

Rancho Seco

Final Status Survey Summary Report

October 29, 2007

Aux. Bldg (-) 20' El., Rm 50, Radwaste Air Supply Fan Room, Upper Walls & Ceiling

Survey Unit F8130682

Prepared By: J. Anderson Date: 10/29/2007

FSS Engineer

Reviewed By: [Signature] Date: 10/30/07

Lead FSS Engineer

Approved By: [Signature] Date: 11-14-07

Dismantlement Superintendent, Radiological

## FINAL STATUS SURVEY SUMMARY REPORT

### Survey Unit:

F8130682, Aux. Bldg (-) 20' El., Rm 50, Radwaste Air Supply Fan Room, Upper Walls & Ceiling

### Survey Unit Description:

Operating History: The reinforced concrete structure contained the RadWaste processing and supporting systems. The building contained six main elevations. Residual radioactive material was known to be present on all levels of the interior of the building. Operating records and the HSA document several events with the potential for a release of radioactivity inside this structure. One report documented contamination of the auxiliary building roof. The roof was later replaced.

Site Characterization: Direct measurements were made of each of the interior elevation surfaces as well as the exterior surfaces of the structure. These measurements confirmed the presence of plant-derived radionuclides. Direct measurements on the -47' elevation showed a mean gross activity level of 320,071 dpm/100 cm<sup>2</sup> and a maximum value of 5,720,000 dpm/100 cm<sup>2</sup>. Direct measurements on the -29' elevation showed a mean gross activity level of 544,756 dpm/100 cm<sup>2</sup> and a maximum value of 11,370,000 dpm/100 cm<sup>2</sup>. Direct measurements on the -20' elevation showed a mean gross activity level of 247,831 dpm/100 cm<sup>2</sup> and a maximum value of 10,080,000 dpm/100 cm<sup>2</sup>. Direct measurements on the grade elevation showed a mean gross activity level of 373,758 dpm/100 cm<sup>2</sup> and a maximum value of 5,800,000 dpm/100 cm<sup>2</sup>. Direct measurements on the +20' elevation showed a mean gross activity level of 85,408 dpm/100 cm<sup>2</sup> and a maximum value of 1,900,000 dpm/100 cm<sup>2</sup>. Direct measurements on the +40' elevation showed a mean gross activity level of 3,288 dpm/100 cm<sup>2</sup> and a maximum value of 24,781 dpm/100 cm<sup>2</sup>. Direct measurements on the building exterior, including the mezzanine roof, showed a mean gross activity level of 1,897 dpm/100 cm<sup>2</sup> and a maximum value of 2,990 dpm/100 cm<sup>2</sup>. (The roof had been replaced prior to the classification survey.) Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the interior of the auxiliary building was determined to be a Class 1, 2 area and the exterior was a Class 2,3.

HSA Events: HSA Report pg. 63.

### Survey Unit Design Information:

The Survey Unit Design Parameters are presented in Table 1 below. The survey unit and measurement locations are depicted on the maps in Attachment 1. Direct measurement locations were determined using a random-start, fixed grid pattern and 47.4 m<sup>2</sup> were scanned for approximately 44% coverage. Samples of removable contamination were collected at each direct measurement location. The instrumentation used for the survey along with the MDC values are listed in Tables 2-1 and 2-2 in Attachment 2.

Table 1. Survey Unit Design Parameters

Survey Design Parameter	Value	Comment
Survey Area:	F813	Aux. Bldg (-) 20' El., Rm 50, Radwaste Air Supply Fan Room, Upper Walls & Ceiling
Survey Unit:	0682	Structure Surface
Class:	2	LTP Table 5-4
SU Area (m <sup>2</sup> ):	106.8	
Evaluator:	D. Anderson	
DCGL (dpm/100 cm <sup>2</sup> ):	43,000	Gross Activity DCGL
Area Factor:	N/A	Class 2
Design DCGL <sub>emc</sub> (dpm/100 cm <sup>2</sup> ):	N/A	Class 2
LBGR (dpm/100 cm <sup>2</sup> ):	21,500	Default = 50% DCGL
Design Sigma (dpm/100 cm <sup>2</sup> ):	12,035	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m <sup>2</sup> ):	6.28	Class 2
Scan Area (m <sup>2</sup> ):	47.4	
Scan Coverage (%):	44%	Class 2
Z <sub>1-α</sub> :	1.645	
Z <sub>1-β</sub> :	1.645	
Sign P:	0.955435	
Calculated Relative Shift:	1.7	
Relative Shift Used:	1.7	Uses 3.0 if Relative Shift is >3
N-Value:	14	
Design N-Value + 20%:	17	NUREG-1575 Table 5-5
Design Min Samples N:	17	Class 2
Grid Spacing L:	2.5	Class 2

### Survey Results:

A total of 18 direct measurements were made in F8130682. The results including mean, median, standard deviation and range are shown in Table 2. All direct measurements were less than the DCGL. None of the scan measurements indicated areas of elevated activity. (Scan activity ranged from 2,611 dpm/100 cm<sup>2</sup> to 14,085 dpm/100 cm<sup>2</sup> for upper wall and ceiling surfaces, based on a surveyor efficiency of 0.5 with no background subtracted.) Samples for removable surface activity were all less than 10% of the DCGL as shown in Table 3. Removable surface activity samples were counted for alpha activity and none was detected at the MDC shown in Table 2-1 of Attachment 2.

**Table 2. Direct Measurement Results**

Measurement ID	Gross Activity (dpm/100 cm <sup>2</sup> )
F8130682-C0001BD	2,028
F8130682-C0002BD	1,567
F8130682-C0003BD	1,567
F8130682-C0004BD	1,380
F8130682-C0005BD	1,421
F8130682-C0006BD	1,603
F8130682-C0007BD	1,530
F8130682-C0008BD	1,577
F8130682-C0009BD	1,452
F8130682-C0010BD	1,509
F8130682-C0011BD	1,452
F8130682-C0012BD	1,447
F8130682-C0013BD	1,556
F8130682-C0014BD	1,644
F8130682-C0015BD	1,452
F8130682-C0016BD	1,624
F8130682-C0017BD	1,577
F8130682-C0018BD	1,567
Mean:	1,553
Median:	1,561
Standard Deviation:	140
Range:	1,380 – 2,028

**Table 3. Removable Surface Activity Results**

<b>Measurement ID</b>	<b>Surface Beta Activity (dpm/100 cm<sup>2</sup>)</b>
F8130682C0001SM	1.01
F8130682C0002SM	15.11
F8130682C0003SM	2.29
F8130682C0004SM	3.58
F8130682C0005SM	3.58
F8130682C0006SM	7.42
F8130682C0007SM	4.86
F8130682C0008SM	1.01
F8130682C0009SM	3.58
F8130682C0010SM	2.29
F8130682C0011SM	2.29
F8130682C0012SM	1.01
F8130682C0013SM	-0.27
F8130682C0014SM	3.58
F8130682C0015SM	12.55
F8130682C0016SM	-0.27
F8130682C0017SM	3.58
F8130682C0018SM	2.29
<b>Mean:</b>	3.86
<b>Median:</b>	2.93
<b>Standard Deviation:</b>	4.09
<b>Range:</b>	-0.27 to 15.11

**Survey Unit Data Assessment:**

The survey design required 18 direct measurements for the Sign Test. The critical value and the results of the Sign Test are presented in Table 4. The sample mean and median values were less than the DCGL. The sample standard deviation was less than the design standard deviation so no additional samples were required.

