



CENTRAL PARK BOULEVARD
INTERCHANGE



I-70 / CENTRAL PARK BOULEVARD I N T E R C H A N G E

NOISE IMPACT ASSESSMENT



PREPARED FOR:
CITY AND COUNTY OF DENVER



IN PARTNERSHIP WITH
**US DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION**



COLORADO DEPARTMENT OF TRANSPORTATION



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J A N U A R Y 2 0 0 9

Noise Impact Assessment – Central Park Boulevard Interchange

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PROJECT: Central Park Boulevard Interchange
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SUMMARY

This memorandum describes the results of a noise study conducted for the Central Park Boulevard Interchange Project located in the Stapleton redevelopment area in Denver, Colorado. The proposed project would construct a new interchange on Interstate 70 (I-70) for the proposed Central Park Boulevard. The noise analysis was conducted according to the Colorado Department of Transportation's (CDOT) *Noise Analysis and Abatement Guidelines* (2002). The study found that there are currently no noise sensitive receptors within the interchange area, and only commercial or undeveloped areas nearby. Hence, the project does not result in any noise impacts according to CDOT policy. Noise level contours showing predicted noise levels with the interchange in the design-year are provided. The contours can be used to guide future development around the interchange to avoid noise impacts.

INTRODUCTION

The Central Park Boulevard Interchange Project is located near the Stapleton redevelopment area in Denver, Colorado, as shown in Figure 1. Previously, a noise analysis was conducted for this area as part of the I-70 East Corridor Environmental Impact Statement, but that study did not include the Central Park Boulevard Interchange. Also, that project analyzed noise impacts for I-70's "ultimate" build condition of six lanes in each direction. The current noise study was conducted using 2035 traffic volumes and I-70 having five lanes in each direction. The following sections describe the applicable noise regulations, noise measurements, validation of the noise model, and the predicted future noise level contours around the interchange.



FIGURE 1 – GENERAL LOCATION OF THE CENTRAL PARK BOULEVARD INTERCHANGE PROJECT

APPLICABLE TRAFFIC NOISE ANALYSIS REGULATIONS

The noise analysis was conducted according to the Colorado Department of Transportation's (CDOT) noise guidelines, which are set forth in *CDOT Noise Analysis and Abatement Guidelines*, December 1, 2002. The CDOT noise guidelines are consistent with those of the Federal Highway Administration (FHWA) (23 CFR 772) and have been approved by the FHWA for use on Federal-aid projects in Colorado. CDOT's guidelines establish noise abatement criteria and design requirements for noise mitigation. The guidelines state that noise mitigation should be considered for any receptor or group of receptors where predicted traffic noise levels, using future traffic volumes and roadway conditions, equal or exceed CDOT's Noise Abatement Criteria (NAC), which are shown in Table 1. The guidelines also state that noise mitigation should be considered for any receptors where predicted noise levels for future conditions are greater than existing noise levels by 10 dBA or more.

TABLE 1
CDOT NOISE ABATEMENT CRITERIA

Activity Category	$L_{eq}^{(1), (2)}$ (dBA)	Description of Activity Category
A	56 (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	66 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	71 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	51 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

⁽¹⁾ Hourly A-weighted equivalent level for the noisiest hour of the day in the design year

⁽²⁾ CDOT impact levels are 1 dBA lower (more stringent) than FHWA values (23 CFR 772), as to "approach" the FHWA levels.

EXISTING NOISE LEVELS

The analysis of the project's existing conditions included a survey of the site to identify the type and location of noise sensitive receptors, and noise measurements for use in validating the Traffic Noise Model (TNM) of the proposed project.

NOISE SENSITIVE RECEPTORS

The area around the proposed interchange project was surveyed for noise sensitive receptors, such as residences and businesses. None were found in the immediate vicinity (1,000 feet). This is consistent with the findings of the noise study conducted for the I-70 East Corridor EIS. Land to the north of the proposed interchange is vacant. The Shops at Northfield are located northwest of the interchange, and commercial offices and warehouses are located to the northeast. To the south are more vacant lands and an active industrial operation. The nearest noise sensitive sites include hotels near Havana and Quebec Streets, which are approximately 2,000 feet and 1,000 feet from the nearest proposed interchange ramps, respectively. The nearest residential homes are located approximately 2,000 feet to the south in the Stapleton area.

