

02PD056

**JOHN W. HEY & COMPANY**

Phone (605) 342-3596  
Fax (605) 342-0787

920 Quincy  
Rapid City, SD 57701

November 14, 2002

Williams & Associates Architecture, Inc  
125 E Colorado Blvd., Suite 2A  
Spearfish, SD 57783

ATTN: Jason

RE: Proposed BHSC OR Addition  
Rapid City, South Dakota  
Mechanical Equipment Sound Analysis

Gentlemen:

The purpose of this letter is to provide information requested by the Rapid City Planning Department with regard to the sound level of the exterior mounted HVAC equipment being located on the ground on the east side of the building.

I anticipate that a single 50 ton cooling capacity unit will be required for the facility. The overall A-weighted sound power in db(a) for a single 50 ton water chiller with Scroll compressors is 90. The calculation allows for future units to be located adjacent to the new chiller.

Dd stands for decibels and is on a logarithmic scale. Each 10 db is 10 times more watts of energy, but to the human ear 10 db is perceived as 2 times the sound.

I have performed an evaluation of the sound levels for four locations based on the 1997 ARI standard 275. Application of Sound Rating Levels of Outdoor Unitary Equipment:

Location #1  
Location #2  
Location #3  
Location #4

Corner of Assisted Living to the Southeast  
West property line of West Hills to the east  
Property line of residential property to North  
Property line on top of hill to west

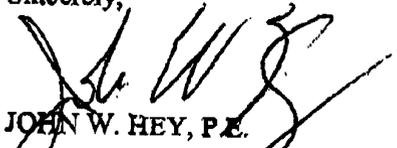
In the absence of a sound ordinance, I am using the sound criteria used by the City of Sioux Falls. They reportedly require systems to comply with the following levels by taking a time weighted reading for 10 minutes at the property line or 50 ft from the building with a hand held meter reading db(a):

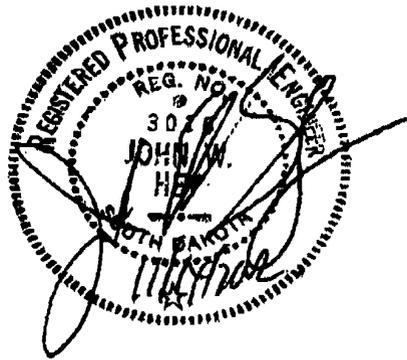
Commercial districts	65 db night and day
Residential	60 db day 55 db night

No screening fence is required to comply with the above criteria.

Please contact me if there are any questions or if additional information is required.

Sincerely,

  
 JOHN W. HEY, P.E.  
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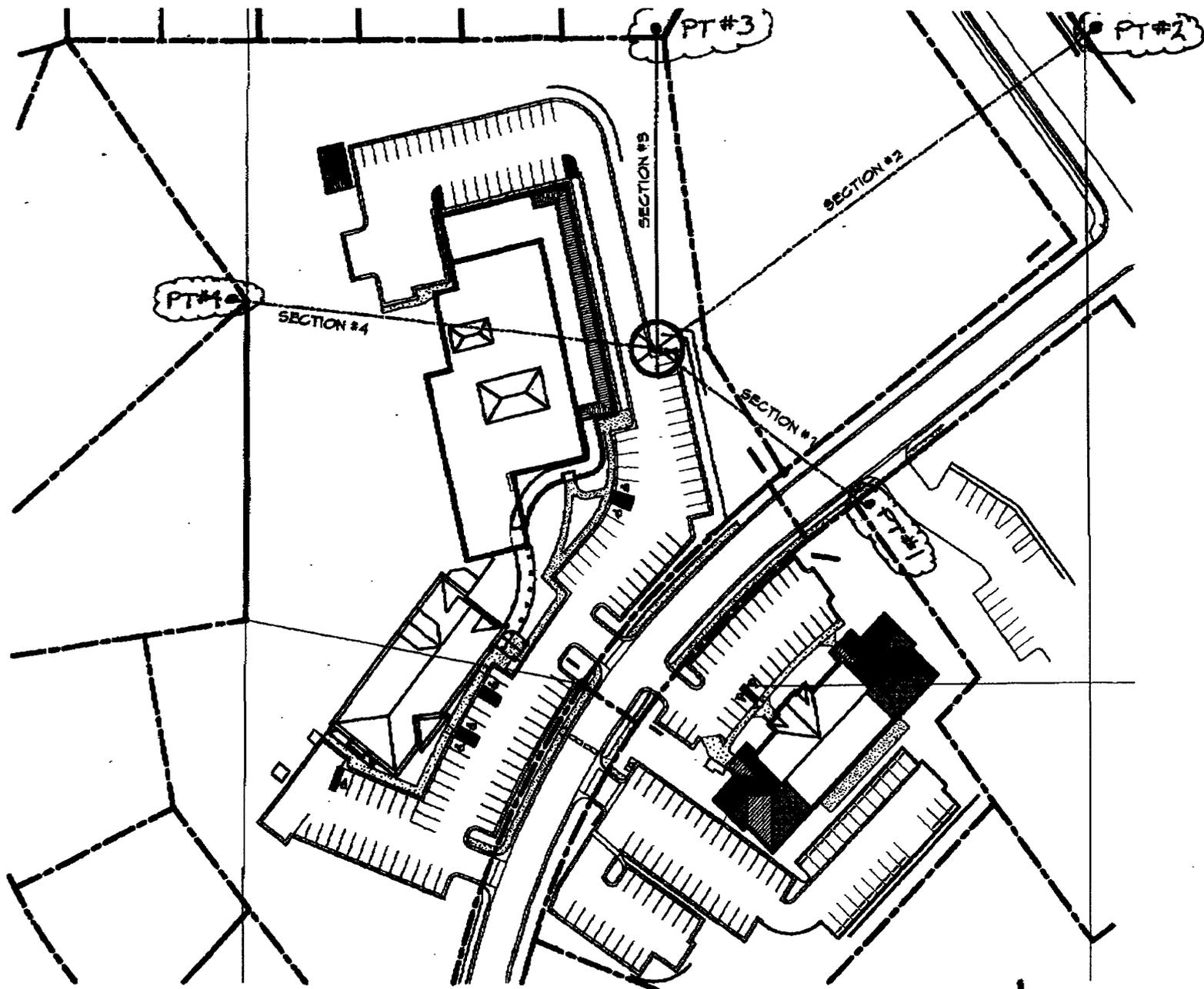
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SOUND EVALUATION

