I-64

Louisville, Kentucky

NOISE IMPACT STUDY

Prepared in accordance with Louisville Development Code Chapter 5 Section1.7.E

Prepared for:

Mindel Scott and Associates

January 2019

Prepared by:

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INTRODUCTION

A study was made of the effects that the operation of I-64 would have on the noise environment at the proposed South English Station Property located in the southeast quadrant of I-64 and English Station Road in Louisville, Jefferson County, Kentucky. The study was prepared consistent with the Louisville Development Code Chapter 5 Section1.7.E, which constitutes the noise compatibility requirements for residential development in Metro Louisville. This section of the code requires that new residential development approximately 250 feet of an existing I-64 must not exceed a sound level of 65 dBA Leq. If sound levels at any residential structure exceed 65 dBA Leq, appropriate abatement strategies must be recommended.

METHODOLOGY

Leq is the equivalent energy level, and is similar to an average value of the sound levels occurring over a period of time. The unit for Leq is the A-weighted decibel, abbreviated

"dBA". The dBA unit takes into account the characteristics of the human hearing mechanism as well the acoustic energy generated by the source.

The code requires that the study be based upon projected future traffic data provided by the Planning Commission. The year 2029 was selected as the study year, in accordance with industry practice. Based upon conversations with Mr. Jadie Tomlinson and Mr. Jonathan Reynolds of the KYTC Division of Planning in Frankfort, traffic count data for I-64 were taken from:

http://datamart.business.transportation.ky.gov/EDSB_SOLUTIONS/CTS/StationDetail.aspx?STATION=056019&TF_NE_ID=41051864;

per e-mail dated Thursday, December 13, 2018 @ 1:11 p.m. from Mr. Jadie Tomlinson Kentucky Transportation Cabinet (KYTC) Division of Planning to Teak-Keun Kim, PE: "*Traffic Count Information, etc.*" and Tuesday, December 18, 2018 @ 11:10 a.m. from Mr. Jonathan Reynolds Kentucky Transportation Cabinet (KYTC) Division of Planning to Teak-Keun Kim, PE: "*Traffic Count Information, etc.*"

The traffic counts were adjusted to 2029 values using 1.2 percent growth factor, based on the KYTC information. Total two-way 2029 Annual Average Daily Traffic (AADT) for I-64 was determined to be 67,278, with the 4% for medium truck and 12% for heavy truck for I-64. This value was converted to an afternoon peak hour using the conversion factor of approximately 9.7 percent extracted from the websites shown above. Also, a directional split of 52/48 EB/WB was also applied, based on the data found in the websites shown above.

The worst traffic noise conditions shall be evaluated as the lesser of the design hour factor percentage of the AADT or the roadway vehicle Level of Service "C" (LOS C) operating at the free flow speed condition. Numerous empirical evaluations and theoretical assessments have confirmed a widely accepted relationship between the loudest traffic hour and the "Level of Service" (LOS) C traffic volumes. When traffic

volumes exceed LOS C, vehicles must slow down, and noise emissions are reduced (source:

https://www.fhwa.dot.gov/Environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/polguide02.cfm).

Traffic volumes on I-64 on based on the 2029 AADT is lesser than LOS C volumes. The number of automobiles, medium trucks, and heavy trucks for a given roadway segment were calculated as the Average Annual Daily Traffic multiplied by the design hour factor. In order to calculate 2029 Leq values, the currently accepted state-of-the-art noise prediction program was used. That program is the USDOT Federal Highway Administration's (FHWA) Traffic Noise Model, TNM, version 2.5, commonly referred to as TNM 2.5. Information on TNM 2.5 may be found at:

http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/tnm_v25

2019 NOISE MEASUREMENTS

Ambient noise measurements on Monday, January 21, 2019 and Tuesday, January 22, 2019 were conducted. The measurements were made with a Larson-Davis SoundTrack LxT Type 1, which was calibrated before and after the measurements. Weather conditions were clear and calm. Measurements were conducted based on the acceptable collection of existing noise level readings according to the FHWA Report, FHWA-PD-96-046, and "Measurement of Highway Related Noise." I-64 traffic noise was dominant at measurement locations. Ambient noise measurements obtained in the field ranged from 65 to 66 dBA Leq on Monday, January 21, 2019. Also, second noise measurements obtained in this field ranged from 66 to 67 dBA Leq on Tuesday, January 22, 2019.