**Table 4. Data Assessment Results**

<b>Survey Results Parameter</b>	<b>Value</b>	<b>Comment</b>	
<b>Material Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A	Average Ambient BKG = 0	
<b>Ambient Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A		
<b>Actual Direct Measurements (N):</b>	18		
<b>Median</b> (dpm/100 cm <sup>2</sup> ):	1,561		
<b>Mean</b> (dpm/100 cm <sup>2</sup> ):	1,553		
<b>Direct Measurement Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	140		
<b>Total Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	140		Based on samples and backgrounds.
<b>Maximum</b> (dpm/100 cm <sup>2</sup> ):	2,028		Background Subtract Not Applied
<b>Material Type:</b>	N/A		
<b>Sign Test Final N Value:</b>	18		Class 2
<b>S+ Value:</b>	18		
<b>Critical Value:</b>	12		
<b>Sufficient Samples Collected:</b>	Yes		
<b>Maximum Value &lt; DCGL:</b>	Yes		
<b>Median Value &lt; DCGL:</b>	Yes		
<b>Mean Value &lt; DCGL:</b>	Yes		
<b>Maximum Value &lt; DCGL<sub>emc</sub>:</b>	N/A		
<b>Total Standard Deviation &lt;= Sigma:</b>	Yes		
<b>Pass the Sign Test?</b>	Yes		
<b>Reject the Null Hypothesis?</b>	Yes		
<b>Does the Survey Unit Pass All Criteria?</b>	Yes		

**Survey Unit Investigations and Results:**

No investigations were required for either direct or scan measurements and no investigation results are reported.

**ALARA Statement:**

As stated in Chapter 4 of the LTP, as long as the residual activity within the survey unit is less than the DCGL (i.e. the survey unit average activity is less than the DCGL and the EMC criterion has been met), the ALARA criterion has been met.

**Changes in Initial Survey Unit Assumptions:**

The survey unit was designed as a Class 2 structure survey and the sample results are consistent with that classification. The variability of the survey results was less than the characterization data used for survey design. No potential areas of elevated activity were detected.

**Conclusion:**

The FSS of this survey unit was properly designed as a Class 2 survey based on Table 5-4 of the LTP. The required number of direct measurements was made and the scan coverage met the requirement of Table 5-6 of the LTP. No direct measurements exceeded the DCGL of 43,000 dpm/100 cm<sup>2</sup> and none of the removable surface activity measurements exceeded 10% of the DCGL. No investigations were required.

The direct measurement data support rejection of the null hypothesis, providing high confidence that the survey unit satisfied the release criteria and that the data quality objectives were met.

It is concluded that survey unit F8130682 meets the release criteria of 10CFR20.1402.

