(8)

ATTACHMENT 2

From: Adam Schaefer
Sent: Thursday, October 26, 2006 12:59 PM
To: Bill Strom; Bill Thorpe; Cam Hill; Ed Harrison; Jim Ward; Jim Ward (h); Kevin Foy; Laurin Easthom; Mark Kleinschmidt; Sally Greene; Bree Bean; BruceHeflin; Carol Abernethy; Catherine Lazorko; Emily Dickens; Flo Miller ; RalphKarpinos; Roger Stancil; Sabrina Oliver; Sandy Kline; ToniPendergraph
Subject: phone call re University Station Multi-Family Development

Council Members,

The Mayor's Office received a phone call today from John Doyle, 141 Schultz St. for the Council.

Mr. Doyle received notification of the Concept Plan for the University Station Multi-Family Development that the Community Design Commission heard last night. He was unhappy with the proposal, calling it "absurd" and "absolutely ridiculous." He said "I voted for the Vilcom project but if the Town Council approves this, I'll make sure that none of them are on the Town Council again."

I told him I'd pass the message along.

Adam

(9)

750 Weaver Dairy Rd., #3115
Chapel Hill, NC 27514
Nov. 9, 2006

Style Definition: Normal: Font: Times New Roman

Formatted: Left: 1.25", Right: 1.25"

Planning Department,
Town Hall
300 Airport Rd. (MLK Blvd.)
Chapel Hill, NC 27500

Dear Friends:

I can't understand your approval of the plans for University Station. Besides being illegal, they're certainly not in the interest of Chapel Hill's development.

You are planning many too many residences, more than legally allowed, and in a very undesirable place for homeowners.

In mixed use zones you are supposed to have some commercial building. You have none. Commercial buildings would be much more suitable for this strip of land than residences.

The houses are much too close to I-40. The decibels will be so high that residents will suffer from the excessive noise – which will be even worse after I-40 is widened. No HUD money will be available.

I urge you to reconsider these plans in the light of legal and quality of living requirements!

Sincerely,

Marnie Clark

Marnie Clark

Handout @ 10-25 University Station

(10)

102406US1

October 25, 2006

To: Community Design Commission'
Jonathan Whitney, Chair

From: Seymour Freed, PE, Inactive Seymour Freed

UNIVERSITY STATION:
I-40 PROXIMITY = 272 "NORMALLY UNACCEPTABLE" UNITS

A. INTRODUCTION

I speak as a Chapel Hill resident who has researched our I-40 problem for seven years. I have impotently watched as the traffic has increased by 35% since 1996, and the noise, the air-borne pollutants, and the numbers of noise-impacted dwelling units have correspondingly increased without any meaningful actions by the Town. Residential closeness to I-40 can no longer be ignored. There are currently three major housing developments before the Town proposing the construction of between 300 and 400 substandard dwelling units. University Station leads the group. It is the closest with the mostest. The CDC has a responsibility to the public health, safety, and welfare to give the I-40 proximity issue serious study.

I am indebted to Dr. Noral D. Stewart for his report (Traffic Sound Levels at Habiatat for Humanity Site near Interstate 40, and Plan for Development, December 21, 2005). Utilizing his field survey, NCDOT future traffic data, and a simplified version of the latest DOT noise prediction program TNM 2.5, and the 2.2 decibel measured difference between equivalent sound level and day-night level, it is possible to quite accurately determine current and year 2015 exterior day-night noise levels at the site:

Building #	Dwelling Units	Dist to CL I-40 (Feet)	Current Day-Night Noise Level (Decibels)	Year 2015 NCDOT Predicted Day-Night Noise Level (Decibels)
9	24	215	74.0	75.1
10	24	220	73.7	74.8
8	24	230	73.3	74.4
11	24	250	72.5	73.6
7	24	265	72.0	73.0
13	26	290	71.1	72.2
15	26	330	69.9	71.0
4	24	340	69.6	70.7
12	26	350	69.4	70.5
14	26	355	69.3	70.2
6	12	400	68.1	69.2
5	12	405	68.0	69.1
Total	272			

(11)

B. NOISE

The project is in a "high noise area." High noise areas are defined by HUD as "those in which the day-night average of exterior noise exceeds 65 decibels. 272 of the dwelling units, or 73% of the total are"Normally Unacceptable" by HUD standards. Of these, 248 or 66% will have a day-night noise level of over 70%, the most serious "normally unacceptable" HUD category.

