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June 15, 2015

Emily Liu, AICP, Director
Louisville Metro Planning & Design Services
444 S. Fifth Street, 3rd Floor
Louisville, Kentucky 40202

Re: Docket No. 15CUP1012, Chamberlain Lane Senior Care, LLC noise mitigation issues

Dear Emily:

Per our recent telephone and e-mail communications, this letter shall serve as evidence of our client Chamberlain Lane Senior Care, LLC's compliance with Land Development Code Section 5.1.7.E.3 plus F.5 "exception" provisions to the 250 ft. setback standard. As discussed, Chamberlain Lane Senior Care has agreed to the same noise mitigation as in the Norton Commons apartment case next door where buildings are positioned actually closer to the Snyder Freeway than the ones approved by Board of Zoning Adjustment in this case pursuant to CUP approved May 4, 2015. I have attached the noise report for the adjoining apartment case and this CUP's site plan with distances from the Snyder Freeway.

As we previously communicated, there is nothing in the referenced regulation that requires a waiver to the extent that a noise study and noise mitigation measures are relied upon. The mitigation measures are automatic if a noise study prepared in accordance with the regulation, "is submitted to the Planning Commission," as the regulation at subsection F.1 exactly reads.

The Noise Impact Study recommendation is to provide a min STC rating of 33 on the exterior windows within the setback, which Chamberlain Lane Senior Care has no objection to providing.

We understand that you wish to place this on the Planning Commission DRC agenda for July 1 (unless you meant full Planning Commission agenda for July 2, although it has been our understanding that the Planning Commission does not meet that day).

Please call me if you need anything in addition to this letter and the attached.

Sincerely,

William B. Bardenwerper

Cc: Ian Guttman, Chamberlain Lane Senior Care, LLC
David Mindel and Kent Gootee, Mindel Scott & Associates, Inc.
Michael Healy & Brad Pauling, ph7 Architects

NORTON COMMONS

Prospect, Kentucky

NOISE IMPACT STUDY

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

Prepared for:
Norton Commons
9420 Norton Commons Blvd.
Prospect, KY 40059

May 27, 2011

Prepared by:
Louis F. Cohn, PhD,PE
Louisville, KY 40292

INTRODUCTION

A study was made of the effects that the operation of I-71 would have on the noise environment at the proposed Norton Commons development located north of I-71, between Dayflower Street and Chamberlain Lane in Prospect, Jefferson County, Kentucky. The study was prepared consistent with the Louisville Development Code Chapter 5 Section1.7.F, which constitutes the noise compatibility requirements for residential development in Metro Louisville. This section of the code requires that new residential development within 250 feet of an existing expressway must not exceed a sound level of 65 dBA, L_{eq}. If sound levels at any residential structure exceed 65 dBA, appropriate abatement strategies must be recommended.

METHODOLOGY

L_{eq} 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 L_{eq} is the A-weighted decibel,

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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 2021 was selected as the study year, in accordance with industry practice. Planning Commission staff directed that traffic data from the Kentucky Transportation Cabinet (KYTC) be used. Based upon conversations with Mr. Daniel Hulker and Mr. James Bruce of the KYTC Division of Planning in Frankfort, traffic count data for I-71 and Chamberlain Lane were taken from:

http://kytcgis.ky.gov/TrafficCounts
http://www.planning.kytc.ky.gov/maps/count_maps/count_maps.asp and
http://www.planning.kytc.ky.gov/projects/projects/dist5/I-71_I-265_interchange/i-71.asp
Alternatives Study for I-71 / I-265 Jefferson County August 2010
KYTC Item Number: 5-68.00, Appendix A

The traffic counts were adjusted to 2021 values using a one percent growth factor, as per Mr. Bruce's directions. Afternoon peak hour volumes were shown to be the highest, and therefore were used as the analysis condition. Total two-way 2021 average daily traffic for I-71 was determined to be 60,291, with 21 percent trucks. This value was converted to an afternoon peak hour using the conversion factor of approximately 08.6 percent extracted from the websites shown above. Truck percentages were also adjusted to 16 percent for the peak hour based on data extracted from KYTC Item Number: 5-68.00, Appendix A. A p.m. directional split of 60/40 NB/SB was also applied, based on the data found in KYTC Item Number: 5-68.00, Appendix A.

In order to calculate 2021 L_{eq} 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

ANALYSIS

Figure 1 shows a schematic plan view of the project site, as generated by TNM 2.5. The figure includes the location of a proposed noise barrier, which is discussed later in this report. Figure 2 shows the results of the TNM 2.5 analysis for 2021. Table 1 below shows a summary of the results. Note that there is one receiver assigned for each building, except for Receivers 5 and 6, which are part of the east-most building. Receiver locations are mid-building except for the buildings at each end of the site. For those buildings, the receiver locations are at the end of the building nearest the project termini. Also, Receiver 5 is located at the west end of the east-most building, with Receiver 6 being at the east end of that building. Note that the L_{eq} values have been rounded to the nearest whole number, in accordance with industry practice.