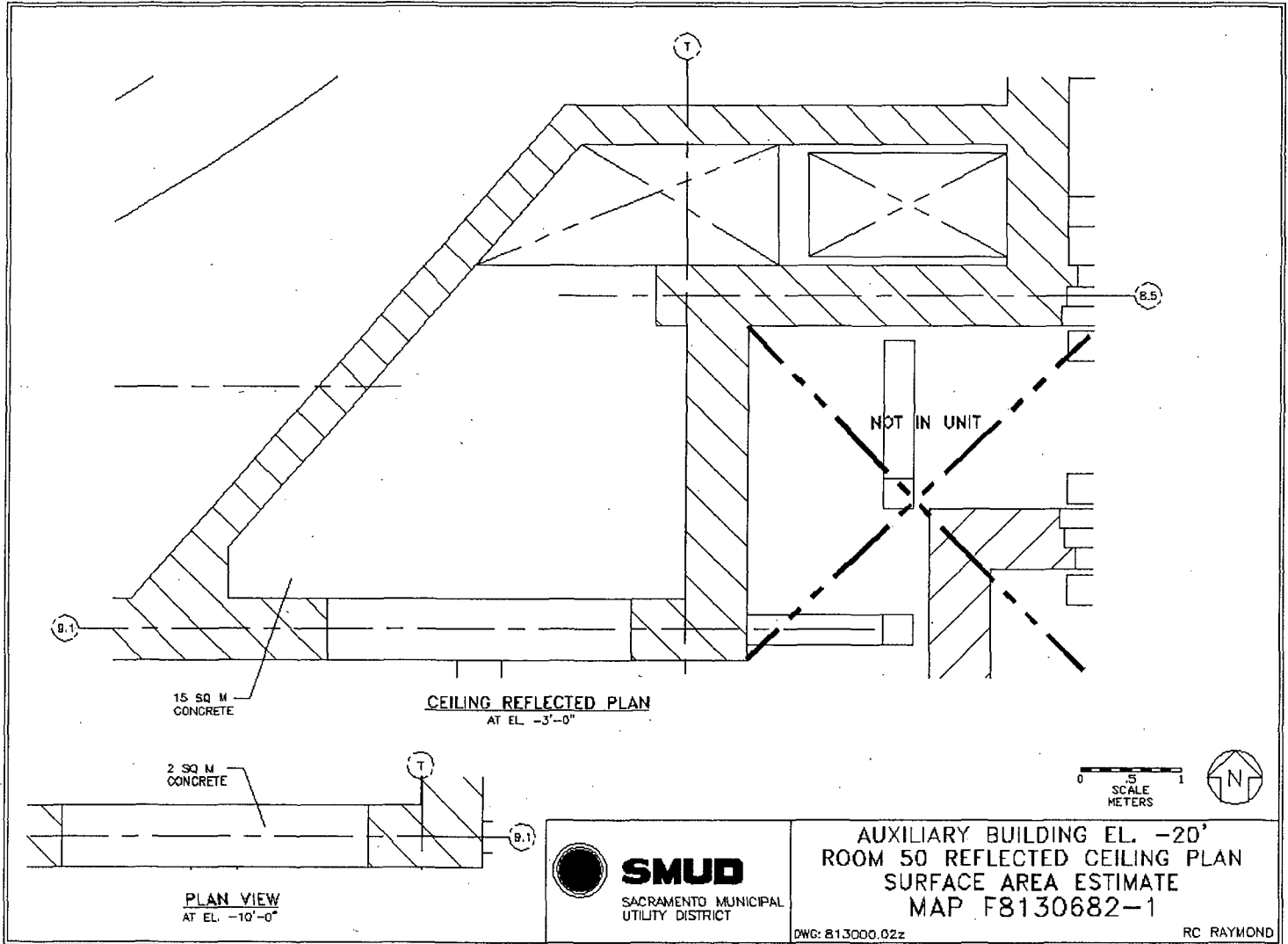


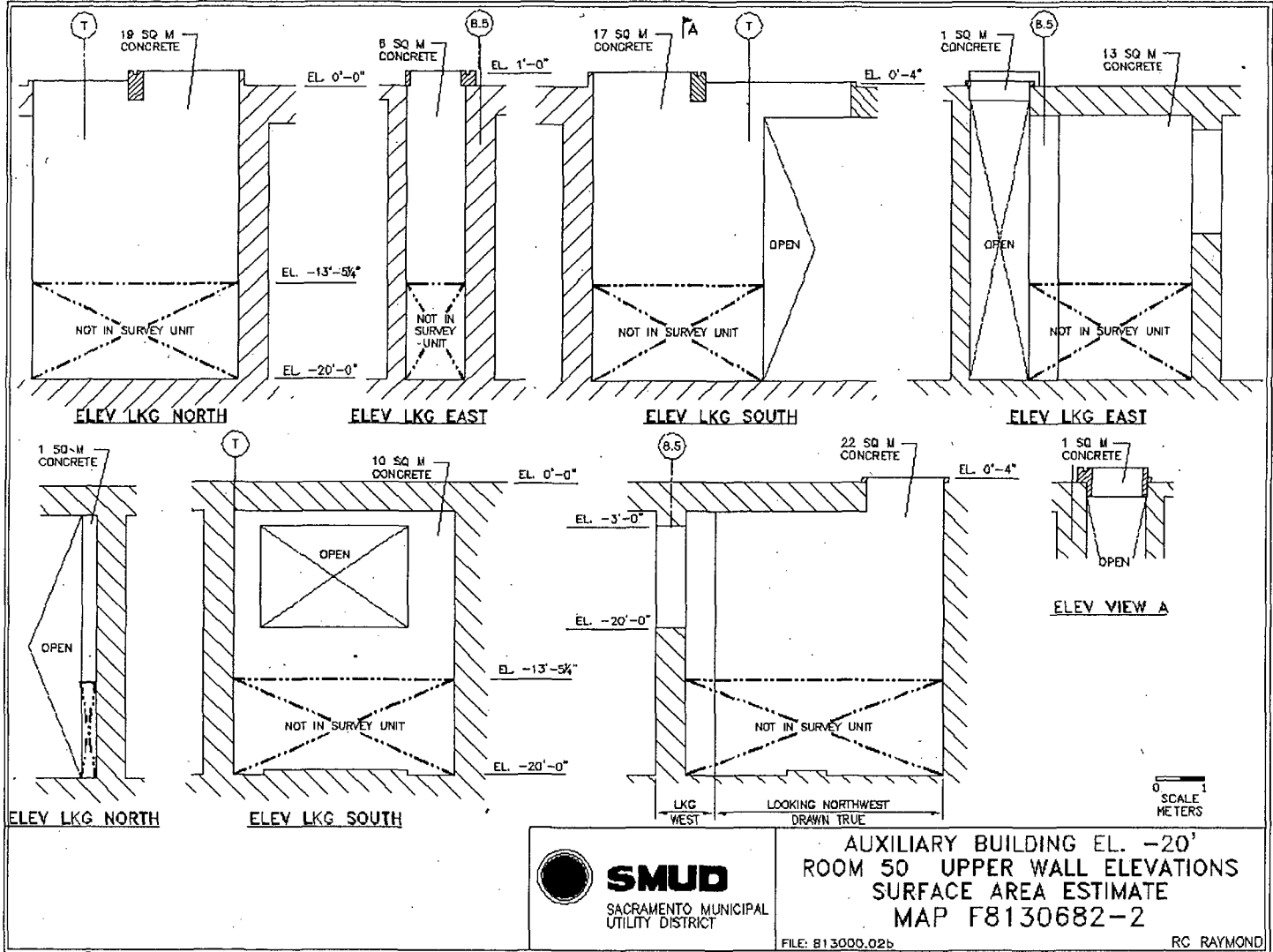
**Attachment 1**


**Maps**

**October 29, 2007**

**Survey Unit F8130682**

