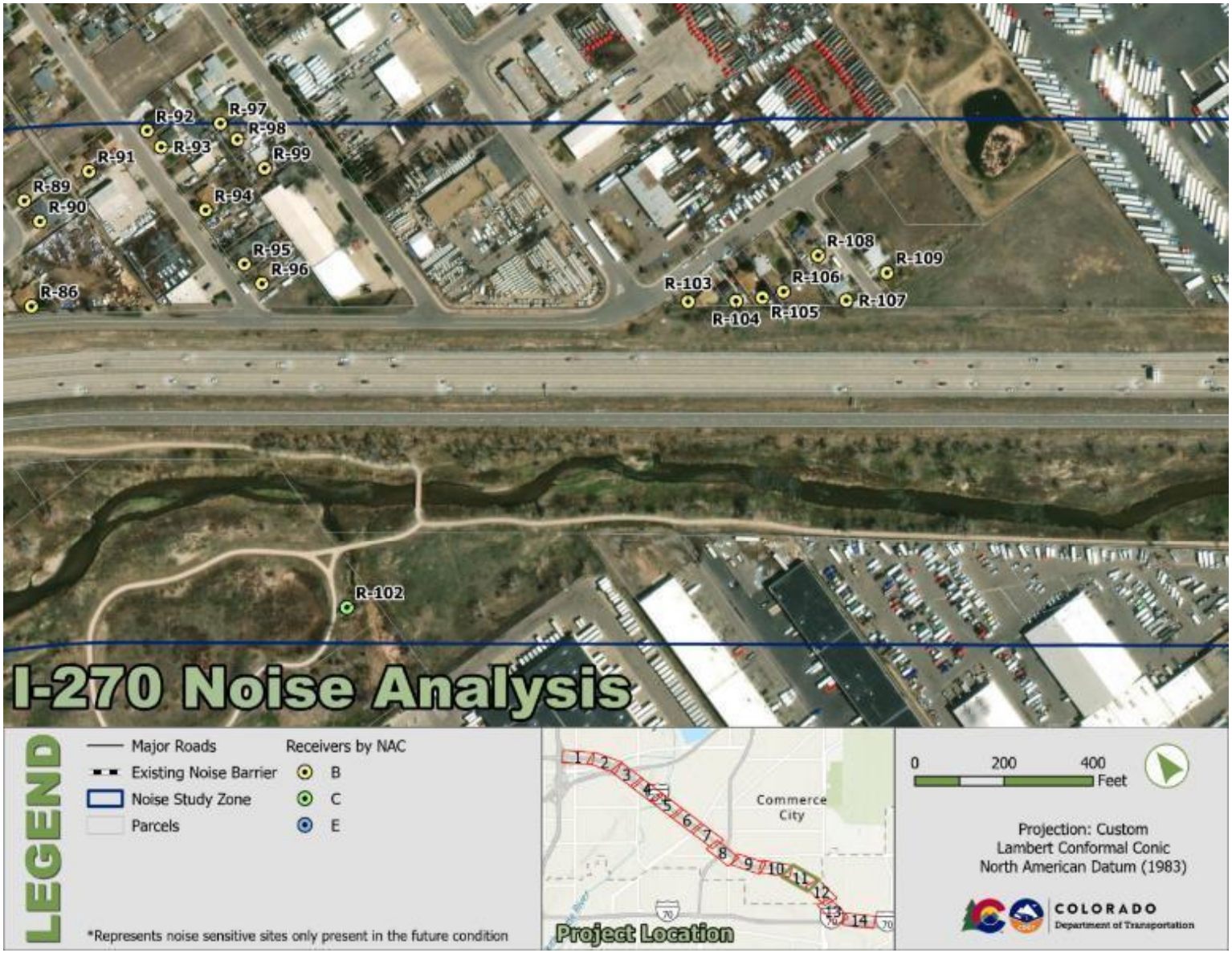

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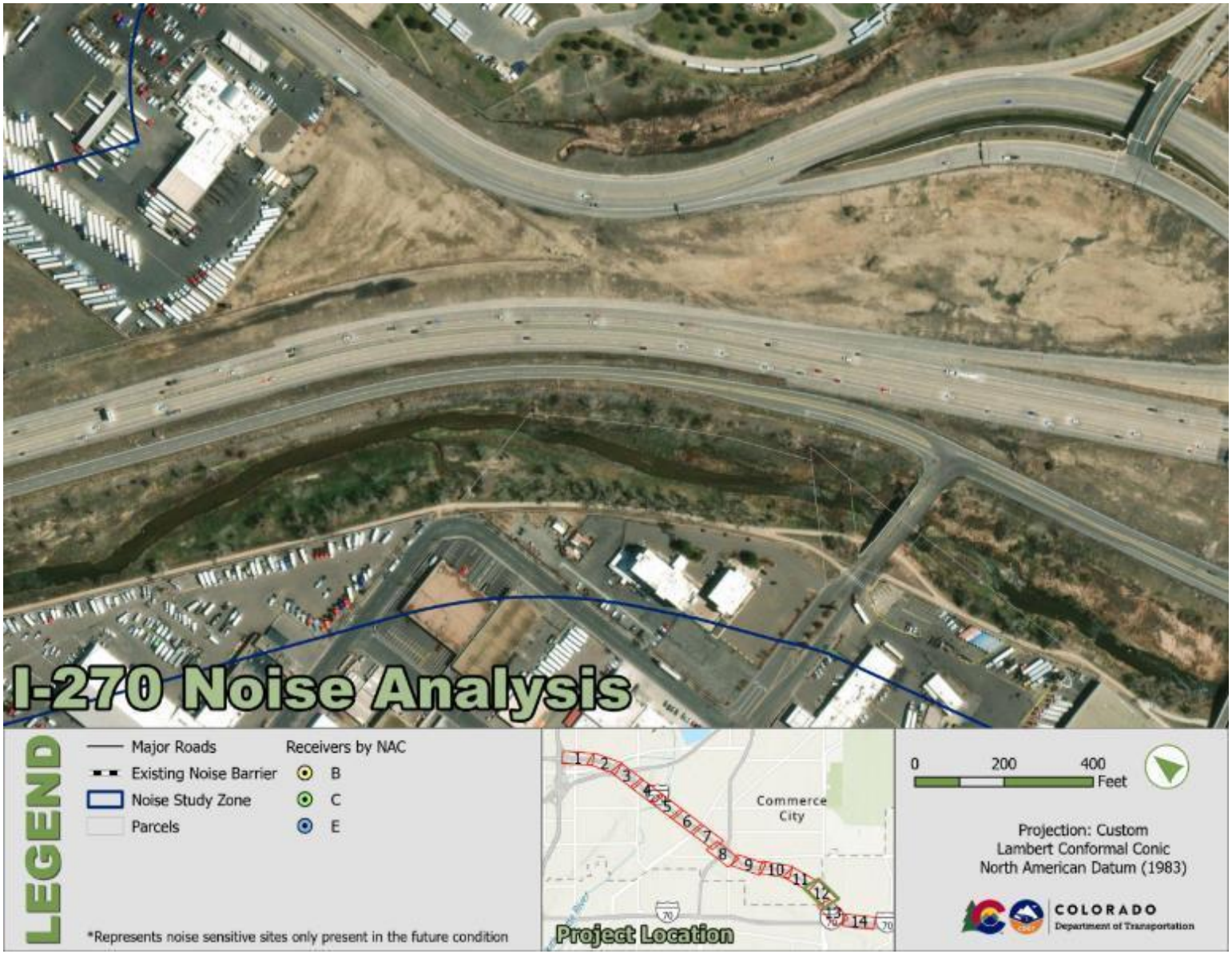


Figure 27 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

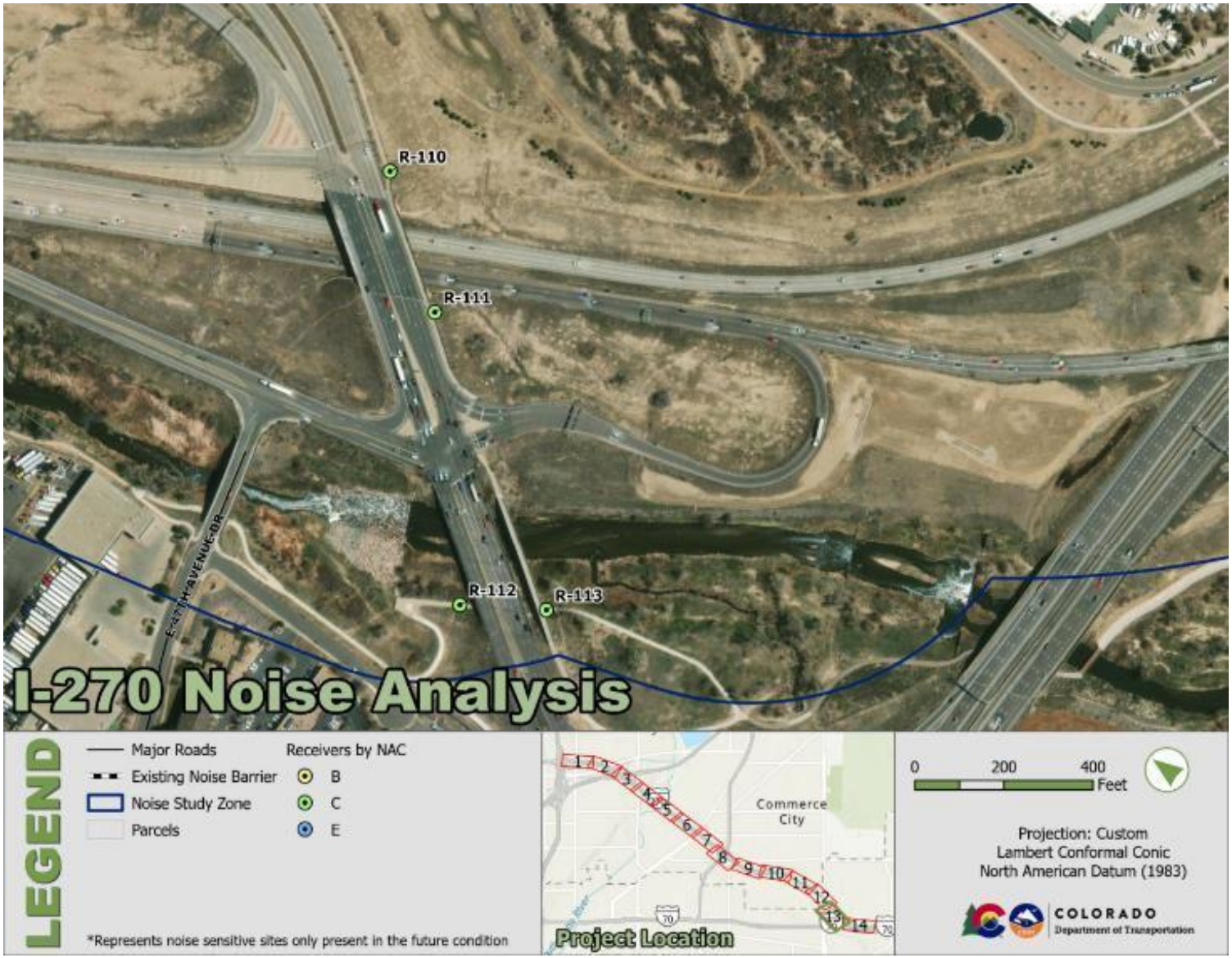


Figure 28 Roadways and Receiver Locations for Existing Condition (2023) and Design Year (2050) No Action Alternative