The locations of 12 of the 17 buildings are substandard according to universally accepted minimum federal noise principles established by HUD. They will be subject to outdoor day-night noise levels of substantially over the 65 decibel maximum. These noise levels are "Normally Unacceptable"* for residential livability. (24CFR, §51.103).

C. ASTHMA

(USC Health Science News, 05/05/2006, Children Living Near Major Roads at Increased Risk of Asthma; USC researchers find link between highways and breathing problems in kids.)

"SAN DIEGO- Children living close to a major road are significantly more likely to have asthma than children who live farther away, according to study findings presented today at the American Thoracic Society International Conference.

"Children living within 250 feet of a major road had a nearly 50% greater risk of having had asthma symptoms in the previous year than were children who lived more than 975 feet away, according to researchers at the Keck School of Medicine of USC.

"The study included more than 5,000 5- and 6-year old children... "

D. NO FEDERAL FUNDING OF AFFORDABLE HOUSING DUE TO "NORMALLY UNACCEPTABLE" NOISE AT SITE

HUD Environmental Standards (24 CFR, Part 51, Environmental Criteria and Standards, and 44 F.R. 40860-40866, July 12, 1979) prohibit HUD support for most new construction of noise-sensitive uses and is discouraged for projects with normally unacceptable noise exposure.

Habitat for Humanity of Orange County has already conceded that it will not receive any federal funding for the Sunrise Ridge Project which cannot comply with federal minimum noise standards. It is unlikely that any Community Development Block Grants, HOME Improvement Partnership Act Program or Section 8 funding will be made available to the developers or even to the Town of Chapel Hill for the administration of all of these projects. Without federal dollars, how will 56 affordable housing units be funded and administered at University Station?

Dealing with the I-40 problem is indeed a serious matter of public health, safety, and welfare. Please carefully review this project.

(12)

UniversitySta2005

* * * * CASE INFORMATION * * * *

* * * * Results calculated with TNM Version 2.5 * * * *

UniversitySta2005

* * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):	4441.9
Average automobile speed (mph):	65.0
Medium truck volume (v/h):	346.1
Average medium truck speed (mph):	65.0
Heavy truck volume (v/h):	980.7
Average heavy truck speed (mph):	65.0
Bus volume (v/h):	0.0
Average bus speed (mph):	0.0
Motorcycle volume (v/h):	0.0
Average Motorcycle speed (mph):	0.0

* * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface: soft

* * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER # 1

215 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft):	180.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA):	71.8

DESCRIPTION OF RECEIVER # 2

220 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft):	185.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA):	71.5

DESCRIPTION OF RECEIVER # 3

230 fty from CL

Distance from center of 12-ft wide, single lane roadway (ft):	195.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA):	71.1

DESCRIPTION OF RECEIVER # 4

240 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft):	205.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA):	70.7

DESCRIPTION OF RECEIVER # 5

250 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft):	215.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA):	70.3

DESCRIPTION OF RECEIVER # 6

260 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 225.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 71.0

DESCRIPTION OF RECEIVER # 7

265 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 230.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 70.8

DESCRIPTION OF RECEIVER # 8

270 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 235.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 70.7

DESCRIPTION OF RECEIVER # 9

280 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 245.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 70.3

DESCRIPTION OF RECEIVER # 10

290 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 255.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 70.0

DESCRIPTION OF RECEIVER # 11

300 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 265.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 69.7

DESCRIPTION OF RECEIVER # 12

310 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 275.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 69.4

DESCRIPTION OF RECEIVER # 13

320 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 285.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 69.1

DESCRIPTION OF RECEIVER # 14

330 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 295.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 68.8

DESCRIPTION OF RECEIVER # 15

340 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 305.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 67.4

DESCRIPTION OF RECEIVER # 16

350 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 315.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 67.2

DESCRIPTION OF RECEIVER # 17

355 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 320.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 67.1

DESCRIPTION OF RECEIVER # 18

360 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 325.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.9

DESCRIPTION OF RECEIVER # 19

370 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 335.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.7

DESCRIPTION OF RECEIVER # 20

380 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 345.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.4

DESCRIPTION OF RECEIVER # 21

390 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 355.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.2

DESCRIPTION OF RECEIVER # 22

395 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 360.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.0

DESCRIPTION OF RECEIVER # 23

400 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 365.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 65.9

DESCRIPTION OF RECEIVER # 24

405 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 370.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.9

DESCRIPTION OF RECEIVER # 25

410 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 375.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.8

DESCRIPTION OF RECEIVER # 26

415 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 380.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.7