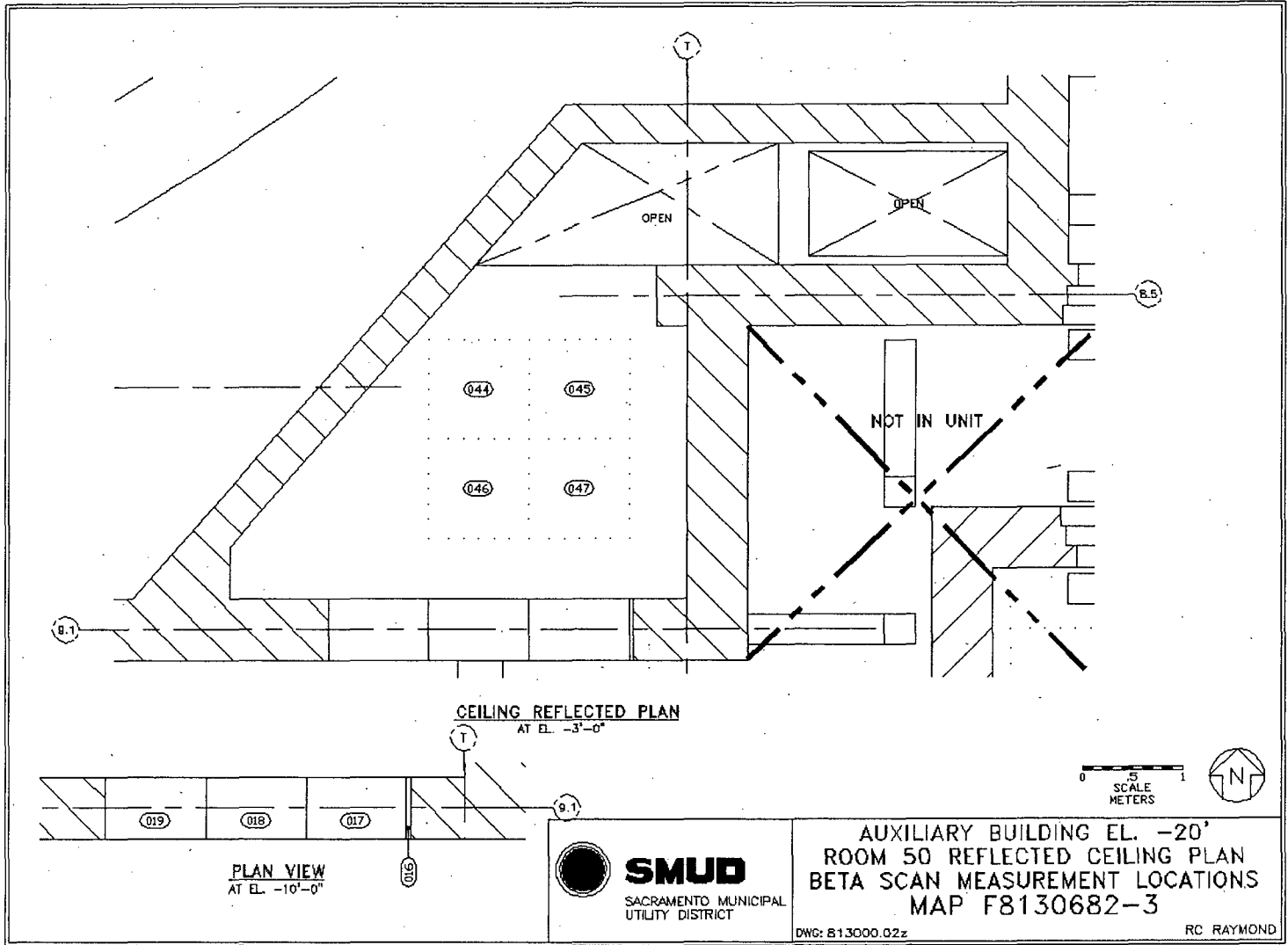


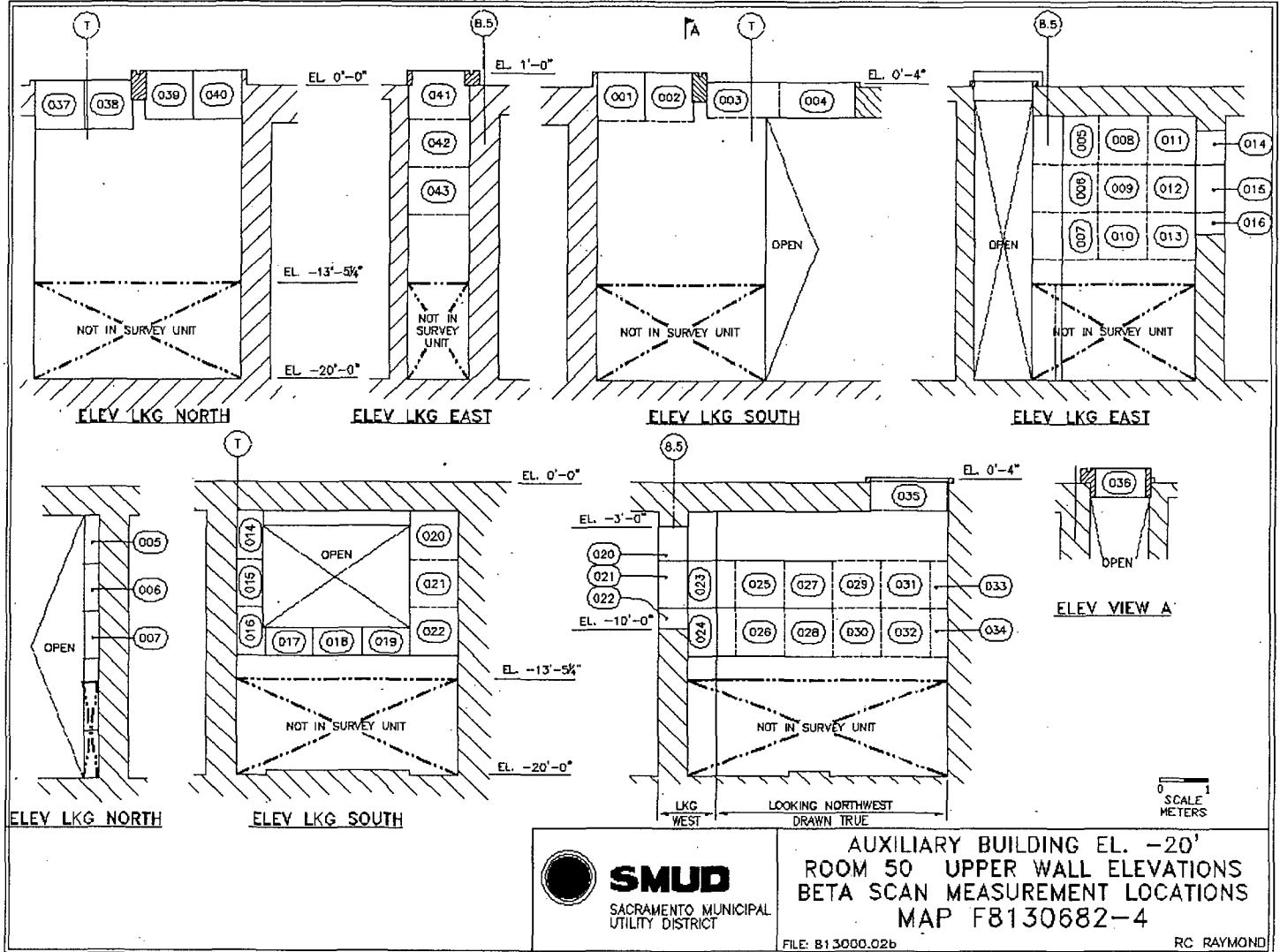


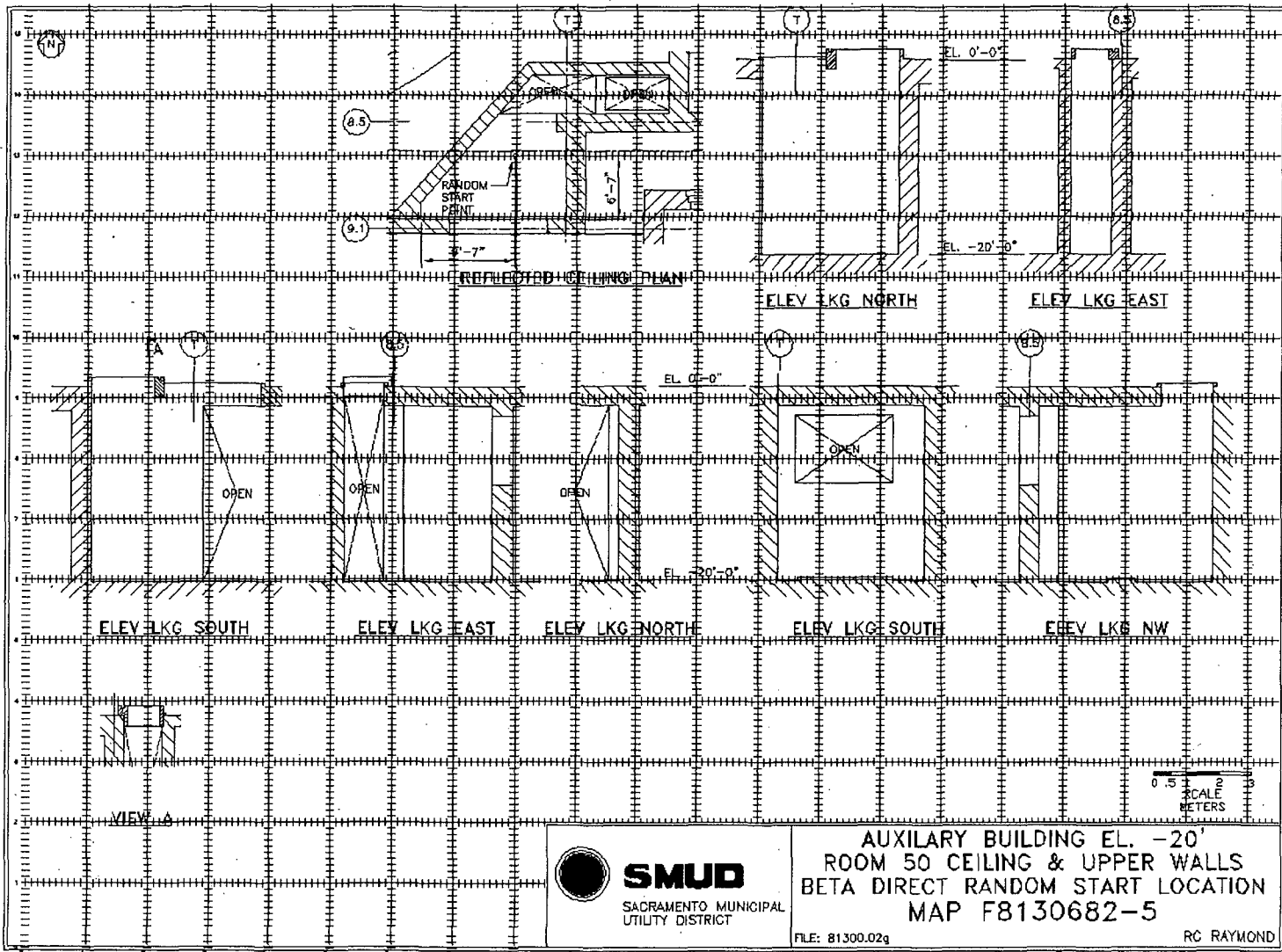

**SMUD**  
 SACRAMENTO MUNICIPAL  
 UTILITY DISTRICT