PROJECT:

BHSC OR ADDITON  
RAPID CITY, S. DAK

		LOCATIONS			
		1	2	3	4
DISTANCE IN FT TO EQUIPMENT FROM EVALUATION POINT		198	414	237	329
LINE	ITEM				
	1 UNIT SOUND RATING LEVEL	90	90	90	90
	2 EQUIPMENT LOCATION FACTOR (TABLE 1.1)	0	0	0	0
	3 ADD LINE 1 AND 2	90	90	90	90
	4 BARRIER SHIELDING FACTOR (TABLE 1, ITEM 2)	0	0	0	7
	5 SOUND PATH FACTOR (TABLE 1, ITEM 3)	0	0	0	0
	6 DISTANCE FACTOR (TABLE 2)	43.5	49.5	44.6	47.4
	7 ADD LINES 4,5,&6	43.5	49.5	44.6	54.4
	8 ESTIMATED WEIGHTED SOUND PRESSURE LEVEL SUBTRACT LINE 7 FROM LINE 3	46.5	48.5	45.4	35.6
	ADDITIVE EFFECT OF MULTIPLE UNITS	7.5	7.5	7.5	7.5
	TOTAL SOUND PRESSURE LEVEL	54	48	52.9	43.1
	RESIDENTIAL LEVEL AT NIGHT	55	55	55	55



# SITE REFERENCE PLAN

SCALE 1" = 100'-0"