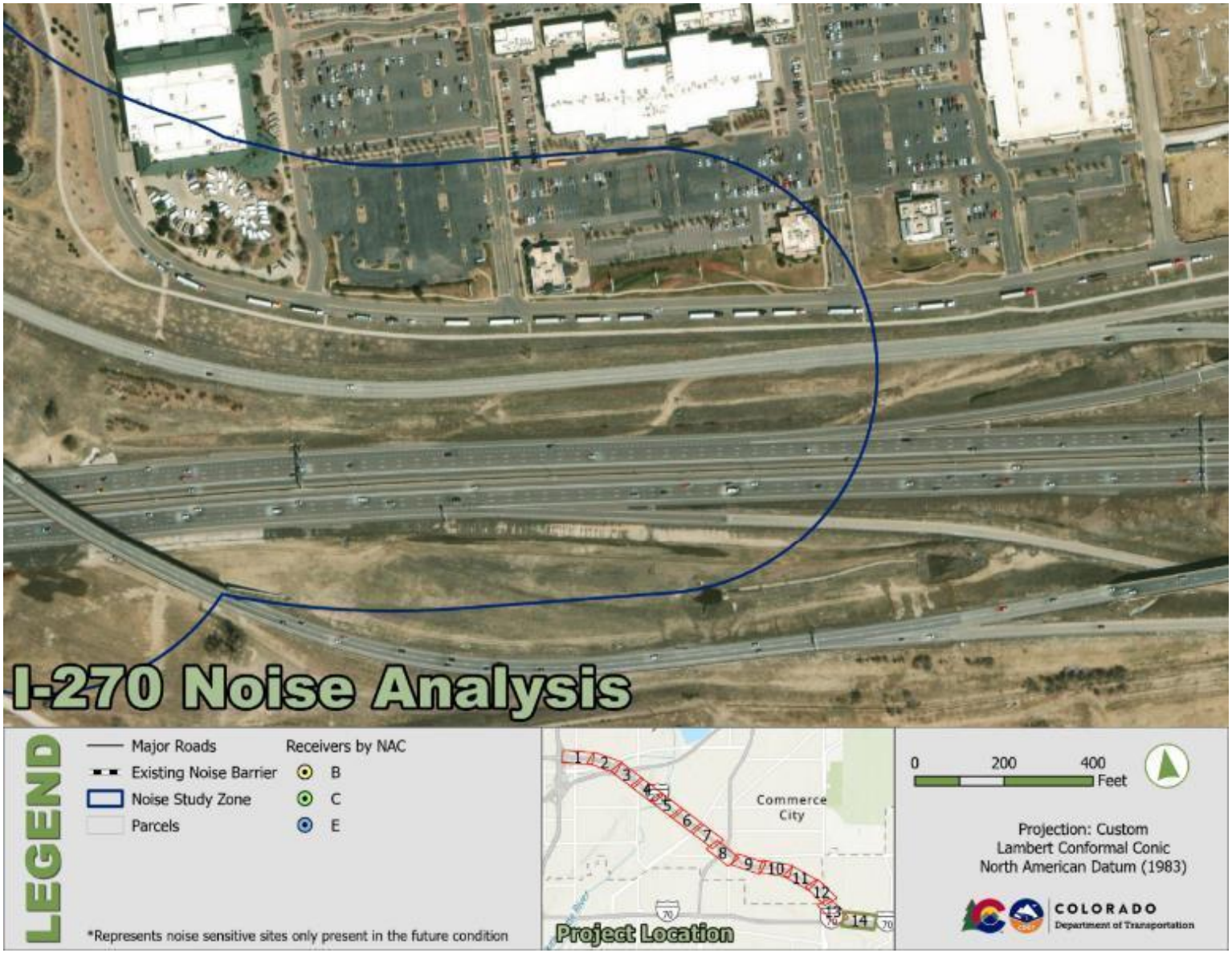


Figure 29 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

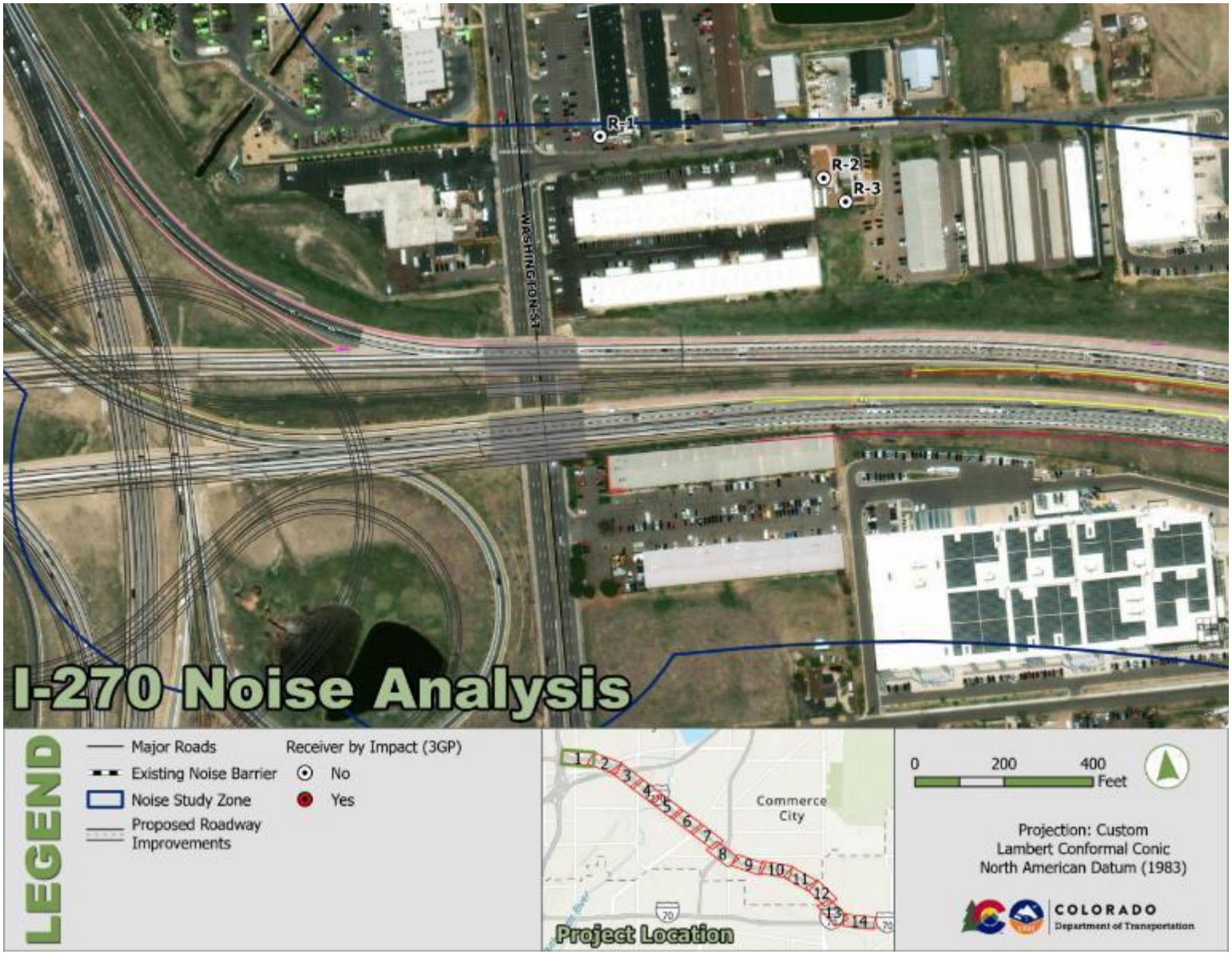


Figure 30 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

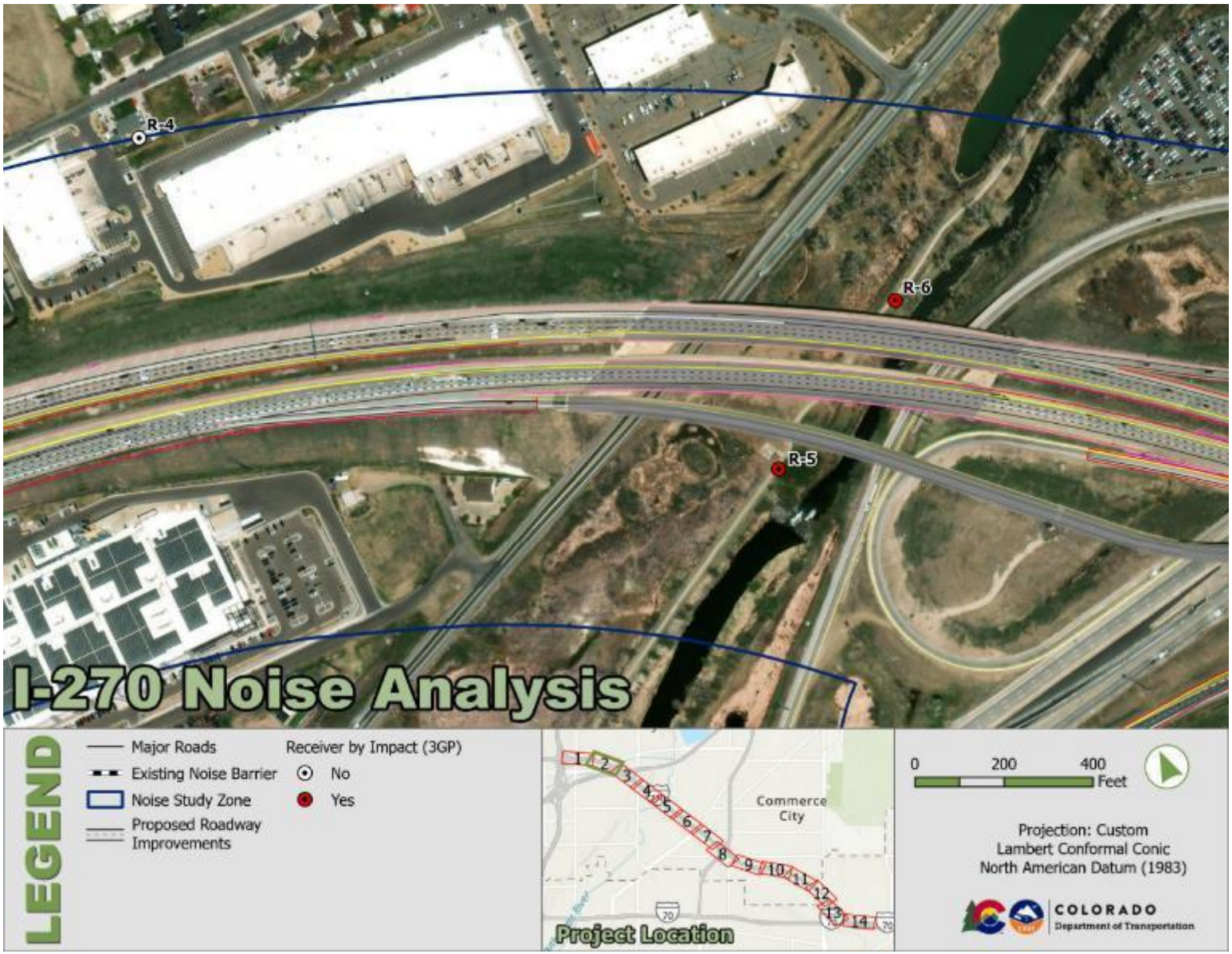


Figure 31 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

Figure 32 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

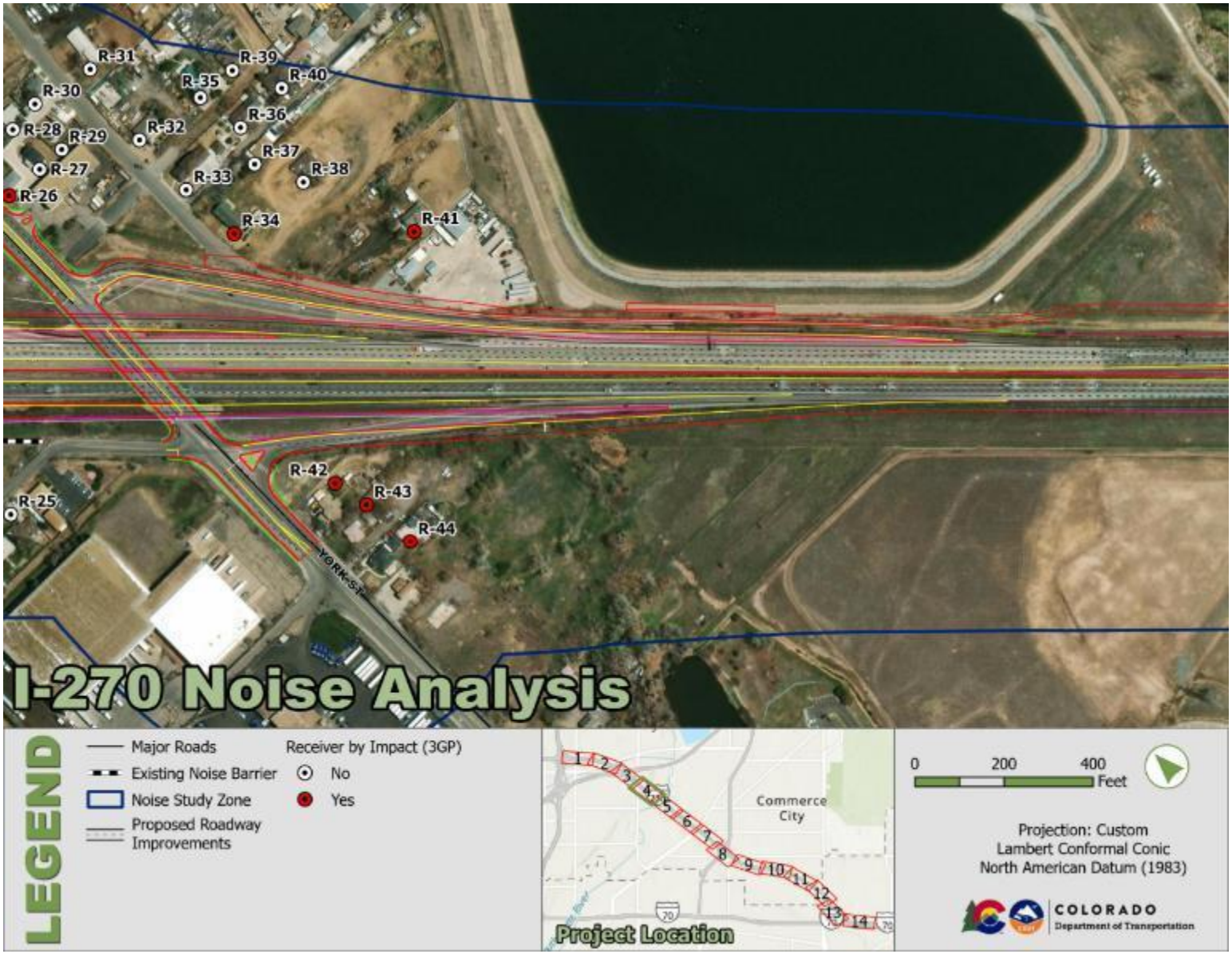


Figure 33 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

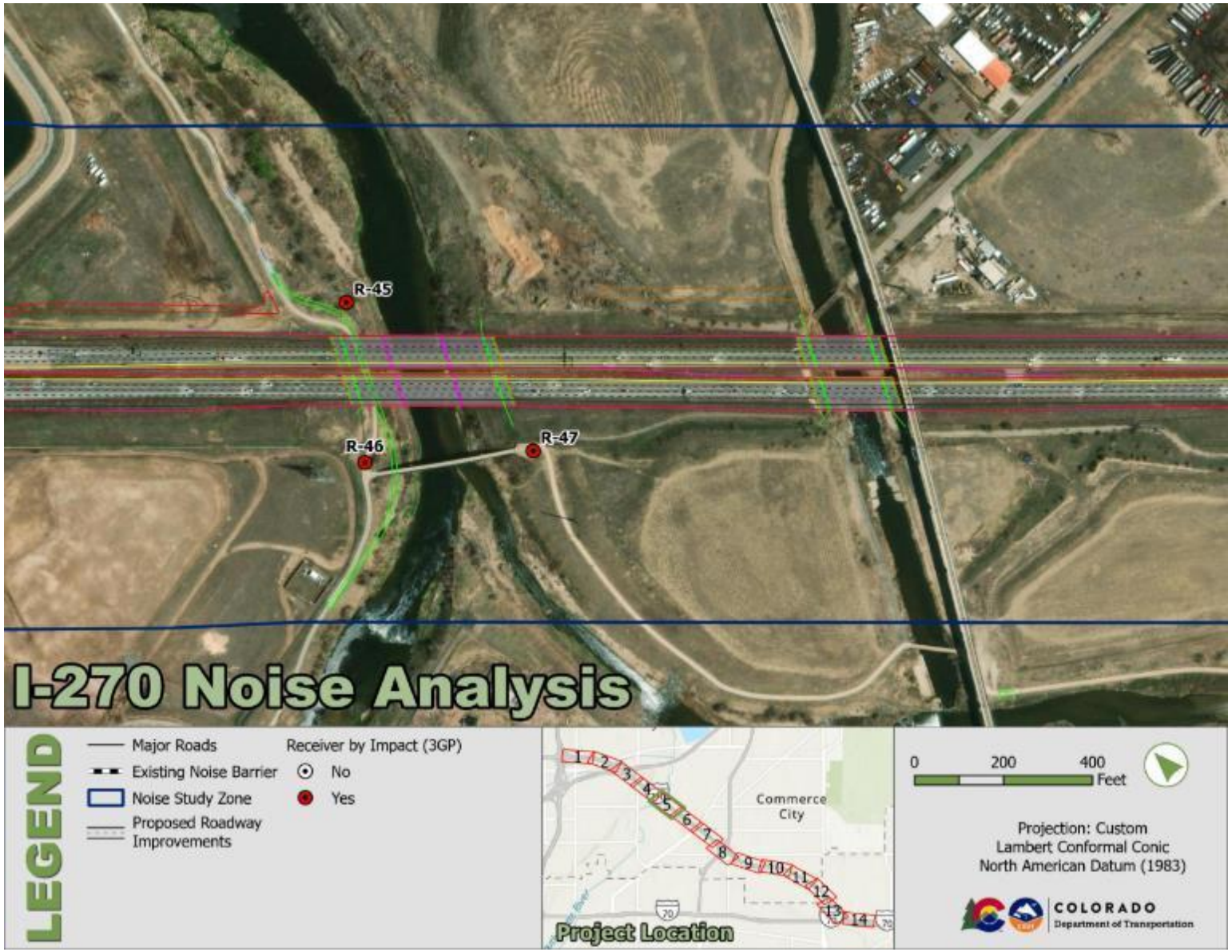


Figure 34 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

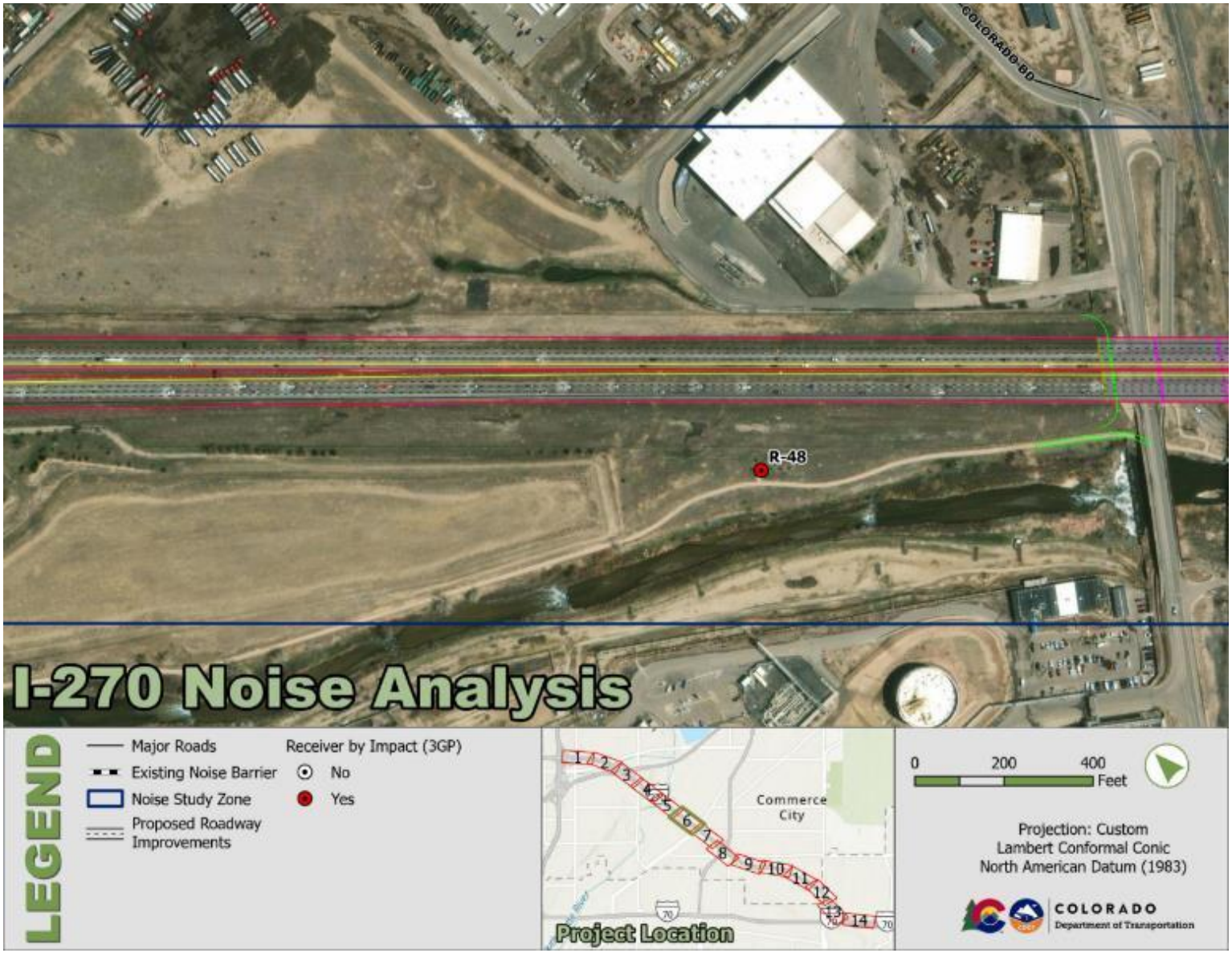


Figure 35 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

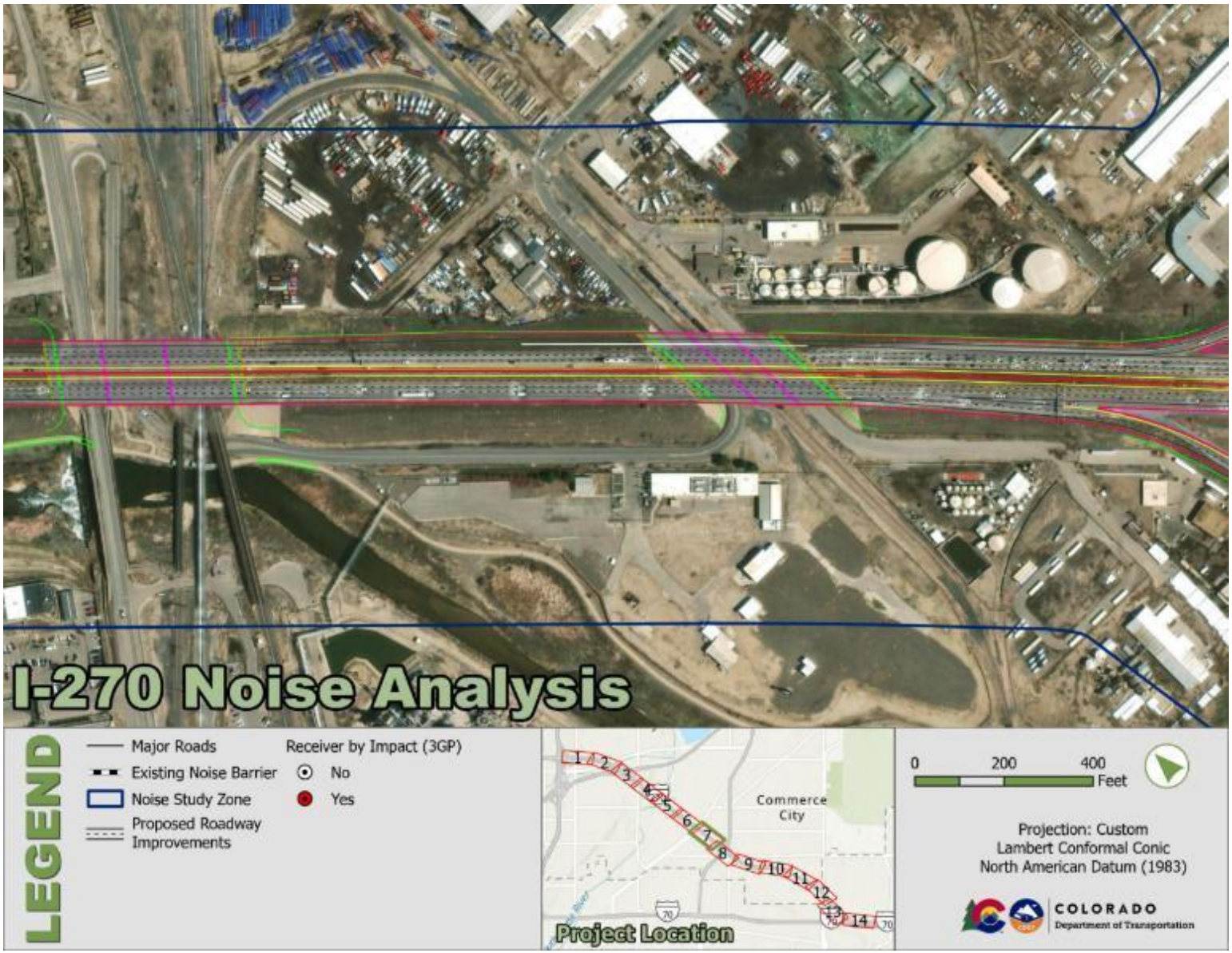