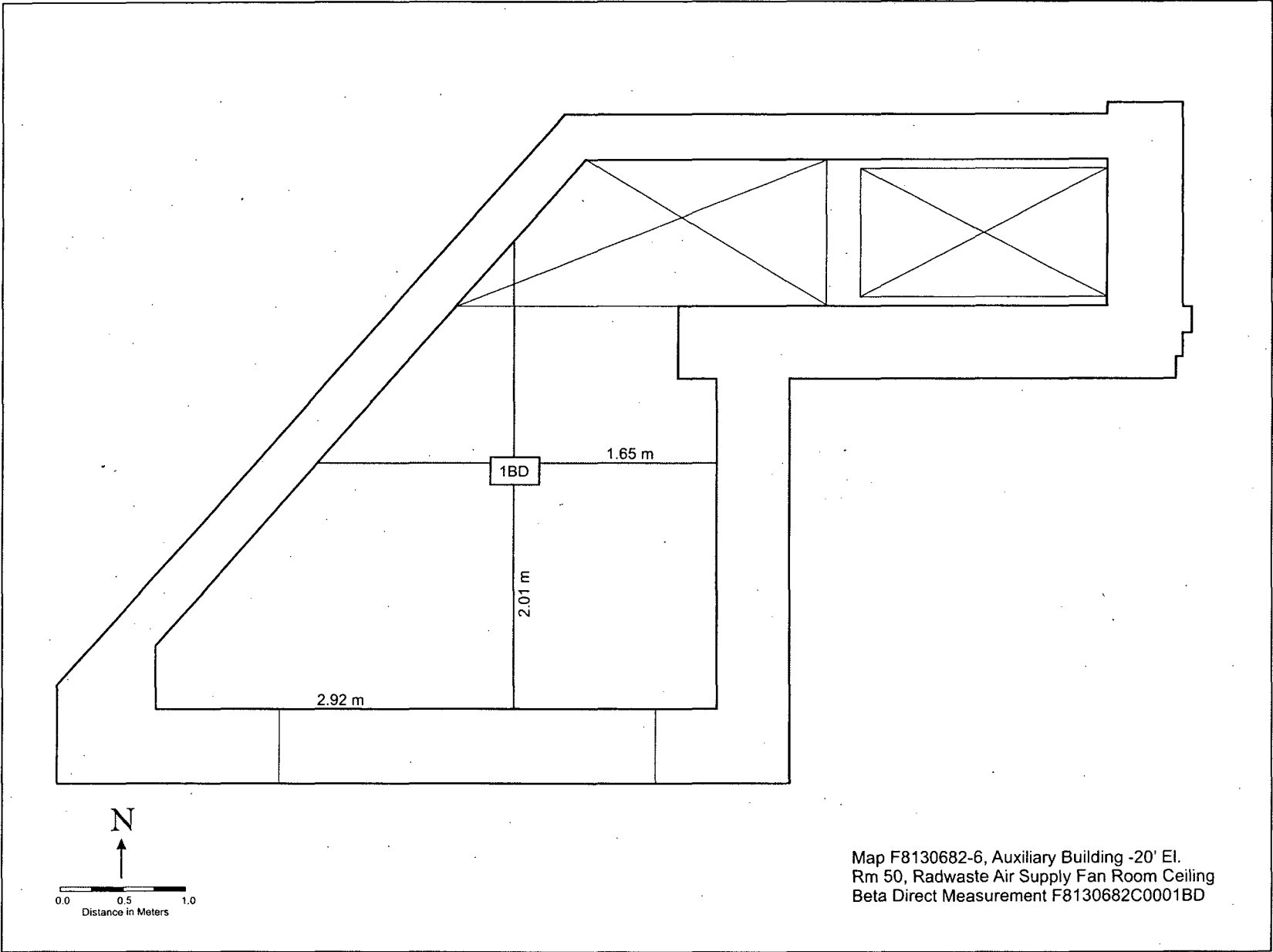
**AUXILIARY BUILDING EL. -20'**  
**ROOM 50 UPPER WALL ELEVATIONS**  
**SURFACE AREA ESTIMATE**  
**MAP F8130682-2**