Receiver	L_{eq} in dBA w/o barrier	L_{eq} in dBA with barrier
1	75	65
2	75	65
3	74	64
4	75	65
5	74	64
6	75	64

Table 1. L_{eq} values in dBA.

CONCLUSION AND RECOMMENDATION

Because 2010 Leq values exceed the 65 dBA criteria, a noise barrier will be required. The values shown as "L_{eq} with barrier" include the effects of a ten-foot high barrier located as close to the I-71 right-of-way line as feasible, and on the existing ground elevations.

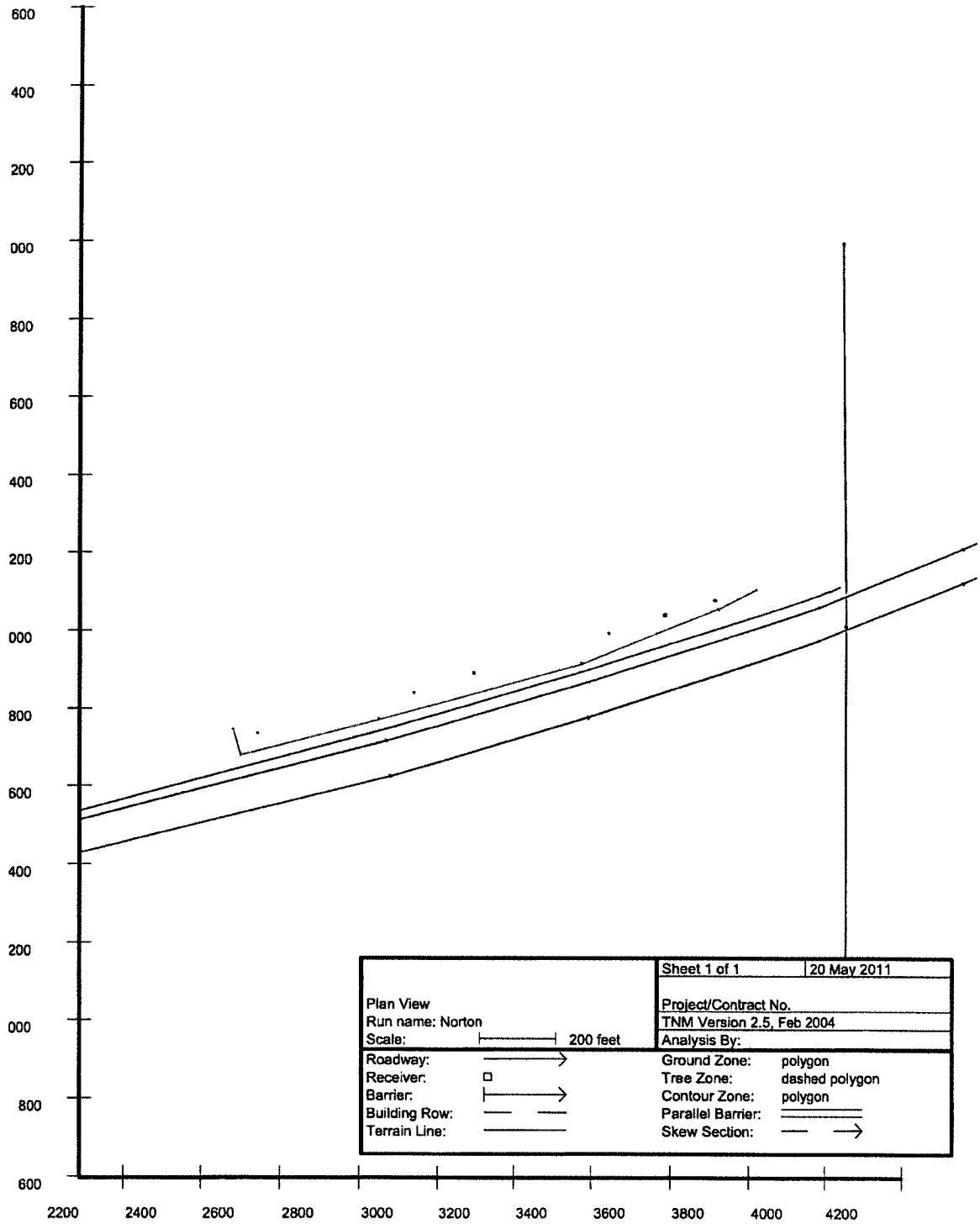

Figure 1. TNM 2.5-generated plan view of the project site.