Figure 36 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

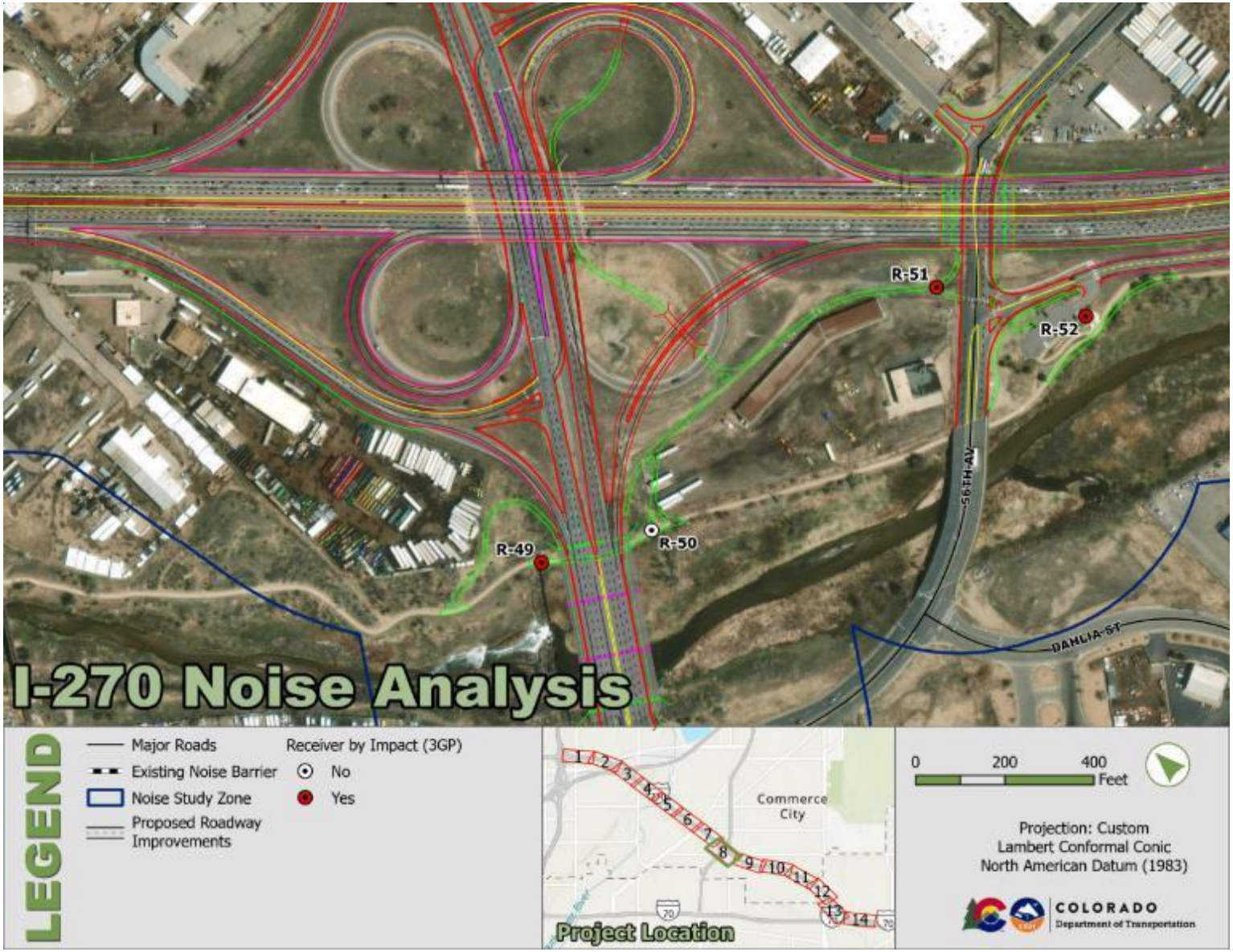


Figure 37 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

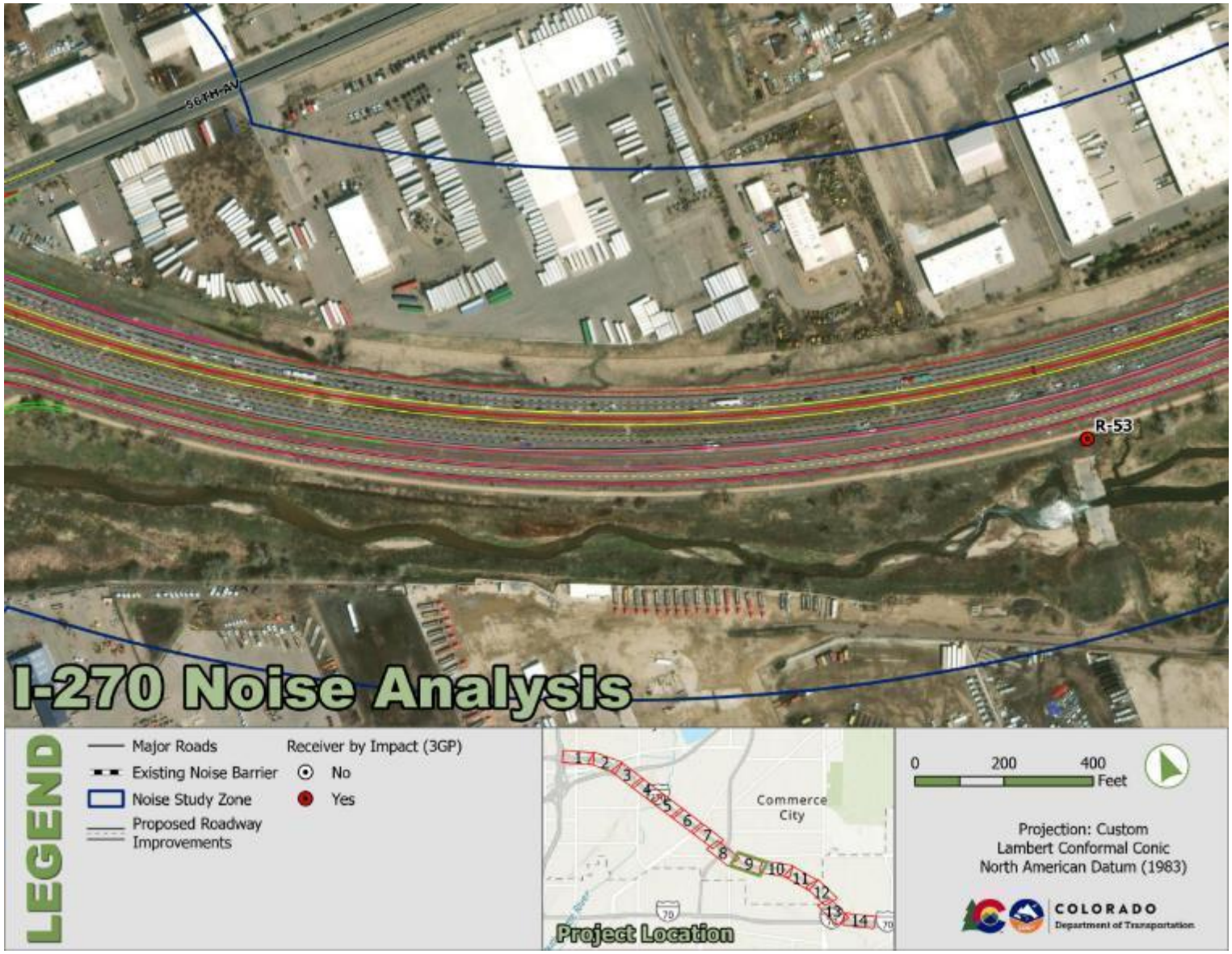


Figure 38 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

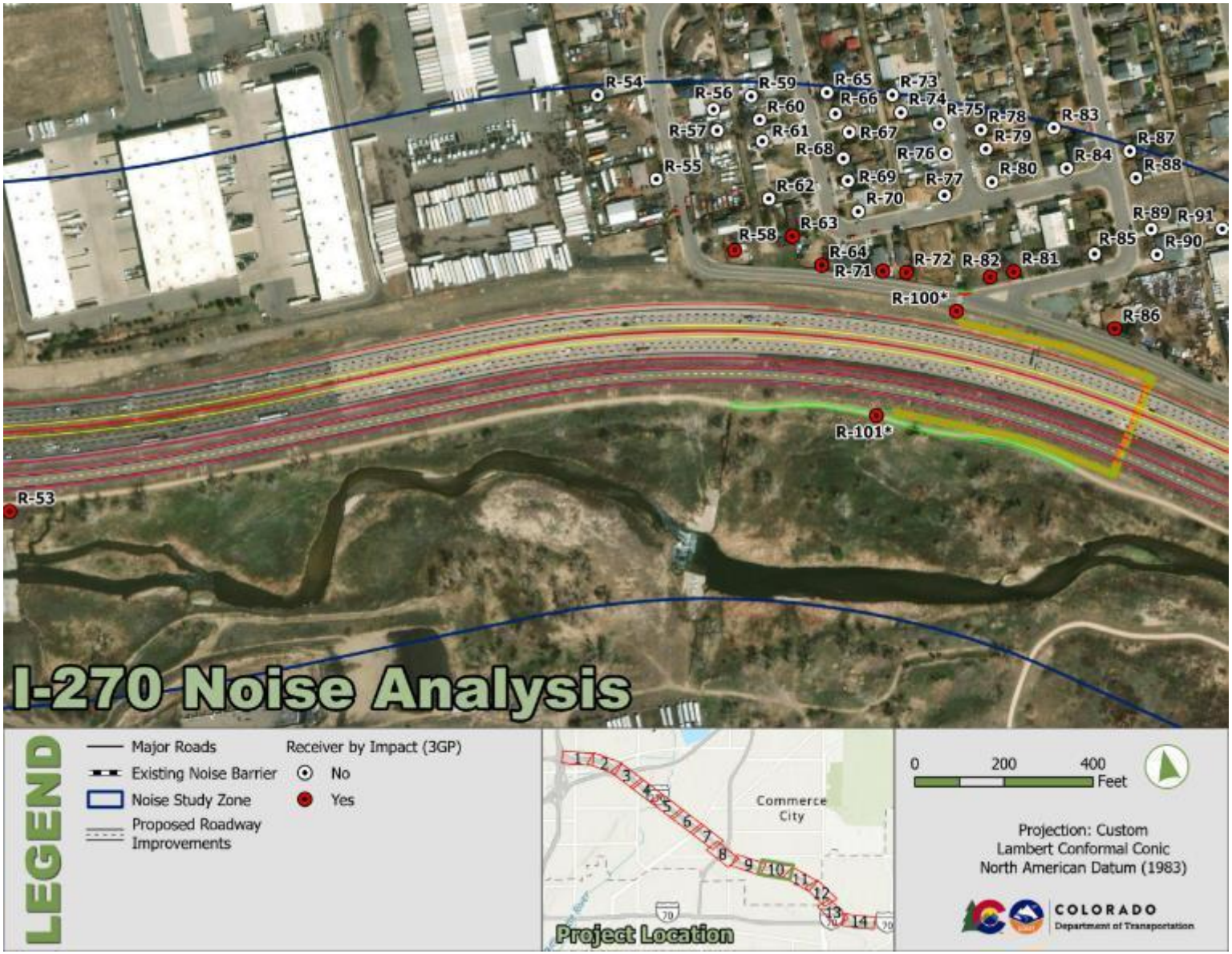


Figure 39 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

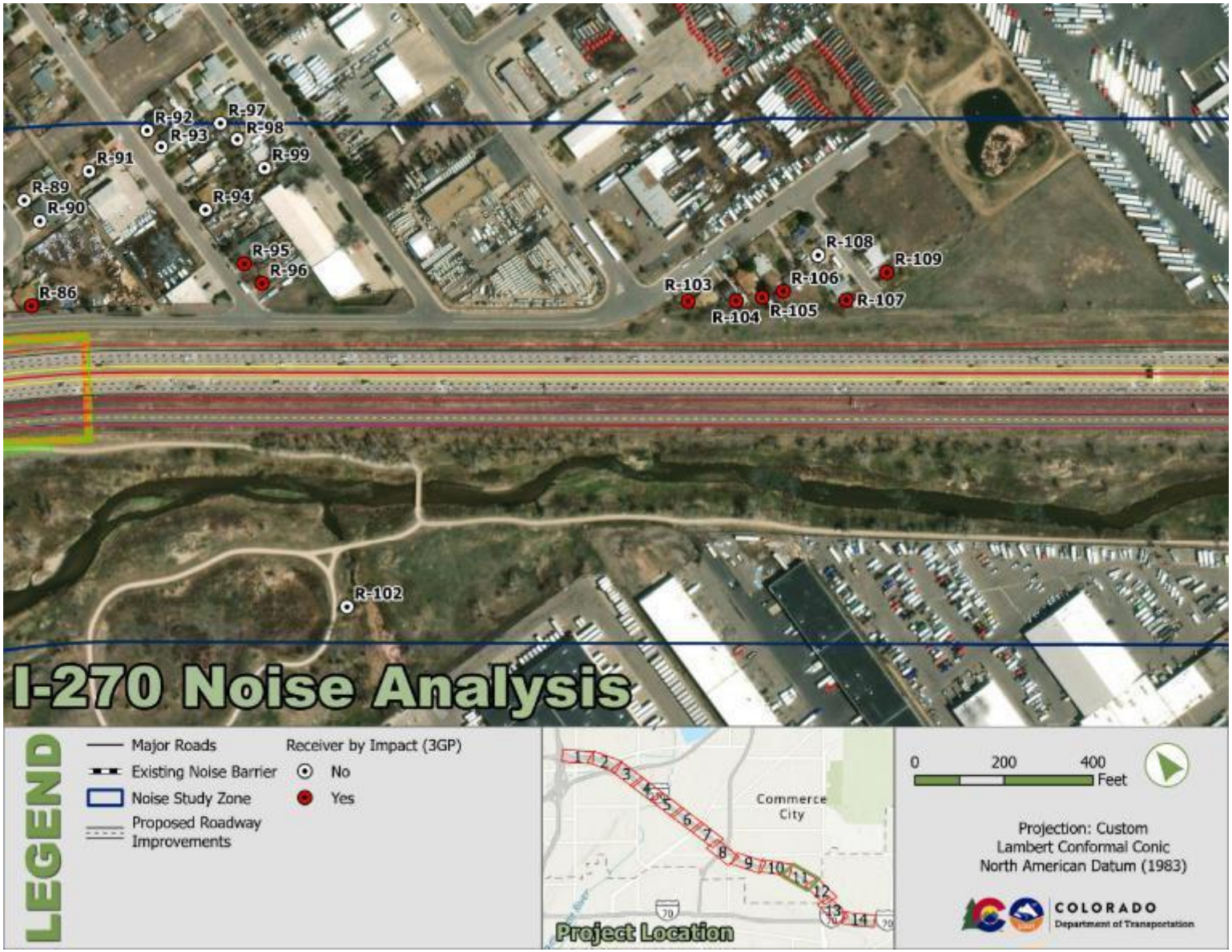


Figure 40 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

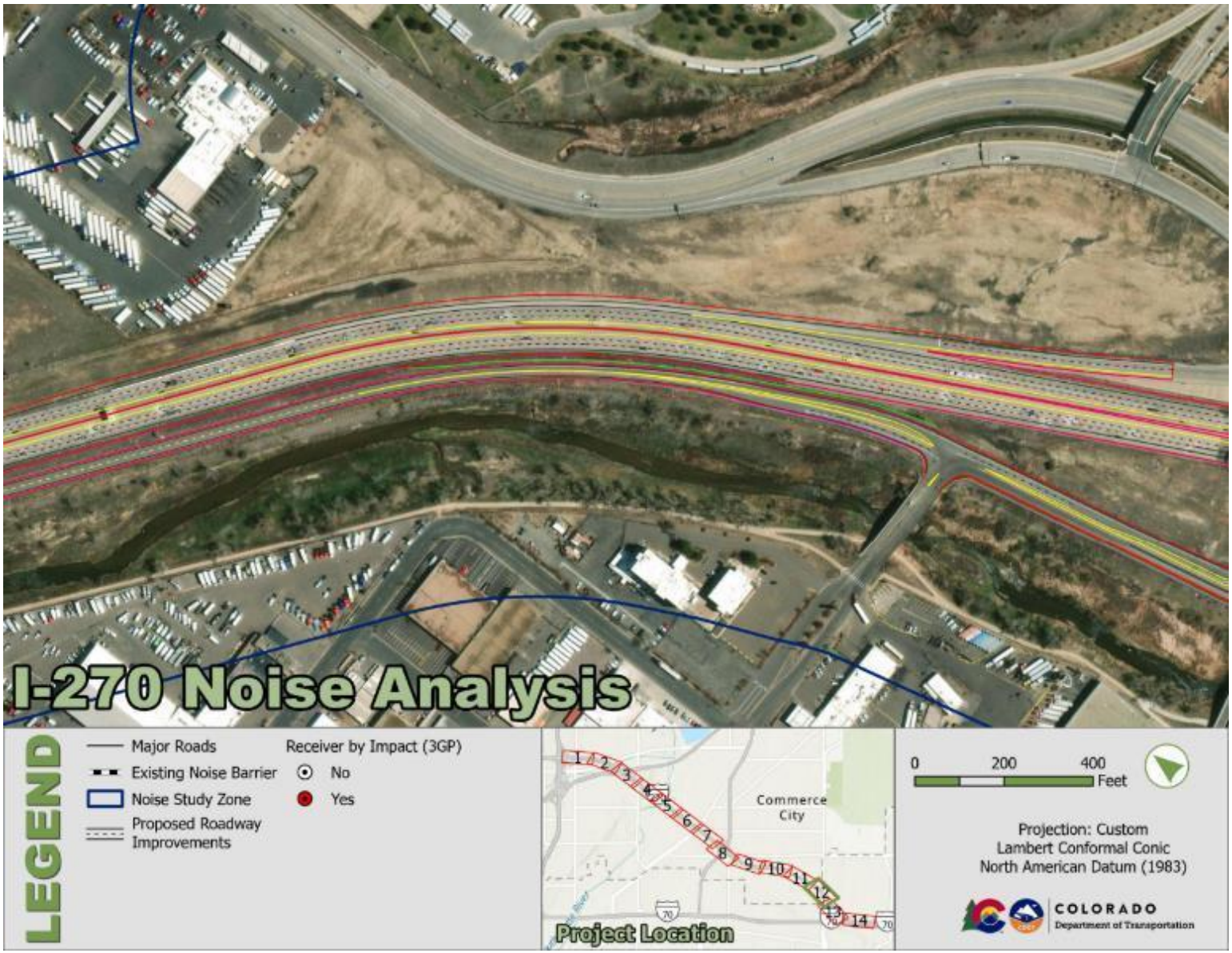


Figure 41 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

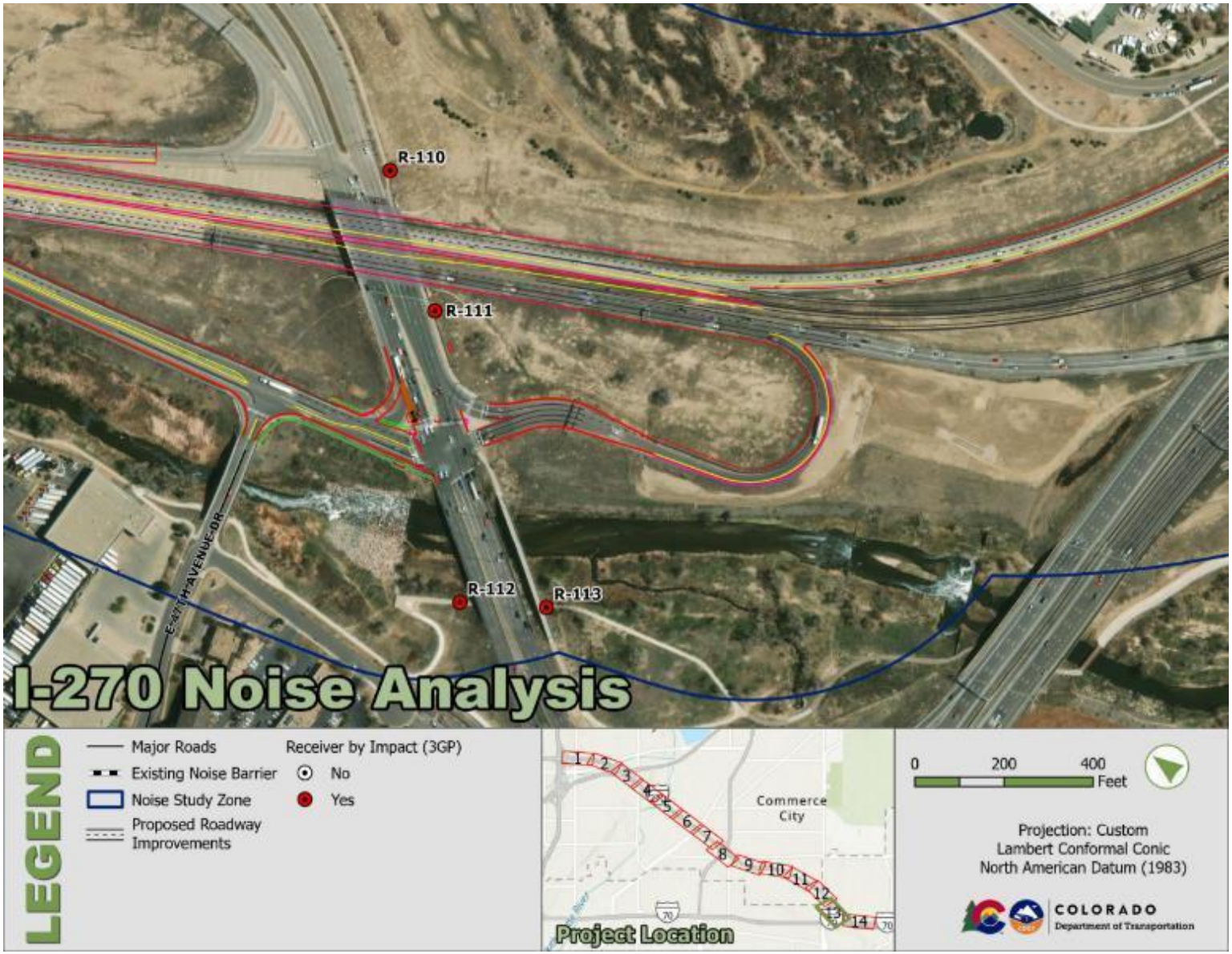


Figure 42 Roadways and Receiver Noise Levels for Design Year (2050) GP Build Alternative (Impacts Identified)