DESCRIPTION OF RECEIVER # 27

420 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 385.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.6

DESCRIPTION OF RECEIVER # 28

430 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 395.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.3

DESCRIPTION OF RECEIVER # 29

440 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 405.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 66.1

DESCRIPTION OF RECEIVER # 30

450 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 415.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 65.9

DESCRIPTION OF RECEIVER # 31

460 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft): 425.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 65.7

DESCRIPTION OF RECEIVER # 32

470 from CL

Distance from center of 12-ft wide, single lane roadway (ft): 425.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 65.7

DESCRIPTION OF RECEIVER # 33

480 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft):	435.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA):	64.4

DESCRIPTION OF RECEIVER # 34

490 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft):	445.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA):	64.2

DESCRIPTION OF RECEIVER # 35

500 ft from CL

Distance from center of 12-ft wide, single lane roadway (ft):	455.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA):	64.0

For File

111206I-40A
November 14, 2006
(17)
750 Weaver Dairy Road #234
Chapel Hill, NC 27514-1468

Jonathan Whitney, Chair
Community Design Commission
Town Hall
405 MLK Jr. Boulevard
Chapel Hill, NC 27514

Hand Delivered

UNIVERSITY STATION: I-40 PROXIMITY, REVISION 1

Upon further investigation, it is necessary to revise the noise estimates previously submitted to the CDC on October 25, 2006, due to the existence of a roadway that is constructed above the immediate terrain on the western two-thirds of the University Station project. The roadway at the project is at elevation 550. (1)

Correcting for banking of the horizontal curve (2) and the height of noise transmission from heavy trucks (3), (heavy trucks are 17% of the traffic) (4) the entire project will be receiving noise transmitted from Elevation 560. The ground level of the western two-thirds of the project varies from Elevation 530 to 545.

If a significant path for sound between source and receiver is soft ground, there is an increased dropping off of sound with distance. This is due to phase-reversal of the longer wave lengths upon shallow reflection off the low (acoustical) impedence soft ground. In order for the soft-ground effect to be realized, the sound must propagate within ten feet of the ground. This is not the case for the western two-thirds of the project, and therefore an adjustment has been made in the noise estimates. The TNM 2.5 program has been recently field checked locally and found to be accurate within one decibel. (4)

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1. (A Reasonable and Feasible Request for Abatement of Significant I-40 Traffic Noise Impacts, CAROL WOODS RETIREMENT COMMUNITY, by Seymour Freed, June 11, 2001, p. 8).

2. [Superelevation .06 ft/ft = .06 x 35 = 2 ft NCDOT As-Built Plan, RW-13, PROJECT # 8-.1457911, Sheet 32].

3. [FHWA-RD-77-108, FHWA TRAFFIC NOISE PREDICTION MODEL, by T.M. Barry & J.A. Reagan, December 1978,
. K-1 Appendix K, HEAVY TRUCK SOURCE HEIGHTS USED IN BARRIER ATTENUATION CALCULATIONS, SIMULATED: 2.44 M = 8.0 FEET]

4, (Traffic Sound Levels at Habitat for Humanity Site near Interstate 40, by Stewart Acoustical Consultants, December 21, 2005, pp. 4, 6,)

(18)

CLEARLY UNACCEPTABLE AND NORMALLY UNACCEPTABLE NOISE LEVELS AT UNIVERSITY STATION PROJECT

Building	Stories	Dwelling Units	Dist to CL I-40 (Feet)	Current Day-Night Noise Level (Decibels)	Year 2017 Day-Night Noise Level (Decibels)
		CLEARLY	**UNACCEPTABLE**		
#9	**3**	**24**	**215**	**77.0**	**78.1**
#10	**3**	**24**	**225**	**76.6**	**77.8**
#8	**3**	**24**	**235**	**76.3**	**77.4**
#11	**3**	**24**	**255**	**75.7**	**76.8**
#7	**3**	**24**	**265**	**75.4**	**76.6**
#13	**3 - 4 Split**	**28**	**295**	**74.6**	**75.7**
#15	**3 - 4 Split**	**26**	**330**	**73.8**	**74.9**
#12	**3 - 4 Split**	**28**	**335**	**73.5**	**74.6**
		NORMALLY	UNACCEPTABLE		
#4	3	24	335	69.6	70.6
Total		226			

Thus 202 units are in the worst HUD category, "Clearly Unacceptable." It is so bad that if any government funding is involved, an Environmental Impact Statement is required by federal regulation. **(§51.104 Special requirements).**

This is a "difficult" site because in 1979, NCDOT and Goforth Properties, Inc. shifted south and changed the original straight alignment of I-40 to an S-curve it so as to snake around and maximize the developable land to the north (which Goforth did not own). Goforth Properties purchased the property (a 130 acre farm) on April 22, 1981. Of course, this redesign concurrently carved out and minimized the developable land to the south (University Station). The Goforth-NCDOT team also pushed the road away from the north R.O.W. line, so that there is as little as 70-feet from the edge of the near lane to University Station property. The site is too close to the road because I-40 was designed by its previous owner that way. To my knowledge, there are no residences in the Triangle this near an active interstate lane that do not have a noise wall.