NOISE MEASUREMENTS

Noise measurements were taken on December 11, 2008 between 12:00 pm and 2:00 pm. Two 20-minute long measurements were conducted at the locations shown in Figure 2 as M1 and M2 on either side of the existing bridge (restricted access). Both locations were on the north side of I-70. No measurements were taken on the south side of the highway due to restricted access. During each measurement the corresponding volume of traffic on I-70 was monitored (video recorded). Wind speed, wind direction, temperature, and relative humidity were measured concurrently. Traffic speeds were estimated to be the posted speed limit. All noise measurements were conducted in accordance with CDOT guidelines, were conducted by qualified personnel, and were conducted using sound level meters meeting American National Standards Institute Type 1 specifications (in addition, the meter was calibrated in the field). Table 2 lists the measured noise levels, traffic volumes, and weather conditions.



FIGURE 2 – VALIDATION NOISE MEASUREMENT LOCATIONS

TABLE 2

MEASURED NOISE LEVELS, TRAFFIC VOLUMES AND WEATHER CONDITIONS

Measurement Number	Measured Noise Level (dBA)	I-70 Eastbound Traffic			I-70 Westbound Traffic			Traffic Speed (mph)
		Autos Per Hour	Medium Trucks Per Hour	Heavy Trucks Per Hour	Autos Per Hour	Medium Trucks Per Hour	Heavy Trucks Per Hour	
M1 ⁽¹⁾	71.8	4,380	282	390	4,635	255	360	55
M2 ⁽²⁾	64.0	5,070	309	339	4,305	348	336	55

⁽¹⁾ North Wind 3 to 5 mph, 50 F, and R.H. 15%

⁽²⁾ North Wind 5 to 7 mph, 50 F, and R.H. 15%

TRAFFIC NOISE MODEL OF EXISTING CONDITIONS

A model of existing traffic noise conditions was created using TNM (v2.5). The following default TNM settings were used: standard vehicle emission factors, ground type of “lawn”, temperature of 68°F, and relative humidity of 50%. Roadways were modeled using the available CAD and spot elevation data provided by the project team. For I-70 and I-270, one TNM roadway element was used to model each direction of travel, whereas one TNM roadway element was used to model other roadways. The actual width of each roadway was estimated using CAD files. Berm barriers were input to represent the significant existing barriers on either side of the existing bridge structure.

TRAFFIC NOISE MODEL VALIDATION

The traffic noise model of existing conditions was validated by predicting noise levels at the measurement locations using the traffic volumes and speed present during the measurements, and comparing the measured and predicted noise levels. As shown in Table 3, the predicted results were 2.0 to 2.4 dBA louder than the measured results. This is within the accepted accuracy range for traffic models, which is ± 3 dBA. Also, considering that the wind during these measurements was blowing from the microphones towards I-70, the measurements were anticipated to be quieter than the predictions, which is consistent with the results shown in Table 3. Thus, based on these results, the noise model is considered to be accurate.

TABLE 3

NOISE MODEL VALIDATION RESULTS

Measurement Number	Measured Noise Level (dBA)	Predicted Noise Level (dBA)	Predicted Minus Measured Noise Level (dBA)
M1	71.8	74.2	+ 2.4
M2	64.0	66.0	+ 2.0

EXISTING NOISE LEVELS

The purpose of predicting existing noise levels is to provide a baseline to compare future noise levels to. This comparison is done at individual receiver locations, such as residences. There are no individual receivers located within the project study area. Therefore, existing noise levels were not predicted (other than for model validation).

DESIGN YEAR NOISE LEVELS

The purpose of analyzing the traffic noise for the future (design year) conditions is to identify noise impacts to sensitive receptors such as residences, and to provide noise level contour maps which identify areas where development should be avoided to minimize future impacts.