# Sound Data

**Table 9, ACZ 010A-155B Sound Pressure**

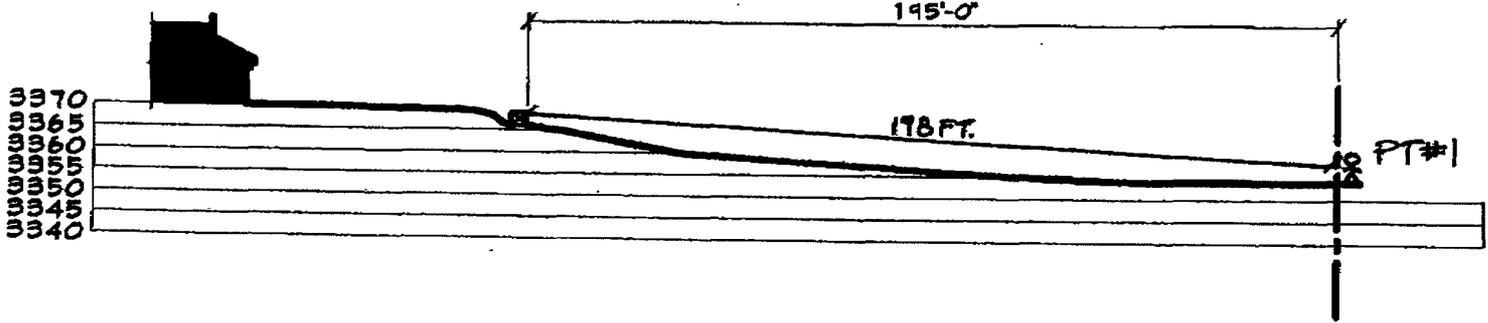
ACZ Unit Model	Octave Band at Center Frequency								Overall A-Weighted
	63	125	250	500	1000	2000	4000	8000	
010A	82	82	82	84	81	86	84	82	85
015A	83	82	82	84	81	86	84	82	85
018A	83	84	84	85	83	87	85	83	86
025A	84	85	85	86	84	88	86	84	87
030A	84	85	85	86	84	88	86	84	87
035A	84	85	85	86	84	88	86	84	87
040A	84	85	85	86	84	88	86	84	87
045A	84	85	85	86	84	88	86	84	87
050A	84	85	85	86	84	88	86	84	87
055A	84	85	85	86	84	88	86	84	87
060A	84	85	85	86	84	88	86	84	87
065A	84	85	85	86	84	88	86	84	87
070A	84	85	85	86	84	88	86	84	87
075A	84	85	85	86	84	88	86	84	87
080A	84	85	85	86	84	88	86	84	87
085A	84	85	85	86	84	88	86	84	87
090A	84	85	85	86	84	88	86	84	87
095A	84	85	85	86	84	88	86	84	87
100A	84	85	85	86	84	88	86	84	87
105A	84	85	85	86	84	88	86	84	87
110A	84	85	85	86	84	88	86	84	87
115A	84	85	85	86	84	88	86	84	87
120A	84	85	85	86	84	88	86	84	87
125A	84	85	85	86	84	88	86	84	87
130A	84	85	85	86	84	88	86	84	87
135A	84	85	85	86	84	88	86	84	87
140A	84	85	85	86	84	88	86	84	87
145A	84	85	85	86	84	88	86	84	87
150A	84	85	85	86	84	88	86	84	87
155B	84	85	85	86	84	88	86	84	87

Note: Data is:  
 1. 50 feet (15m) from side of unit.  
 2. Out, unit on a bar roof or ground with no adjacent wall.

**Table 10, ACZ 010A-155B Sound Power**

ACZ Unit Model	Octave Band at Center Frequency (per ANSI Standard S7.1)								Overall A-Weighted
	63	125	250	500	1000	2000	4000	8000	
010A	79	79	79	81	78	83	81	79	82
015A	79	79	79	81	78	83	81	79	82
018A	80	81	81	83	79	84	82	80	83
025A	80	81	81	83	79	84	82	80	83
030A	80	81	81	83	79	84	82	80	83
035A	80	81	81	83	79	84	82	80	83
040A	80	81	81	83	79	84	82	80	83
045A	80	81	81	83	79	84	82	80	83
050A	80	81	81	83	79	84	82	80	83
055A	80	81	81	83	79	84	82	80	83
060A	80	81	81	83	79	84	82	80	83
065A	80	81	81	83	79	84	82	80	83
070A	80	81	81	83	79	84	82	80	83
075A	80	81	81	83	79	84	82	80	83
080A	80	81	81	83	79	84	82	80	83
085A	80	81	81	83	79	84	82	80	83
090A	80	81	81	83	79	84	82	80	83
095A	80	81	81	83	79	84	82	80	83
100A	80	81	81	83	79	84	82	80	83
105A	80	81	81	83	79	84	82	80	83
110A	80	81	81	83	79	84	82	80	83
115A	80	81	81	83	79	84	82	80	83
120A	80	81	81	83	79	84	82	80	83
125A	80	81	81	83	79	84	82	80	83
130A	80	81	81	83	79	84	82	80	83
135A	80	81	81	83	79	84	82	80	83
140A	80	81	81	83	79	84	82	80	83
145A	80	81	81	83	79	84	82	80	83
150A	80	81	81	83	79	84	82	80	83
155B	80	81	81	83	79	84	82	80	83