The CDC has been justifiably concerned in the past with proximity to I-40, but it has never had to deal with so serious a problem on so disturbing a scale as this Design Concept presents. Please reflect on the implications of this matter.

Sincerely,

Seymour Freed

Seymour Freed, PE, Inactive

cc: M. Broadwell, M. Carroll, C. Culbreath, K. James, G. MacNair, L. Moore, S. Nilson, A. Ryan, R.Whitsell

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An Explanation of How The Noise Estimate Was Made.

• A 1-inch=300-foot copy of the CONNECTIVITY PLAN was made on an 11 x 17 sheet using Photoshop CS. This Plan clearly defines the I-40 lanes as well as the locations of the proposed buildings.

• The distances from the center of I-40 were measured in accordance with The (HUD) Noise Guidebook, Chapter 5, Noise Assessment Guidelines, Introduction, p. 5, "When measuring the distance from the site to any noise source, measure from the source to the nearest point on the site where buildings having noise-sensitive uses are located... The relevant measurement location for buildings is a point 2 meters (6.5 feet) from the façade."

• The TNM 2.5 Look Up Program was downloaded from the internet. Noral D. Stewart (Ibid, p. 5 states: "... The new TNM model more accurately models the effects of soft ground among other improvements. A simplified version of this model has been made available that can easily and quickly calculate an hourly average sound level at a given distance from the road for either hard or soft ground conditions."

TNM 2.5 Input

• 35-feet was subtracted from distance to centerline in order to input distance from transmitter to receiver.

• Peak hour 2005 traffic from the Stewart Report was used for current traffic (Ibid, p.2). (the difference between 2005 and 2007 was not considered).

• For year 2017 traffic, straight line interpolation between NCDOT's 1996 and 2020 traffic was utilized. "a noise study of the area was available from NCDOT. NCDOT also provided the traffic data for the site which is the same data used in the noise study. This is as follows:

1996 42,800 vehicles per day, 6% medium trucks and buses, 17% heavy trucks
2020 est.82, 500 vehicles per day, 6% medium trucks and buses, 17% heavy trucks (Ibid, p.1). Year 2017 was used in accordance with **§51.106 Implementation (e) Projections of noise exposure**, which states: "... To the extent possible, noise exposure shall be projected to be representative of conditions that exist at a time at least 10 years beyond the date of the project..."

• Calculations were made for years 2005 and 20017 for both soft and hard ground.

TNM Output

• Reading were converted from equivalent sound level to day night level by the addition of 2.25 decibels. This was based upon Dr. Stewart's measured "Comparison of Results" which showed an increase of 2.3, 2.3, 2.2, and 2.2 for day night level. (Ibid, p.6)

• Soft ground was used for Building #4.

• An average between hard and soft ground was used for the other buildings. This was done because there would be some soft ground, but not much in the straight line path of the sound from transmitter to these locations.

(20)

APPENDIX

1 Noise Fundamental Training Document
Glossary and Bibliography, September 1980
U.S. DOT, Federal Highway Administration
Absorptive Ground: Types of ground (such as normal earth and most ground with vegetation) that are absorptive to sound energy, and that reverse the phase of reflected energy at grazing angles of incidence. Absorptive ground does provide ground-effect attenuation.

Elevated Roadway: A roadway that is constructed above the immediate terrain.

Ground Effects: If a significant path for sound between source and receiver grazes soft ground (plowed or thickly covered with vegetation) and an additional 1.5 dB per distance-doubling occurs over the hard-ground distance drop-off due to spreading. For example, the line source, hard ground drop-off rate increases from 3 to 4.5 dB/DD. This is due to phase-reversal (and subsequent destructive interference) of the longer wavelengths upon shallow reflection off the low (acoustical) impedence soft ground.

Hard Ground: See Reflective Ground.

