CSU PROPERTIES, LLC

403 National Street, Ste. 1
P.O. Box 9596
Rapid City, South Dakota 57709

Alan L. Smoot
Brian L. Utzman
Keith Carlyle

TELEPHONE: (605) 341-5080
TELEPHONE: (605) 343-1808
FAX: (605) 341-1337
E-Mail: alsmoot@rushmore.com
E-Mail: blutzman@rushmore.com

November 25, 2002

Ms. Lisa Seaman
Rapid City Planning Department
300 Sixth Street
Rapid City, SD 57701

Re: Professional Plaza PCD

Dear Lisa:

Enclosed for your consideration please find a copy of correspondence from Campanella Associates, dated November 14, 2001 concerning the A/C condenser noise levels for the air conditioning units for our building to be located at 5th and North Street in Rapid City, South Dakota.

If you have any questions concerning this document, feel free to contact me. Thank you for your consideration. Have a nice day.

Sincerely yours,

CSU PROPERTIES, LLC

Brian L. Utzman, Member

BLU/rma
Enclosure

CONSULTANTS
IN ACOUSTICS

- Air System Quieting
- Building Acoustics
- Community Noise
- Industrial Noise Reduction
- Materials Evaluation
- Open Plan Offices
- Seismic Analysis
- Studio Design
- Transportation Noise (Highway - Railroad - Aircraft)

[illegible] Wednesday, 20 November, 2002 Rapid City, SD
E-Mail: A.Campanella@Worldnet.att.net
= Page 1 of 3 =

Campanella Associates

cell 614-560-0519

...formerly known as "ACCULAB"

3201 Ridgewood Drive • Columbus, Ohio 43026 • Tel (614) 876-5108
www.point-and-click.com/Campanella_Acoustics/ Fax (614) 771-8740

Brian Utzman
CSU Properties, Suite #1
Dakota Professional Building
403 national Street
Rapid City, SD 57709

Tel 605-341-5080
FAX 605-341-1337

14 November, 2001

Re: A/C condenser noise near a residential High-Rise Building:

Dear Brian:

Thank you for the 6 November, 2002 FAX information on the referenced installation. It is understood that six RUUD (Rheem Co.) type UANB048JBZ (4 ea) and UANB060JBZ (2ea) A/C Condenser units will be installed on top of a proposed office building at some elevation above, 230 feet from, an existing high-rise residential building. You also provided noise emission data for one of those condensers. These data are poorly identified, and other associated Rheem Co. sound data are all poorly related to the cited units. To be more certain of the conclusions that I will draw in this report I provide worst-case and best-effort information at this time. If better information from Ruud/Rheem becomes available, these data can be adjusted to reflect it.

Noise Source: The original data provided by you was A-weighted sound power of 82 decibels, along with frequency information in octave band spectrum form. The Rheem factory sound power information states only 7.8 Bels (78 decibels) for similar units and 79 decibels for a TTB060D100A unit, all A-Weighted sound power per ARI Standard 270. As a conservative measure, the highest related value of 82 dB A-weighted sound power, along with its stated frequency spectrum, will be assumed.

Noise Emission Prediction and Noise Barrier Effectiveness: A computerized noise barrier design model (Table 1) used sound power in individual frequency bands ("octave bands"). (Barriers work poorer at lower frequencies). The loudest among the data provided in every frequency band for the Ruud condensers was presumed. The presumed barrier was 42" high at a distance of five (5) feet from the 34" high Ruud units, providing an 8" (0.7 foot) break in the line-of sight to a distant observer. The noise to be heard from one unit in a developed residential area at a hypothetical distance of 50 feet from a single condenser was computed (top part of Table 1). The result for a single unit was 50 dBA without a barrier and 42 dBA with a barrier. On that basis (see **"Annoyance"**), an unshielded Ruud condenser would be marginally acceptable in such a neighborhood, but acceptable with the prescribed barrier.

CSU/High Rise Case: Computation for the CSU Properties distance of 230 feet(lower part of Table 1), and combined noise from all units was then performed. Noise combined from six units will raise the community noise heard at a distance by 7.8 decibels. This results in a noise level of 44 dBA without the barrier and 37 dBA with the prescribed 42" barrier shielding the Ruud units from the high rise building.

Annoyance: It is my experience that residents adjacent to a new fixed, and at times constant, noise source will first be aware of it during quiet moments in the day or evening, and if it reaches a level of about 40-45 dBA within their property. They will become annoyed by it at night or early morning if it is 50 dBA and more. They will complain vociferously if it reaches and remains at 55 dBA or more.

An Effective Noise Ordinance:

At least one Ohio city, Upper Arlington (near Columbus) has had for some years Ordinance 1141.04(4) per 1141.03(2) (at any point within an adjacent R-district), requiring that the sound level shall not exceed 40 decibels in any octave band above 300 cycles per second (Hz). For noise from a fixed mechanical installation, I have found this limit to be reasonable and successful. For a project near a school in Upper Arlington, OH rooftop condensers without a barrier annoyed neighbors at some distance, experiencing a 50 dBA noise level therefrom. The "whine" level in the 300-600 band was 42dB, in the 600 – 1200 band level it was 49dB and in the 1200 – 2400 Hz band level it was 42 dB. A barrier design including a 4 foot line-of-sight break was predicted to reduce the noise level by about 10 decibels. This is planned to be done.

Conclusion:

The proposed 230 feet distance, and the 42"barrier, are cceptable.

Recommendations:

1- Proceed with the project.

2- Consider a noise ordinance for fixed noise sources in your community.

Future Actions :

Submit construction barrier construction drawings for review. Vendors may contact us for fill-in information as needed throughout bidding and construction.