ANALYSIS

Figure 1 shows a proposed plan view of the project site, as provided by Mindel Scott & Associates that is located in Louisville, Kentucky. The figure includes the location of modeled receiver, measurement location, and proposed noise barrier. Figure 2 shows the TNM 2.5-generated plan view of the project site. Table 1 below shows a summary of the results. In determining traffic noise impacts, a highway agency shall give primary consideration to exterior areas where frequent human use occurs based on CFR 772.11 Analysis of traffic noise impacts.

All receivers, which are facing to I-64, are predicted to be impacted (refer to Table 1 and Figure 1). Therefore, appropriate abatement strategies must be recommended. Note that the Leq values have been rounded to the nearest whole number, in accordance with industry practice. Note that there is one receiver assigned for each building. Table 2 shows the results of the TNM 2.5 analysis for 2029.

Table 1: L_{eq} values in dBA.

Receiver	Leq in dBA w/o barrier	Leq in dBA with barrier	Receiver	Leq in dBA w/o barrier	Leq in dBA with barrier
R-01	**67**	60	R-09	**69**	63
R-02	**68**	62	R-10	**69**	63
R-03	**70**	63	R-11	**68**	63
R-04	**71**	64	R-12	**68**	63
R-05	**70**	64	R-13	**68**	64
R-06	**70**	64	R-14	**68**	64
R-07	**70**	63	R-15	**68**	63
R-08	**70**	63	R-16	**65**	60

XX exceed 65 dBA Leq

Note: W/O barrier noise levels are based on the existing topography.

CONCLUSION AND RECOMMENDATION

Because 2029 Leq values exceed the 65 dBA criteria, a noise barrier will be required. The values shown as "Leq with barrier" include the effects of a five-foot high barrier

located (refer to Figure 3) as close to the I-64 right-of-way line as feasible, and on the assumed ground elevations (i.e., 700 feet) between the proposed noise barrier and receivers (refer to Figure 4).

Figure 1: Noise Figure

Created by Tech Engineering Group (January 2019)