Reflective Ground: Opposite of Absorptive Ground. Does not provide any excess ground-effect attenuation. Examples are asphalt, concrete, hard packed soil.

Soft Ground: See Absorptive Ground.

Source: A general term designating the prime sound energy generator. The noise source is (for roadways) approximated by a line located horizontally at the equivalent distance DE from several of the closest observers. This source line is located at the source height

Source Height: The effective acoustic height of the vehicle noise sources... In this textbook, source heights are as follows:
Automobiles: 0.00m (0 ft)
Medium Trucks: 0.70m (2.3 ft)
Heavy Trucks: 2.44m (8 ft)
The heights represent a sound energy-average between exhaust, engine and tire height above pavement level.

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2 Noise Fundamental Training Document
Highway Noise Fundamentals, September 1980
U.S. DOT, Federal Highway Administration
p. 95 4.3 Excess Attenuation due to Hard and Soft Ground Effects
In the previous discussion
Of sound-level drop-off with distance, the geometric concepts of spherical (actually "hemispherical") spreading at 6 dB per distance doubling and cylindrical (actually "semi-cylindrical") spreading at 3 dB per distance doubling were discussed. In practice, the actual rates of level reduction observed range upward from these values because of a number of factors. In this section the excess attenuation beyond that provided by geometrical considerations will be discussed.

Since the great majority of our work in highway noise applies to receivers and line sources at or near the ground, we must consider the effect of the ground surface as a reflector/absorber in the path of the sound waves. There is experimental evidence showing that where sound from a highway propagates close to "soft" ground (e.g., plowed farmland, grass, crops, etc., the most suitable drop-off rate to use is not 3 dB but rather 4.5 dB per distance doubling. Measurements of individual vehicles (point source) have shown drop-off rates of 7.5 dB per distance doubling. While the exact mechanisms are not always precisely understood, it is accepted that the nature of the ground can greatly affect the drop-off rate at a particular site. Propagation over very hard surfaces or well above the ground such as to elevated receivers in buildings would observe the 3 dB rate for a line source (road) while ground receivers with

grass-covered soil or soft sand just below the path would measure a 4.5 dB rate... We assume that in order for the soft-ground effect to be realized, the sound must propagate within 3 meters of the ground.

FHWA-RD-77-108, FHWA TRAFFIC NOISE PREDICTION MODEL
By T.M. Barry & J.A. Reagan, December 1978
p.22 Ground Effects

The problem of finite length roadways is complicated by the fact that ground effects must be taken into account. In the matter if distance adjustments, it was indicated that the drop-off rate was a function of the height of the line-of-sight and the nature of the terrain between the observer and the roadway. The finite length roadway adjustment is also affected by these factors. Consequently, the finite length roadway adjustment factor takes the form of
10 log [$\Psi\alpha(\Phi 1, \Phi 2)/\Pi$]
where,
... α is the site parameter.
When $\alpha = 0$, the site is reflective (i.e., the drop-off rate is 3 dBA/DD[Distance Doubled]) and the term 10 log [$\Psi\alpha(\Phi 1, \Phi 2)/\Pi$] reduces to 10 log [$\Delta\Phi/\Pi$]...

When $\alpha = 1/2$, the site is absorptive (i.e., the drop-off rate is 4.5 dBA/DD). At absorbing sites, the correction

p.32 Shielding Adjustments to the Reference Levels

So far it has been shown that, as a minimum, the equivalent sound levels generated by a stream of traffic decrease at a rate of 3 dBA/DD. This attenuation is accounted for explicitly in the FWHA model when the parameter is zero ($\alpha - 0$)...

It has also been discussed that in many situations ground effects can lead to an additional attenuation of up to 1.5 dBA/dd. This only occurs when both the source and receiver are close to the ground and the terrain between the observer and the roadway is relatively flat and soft. As a result of this additional attenuation, the equivalent sound levels decrease at a rate of approximately 4.5 dBA/DD in soft sites. Excess attenuation is accounted for explicitly in the FHWA model when the site parameter is one-half ($\alpha = ½$).

p. K-1 Appendix K
HEAVY TRUCK SOURCE HEIGHTS USED IN BARRIER ATTENUATION CALCULATIONS

EXHAUST	3.6 m	= 11.8 FEET
SIMULATED	2.44 M	= 8.0 FEET
ENGINE	1.2 M	
TIRES	0 M	

Report No. FHWA-RD-77-18
USERS MANUAL: TSC HIGHWAY NOISE PREDICTION CODE: MOD-04
By F.F. Rudder & P. Lam, January 1977.
p.18 3.3.2 Site Vegetation Characterization

The highway traffic noise prediction code considers only the excess attenuation expected by.. low ground cover...