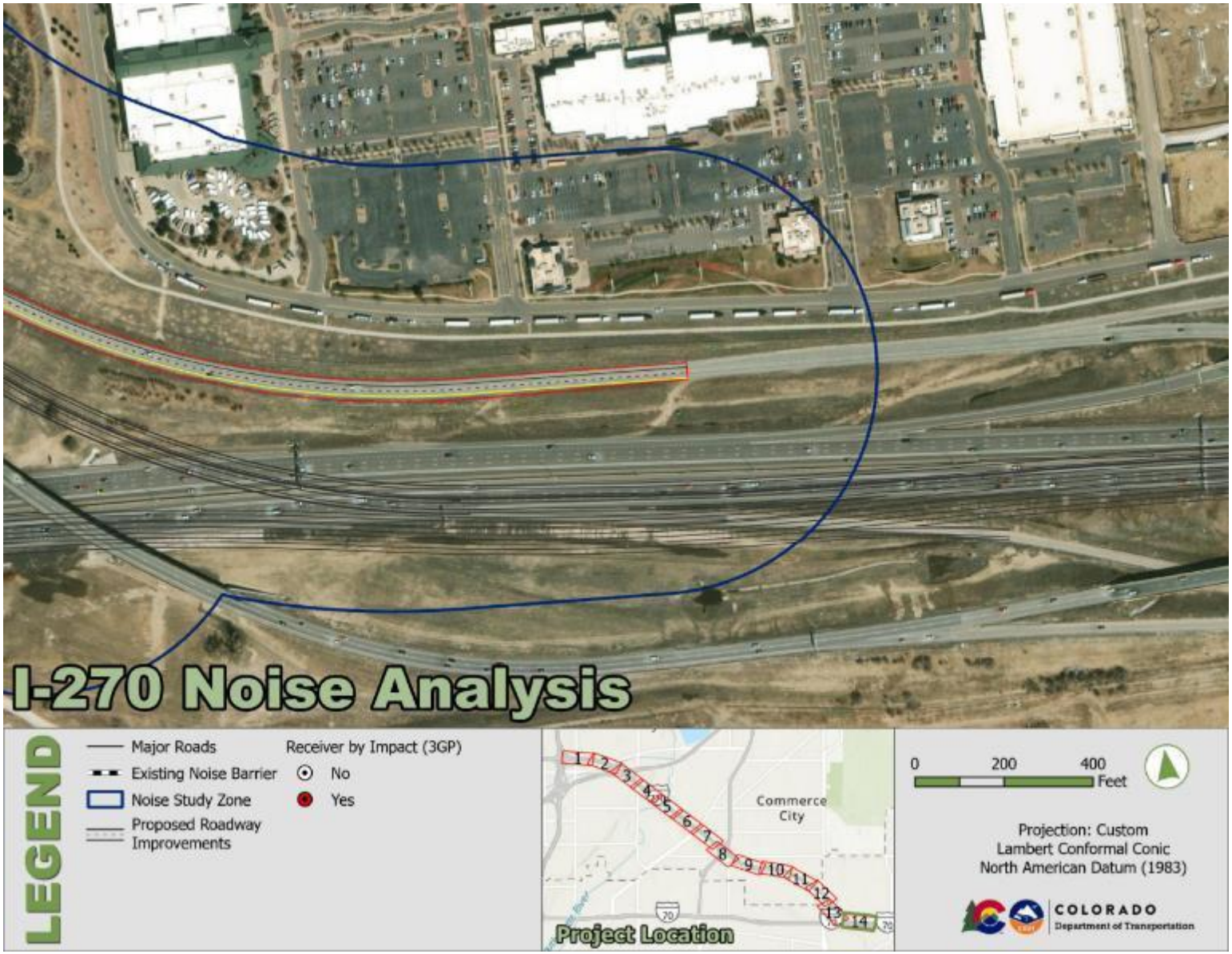


Figure 43 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

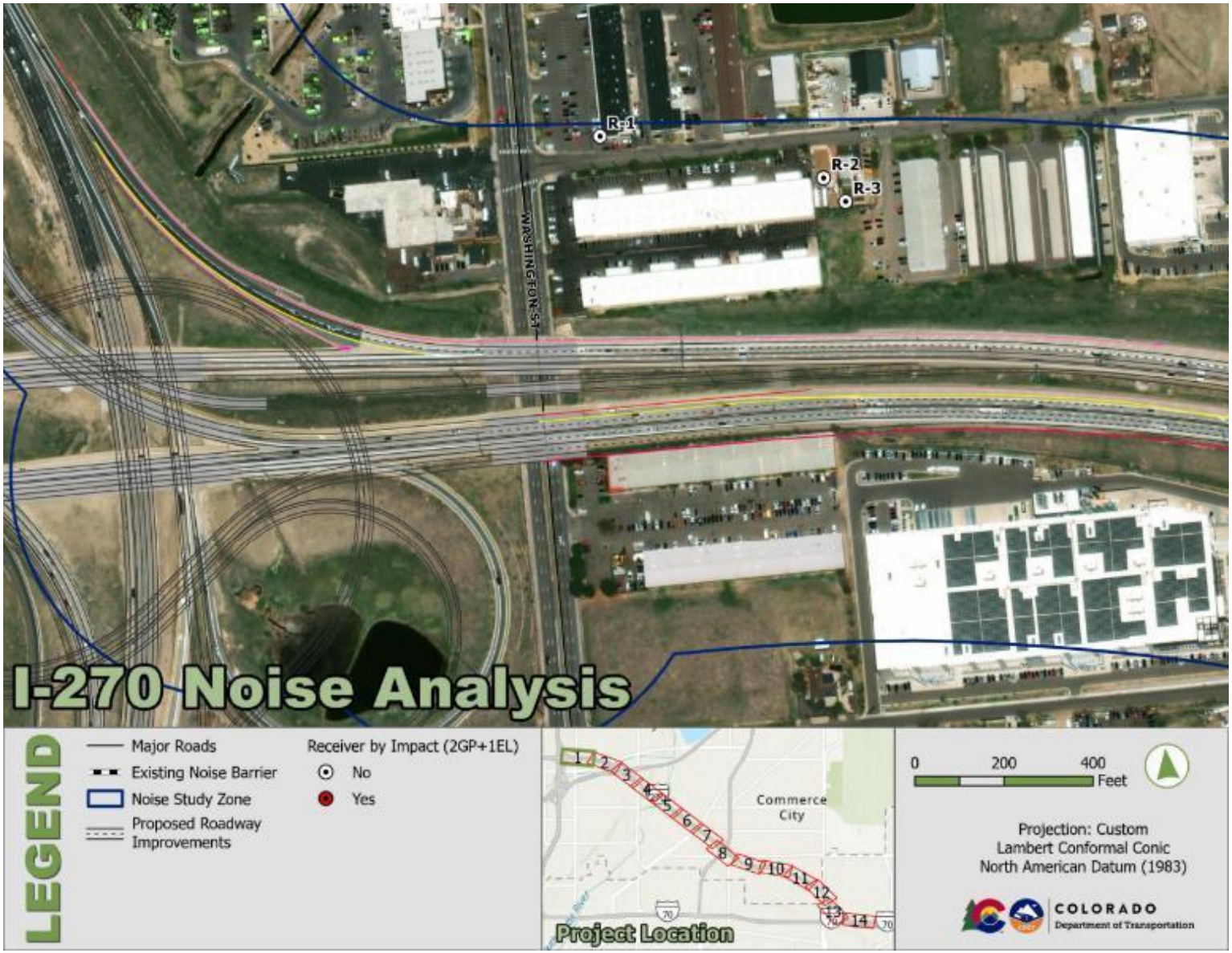


Figure 44 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

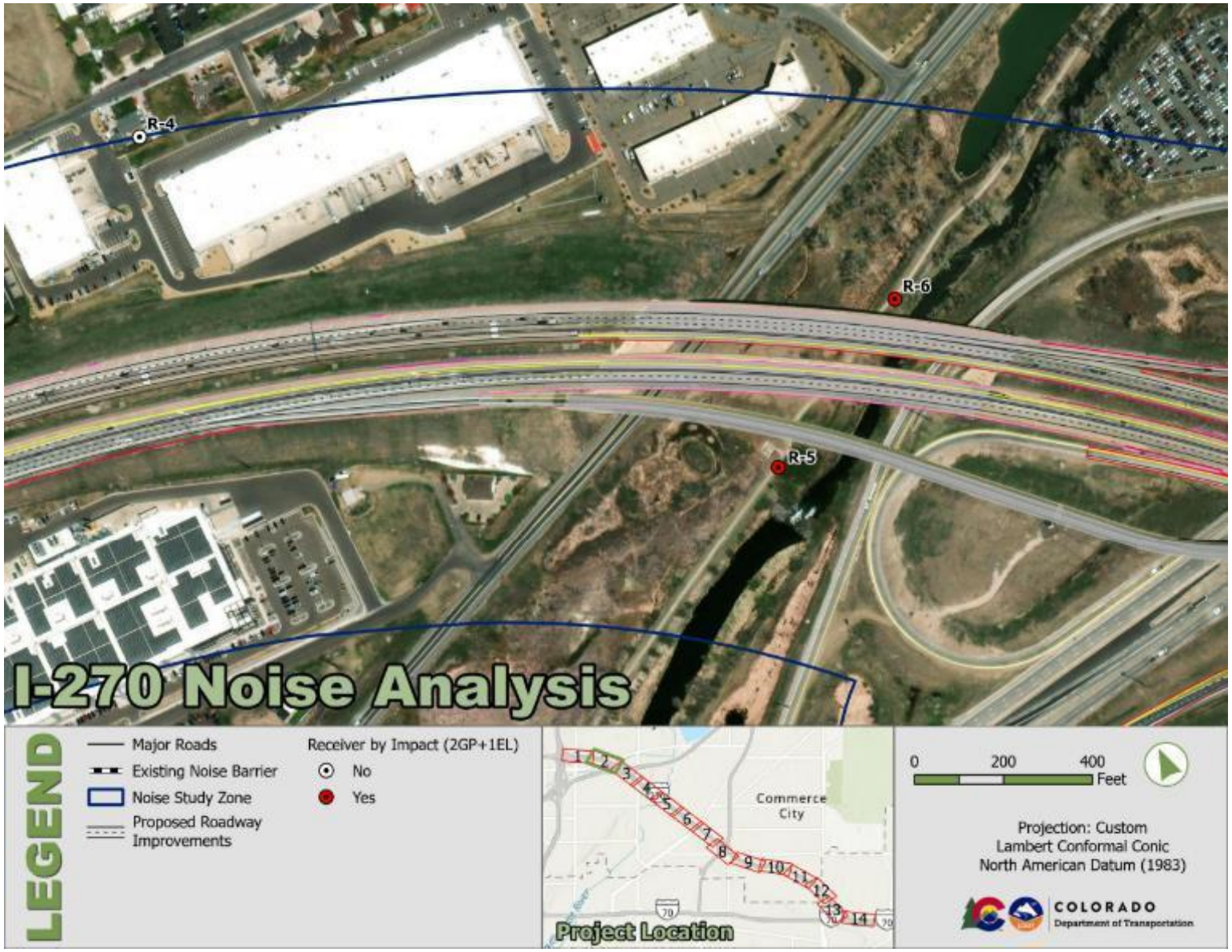


Figure 45 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

Figure 46 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

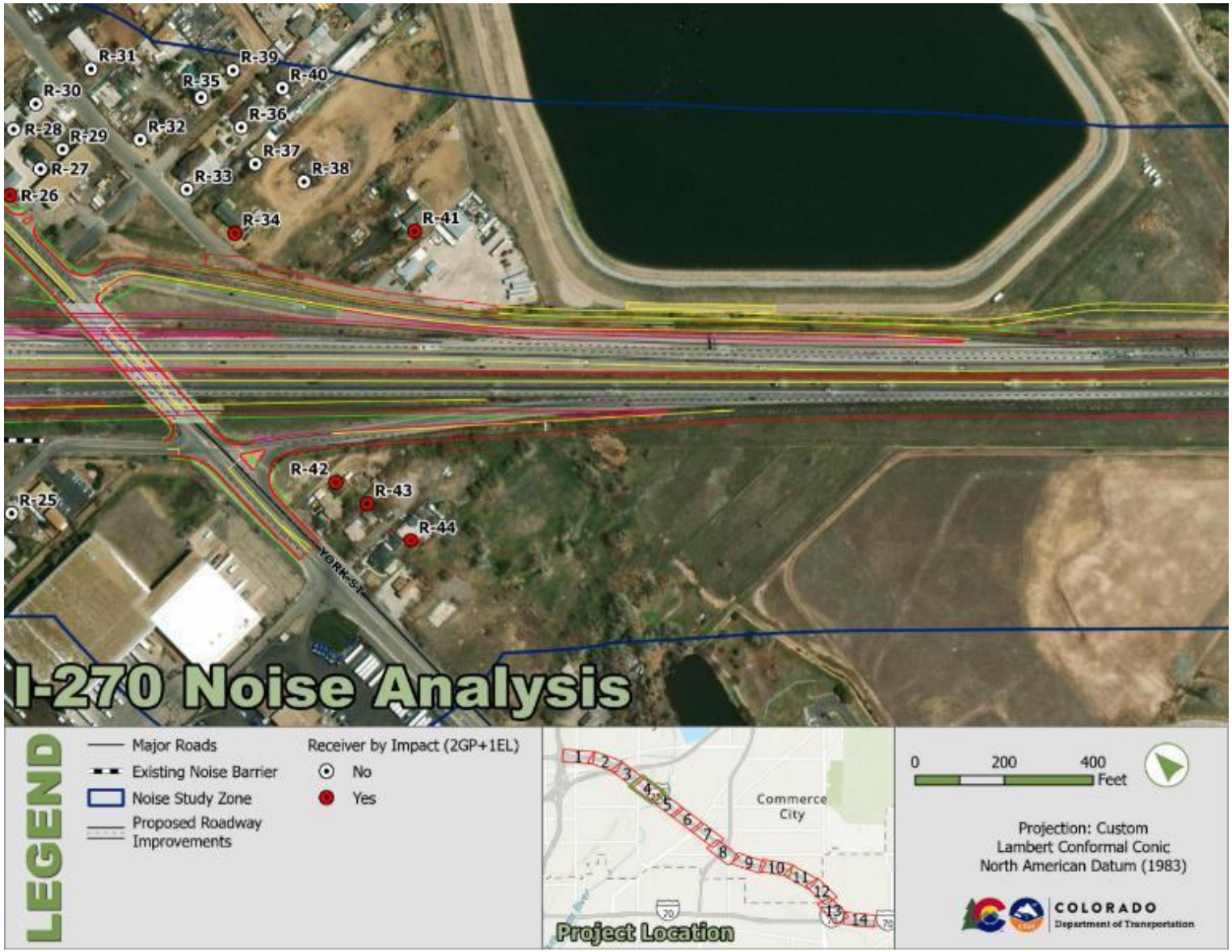


Figure 47 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

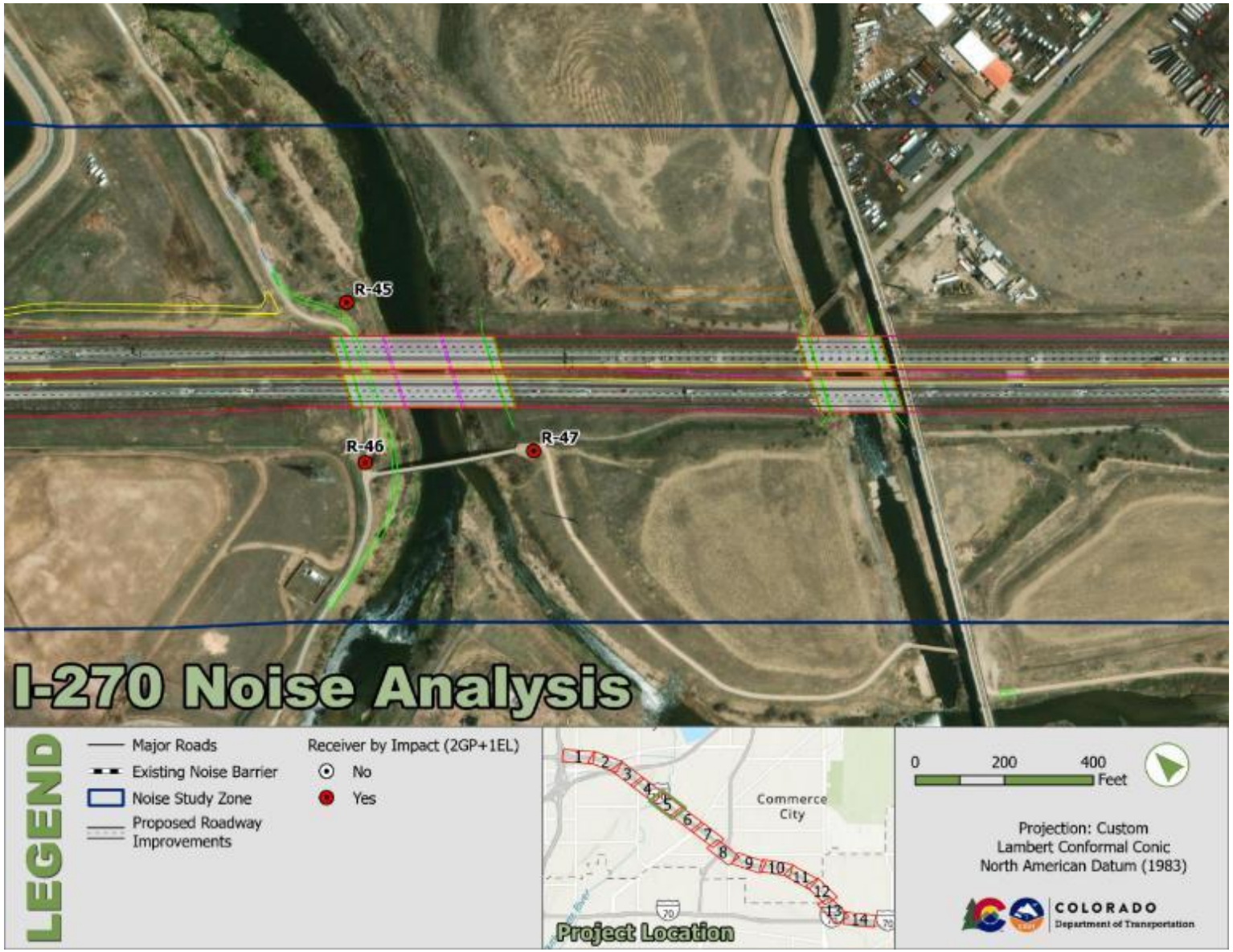