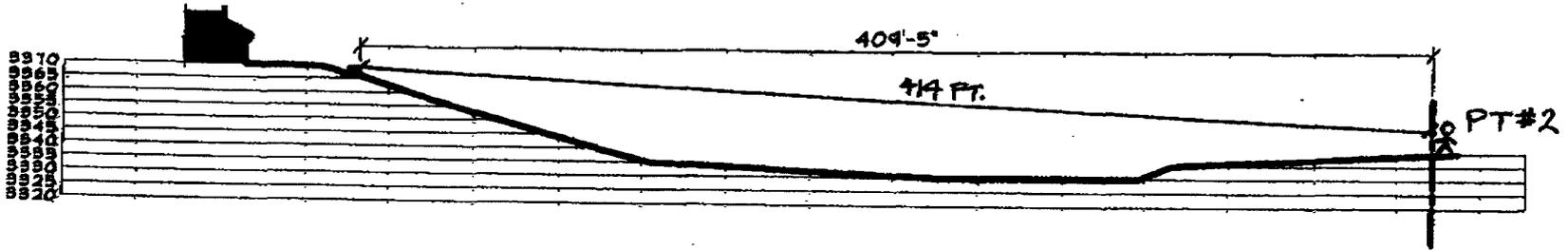
50 feet →



1

# CONTOUR SECTION

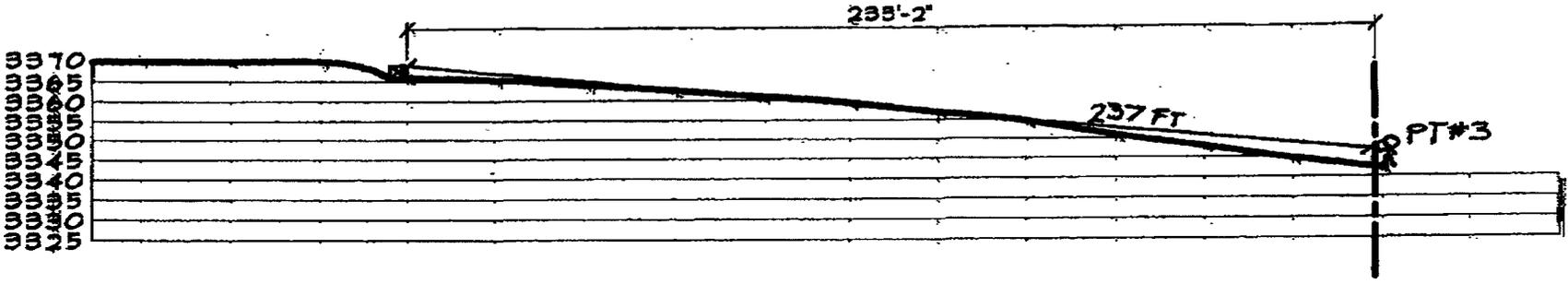
SCALE: 1" = 40'-0"



2

# CONTOUR SECTION

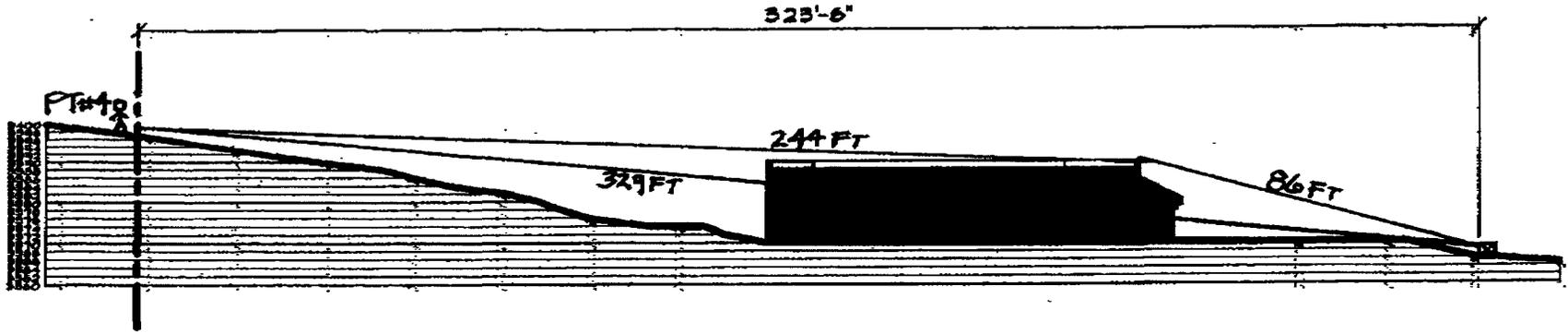
SCALE: 1" = 60'-0"



3

# CONTOUR SECTION

SCALE: 1" = 40'-0"



4

# CONTOUR SECTION

SCALE: 1" = 40'-0"