... low ground cover (is) defined by the user as a rectangular patch or strip comprising of a centerline and a width. The centerline of the patch is located at ground elevation. Low ground cover is defined by the code as ten (10) feet high above the patch centerline... If the direct ray from a source location on a roadway segment to the receiver passes over 10 feet above the centerline for low ground cover... the code ignores the attenuation resulting from the ground cover in calculating the acoustic intensity at the receiver. Also, if a direct ray from the source to the receiver is encountered, the attenuation resulting from the ground cover is ignored completely.

p. A-23 A.7 GROUND ABSORPTION

(27)

Ground attenuation is a function of the structure and the covering of the ground, both of which influence its acoustic properties, and of the heights of the source and receiver above the ground.

For these procedures, a very simple approximation of rectangular ground strips is assumed, defined by two end points of a center line and by a width, and which have a low cover...

The height of a sound ray traveling from the source to the receiver over the ground strip is checked only with respect to the center line of the strip. Thus, it is assumed that the plane of the ground strip is approximately parallel to a plane defined by a road segment and a receiver. If the height of the direct sound ray from the source to the receiver is more than 10 feet above a ground strip with a low cover... any sound attenuation due to ground absorption is neglected...

FHWA-RD-76-58
NOISE BARRIER DESIGN HANDBOOK
By Bolt Beranek and Newman
February 1976
p. 2-13 Ground Effects

Consider again the direct path of sound from the source to the receiver... For sources and receivers located close to the ground, in addition to this direct path, sound energy may reach the receiver by reflecting off the ground. When the terrain is relatively hard and flat, such a reflection will add to the noise from the direct path to increase the level at the receiver. However, when the ground is soft, there may be a phase reversal upon reflection such that the noise from the ground reflection path will destructively interfere with the noise from the direct path resulting in a reduction in level at the receiver which could be quite significant.

This reduction in level, known as ground-effect attenuation, is in excess of the 3 dB per doubling of distance propagation loss for a line source of noise and occurs above soft absorptive ground (such as normal earth and most ground with vegetation). Over hard ground (such as concrete, stone and very hard-packed earth) these ground effects do not occur. These effects are most apparent for receivers on the ground floor, and decrease rapidly as receiver height above ground increases.

While ground absorption effects are not completely understood, it is generally believed that these effects account for the 4.5 dB per doubling propagation loss observed over hard ground.

In highway noise analyses, the proper choice of the drop-off rate cannot be over-emphasized. Many highway noise models allow the user to specify this aspect of the problem. The consequences of selecting an inaccurate factor can be demonstrated if one wished to find the noise level from a road where the surrounding soft grass-covered ground exhibited a 4.5 dB drop-off rate but the highway engineer chose a 3 dB rate in modeling the problem. From a comparison of Tables 10 and 11, the error at 66 meters or 200 feet (a common distance for an interstate facility problem) from the road would be over-prediction of noise levels by 3 dB if the engineer used the 3 dB rate in the face of an actual 4.5 dB rate. Analysis alternatives which build in these magnitudes of errors from the outset must be avoided.

For File

(23)

110406UniversitySta

November 8, 2006
750 Weaver Dairy Road #234
Chapel Hill, NC 27514-1468

Jonathan Whitney, Chair
Community Design Commission
Town Hall
405 MLK Jr. Boulevard
Chapel Hill, NC 27514

Hand Delivered

Re: University Station- Proposed Illegal Number of "Unacceptable"* Dwelling Units
(* According to universally accepted federal housing livability standards.)

Dear Mr. Whitney:

The Land Use Management Ordinance (LUMO) states:
"The Community Design Commission shall consider public comments and shall base its recommendations on its determination of whether or not the application conforms to the applicable provisions of this Chapter." The University Station Concept Plan does not conform to the LUMO. While the submitted Permitted Floor Area is 374,000 square feet, Residential Permitted Floor Area is restricted to 237,000 square feet. Retail, Office, Commercial are the only permitted uses for the remaining 137,000 square feet.

R-3 Zone Allowable Density

The site, as submitted on Conceptual Site Plan A-1 includes 22.68 acres of R-3 and 19.96 acres of Mixed Use-OI-1 Zones. The proposed number of residential units for the R-3 Zone is correctly stated as 147.