FILE: B13000.02b RC RAYMOND

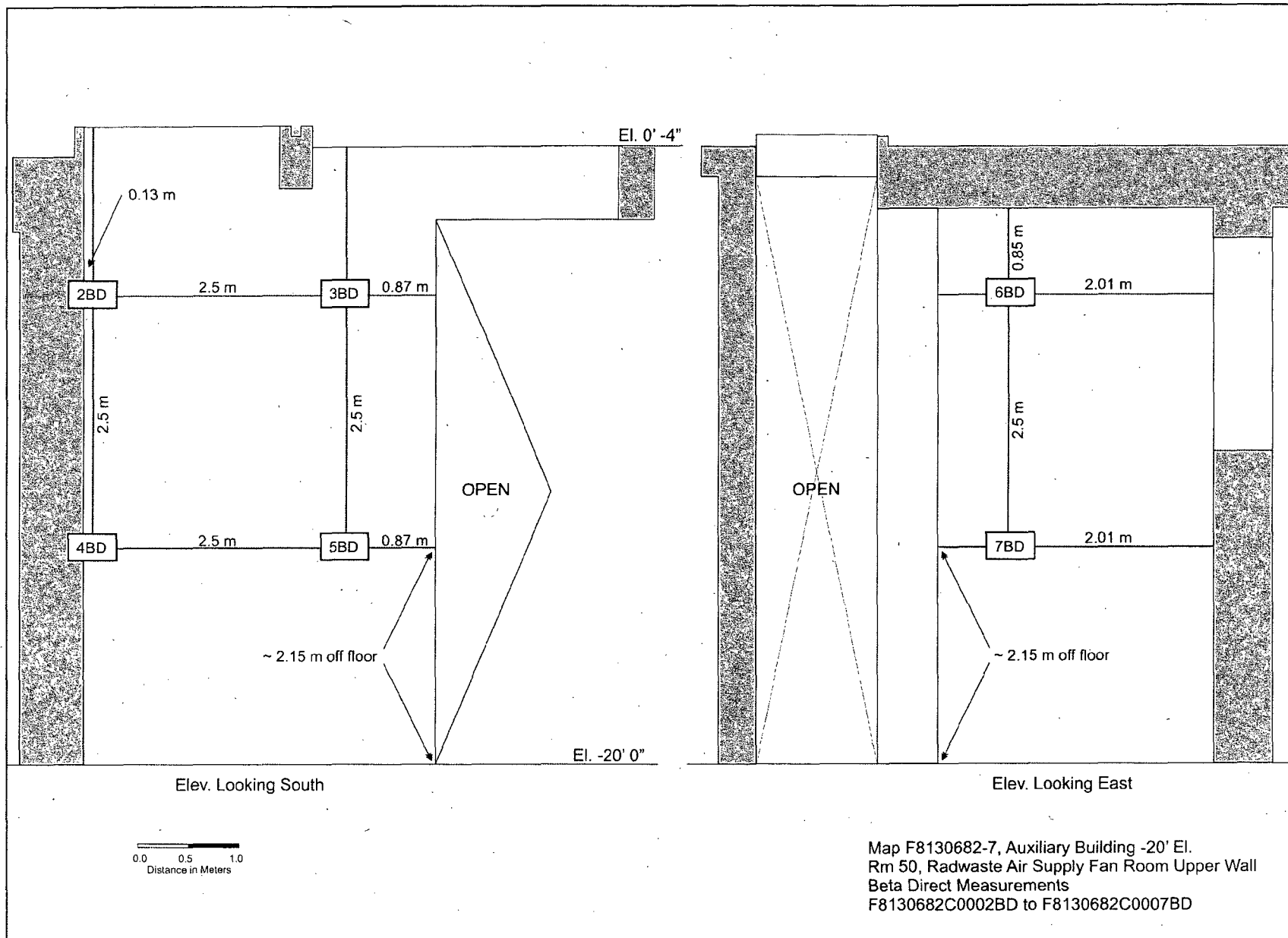




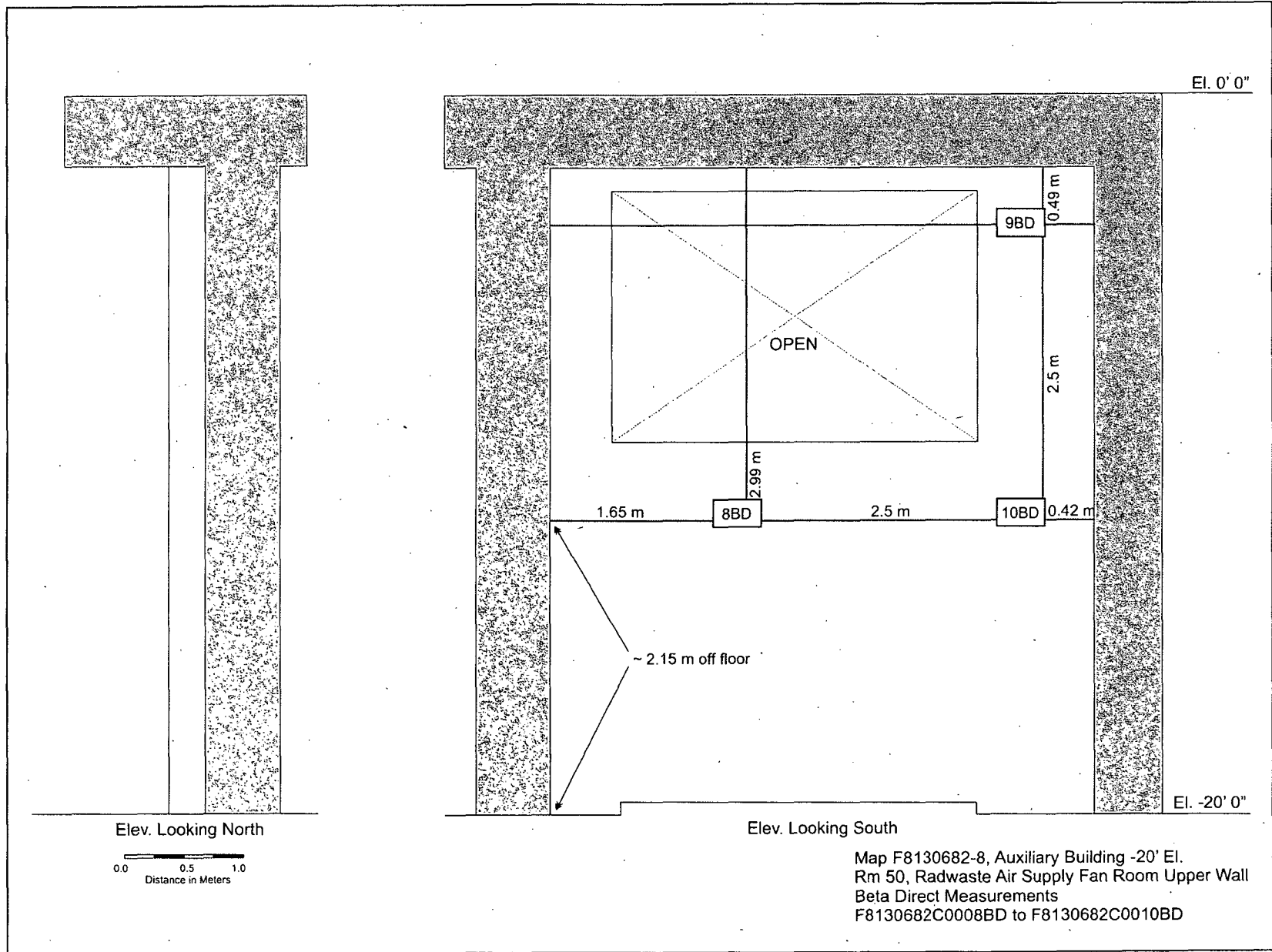


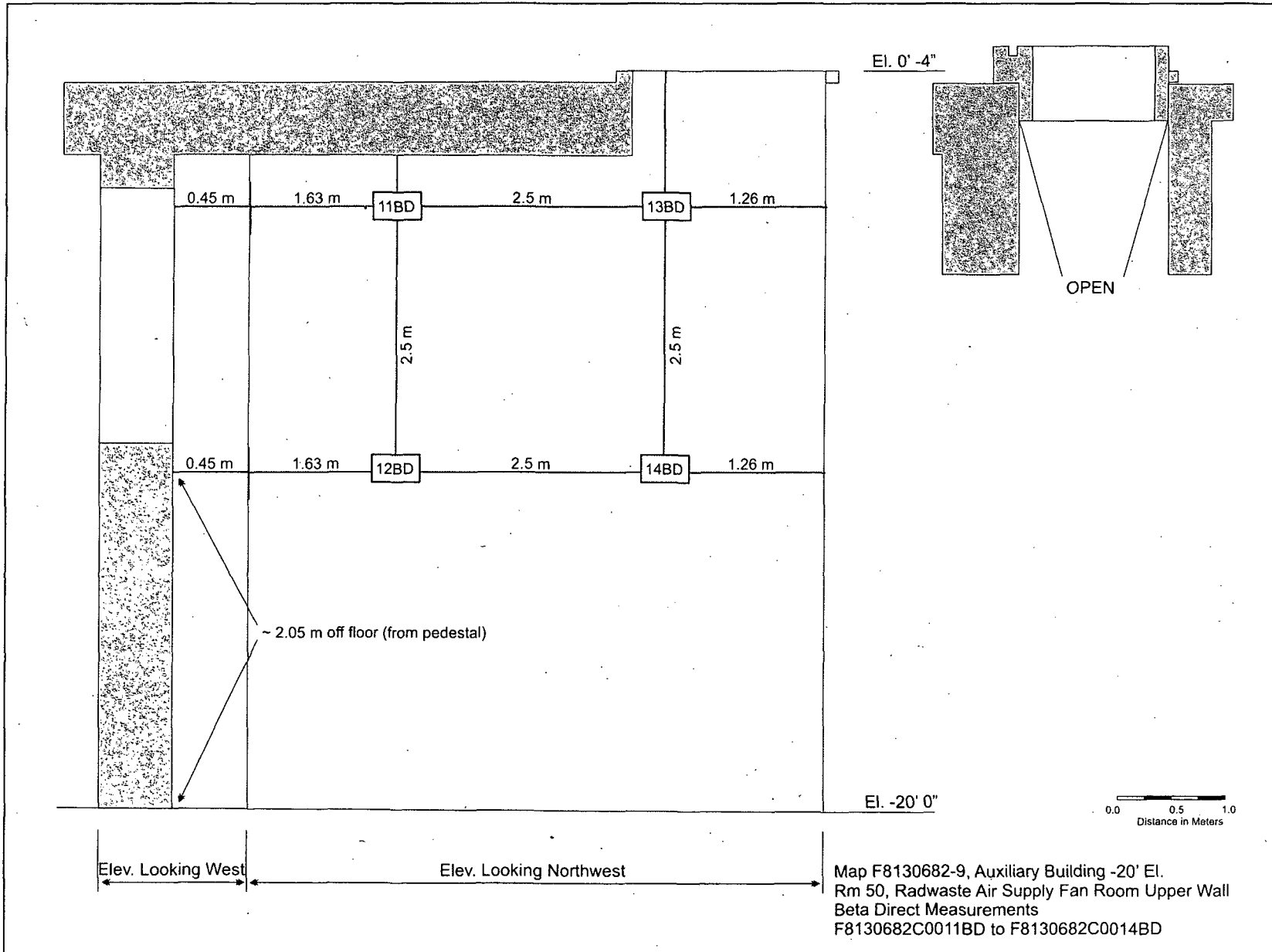