Angelo J Campanella

Angelo Campanella, P.E., Ph.D.

Principal, Campanella Associates

TABLE 1: COMPUTERIZED NOISE BARRIER DESIGN MODEL OUTPUT.

HYPOTHETICAL DESIGN BARRIER — NO BARRIER (UNSHIELDED)

dB/DDraFIXED Noise Source	Ground Refl.				1				
COMPUTATION DATE 6 Src-Br	Br-Rcv	LOS-Bk	Del,Br	S-RfNB	RfRcNB	NoBrHtD	NoBr		
15-Nov-2002 17:24 5	50	0.7	0.054	5	50	-5	2.750		
OctaveBandCtrFre	31	63	125	250	500	1000	2000	4000	8000
Barr. Delta (F)	0.00	0.01	0.01	0.02	0.05	0.10	0.20	0.40	0.79
Atten.(F)	4.8	4.8	4.8	5.3	5.3	6.6	7.9	10.0	12.3
Delta(F), No Bar	0.16	0.32	0.63	1.27	2.53	5.07	10.14	20.28	40.55
Atten.(F)	2.3	1.0	0.5	0.1	0.1	0.1	0.0	0.0	0.0
Net Barrier Atte	2.5	3.8	4.3	5.2	5.2	6.5	7.9	10.0	12.3
Barrier Distance Atten.	31.2	//With and Without Barrier----------							
NoBarrier.Dist.Atten.=	31.2	BarRcvrA-Lvl=	42.0	dBA	NoBaRcvA-Lvl=	49.5			
Source PWL(f) Pow	60	60	58	69	72	75	77	70.5	64.5
SorcePWL(f)A-Wt	25	34.8	42.4	60.6	68.9	75	78.2	71.4	63.4
ReceiverSPLre20u	24.0	24.0	22.0	32.5	35.4	37.1	37.7	28.9	20.2
RcverA-Wt Level	-11.0	-1.2	6.4	24.1	32.3	37.1	38.9	29.8	19.1
E33.09Crit.BARRI	36	36	36	37	37	38	39	42	44
NoBarRcvSPLre20u	26.5	27.8	26.3	37.7	40.7	43.6	45.6	38.9	32.5
NoBarRcverA-WtLe	-8.5	2.6	10.7	29.3	37.6	43.6	46.8	39.8	31.4
E33.09Crit.NO.BA	34	32	32	31	31	31	31	32	32

50' HYPOTHETICAL → 50 dBA.

RUUD WORST-CASE SOUND POWER, ONE UNIT.

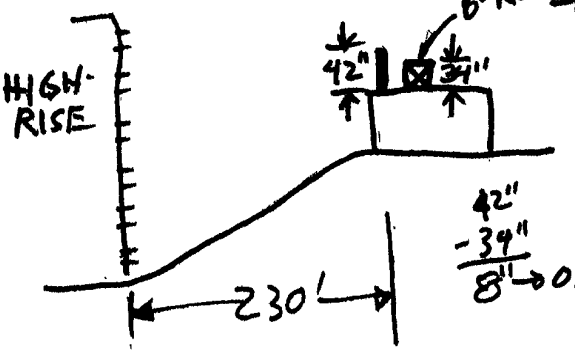
HYPOTHETICAL ↕ CSU + HI-RISE

CSU-HI-RISE DISTANCE.

dB/DD rate FIXED NFIXED Noise Source									
6 Src-Br	Src-Br	Br-Rcv	LOS-Bk	Del,Br	S-RfNB	RfRcNB	NoBrHtD	NoBr	
BarrierParameters	5	230	0.7	0.050	5	230	-5	2.554	
				*******					
OctaveBandCtrFre	63	63	125	250	500	1000	2000	4000	8000
Barr. Delta (F)	0.01	0.01	0.01	0.02	0.05	0.09	0.18	0.37	0.74
Atten.(F)	4.8	4.8	4.8	5.3	5.3	6.6	7.9	10.0	12.3
Delta(F), No Bar	0.30	0.30	0.59	1.18	2.35	4.71	9.42	18.83	37.67
Atten.(F)	1.0	1.0	0.5	0.1	0.1	0.1	0.1	0.0	0.0
Net Barrier Atte	3.8	3.8	4.3	5.2	5.2	6.5	7.8	10.0	12.3
----------	//With	//With other Mound Height\\							
Barr.Dist.Atten.=		43.8	BarRcvrA-Lvl=	29.0		NoBaRcvA-Lvl=	36.3		
Source PWL(f) Pow	60	60	58	69	72	75	77	70.5	64.5
SorcePWL(f)A-Wt	34.8	34.8	42.4	60.6	68.9	75	78.2	71.4	63.4
ReceiverSPLre20u	1.3	11.4	9.4	19.8	22.7	24.2	24.5	14.9	5.0
RcverA-Wt Level	-23.9	-13.8	-6.2	11.4	19.6	24.2	25.7	15.8	3.9
I-270 Trk, No Ba	13.5	43.8	NO-Barr RecvrA-Lvl=		36.3 dBA				
NoBarRcvSPLre20u	15.2	15.2	13.6	25.0	27.9	30.7	32.4	24.9	17.3
NoBarRcverA-WtLe	-10.0	-10.0	-2.0	16.6	24.8	30.7	33.6	25.8	16.2

WITH BARRIER — ONE UNIT ONLY UNSHIELDED.

8 April, 1996 VERSION CAMPANELLA ASSOCIATES BARRIER ATTENUATION COMPUTATION.



6-RUUD → +7.8 dB

BARRIER	UNSHIELDED
29.0	36.3
+7.8	7.8
36.8	44.1
37 dBA	44 dBA.