MU-OI-1 Zone Allowable Density

The proposed number of residential units for the Mixed Use-OI-1 (MU-OI-1) Zone is 226. The Mixed Use Zone has an area of 869,458 square feet. The Floor Area Ratio (FAR) is .264. The developer proposed 226,000 square feet of Residential Floor Area. York errs in converting 226,000 Mixed Use square feet into 226,000 Residential square feet. That is illegal.

In the early 90s, the University Station site was zoned entirely Residential, R-3. At that time, 185 units were permitted on the site. Around 1992, the zoning of the west half was changed to MU-OI-1. This permitted much higher density in return for compliance with one of the following combinations of Mixed Uses:

"• *Office, Commercial, and Residential uses*
• *Office and Commercial uses*
• *Office and Residential uses"*

The LUMO also stated:

"... development of property in a MU-OI-1 zone.. (must) meet all of the following thresholds..."

"At least 60% of the floor area devoted to "business, office-type" uses... " The developer is limited to 90,400 square feet of Residential use (and is free to apply the remaining 135,600 square feet to Business, Office Type uses). 90 dwelling units is the maximum permitted by law in the MU-OI-1 Zone.

Total Site Allowable Density

The total maximum allowable number of dwelling units at the University Plaza site is 147 plus 90, or 237. Because of its proximity to I-40, and many other reasons, the site is unsuitable for even 237 housing units. It has the most Chapel Hill substandard units that are the closest to I-40 at the narrowest half Right-of-Way in Chapel Hill. 237 units comply with the LUMO, and must be tolerated. Most of these residences will be subjected to noise levels that are "Clearly Unacceptable" or "Normally Unacceptable" by universally accepted federal livability standards (51CFR §101(a) and 51CFR §103).

The developer has stated:

"While this project is not a mixed-use development on its own, it will provide the residential component to an area that has been identified in the Town's Comprehensive Plan as mixed use, but that currently contains a fairly disproportionate amount of non-residential commercial uses. This project will provide greenway/pedestrian connections which will allow residents to access retail and commercial establishments along Weaver Dairy Road and NC86 such as Timberlyne Shopping Center, Chapel Hill North, and Vilcom, thereby increasing the customer base for these establishments and reducing the number of vehicular trips required from the proposed development."

I disagree with this argument in its entirety. I am confident that public comment will indicate serious disapproval.

Correcting the Design Concept residential density to conform to the law is a Critical Path item for this project. It is basic. It does not fulfill a public need to increase the stock of substandard housing. Gratuitously added housing density. far too close to I-40 is not just illegal- it is detrimental. The Design Concept residential density should be reviewed and reduced before lesser details are considered.

Sincerely,

Seymour Freed

Seymour Freed, PE, Inactive

cc: M. Broadwell, M. Carroll, C. Culbreath, K. James, G. MacNair, L. Moore, S. Nilson, A. Ryan, R.Whitsell

9880-56-2680

(25)

-----Original Message-----
From: Carol Abernethy
Sent: Tuesday, January 16, 2007 9:24 AM
To: 'acquire2001@yahoo.com'
Cc: JB Culpepper; Bill Strom; Bill Thorpe; Cam Hill; Ed Harrison; Jim Ward; Jim Ward (w) ; Kevin Foy; Laurin Easthom; Mark Kleinschmidt; Sally Greene (w); Adam Schaefer; Catherine Lazorko; Roger Stancil; Sabrina Oliver; Sandy Kline; Bruce Heflin; Flo Miller; Ralph Karpinos; Toni Pendergraph
Subject: Email FW: North Side Development of Chapel Hill

Thank you for your email. A copy has been forwarded to each Council Member and to senior staff members.
Carol Abernethy
Exec. Asst., Manager's Office
Town of Chapel Hill

-----Original Message-----
From: wright richard [mailto:acquire2001@yahoo.com]
Sent: Friday, January 12, 2007 5:09 PM
To: All Clerk
Subject: North Side Development of Chapel Hill

To Whom It May Concern:

I reside in Chapel Hill and oppose further development on the north side of town including the projects contemplated from Weaver Dairy Road to Homestead Road. The planned University Station Multi-Family Development (File 9880-56-2680) will have a negative impact on open spaces, landscape areas and adversely impact traffic on Weaver Dairy Road.

We moved to Chapel Hill from Austin Texas to escape runaway development that compromised the beauty of the enviornment and the intamacy of what once was a small town. The development projects under consideration will rob Chapel Hill of its character and exacerbate the traffic conditions on Weaver Dairy Road and Martin Luther King Boulevard.