Figure 2: TNM 2.5-generated plan view of the project site

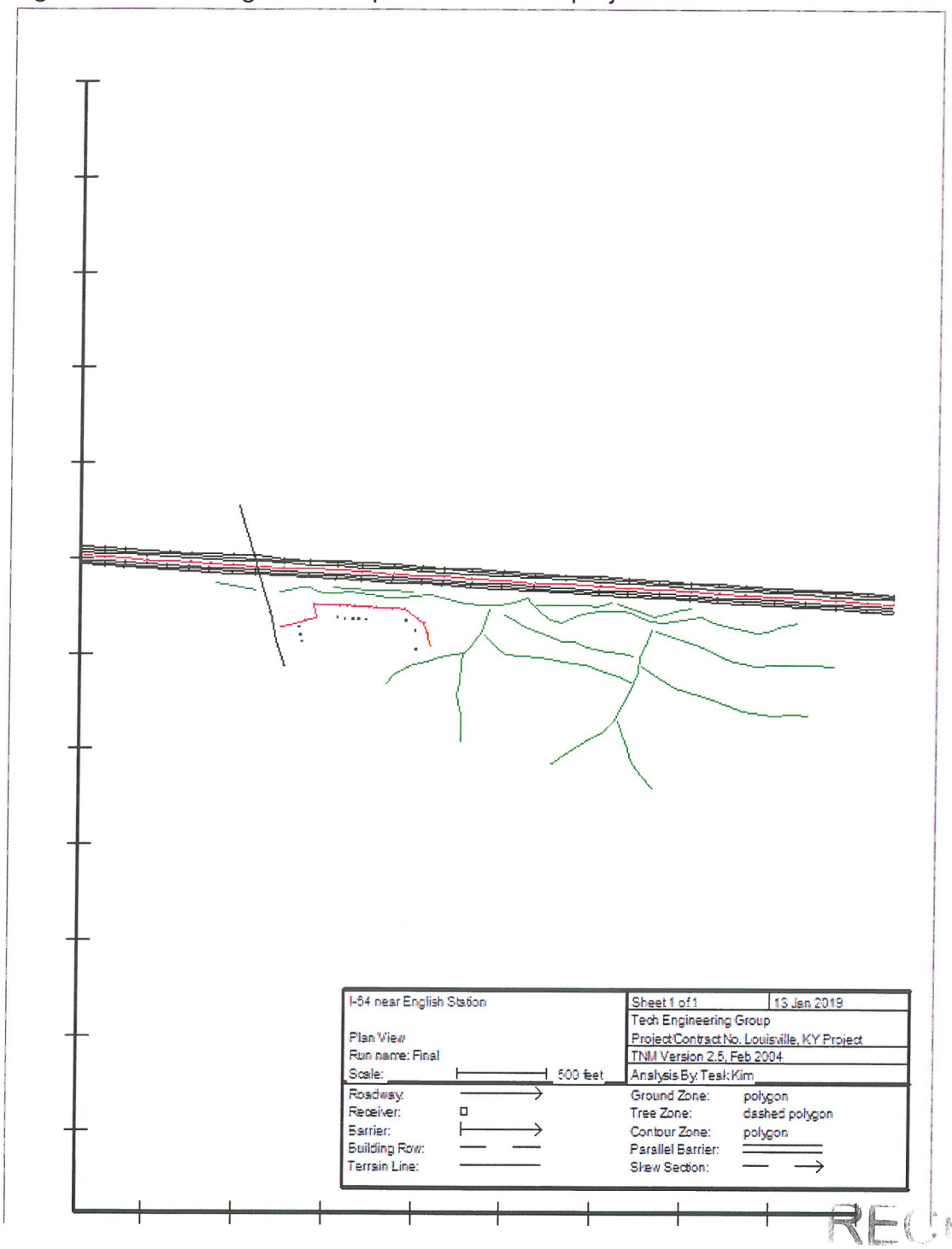

Figure 3: TNM 2.5-generated plan view of the barrier design