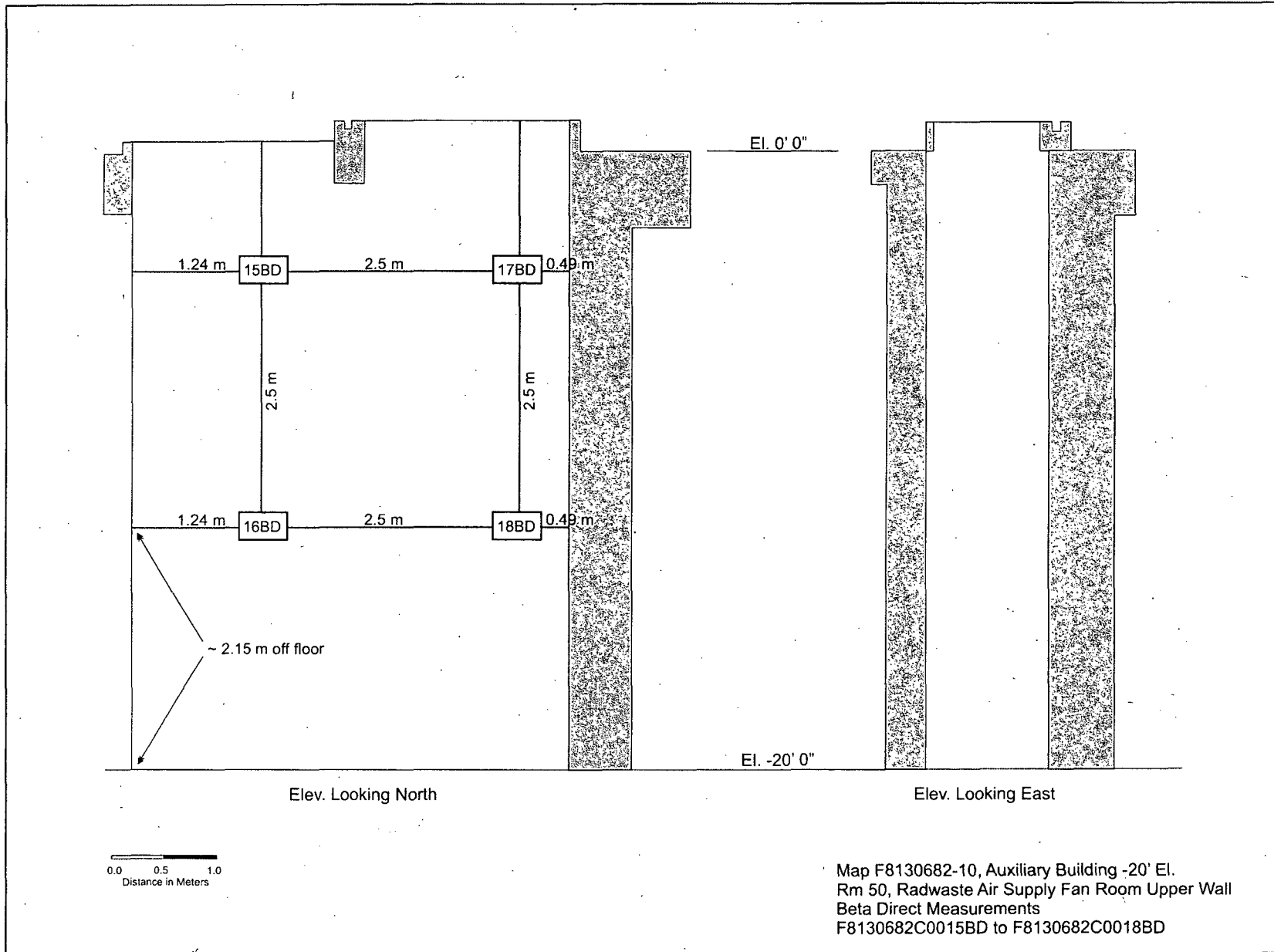
Map F8130682-6, Auxiliary Building -20' E1.  
Rm 50, Radwaste Air Supply Fan Room Ceiling  
Beta Direct Measurement F8130682C0001BD