Figure 48 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

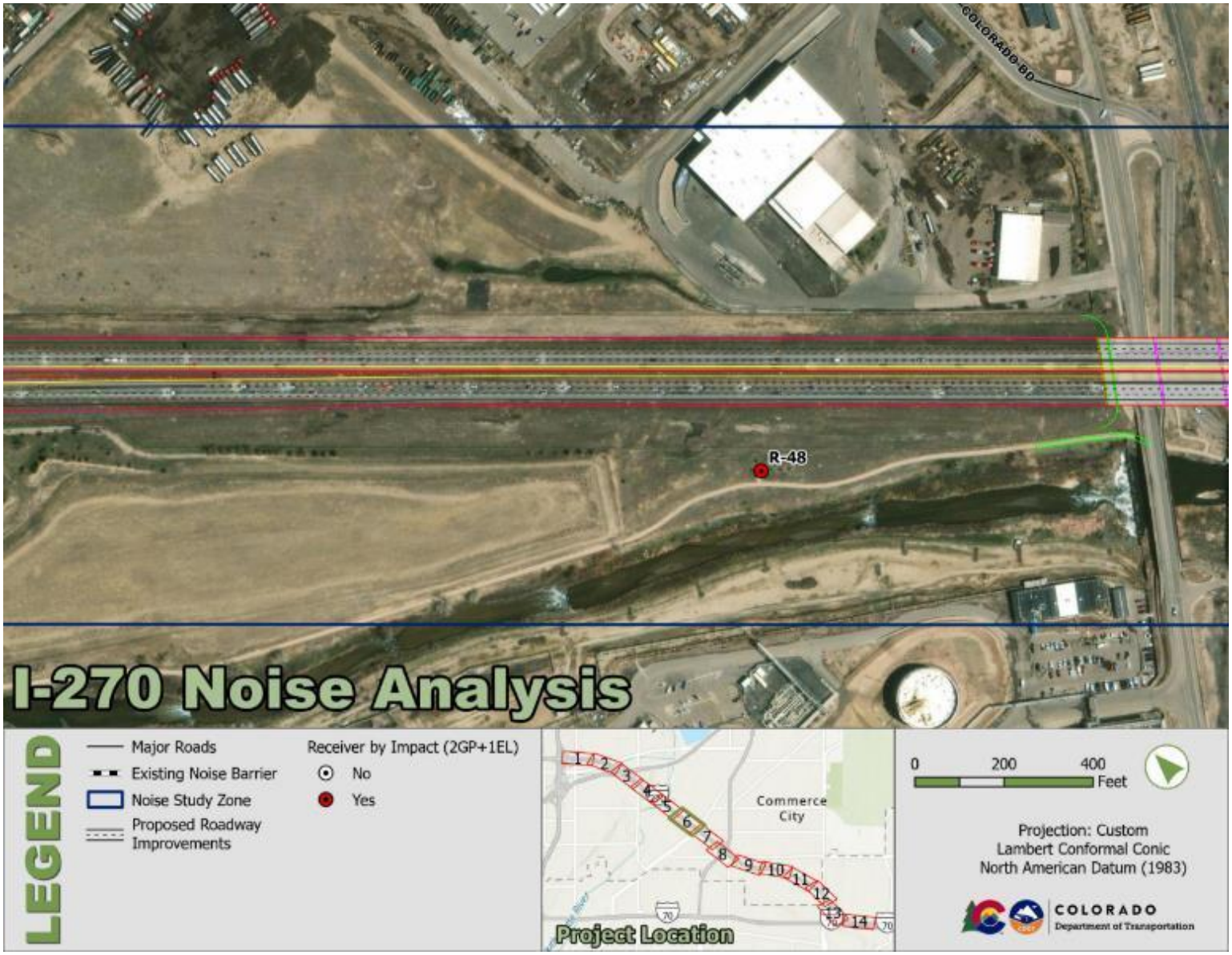


Figure 49 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

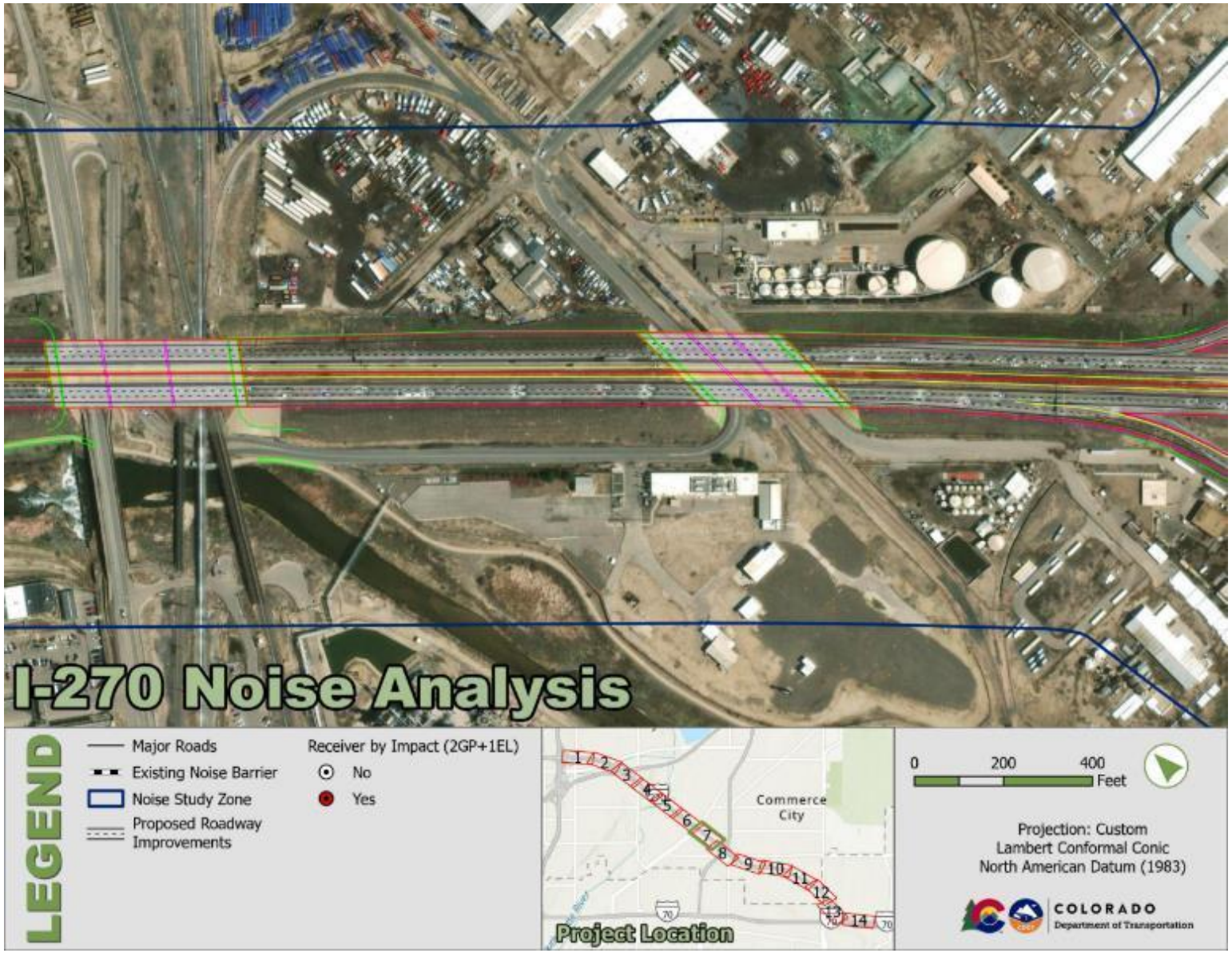


Figure 50 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

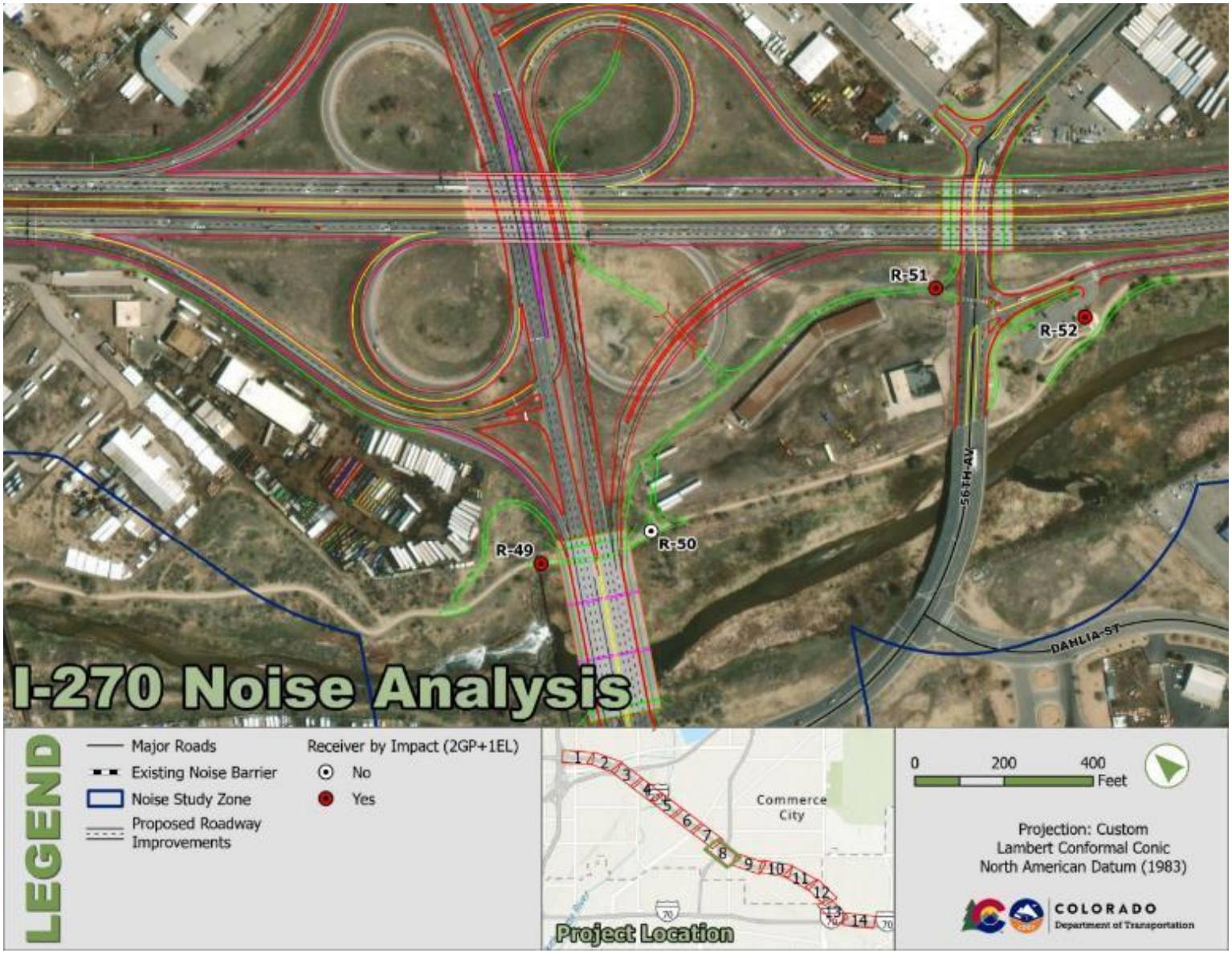


Figure 51 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

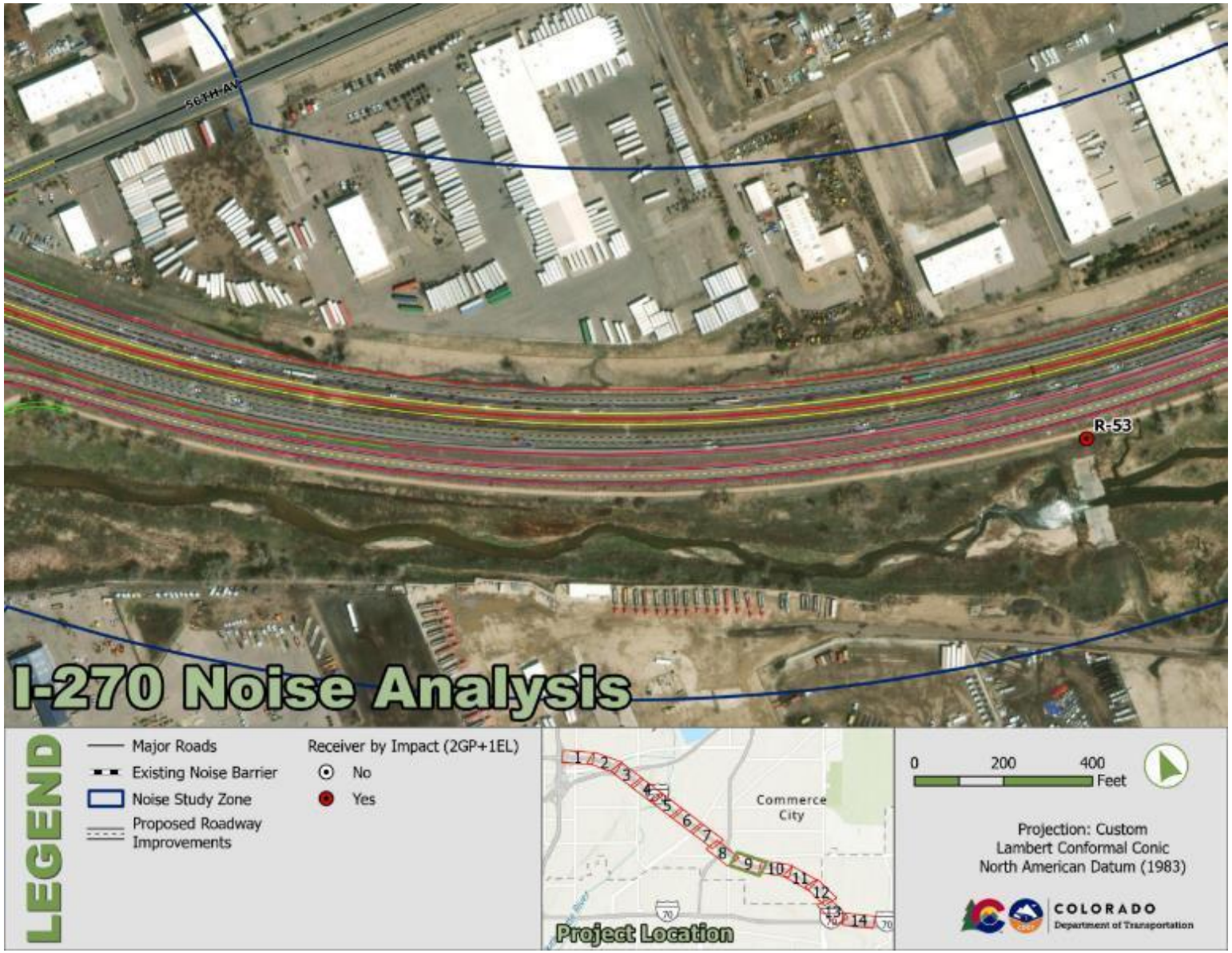


Figure 52 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

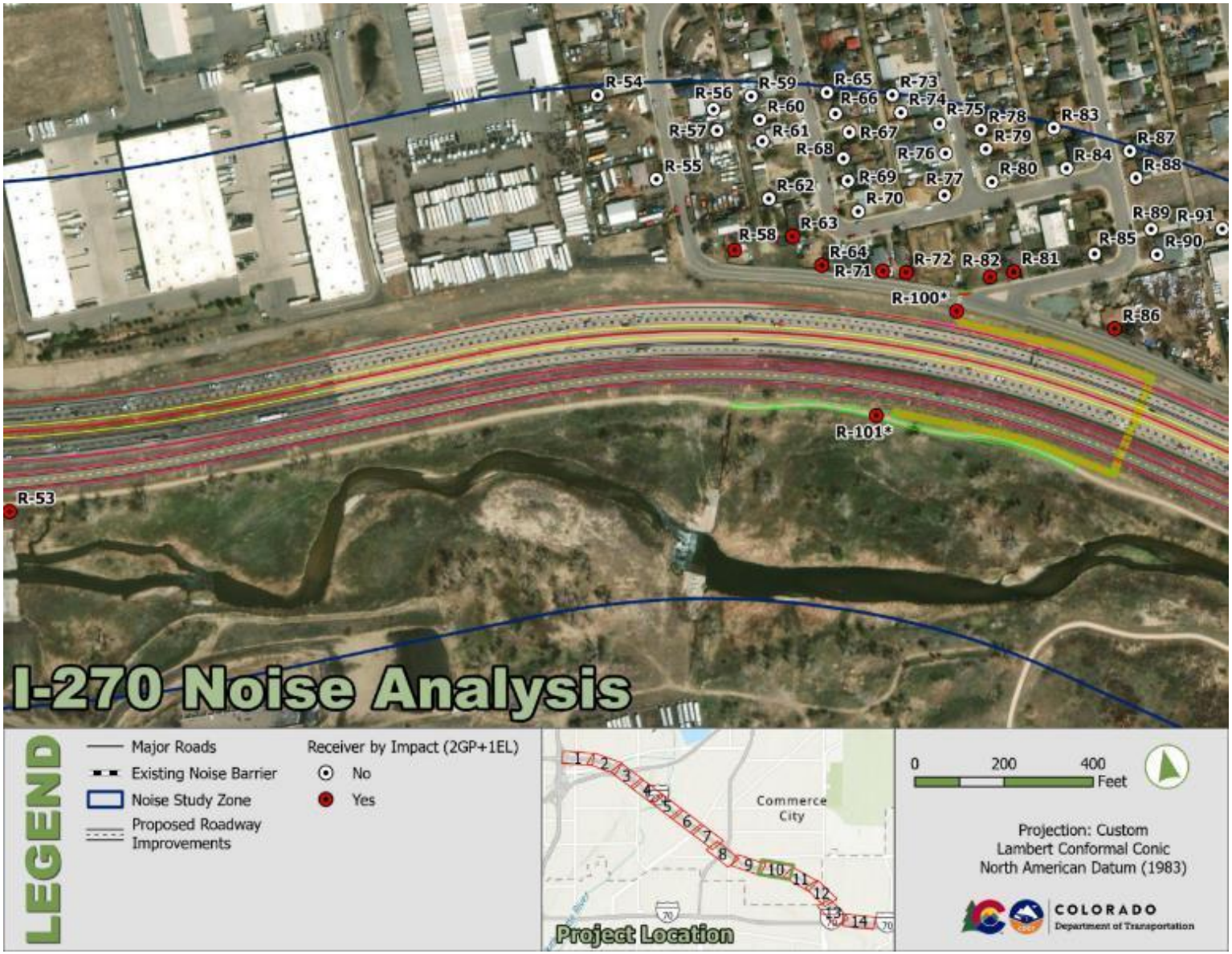