TRAFFIC NOISE MODEL OF DESIGN YEAR CONDITIONS

Design year (2035) noise levels were predicted using TNM (v2.5). The model of existing conditions was modified to include the preferred Central Park Boulevard interchange design (Alternative 4), in addition to I-70, I-270, Quebec Street, etc. Again, default conditions were used, including standard vehicle emission factors, ground type of "lawn", temperature of 68°F, and relative humidity of 50%. Roadway locations, new bridge structure, and widths were imported using CAD data provided by the project team. Elevation data was input or estimated from an electronic drawing with spot elevations. As there were no noise sensitive receivers to model, noise levels were instead predicted at a series of points in order to identify the locations of the 66 dBA and 71 dBA noise level contours. The design-year 2035 traffic volumes and speeds used in the model are shown in Figure 3. These volumes were provided by the project team with the truck percentages taken from the *I-70 East EIS Traffic Noise Study (June 2007)*. The volumes correspond to a Level of Service C or D, which represents loudest-hour conditions. Directional volumes were used for I-70 and total volumes were used for all side roads.

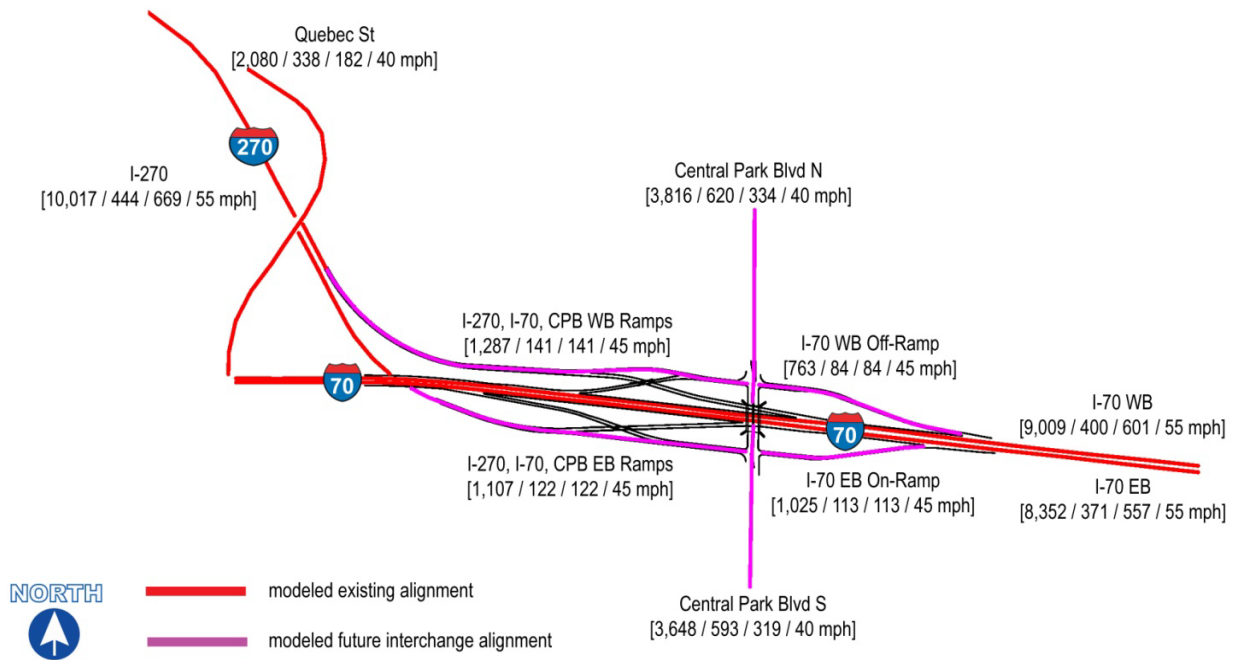


FIGURE 3 – 2035 TRAFFIC VOLUMES USED IN NOISE ANALYSIS

FUTURE NOISE LEVELS AND IMPACTS

As previously described, there are no noise sensitive receivers (i.e.: residences, churches, commercial outdoor use areas, etc.) within the project study area. Therefore, future noise levels were not predicted at individual locations. Thus, there are no noise impacts associated with this project.