RESULTS: SOUND LEVELS <Project Name?>

<Organization?>
<Analysis By?>

20 May 2011
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: <Project Name?>
RUN: <Run Title?>
BARRIER DESIGN: INPUT HEIGHTS

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

ATMOSPHERICS: 68 deg F, 50% RH

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	75.3	66	75.3	10	Snd Lvl	64.6	10.7	8	2.7
Receiver2	2	1	0.0	74.7	66	74.7	10	Snd Lvl	64.7	10.0	8	2.0
Receiver3	3	1	0.0	74.1	66	74.1	10	Snd Lvl	64.3	9.8	8	1.8
Receiver4	5	1	0.0	74.8	66	74.8	10	Snd Lvl	64.8	10.0	8	2.0
Receiver5	7	1	0.0	74.3	66	74.3	10	Snd Lvl	64.0	10.3	8	2.3
Receiver6	9	1	0.0	74.8	66	74.8	10	Snd Lvl	64.2	10.6	8	2.6

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	6	9.8	10.2	10.7
All Impacted	6	9.8	10.2	10.7
All that meet NR Goal	6	9.8	10.2	10.7

Figure 2. TNM 2.5-generated noise levels results file.

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ADDENDUM

It should be noted that the design of the residential buildings in this section of Norton Commons is such that there will be no exterior noise sensitive activity. There will be a street with driveways leading directly into the garages of the units, with no space allocated for anything other than pulling autos directly into the garages and walking into the residences. Since noise barriers are only intended to provide abatement for exterior, first floor noise sensitive activities, this recommended ten-foot barrier will be of little value.

In the absence of exterior activity, all federal and state agencies involved in transportation noise control apply interior criteria. For example, the US Department Housing and Urban Development (HUD) regulation states (24CFR51,103(c).1:

> ...the standards shall apply 2 meters (6.5 feet) from the building setback line nearest to the predominant noise source. The standards shall also apply at other locations where it is determined that quiet outdoor space is required in an area ancillary to the principal use on the site.
>
> (2) The noise environment inside a building is considered acceptable if: (i) The noise environment external to the building complies with these standards, and (ii) the building is constructed in a manner common to the area or, if of uncommon construction, has at least the equivalent noise attenuation characteristics.

The conclusion of this regulation is that the exterior noise criteria apply where there is noise sensitive exterior activity. In the absence of such activity, then interior levels will be considered for abatement goals. For example, if the exterior calculations lead to 65 dBA or less, then the interior levels are deemed acceptable provided standards of construction are met. If the exterior calculations exceed 65 dBA, then additional sound reduction may be included to bring interior noise levels down to an acceptable level, thereby allowing project approval. If, and only if, there is exterior noise

sensitive activity, then noise barriers must be considered.

Similarly, the USDOT FHWA states in 23CFR772.11:

> (a) In determining and abating traffic noise impacts, primary consideration is to be given to exterior areas. Abatement will usually be necessary only where frequent human use occurs and a lowered noise level would be of benefit.

The industry standard for considering interior noise is the HUD regulation, 24CFR51.104(a)(1), which says "Noise attenuation measures are those required in addition to attenuation provided by buildings as commonly constructed in the area, and requiring open windows for ventilation." This section also states that

> "Approvals in Normally Unacceptable Noise Zones [greater than 65 dBA] require a minimum of 5 decibels [dBA] additional sound attenuation for buildings having noise-sensitive uses if the day-night average [DNL] sound level is greater than 65 decibels but does not exceed 70 decibels, or a minimum of 10 decibels of additional sound attenuation if the day-night average sound level is greater than 70 decibels but does not exceed 75 decibels."
> *(Note: DNL is approximately equal to L_{eq} for high volume freeways such as I-71.)*

Since the highest exterior L_{eq} value on the site is 75 dBA, a minimum of 10 dBA of additional sound attenuation is needed for the sides of those units with a direct line-of-sight to I-71.

The "default" value for "attenuation provided by buildings as commonly constructed in the area" is a Sound Transmission Class (STC) rating of 20 dB plus a factor of safety of 3, for an STC rating of 23 dB for all points of sound transmission. Therefore, if the calculated DNL or L_{eq} value is between 70 and 75 dBA, an STC rating of 33 is required to obtain the 5 dBA additional sound attenuation specified in 24CFR51.104(a)(1).

Building components other than windows and exterior doors typically provide

ample noise reduction. This is demonstrated in Figure 3 below, excerpted from Chapter 4 of the HUD Noise Assessment Guidelines found at this website: (http://portal.hud.gov:80/hudportal/documents/huddoc?id=DOC_16420.pdf)

Sound transmission issues with exterior doors can easily be solved with the installation of aluminum and glass storm doors, if needed. Typical window components are not normally sufficient to provide adequate noise reduction, as shown in Figure 3. While most windows listed in the table do not achieve the required STC 33, there is one example that does. Others are available from manufacturers.