Figure 53 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

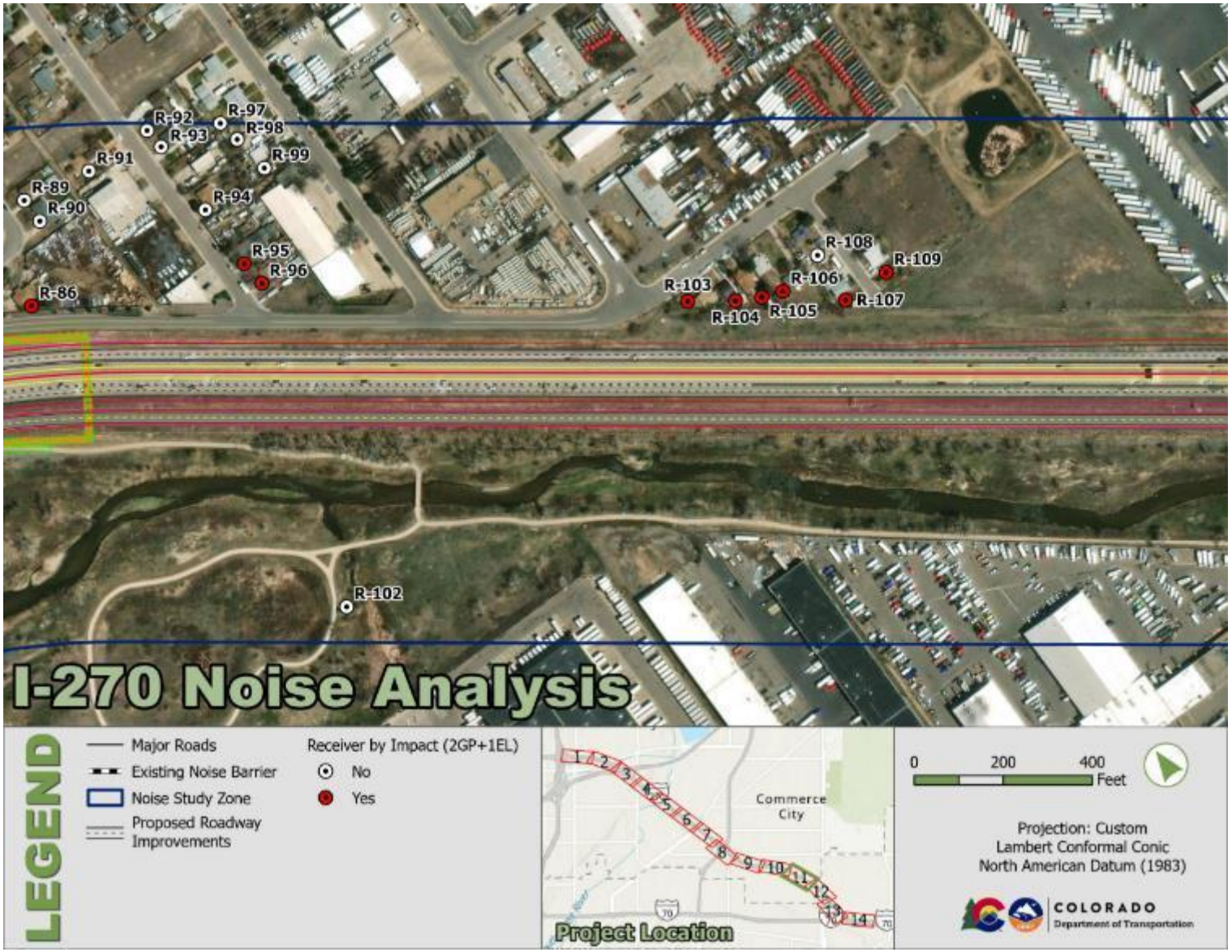


Figure 54 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

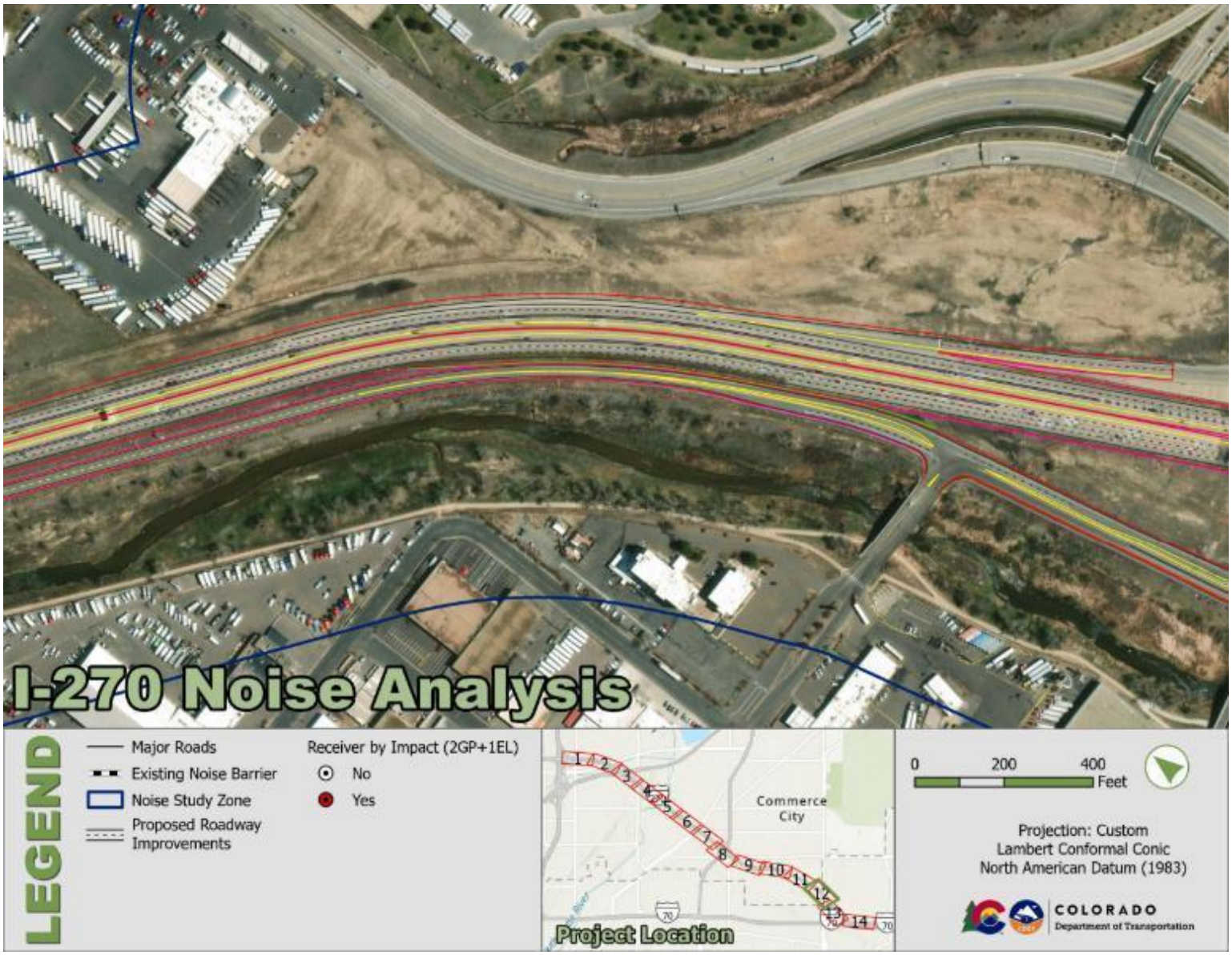


Figure 55 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

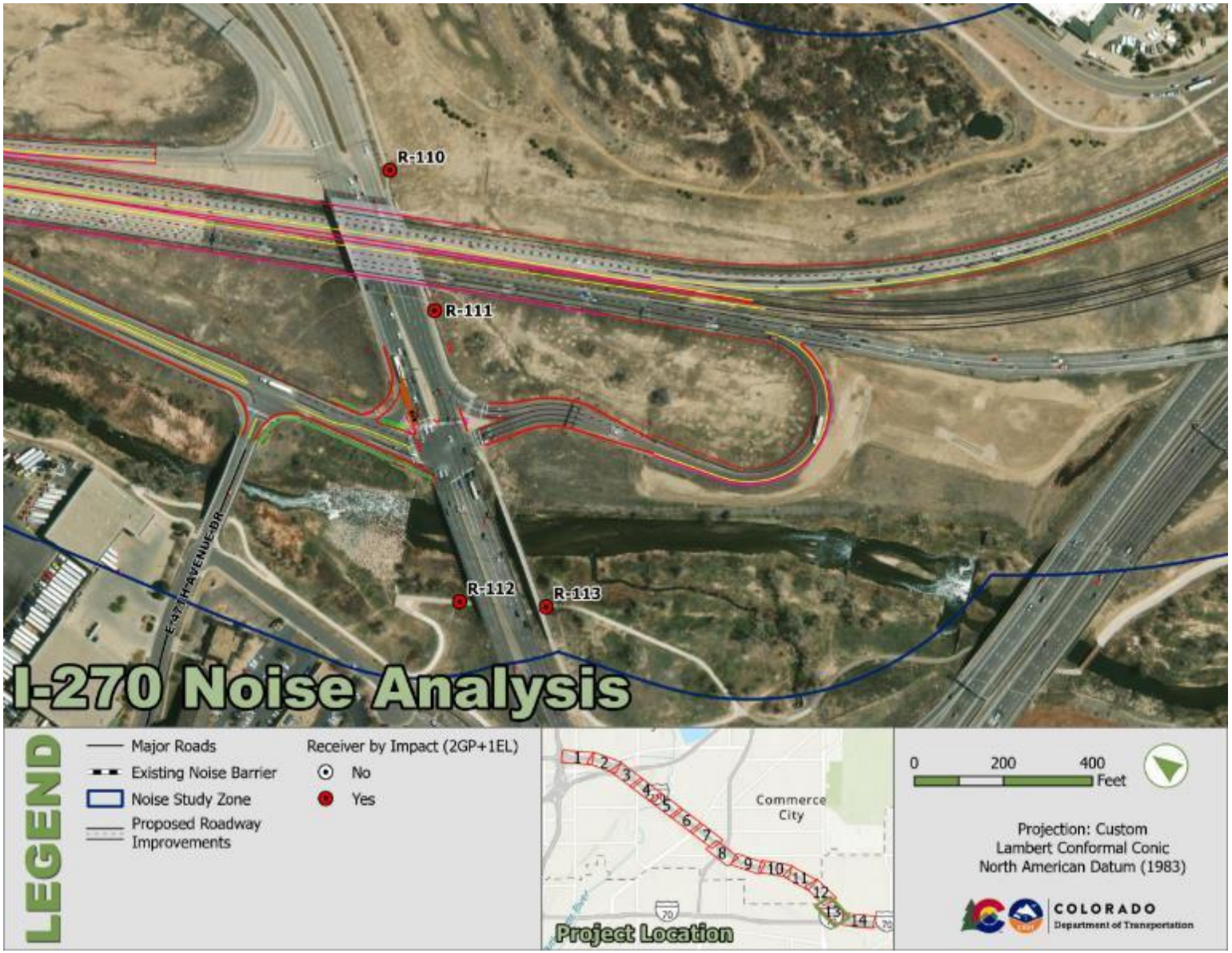


Figure 56 Roadways and Receiver Noise Levels for Design Year (2050) EL Build Alternative (Impacts Identified)

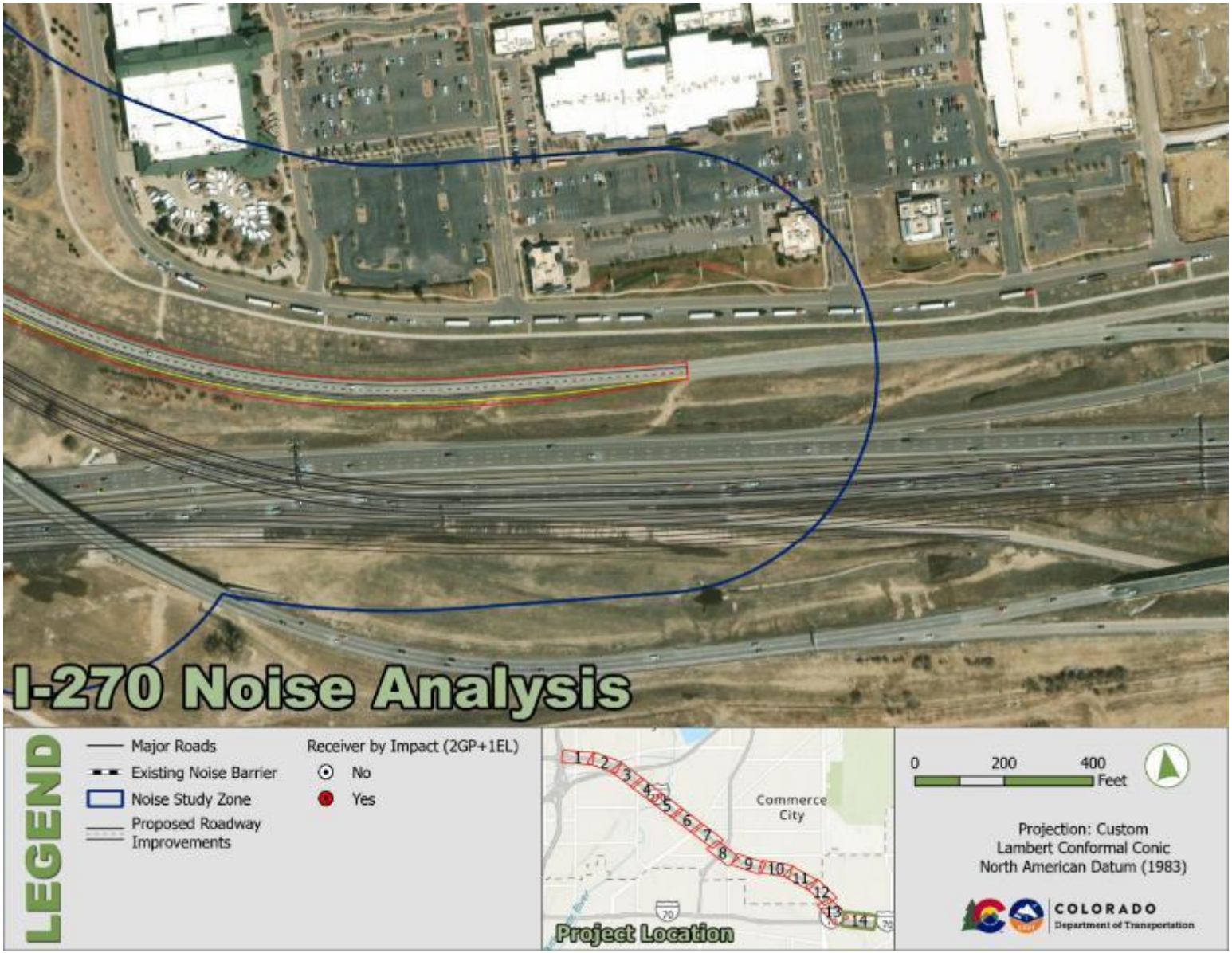


Figure 57 Evaluated Noise Barrier Locations (GP)