NOISE LEVEL CONTOURS

Noise contour lines represent the location at which a particular noise level is achieved at a particular distance from a noise source. For highway projects in Colorado, future design-year noise contours for the 66 dBA and 71 dBA levels are generally produced, as these levels represent the Noise Impact Criteria for Category B (residential) and Category C (commercial) land uses, respectively. Figures 4 to 6 show the locations of the 66 and 71 dBA noise level contours for design year conditions. To avoid noise impacts in the future, residential development should be discouraged between the roadways and the 66 dBA contour, and commercial development should be discouraged between the roadways and the 71 dBA contour. To facilitate this, these contour maps should be provided to City and County planning staff.

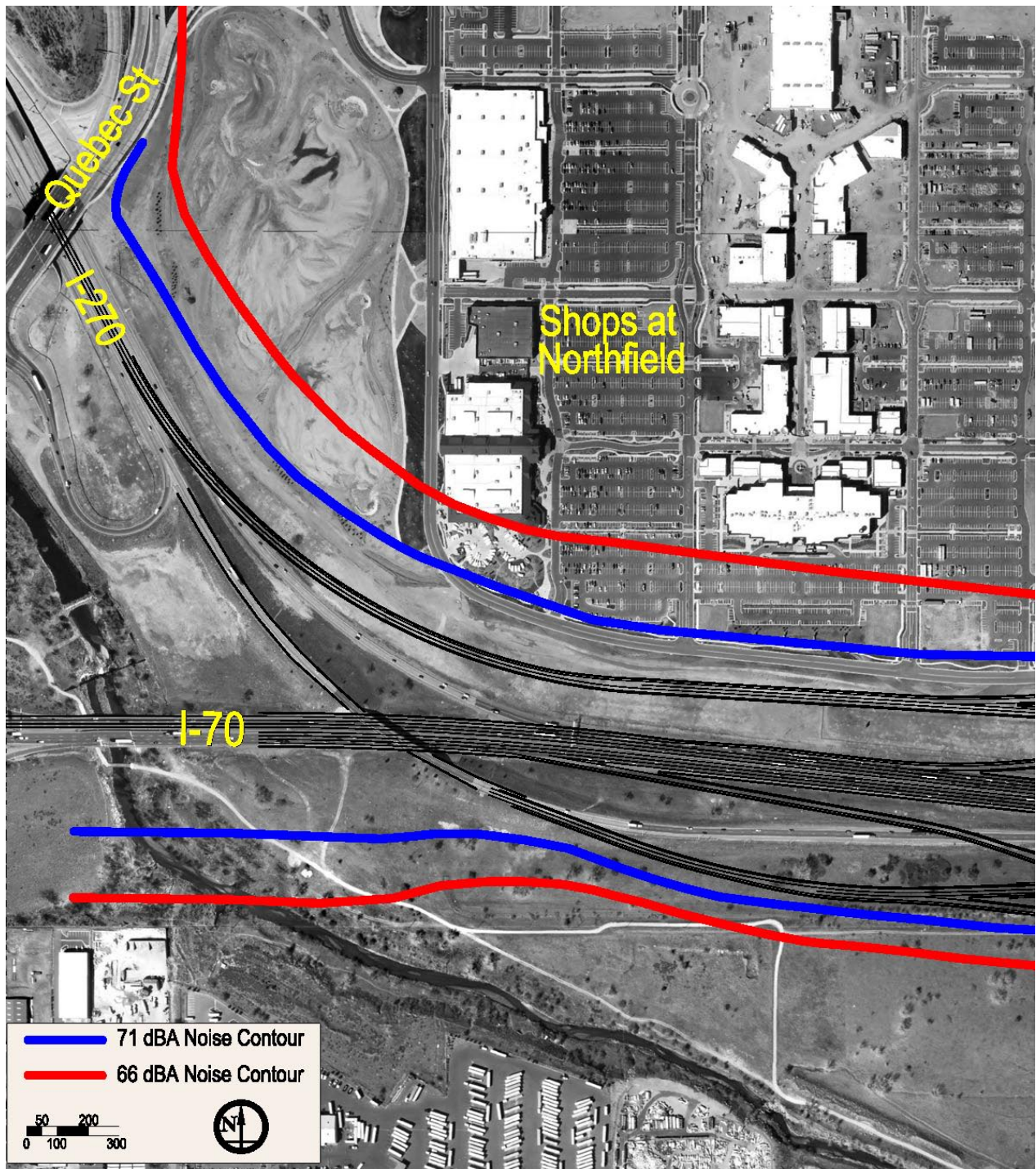


FIGURE 4 – CENTRAL PARK BOULEVARD INTERCHANGE NOISE CONTOUR INFORMATION – WEST

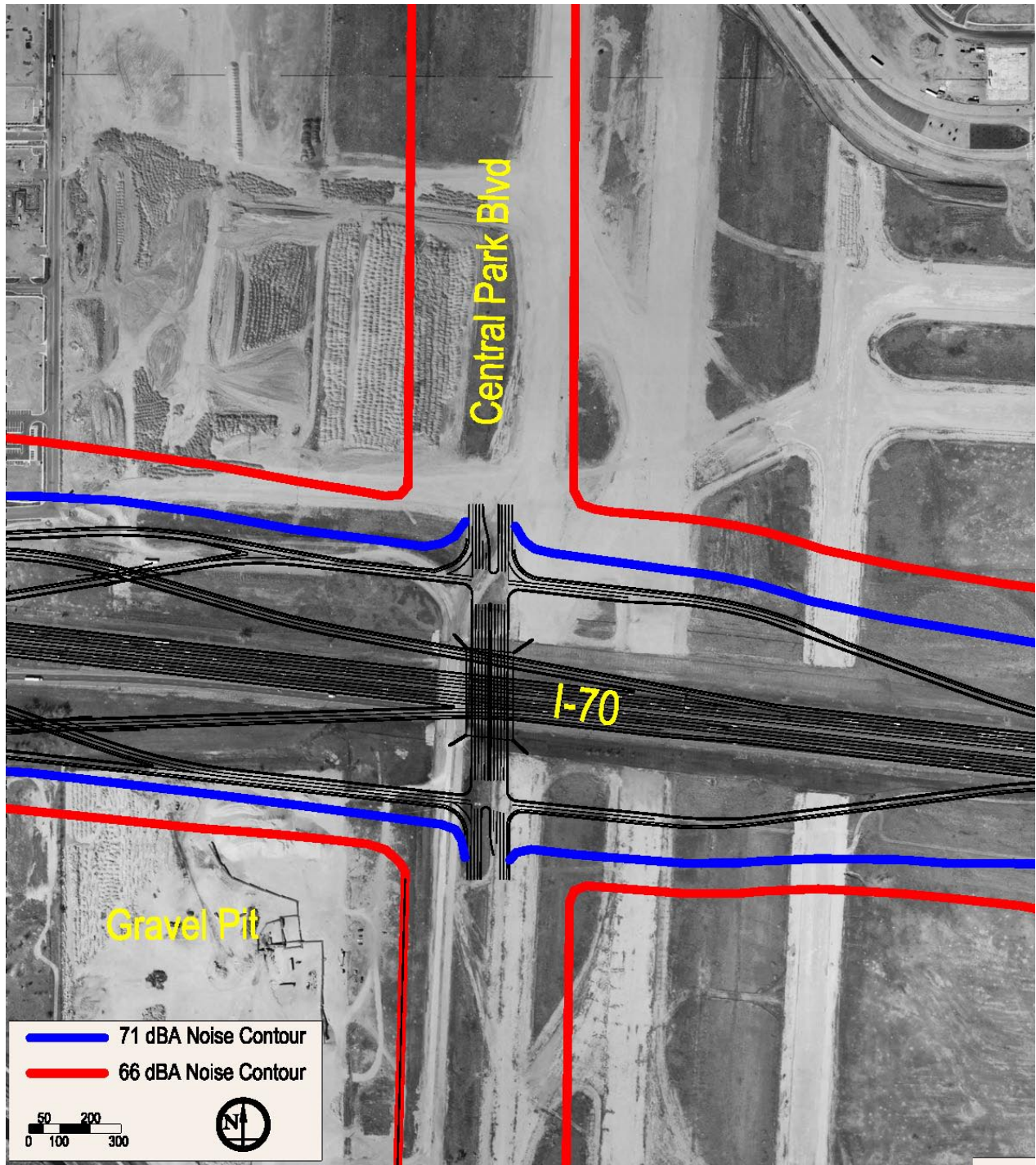


FIGURE 5 – CENTRAL PARK BOULEVARD INTERCHANGE NOISE CONTOUR INFORMATION – CENTRAL

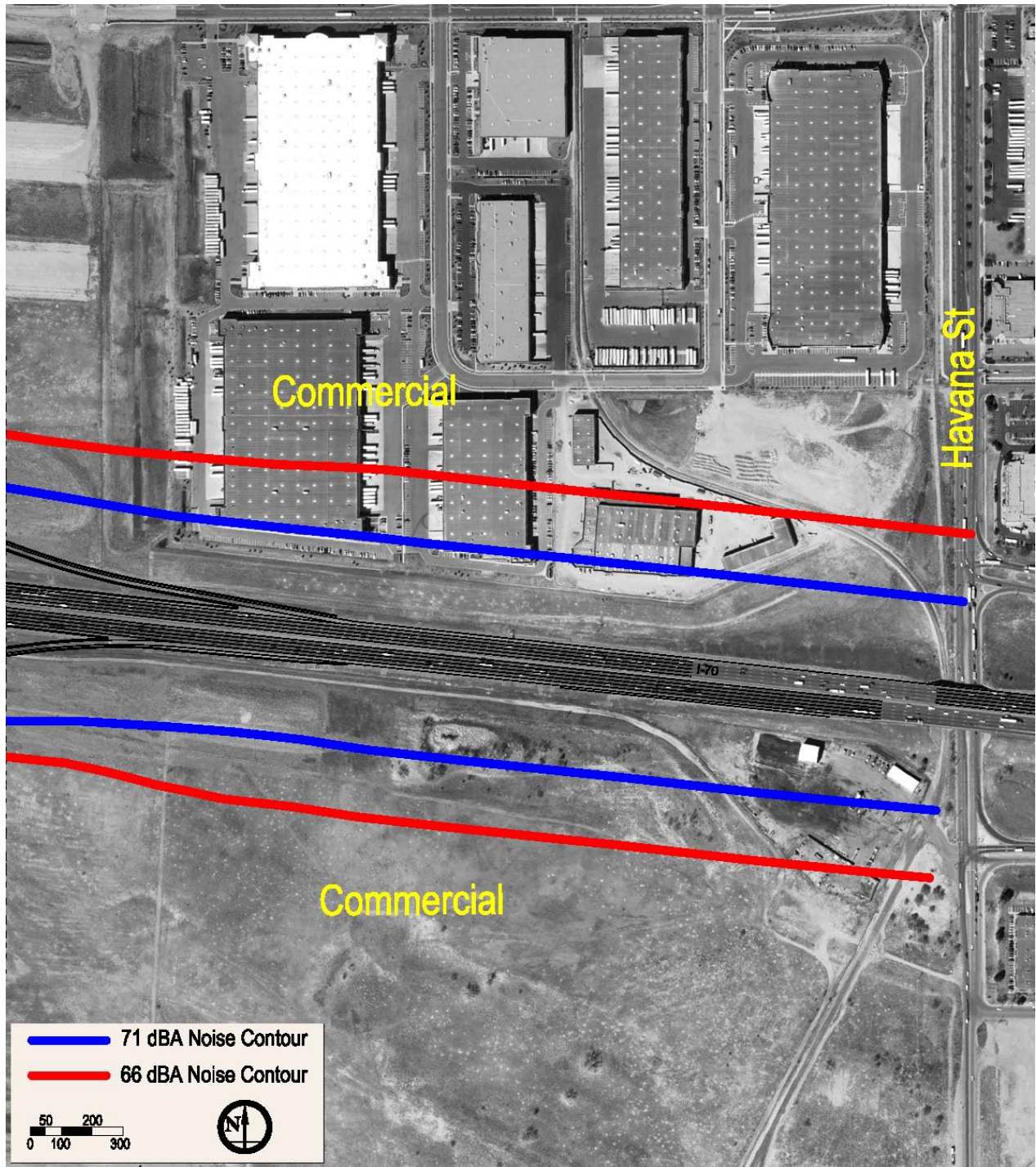


FIGURE 6 – CENTRAL PARK BOULEVARD INTERCHANGE NOISE CONTOUR INFORMATION – EAST