Typically, such windows are double hung (two panes of glass separated by a vacuum air pocket). The glass thickness is usually at least 3/8 inch and the air pocket width is at least two inches. More details for several of the window options are shown in Figure 4 (also from Chapter 4 of the HUD Noise Assessment Guidelines).

CONCLUSION AND RECOMMENDATION (ADDENDUM)

Because there is no exterior noise sensitive activity, construction of the ten-foot noise barrier needed to reduce L_{eq} values to 65 dBA will be of little value. There will also be negative esthetic consequences to constructing the wall so close to the units. The best and most cost-effective solution is to design the windows and doors with a minimum STC 33 rating, for those with direct line-of-sight to I-71.

Building Component	Description	STC Rating
Frame Wall	a. 5/8" x 10" Redwood Siding b. 1/2" Insulation Board Sheathing c. 2 x 4 studs 16" o.c. d. Fiberglass Building Insulation e. 1/2" Gypsum Board attached directly to studs	39 dB
Stucco/Frame Wall	a. 7/8" Stucco b. No. 15 felt Building Paper and 1" Wire Mesh c. 2 x 4 Studs 16" o.c. d. Fiberglass Building Insulation e. 1/2" Gypsum Board attached directly to studs	46
Brick Veneer Wall	a. Face Brick b. 1/2" Airspace with metal ties c. 3/4" Insulation Board Sheathing d. 2 x 4 Studs 16" o.c. e. Fiberglass Building Insulation f. 1/2" Gypsum Board attached directly to studs	56
Masonry Wall	a. 1" Stucco b. 8" thick Hollow Concrete Block c. 1/2" Gypsum Board attached to furring strips	49 (estimated)
Windows	Wood double hung, closed but unlocked, single glazing	23
	Aluminum sliding, latched, single glazing	24
	Wood double hung, closed but unlocked, glazed with 7/16" insulating glass	22
	Aluminum single hung, closed, glazed with 7/16" insulating glass	25
	Wood, double hung, sealed, glazed with 7/16" insulating glass with single glazed storm sash-2 1/8" separation	35
	Aluminum sliding, closed, single glazed with single glazed storm sash, 1/8" separation	22
Exterior Doors	Wood, flush solid core, with brass weather stripping	27
	Wood, flush solid core, plastic weather stripping, aluminum storm door	34
	Wood, French door, brass weather stripping	26
	Steel, flush, with urethane foam core, with magnetic weather stripping	28
Roof	Shingle Roof with attic, 1/2" gypsum wall board ceiling framed independently of roof	43 (estimated)

[1]Except as noted, all STC ratings are from: *Acoustical and Thermal Performance of Exterior Residential Walls, Doors and Windows*, National Bureau of Standards.

Figure 3. STC Ratings for Typical Building Components.

WINDOWS

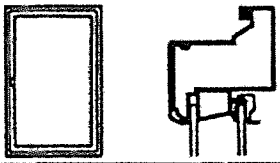
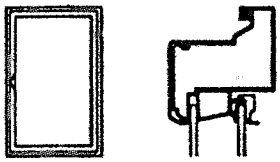
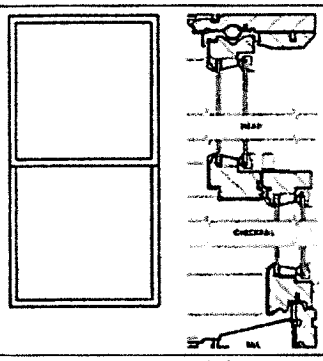
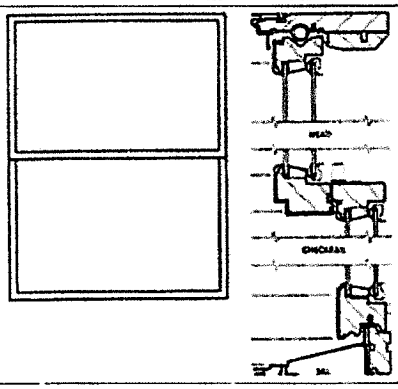
Sketch Front / Cross Section	Brief Description	STC
	30x48" aluminum clad casement, two 1/8" panels of glass, 13/16" apart in a wood frame.	29
	30x48" aluminum clad casement, one 3/32" panel and one 1/8" panel, 13/16" apart in a wood frame.	31
	32x24x24" aluminum double-hung windows (32" wide with 24" high upper sash and a 24" high lower sash), each sash has one 3/32" panel and one 1/8" panel, 13/16" apart in a wood frame.	29
	3x5' double hung window, 7/16" glazed insulating glass, single panel plus storm sash, glazed single strength, single sealed separation between panels: upper 1 ½", lower 2 13/16".	35

Figure 4. Construction Details for Various Windows.