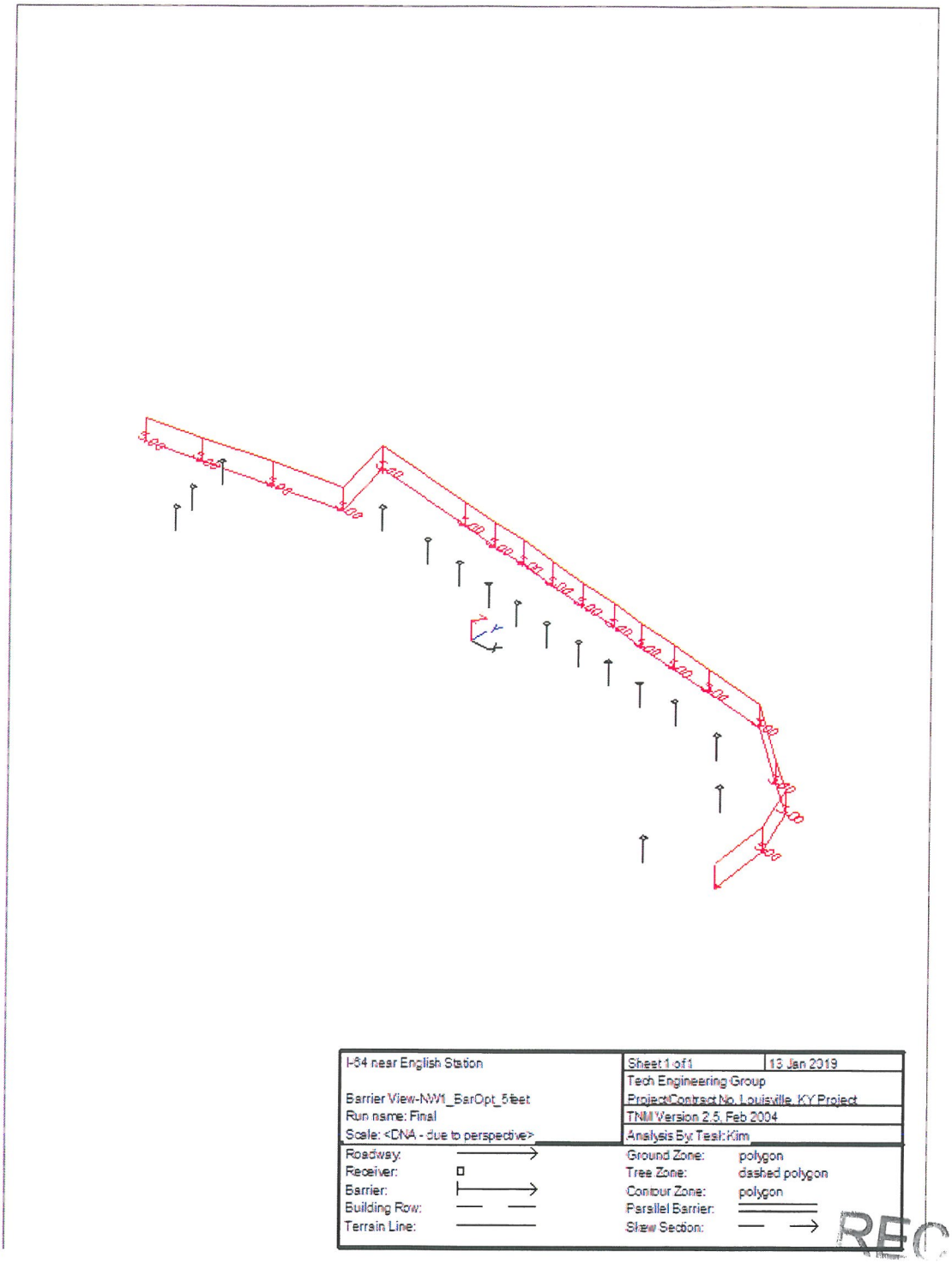

Figure 4: Assumed ground elevations (i.e., 700 feet) between the proposed noise barrier and receiver