I'm certain if these projects were subject to voter referendum, there would be record turnout and the majority would vote "no".

Sincerely,

Richard C. Wright

9880-56-2680

(26)

Original Message-----
From: Seymour Freed [mailto:ruthsy@msn.com]
Sent: Wednesday, January 10, 2007 11:46 AM
To: Town Council
Cc: hankelkins@mindspring.com; cwcastle@nc.rr.com; ngus@mindspring.com
Subject:

011007HUD

January 10, 2007

To: Mayor Kevin Foy and Members Chapel Hill Town Council

From: Seymour Freed, PE, Inactive

Re: Unlikely Federal Financing of 74 Affordable Housing Units Due to I-40 Noise

This is a follow-up to my statement of January 8 2007 with respect to Agenda Item #s 7 and 8:

The Residences at Chapel Hill North and University Station developments promise a total of 18 + 56, or 74 affordable housing units for Chapel Hill. Affordable housing sponsored by private owners, including utilities, has been subsidized in Chapel Hill through the U.S. Department of Housing and Urban Development (HUD). The Chapel Hill programs for The Residences at Chapel Hill North and University Station would probably be similar to Section 236, Low Income Housing Tax Credit (LIHTC), or Community Development Block Grant/HOME/Section 8 now in place. These are all HUD-financed programs.

In order to qualify for federal funding, The Residences and University Station must first apply for and receive federal approval that they comply with HUD noise abatement and control requirements (24 CFR Part 51). If HUD has reason to believe the day-night average sound level is above 65 decibels, a noise assessment is required. This assessment will probably use calculations according to HUD procedures because of I-40 nearness. There is no evidence that any effort has been made by either project to make a HUD noise assessment, nor to attempt to gain approval for HUD funding.

Using HUD noise procedures, I have calculated that Buildings 3, 4, and 5 at The Residences will be exposed to day-night noise levels of between 68 and 71 decibels in ten years. ("Normally Unacceptable" by HUD standards.) It is quite possible that the Residences at Chapel Hill North, with additional good faith effort, design modifications and revisions of their Concept Plan, might possibly be approved for HUD funding. The Town should be assured prior to approving the project that funding will be available for these 18 units.

The noise problems at University Station are acute. There will be 8 buildings, with 202 units subject to day-night noise levels between 75 and 78 decibels in ten years (Unacceptable by HUD standards), and one building with 24 units subject to 71 decibels (Normally Unacceptable by HUD standards). Today's noise levels at these building are just one decibel lower. In the case of University Station's 56 affordable units, it is implausible that there will ever be any federal funding for this project.

That is because, as stated by Triangle acoustical expert Noral D. Stewart in his 2004 article on HUD… Loan Noise Requirements, "In the unlikely event the noise is above 75 decibels, HUD and FHA will probably not approve the application even with noise control steps." Because of University Station's extraordinarily high noise levels at an exceptionally high density, an Environmental Impact Statement and approval by the Program Assistant Secretary is necessary before the project can be approved by HUD.

In making my calculations, I have relied on my extensive study of the Chapel Hill's I-40 proximity problem; the excellent field survey, computations and NCDOT traffic prediction data provided in Traffic Sound Levels at Habitat for Humanity Site near Interstate 40 by Stewart Acoustical Consultants, December 21, 2005; many USDOT Highway Traffic Noise Prediction Documents; and the latest NCDOT traffic prediction program TNM 2.5.

The basic standards that the two projects do not comply with, are spelled out in 24CFR PART 51—ENVIRONMENTAL CRITERIA AND STANDARDS. "§51.101 General policy. states:
"Where activities are planned in a noisy area, and HUD assistance is contemplated later for housing and/or other noise sensitive activities, the responsible entity risks denial of the HUD assistance unless the HUD standards are met.

"HUD support for new construction.
HUD assistance for the construction of new noise sensitive uses is prohibited generally for projects with unacceptable noise exposures and is discouraged for projects with normally unacceptable noise exposure. This policy applies to all HUD programs providing assistance, subsidy or insurance for housing…"

Whether or not a residential project gets funding for affordable housing despite its Unacceptable noise levels by federal standards has never before been a factor to be considered before by the Mayor and Town Council. It must be considered now, in the approval process. Otherwise, after the fact, the reality will probably be there will be no affordable housing at these two projects. It is essential that the developers take the required HUD approval actions including an Environmental Impact Statement for University Station, and/or they provide the financial bonding that there will be adequate funding for affordable housing, before these projects are approved by the Town.

P.S. Technical details and computer printouts are available if requested.