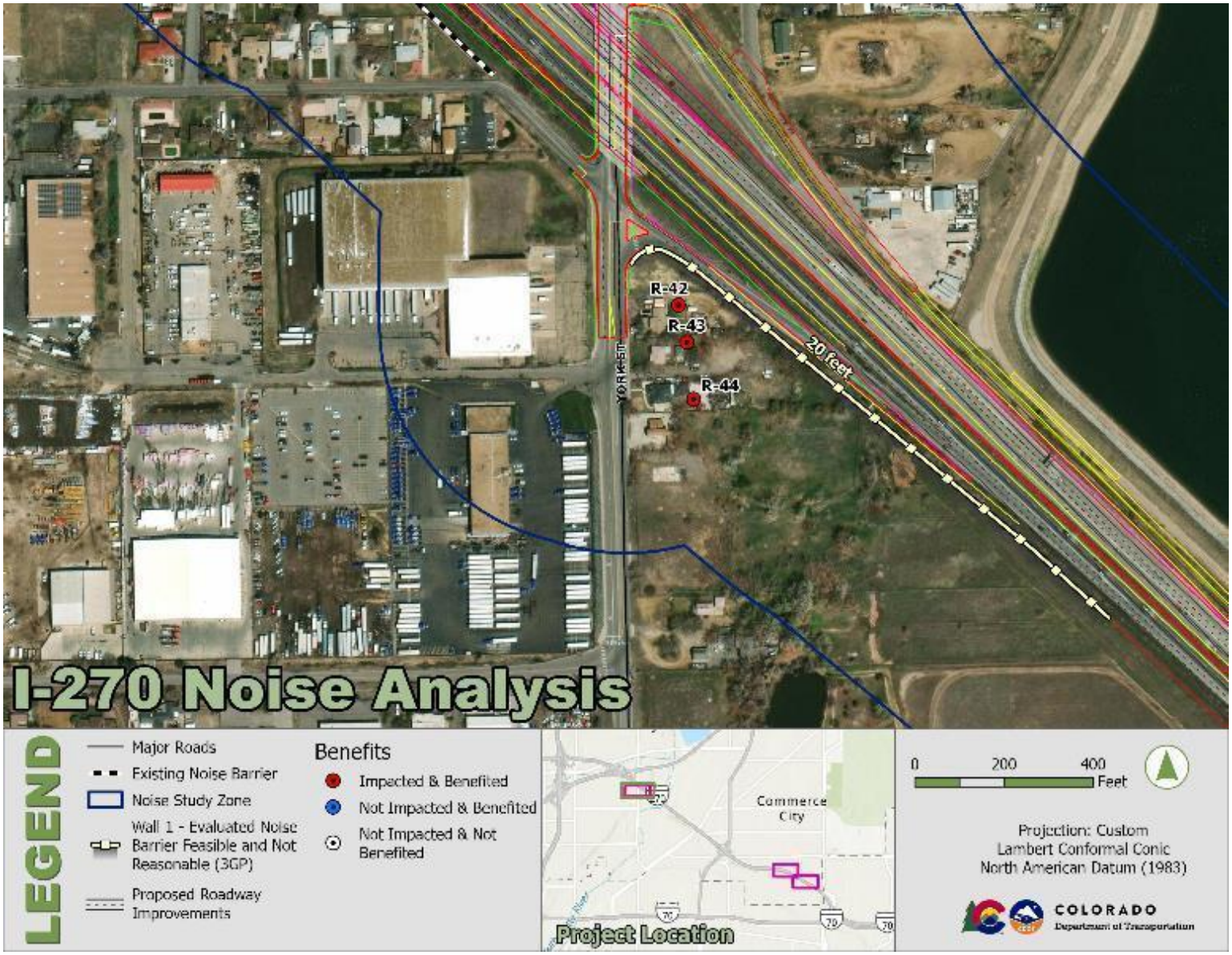


Figure 58 Evaluated Noise Barrier Locations (GP)

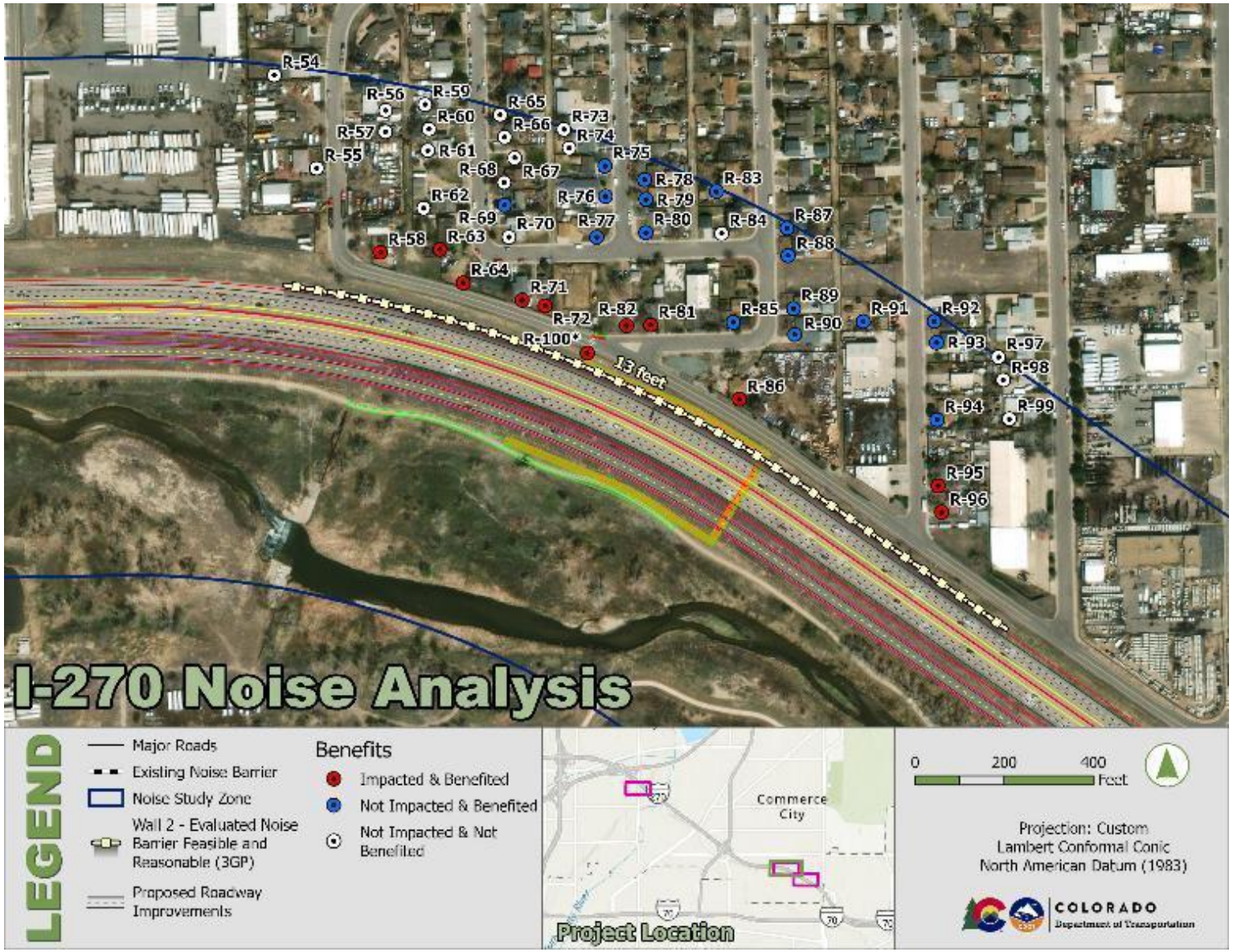


Figure 59 Evaluated Noise Barrier Locations (GP)

Figure 60 Evaluated Noise Barrier Locations (EL)

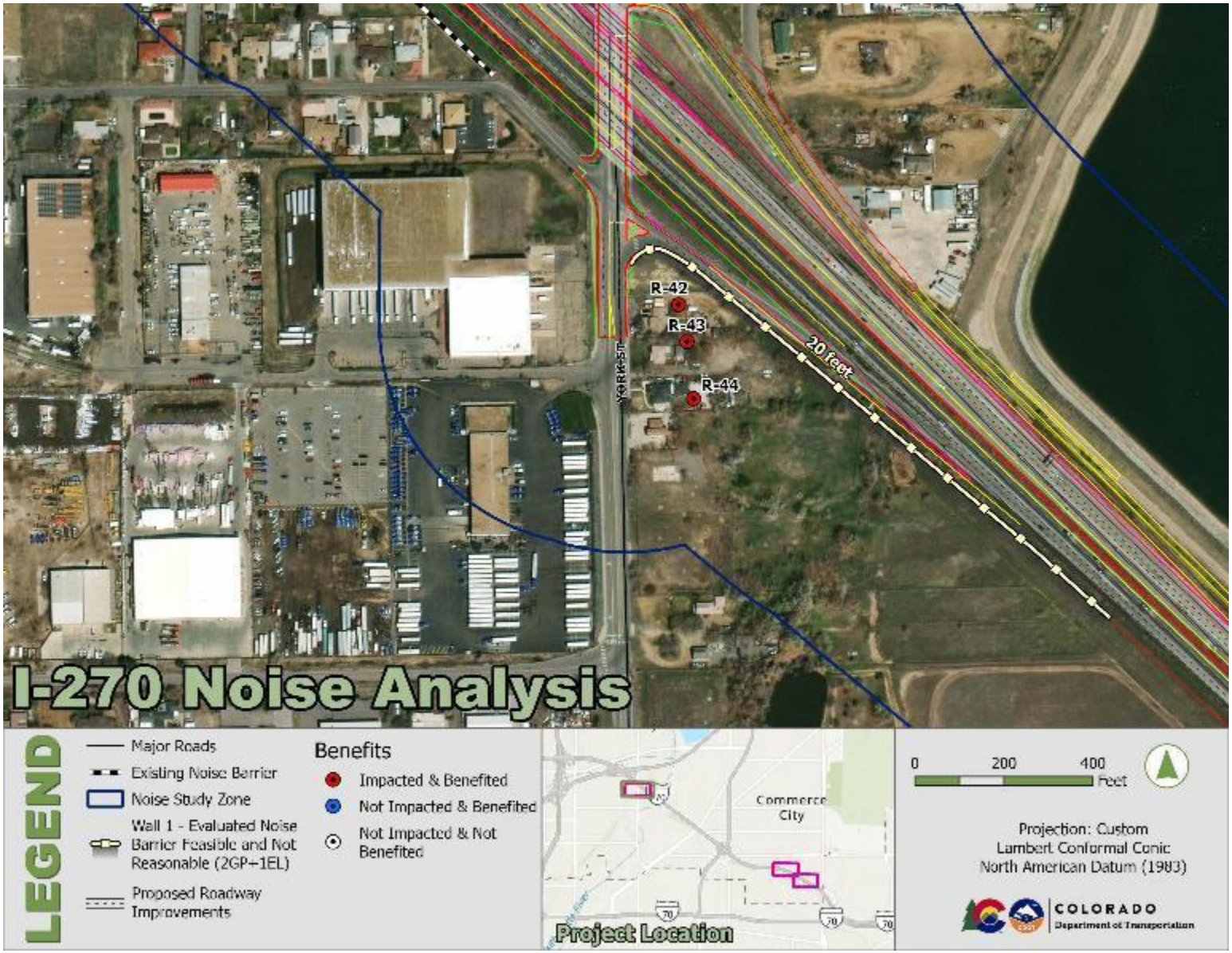


Figure 61 Evaluated Noise Barrier Locations (EL)

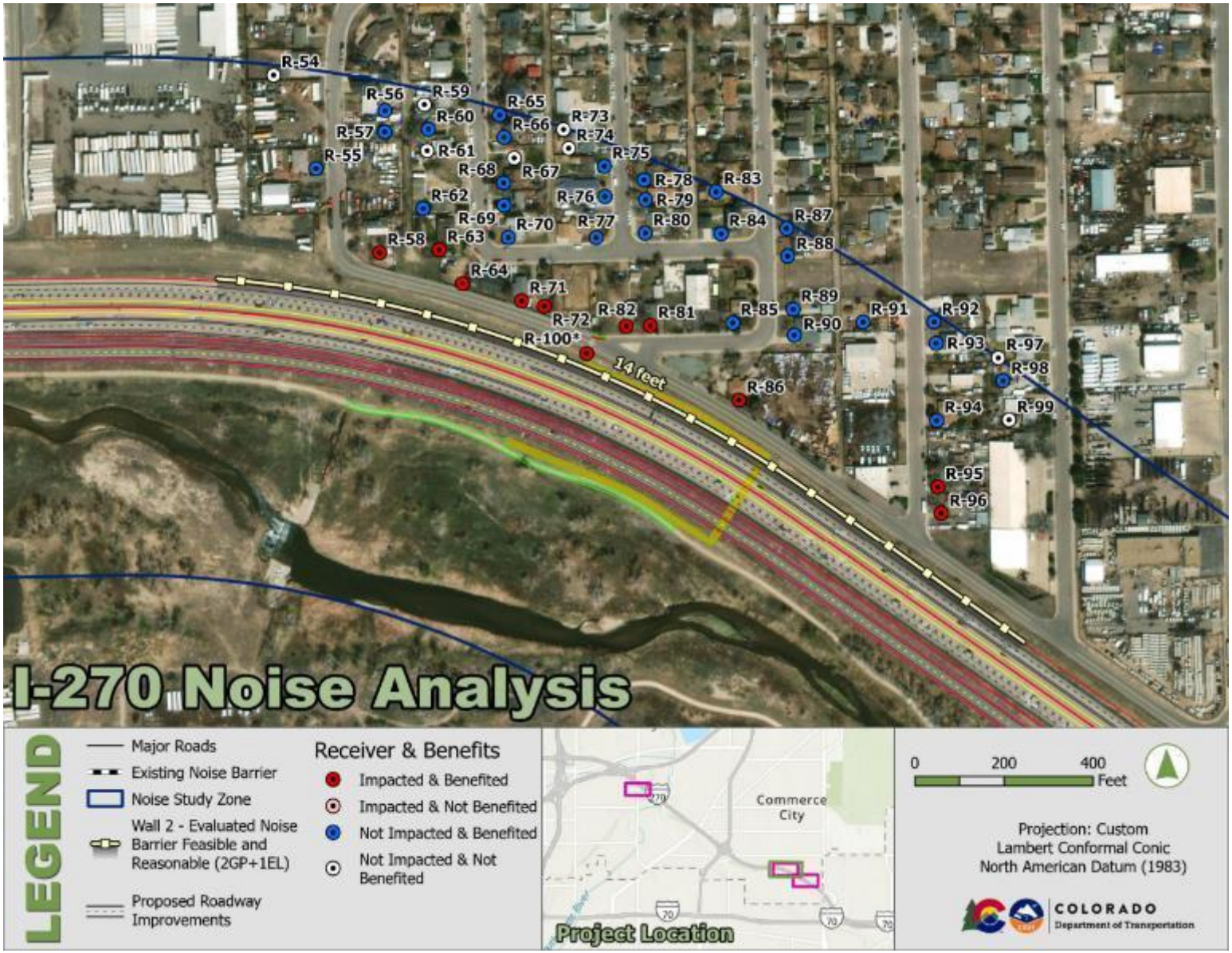
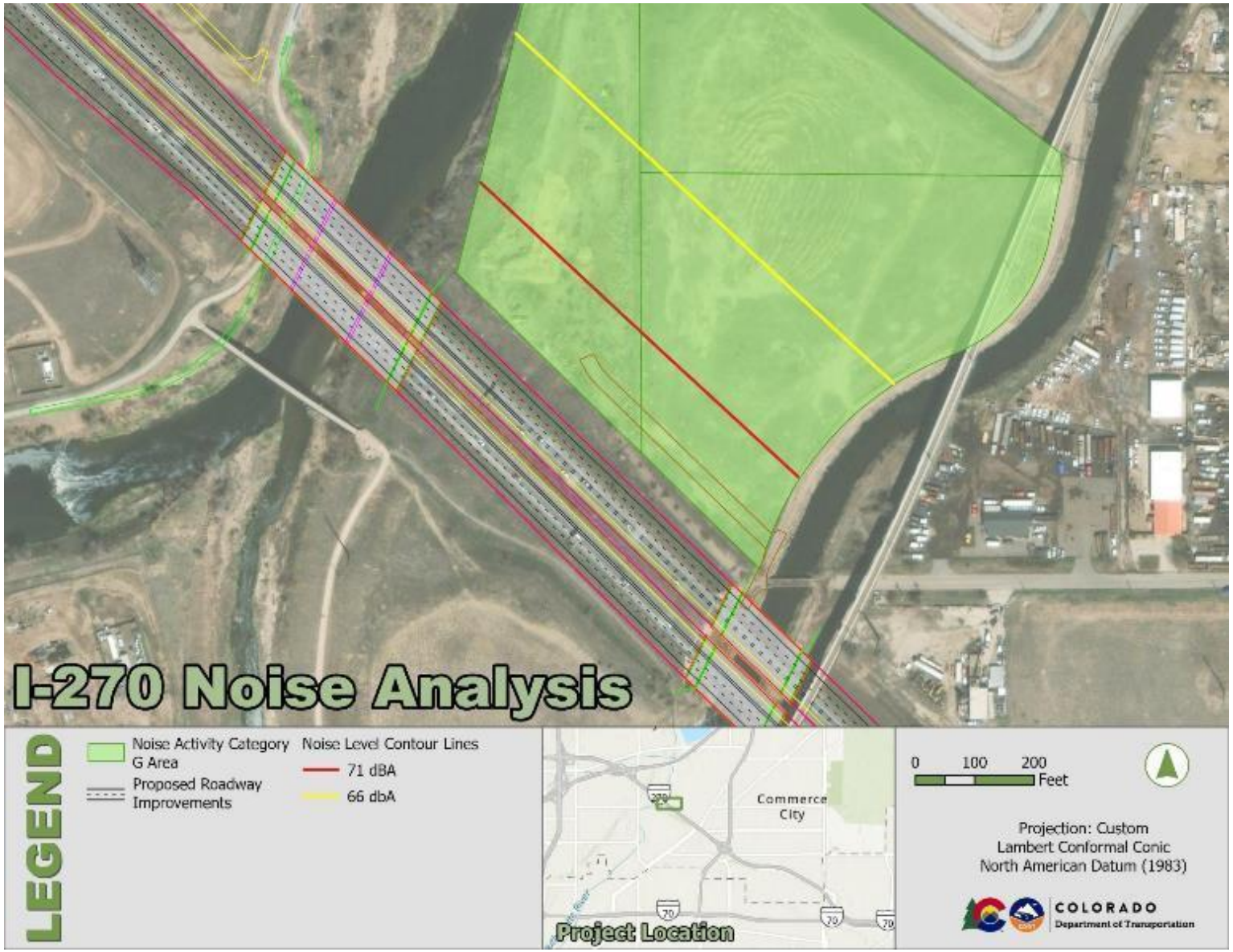


Figure 62 Evaluated Noise Barrier Locations (EL)

Figure 63 Design Year (2050) Build Alternative NAC Activity Category G Noise Level Contours



Appendix A Field Noise Measurement Data

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NOTE: This attachment is not able to be included with the EIS at this time due to accessibility. If you would like a copy of this attachment or to sit down with a project team member to review this attachment, please contact the project team at cdot_i270@state.co.us or 303-512-4270.