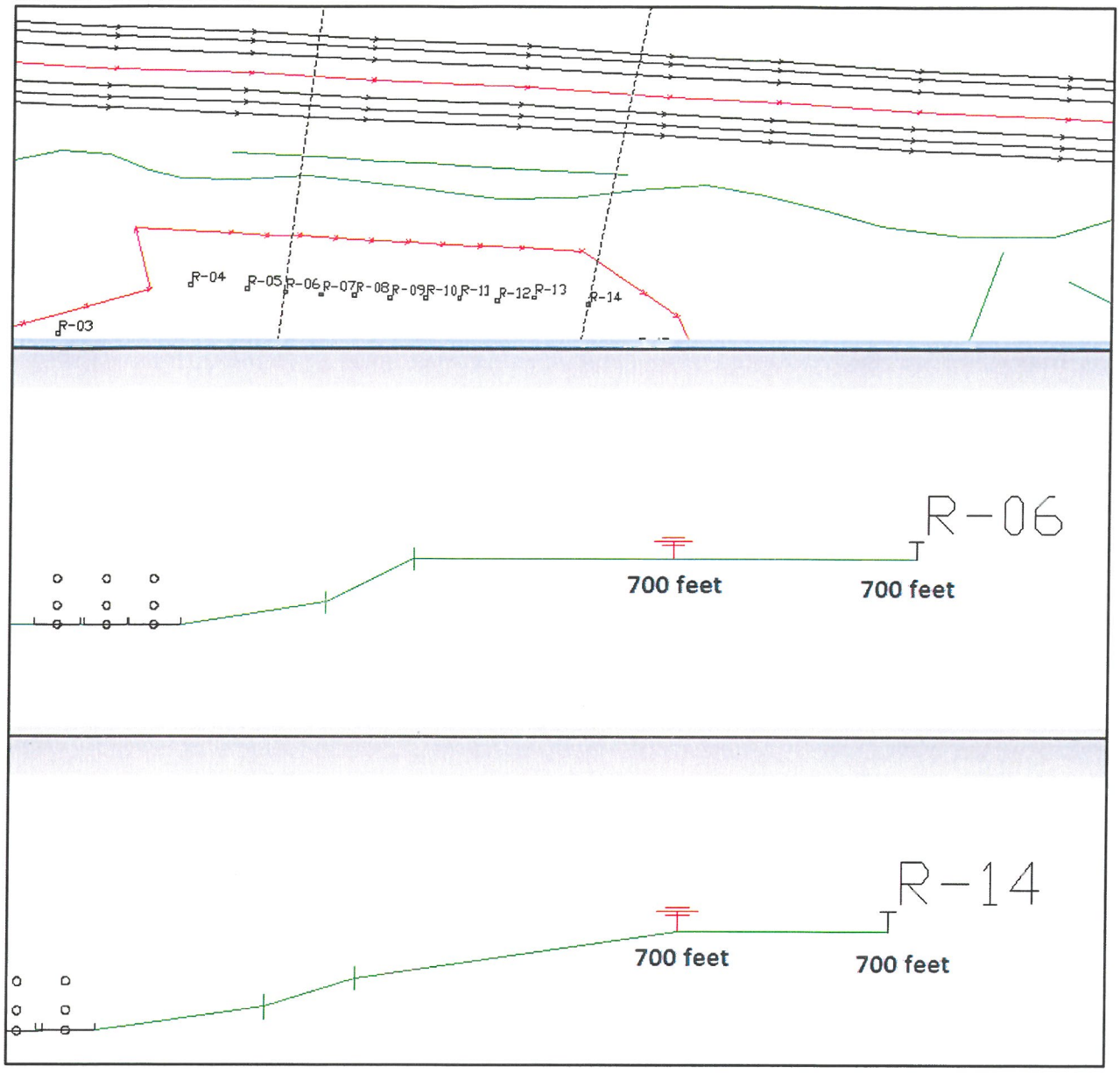

Table 2: TNM 2.5-generated noise levels results file.

No Barrier			
LAeq1h		Increase over existing	
Calculated	Crit'n	Calculated	Crit'n Sub'l Inc
dBA	dBA	dB	dB
66.9	66	66.9	10
68.1	66	68.1	10
70.0	66	70.0	10
70.6	66	70.6	10
69.5	66	69.5	10
69.6	66	69.6	10
69.9	66	69.9	10
70.1	66	70.1	10
68.8	66	68.8	10
68.5	66	68.5	10
68.3	66	68.3	10
68.2	66	68.2	10
68.0	66	68.0	10
67.6	66	67.6	10
67.9	66	67.9	10
65.1	66	65.1	10

Note: No barrier noise levels are based on the existing topography

With Barrier			
Calculated	Noise Reduction		
LAeq1h	Calculated	Goal	Calculated minus Goal
dBA	dB	dB	dB
60.3	4.0	8	-4.0
61.5	4.4	8	-3.6
63.4	4.8	8	-3.2
64.4	5.0	8	-3.0
63.8	4.6	8	-3.4
63.5	4.1	8	-3.9
63.2	3.8	8	-4.2
63.0	3.6	8	-4.4
62.9	3.5	8	-4.5
63.1	3.7	8	-4.3
63.3	3.7	8	-4.3
63.4	4.0	8	-4.0
63.9	4.9	8	-3.1
64.3	6.2	8	-1.8
62.8	5.9	8	-2.1
59.9	4.0	8	-4.0

Note: Assumed ground elevations (i.e., 700 feet) between the proposed noise barrier and receiver