Appendix B TNM Noise Modeling Input Data

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Table 21 Traffic Input Data

Existing Conditions Noise Model Traffic Data (2023)[1]

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
I-25 SB Ramp to I-270 EB	2	552	31	31	55
I-25 NB	3	1170	65	65	55
I-76 EB Ramp to I-25 NB	1	704	40	56	55
I-270 WB Ramp to I-25 NB	1	704	40	56	55
I-270 WB to US 36 WB	2	1170	65	65	55
US 36 EB to I-25 NB	2	0	0	0	55
US 36 EB to I-270 EB	2	1170	65	65	55
I-270 EB (Washington Street to I-76)	4	889	50	71	55
I-270 WB (I-76 to Washington Street)	3	1144	65	91	55
I-270 EB Ramp to I-76 EB	1	720	32	48	55
I-76 WB Ramp to I-270 EB	1	84	6	7	55
I-270 EB (I-76 off-ramp to on-ramp)	2	1170	52	78	55
I-76 EB Ramp to I-270 EB	1	30	2	2	55
I-76 EB	3	1056	73	85	55
I-270 WB Ramp to I-76 EB	1	107	5	7	55
I-270 WB Ramp to I-76 WB	1	73	3	5	55
I-270 WB (between I-76 off-ramp and on-ramp)	2	1170	52	78	55
I-76 WB Ramp to I-270 WB	1	696	48	56	55
I-76 WB	3	767	53	62	55
I-270 EB (I-76 on-ramp to York Street on-ramp)	2	1170	52	78	55
I-270 WB ramp to York Street	1	477	21	32	55
I-270 EB (York Street on-ramp to Vasquez Boulevard)	2	1170	52	78	55
I-270 WB (Vasquez Boulevard on-ramp to York Street off-ramp)	2	1170	52	78	55
Washington Street (NB and SB)	6	439	20	29	40
York Street north of I-270 (NB and SB)	4	406	18	27	35
York Street over I-270 (NB and SB)	3	448	20	30	35

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
York Street south of I-270 (NB and SB)	2	423	19	28	35
York Street on-ramp to I-270 EB	1	561	25	37	55
I-270 EB off-ramp to Vasquez Boulevard SB	1	720	32	48	55
I-270 EB (between SB and NB Vasquez Boulevard off-ramps)	2	1170	52	78	55
Vasquez Boulevard SB on-ramp to I-270 EB	1	302	13	20	55
I-270 EB (between Vasquez Boulevard cloverleaf ramps)	2	1170	52	78	55
I-270 EB off-ramp to Vasquez Boulevard NB	1	2	0	0	55
I-270 WB off-ramp to Vasquez Boulevard NB	1	367	16	24	55
I-270 WB (after off-ramp to Vasquez Boulevard)	2	1170	52	78	55
Vasquez Boulevard NB on-ramp to I-270 WB	1	564	25	38	55
I-270 WB off-ramp to Vasquez Boulevard SB	1	0	0	0	55
I-270 WB (between Vasquez Boulevard cloverleaf ramps)	2	1170	52	78	55
Vasquez Boulevard SB on-ramp to I-270 WB	1	411	18	27	55
I-270 EB (Vasquez Boulevard to Quebec Street)	2	1170	52	78	55
I-270 WB (Quebec Street to Vasquez Boulevard)	2	1170	52	78	55
I-270 EB off-ramp to Quebec Street	1	231	10	15	55
I-270 WB on-ramp from Quebec Street	2	197	9	13	55
I-270 EB (Quebec Street to I-70)	2	1170	52	78	55
I-270 WB (I-70 to Quebec Street)	2	1170	52	78	55
I-70 WB	3	1170	52	78	55
I-70 EB	3	1170	52	78	55
Vasquez Boulevard south of I-270 (NB and SB)	6	540	24	36	45
Vasquez Boulevard north of I-270 (NB and SB)	6	512	54	30	45
56th Avenue west of I-270 (EB and WB)	4	540	24	36	30
56th Avenue east of I-270 (EB and WB)	2	540	24	36	30

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
Quebec Street north of I-270 (NB and SB)	4	475	21	32	45
Northfield Boulevard SB to SB Quebec Street	2	359	16	24	45
Quebec Street NB to EB Northfield Boulevard	2	306	14	20	45
Northfield Boulevard WB to Quebec Street NB	1	129	6	9	45
Northfield Boulevard WB to I-270 WB on-ramp	3	307	14	20	45
Quebec Street between I-270 ramps (NB and SB)	6	509	23	34	40
Quebec Street south of Sandcreek Drive (NB and SB)	6	540	24	36	40
Sandcreek Drive (EB and WB)	2	210	9	14	45

Design Year No Action Noise Model Traffic Data (2050)[2]

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
I-25 SB ramp to I-270 EB	2	569	32	32	55
SB Express I-25 to EB I-270 Express	1	48	0	0	55
Express EB US 36 to EB I-270 Express	1	1274	13	13	55
Express EB US 36 to SB I-25 ramp	1	1274	13	13	55
EB US 36 to I-270 EB	2	843	37	56	55
I-25 NB	3	1170	52	78	55
I-76 EB ramp to I-25 NB	1	704	40	56	55
I-25 NB to WB US 36 flyover	1	720	40	40	55
I-270 WB ramp to I-25 NB	2	360	20	29	55
Express WB I-270 to NB I-25 Express	1	386	4	4	55
I-270 WB to US 36 WB	2	1170	52	78	55
Express I-270 WB to US 36 WB	1	303	3	3	55
Express EB I-270 east of I-25 interchange	1	1274	13	13	55
I-270 EB between Washington Street & I-76	3	1144	65	91	55
Express I-270 WB east of I-25 interchange	1	689	7	7	55
I-270 WB between I-76 & Washington Street	3	1133	64	90	55
I-270 EB ramp to I-76 EB	1	720	32	48	55

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
I-76 WB ramp to I-270 EB	1	117	8	9	55
I-270 EB (I-76 off-ramp to on-ramp)	2	720	32	48	55
I-76 EB ramp to I-270 EB	1	53	4	4	55
I-76 EB	3	1131	78	91	55
I-270 WB ramp to I-76 EB	1	150	7	10	55
I-270 WB ramp to I-76 WB	1	95	4	6	55
I-270 WB (I-76 off-ramp to on-ramp)	3	720	32	48	55
I-76 WB ramp to I-270 WB	1	696	48	56	55
I-76 WB	3	1025	71	82	55
I-270 EB (I-76 on-ramp to York Street on-ramp)	2	1170	52	78	55
I-270 WB ramp to York Street	1	543	24	36	55
I-270 EB (York Street on-ramp to Vasquez Boulevard)	2	1170	52	78	55
I-270 WB (Vasquez Boulevard on-ramp to York Street off-ramp)	2	1170	52	78	55
Washington Street (NB and SB)	6	501	22	33	40
York Street north of I-270 (NB and SB)	4	540	24	36	35
York Street over and south of I-270 (NB and SB)	4	493	22	33	35
York Street on-ramp to I-270 EB	1	626	28	42	55
I-270 EB off-ramp to Vasquez Boulevard SB	1	720	32	48	55
I-270 EB (between SB and NB Vasquez Boulevard off-ramps)	2	720	32	48	55
SB Vasquez Boulevard on-ramp to I-270 EB	1	291	13	19	55
I-270 EB (between Vasquez Boulevard cloverleaf ramps)	2	1170	52	78	55
I-270 EB off-ramp to Vasquez Boulevard NB	1	321	14	21	55
I-270 WB off-ramp to Vasquez Boulevard NB	1	324	14	22	55
I-270 WB (after off-ramp to Vasquez Boulevard)	2	1170	52	78	55
Vasquez Boulevard NB on-ramp to I-270 WB	1	452	20	30	55
I-270 WB off-ramp to Vasquez Boulevard SB	1	23	1	2	55

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
I-270 WB (between Vasquez Boulevard cloverleaf ramps)	2	1170	52	78	55
I-270 EB (Vasquez Boulevard to Quebec Street)	2	1170	52	78	55
I-270 WB (Quebec Street to Vasquez Boulevard)	2	1170	52	78	55
I-270 EB off-ramp to Quebec Street	1	448	20	30	55
I-270 WB on-ramp from Quebec Street	1	394	18	26	55
Express EB I-270 to I-70	1	90	1	1	55
I-270 EB (Quebec Street to I-70)	2	1170	52	78	55
Express WB I-70 to I-270	1	67	1	1	55
I-270 WB (I-70 to Quebec Street)	2	1170	52	78	55
Vasquez Boulevard north of I-270 (NB and SB)	6	516	54	30	45
Vasquez Boulevard south of I-270 (NB and SB)	6	540	24	36	45
56th Avenue west of I-270 (EB and WB)	4	540	24	36	30
56th Avenue east of I-270 (EB and WB)	2	540	24	36	30
Quebec Street north of I-270 (NB and SB)	4	540	24	36	45
Northfield Boulevard SB to SB Quebec Street	1	540	24	36	55
Quebec Street NB to EB Northfield Boulevard	2	540	24	36	45
Northfield Boulevard WB Exit to Quebec Street NB	1	285	13	19	45
Northfield Boulevard WB to I-270 WB on-ramp	3	394	17	26	45
Quebec Street between I-270 ramps (NB and SB)	6	540	24	36	40
Quebec Street south of Sandcreek Drive (NB and SB)	6	540	24	36	40
Sandcreek Drive (EB and WB)	2	294	13	20	45

Design Year GP Build Alternative Noise Model Traffic Data (2050)[3]

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
I-25 SB ramp to I-270 EB	2	691	38	38	55

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
SB Express I-25 to EB I-270 Express	1	318	3	3	55
Express EB US 36 to EB I-270 Express	1	1274	13	13	55
EB US 36 to I-270 EB	2	1170	52	78	55
I-25 NB	3	1170	65	65	55
I-76 EB ramp to I-25 NB	1	704	40	56	55
I-25 NB to WB US 36 flyover	2	720	40	40	55
I-270 WB ramp to I-25 NB	2	585	33	47	55
Express WB I-270 to NB I-25 Express	1	555	6	6	55
I-270 WB to US 36 WB	2	1144	65	91	55
Express I-270 WB to US 36 WB	1	165	2	2	55
US 36 EB to I-25 NB	2	0	0	0	55
Express EB I-270 east of I-25	1	1274	13	13	55
I-270 EB between I-25 & end of Express	3	1144	65	91	55
I-270 EB between end of Express & I-76	3	1144	65	91	55
Express WB I-270 between begin of Express & I-25	1	719	7	7	55
I-270 WB between I-25 & I-76	3	1144	65	91	55
I-270 EB ramp to I-76 EB	1	720	32	48	55
I-76 WB ramp to I-270 EB	1	0	0	0	55
I-270 EB (I-76 off-ramp to on-ramp)	3	1170	52	78	55
I-270 EB (I-76 on-ramp to York Street on-ramp)	4	1101	49	73	55
I-76 EB ramp to I-270 EB	1	291	20	23	55
I-76 EB	3	1131	78	91	55
I-270 WB ramp to I-76 EB	1	0	0	0	55
I-270 WB ramp to I-76 WB	1	283	13	19	55
I-270 WB (I-76 off-ramp to on-ramp)	3	1170	52	78	55
I-76 WB ramp to I-270 WB	1	696	48	56	55
I-76 WB	2	1131	78	91	55
I-270 EB (I-76 on-ramp to York Street on-ramp)	4	1170	52	78	55
I-270 WB ramp to York Street	1	720	32	48	55

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
I-270 EB (York Street on-ramp to Vasquez Boulevard)	4	1170	52	78	55
I-270 WB (Vasquez Boulevard on-ramp to York Street off-ramp)	4	1170	52	78	55
Washington Street (NB and SB)	6	501	22	33	40
York Street north of I-270 (NB and SB)	4	540	24	36	35
York Street over I-270 (NB and SB)	4	540	24	36	35
York Street on-ramp to I-270 EB	1	720	32	48	35
I-270 EB off-ramp to Vasquez Boulevard (SB & NB)	2	720	32	48	55
I-270 EB (between SB and NB Vasquez Boulevard off-ramps)	3	1170	52	78	55
SB Vasquez Boulevard on-ramp to I-270 EB	1	308	14	21	55
I-270 EB (between Vasquez Boulevard cloverleaf ramp and on-ramp)	4	1085	48	72	55
NB Vasquez Boulevard to I-270 EB on ramp	1	151	7	10	55
I-270 WB off-ramp to Vasquez Boulevard NB & SB	1	343	15	23	35
I-270 WB (Vasquez Boulevard off-ramp to cloverleaf on-ramp)	3	1170	52	78	55
Vasquez Boulevard NB on-ramp to I-270 WB	1	720	32	48	55
I-270 WB (between NB Vasquez Boulevard on-ramp and SB Vasquez Boulevard on-ramp)	4	1170	52	78	55
I-270 EB off-ramp to Vasquez Boulevard NB	2	720	32	48	35
I-270 EB Mainline (Vasquez Boulevard to Quebec Street)	3	1170	52	78	55
I-270 WB Mainline (Quebec Street to Vasquez Boulevard Interchange)	3	1170	52	78	55
I-270 EB off-ramp to Quebec Street	1	720	32	48	55
I-270 WB on-ramp from Quebec Street	1	720	32	48	55
Express EB I-270 to I-70	1	130	1	1	55
I-270 EB (Quebec Street to I-70)	2	1170	52	78	55

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
Express WB I-70 to I-270	1	129	1	1	55
I-270 WB (I-70 to Quebec Street)	2	1170	52	78	55
Vasquez Boulevard north of I-270 (NB and SB)	6	516	54	30	45
Vasquez Boulevard south of I-270 (NB and SB)	6	540	30	30	45
Vasquez Boulevard south of I-270 ramps (NB and SB)	6	540	30	30	45
56th Avenue west of I-270 (EB and WB)	4	540	24	36	30
56th Avenue east of I-270 (EB and WB)	2	540	24	36	30
Quebec Street north of I-270 (NB and SB)	4	540	24	36	45
Northfield Boulevard SB to SB Quebec Street	2	106	5	7	55
Quebec Street NB to EB Northfield Boulevard	2	540	24	36	45
Northfield Boulevard WB Exit to Quebec Street NB	1	241	11	16	45
Northfield Boulevard WB to I-270 WB on-ramp	3	393	17	26	45
Quebec Street between I-270 ramps (NB and SB)	6	540	24	36	40
Quebec Street south of Sandcreek Drive (NB and SB)	6	540	24	36	40
Sandcreek Drive (EB and WB)	2	237	11	16	45

Design Year EL Build Alternative Noise Model Traffic Data (2050)[4]

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
I-25 SB ramp to I-270 EB	2	693	39	39	55
SB Express I-25 to EB I-270 Express	1	377	4	4	55
Express EB US 36 to EB I-270 Express	1	1251	13	13	55
EB US 36 to I-270 EB	2	1170	52	78	55
I-25 NB	3	1170	65	65	55
I-76 EB ramp to I-25 NB	1	704	40	56	55
I-270 WB ramp to I-25 NB	1	704	40	56	55
Express WB I-270 to NB I-25 Express	1	333	3	3	55
I-270 WB to US 36 WB	2	1144	65	91	55
Express I-270 WB to US 36 WB	1	99	1	1	55
Express EB I-270 from I-25 to I-76	1	1274	13	13	55
I-270 EB between I-25 & I-76	2	1144	65	91	55
Express WB I-270 between I-76 & I-25	1	1274	13	13	55
I-270 WB between I-25 & I-76	3	1144	65	91	55
I-270 EB ramp to I-76 EB	1	720	32	48	55
I-76 WB ramp to I-270 EB	1	117	8	9	55
I-270 EB (I-76 ramps to York Street on-ramp)	2	1170	52	78	55
I-76 EB ramp to I-270 EB	1	294	20	24	55
I-76 EB	2	1131	78	91	55
I-270 WB ramp to I-76 EB	1	150	7	10	55
I-270 WB ramp to I-76 WB	1	383	17	26	55
I-270 WB (I-76 off-ramp to on-ramp)	2	1170	52	78	55
I-76 WB ramp to I-270 WB	1	696	48	56	55
I-76 WB	3	1008	70	81	55
I-270 WB ramp to York Street	1	720	32	48	35
I-270 EB (York Street on-ramp to Vasquez Boulevard)	3	1170	52	78	55
I-270 WB (Vasquez Boulevard on-ramp to York Street off-ramp)	3	1170	52	78	55
Washington Street (NB and SB)	6	515	23	34	40

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
York Street north of I-270 (NB and SB)	4	540	24	36	35
York Street over I-270 (NB and SB)	4	540	24	36	35
York Street on-ramp to I-270 EB	1	540	24	36	35
I-270 EB off-ramp to Vasquez Boulevard (SB & NB)	2	720	32	48	55
I-270 EB (between SB and NB Vasquez Boulevard off-ramps)	2	1170	52	78	55
SB Vasquez Boulevard on-ramp to I-270 EB	1	294	13	20	55
I-270 EB (between Vasquez Boulevard cloverleaf ramp and on-ramp)	3	943	42	63	55
NB Vasquez Boulevard to I-270 EB on ramp	1	149	7	10	55
I-270 WB off-ramp to Vasquez Boulevard NB & SB	1	387	17	26	55
I-270 WB (Vasquez Boulevard off-ramp to cloverleaf on-ramp)	2	1170	52	78	55
Vasquez NB on-ramp to I-270 WB	1	720	32	48	35
I-270 EB Mainline (Vasquez Boulevard to Quebec Street)	2	1170	52	78	55
I-270 WB Mainline (Quebec Street to Vasquez Boulevard Interchange)	2	1170	52	78	55
I-270 EB off-ramp to Quebec Street	1	720	32	48	35
I-270 WB on-ramp from Quebec Street	1	720	32	48	55
Express EB I-270 to I-70	1	164	2	2	55
I-270 EB (Quebec Street to I-70)	2	1170	52	78	55
Express WB I-70 to I-270	1	322	3	3	55
I-270 WB (I-70 to Quebec Street)	3	1082	48	72	55
Vasquez Boulevard north of I-270 (NB and SB)	6	516	54	30	55
Vasquez Boulevard south of I-270 (NB and SB)	6	540	30	30	45
Vasquez Boulevard south of I-270 ramps (NB and SB)	7	540	30	30	45
56th Avenue west of I-270 (EB and WB)	4	540	24	36	30
56th Avenue east of I-270 (EB and WB)	2	540	24	36	30

Roadway	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Posted Speed (mph)
Quebec Street north of I-270 (NB and SB)	4	540	24	36	45
Northfield Boulevard SB to SB Quebec Street	1	204	9	14	55
Quebec Street NB to EB Northfield Boulevard	2	540	24	36	45
Northfield Boulevard WB Exit to Quebec Street NB	1	219	10	15	45
Northfield Boulevard WB to I-270 WB on-ramp	3	393	17	26	45
Quebec Street between I-270 ramps (NB and SB)	6	540	24	36	40
Quebec Street south of Sandcreek Drive (NB and SB)	6	540	24	36	40
Sandcreek Drive (EB and WB)	2	237	11	16	45

Notes:

1. Existing Conditions traffic data source: Calibrated TransCAD 2023 PM Peak model outputs developed by Felsberg Holt Ullevig.
2. No Action traffic data source: Calibrated TransCAD 2050 PM Peak model outputs developed by Felsberg Holt Ullevig.
3. Build Alternative traffic data source: Calibrated TransCAD 2050 PM Peak model outputs developed by Felsberg Holt Ullevig.

Appendix C TNM Noise Modeling Results

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Appendix D Noise Abatement Evaluation Worksheets (CDOT Form 1209)

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