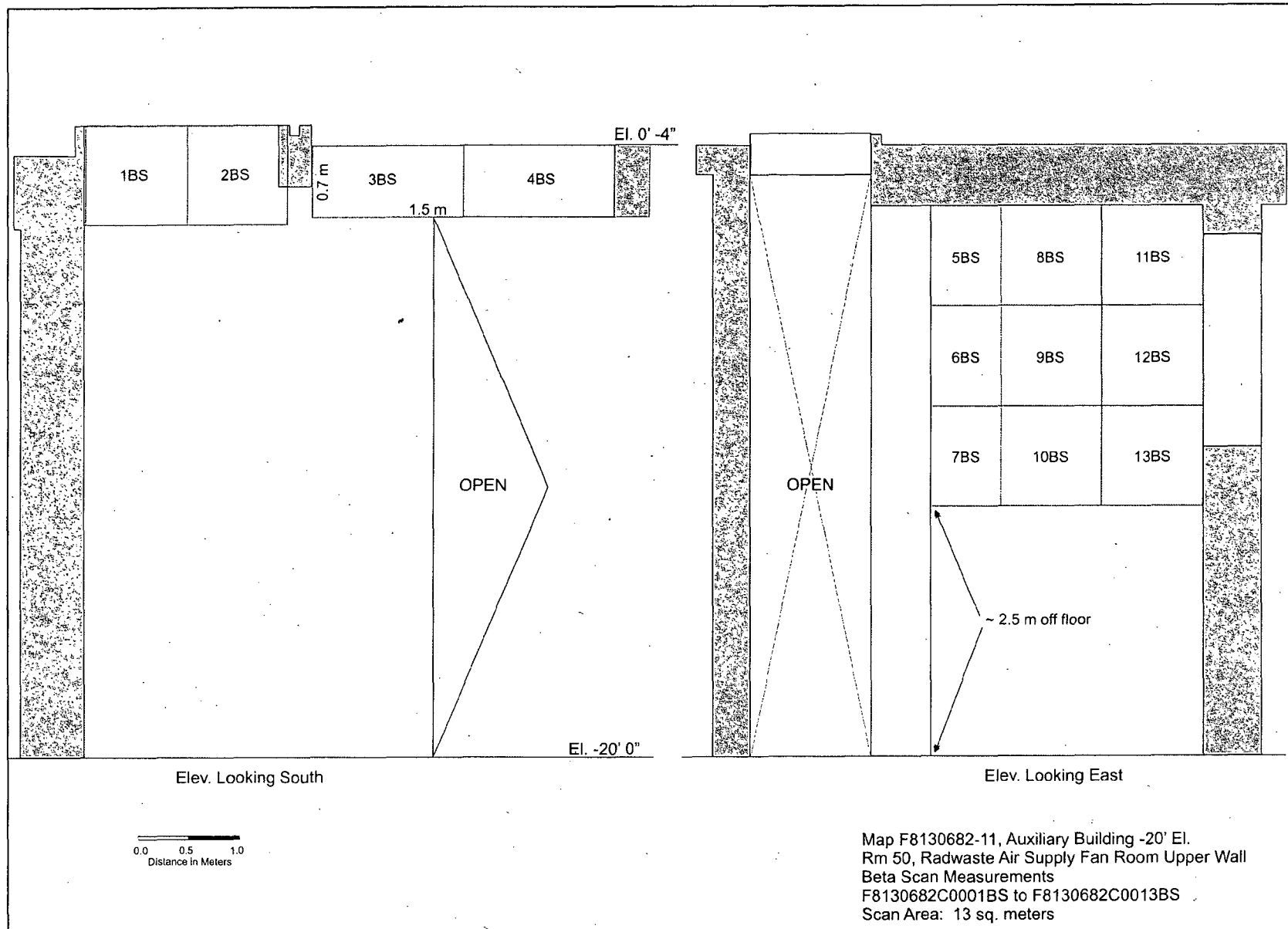


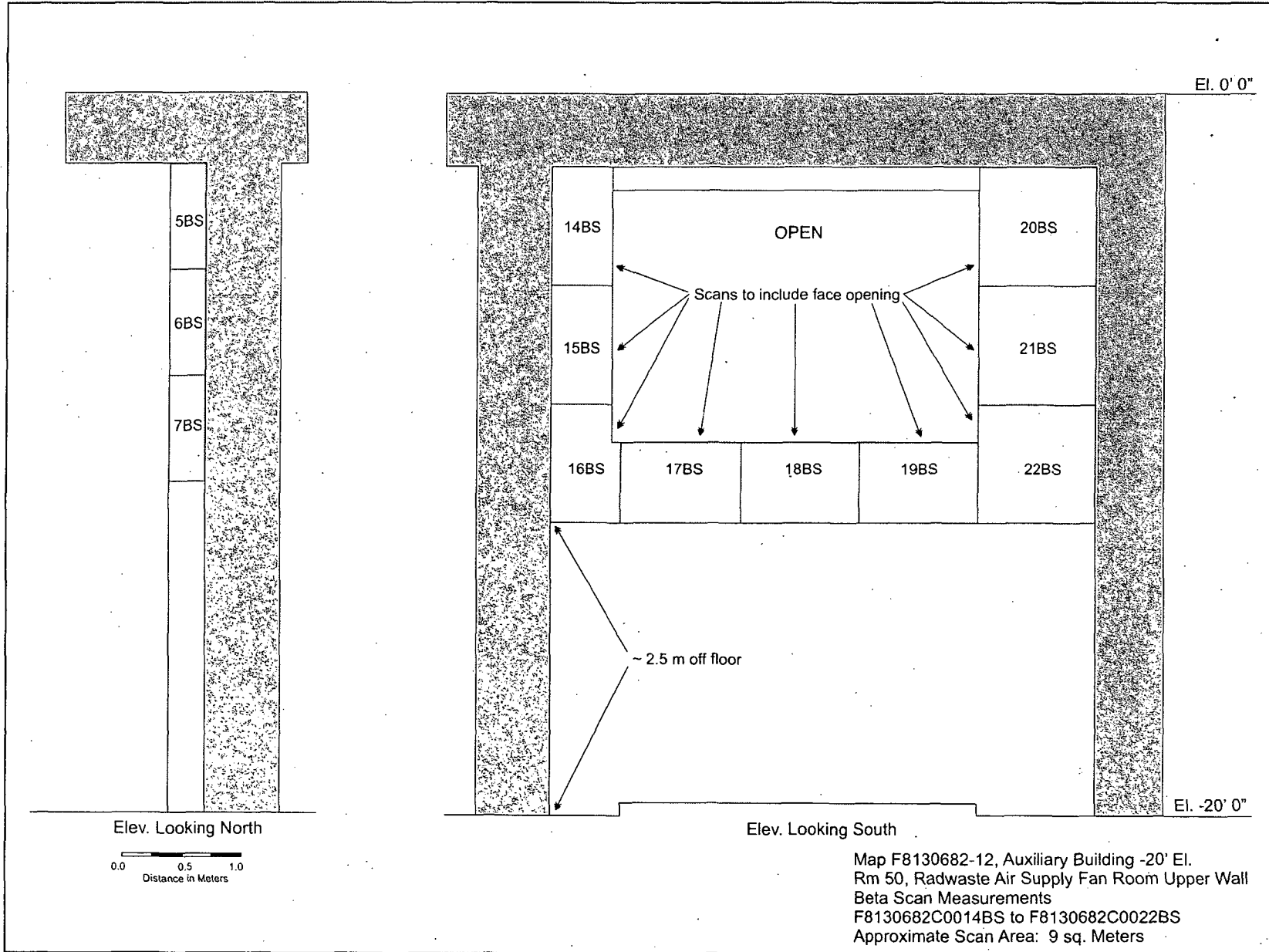


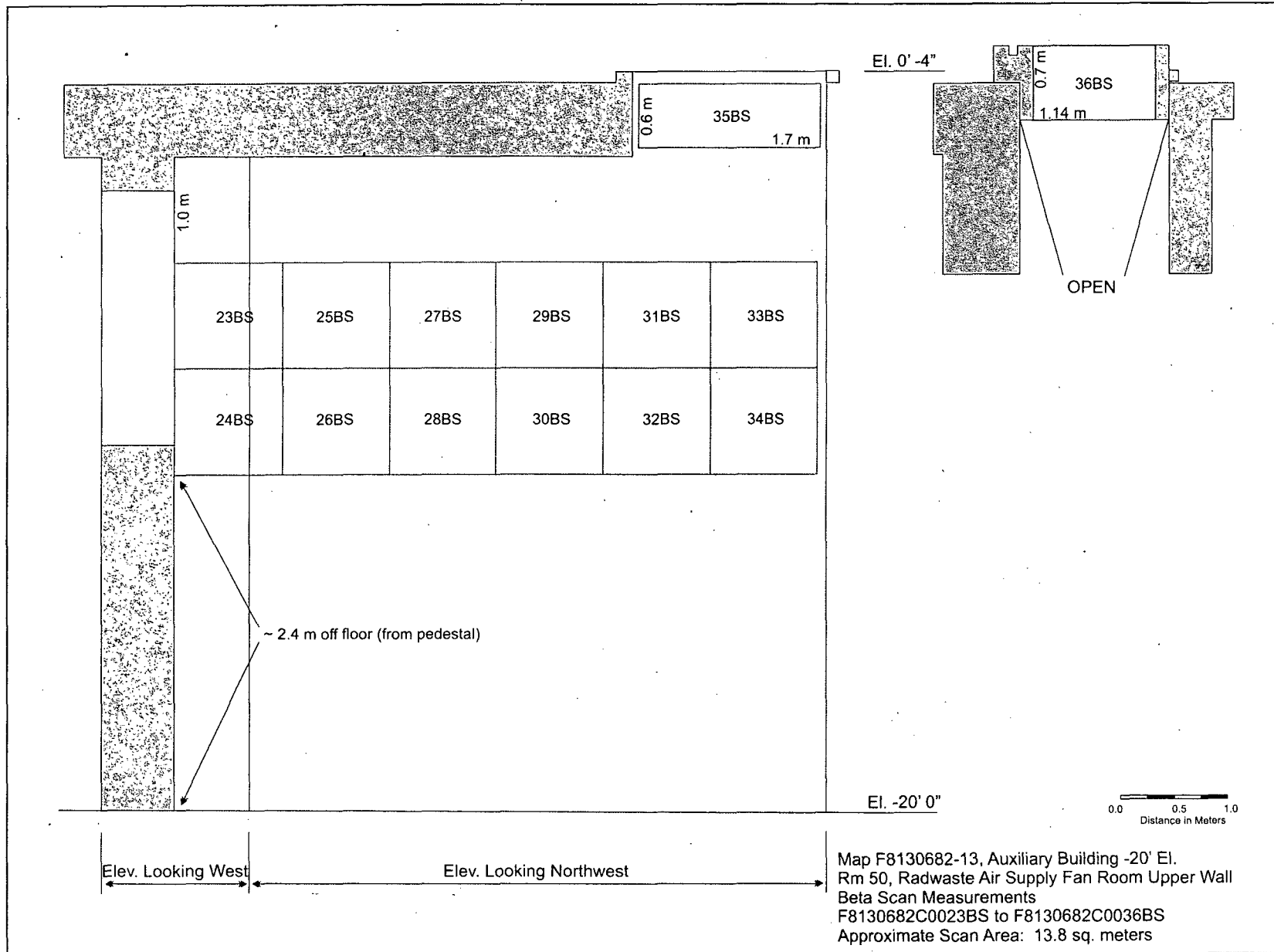


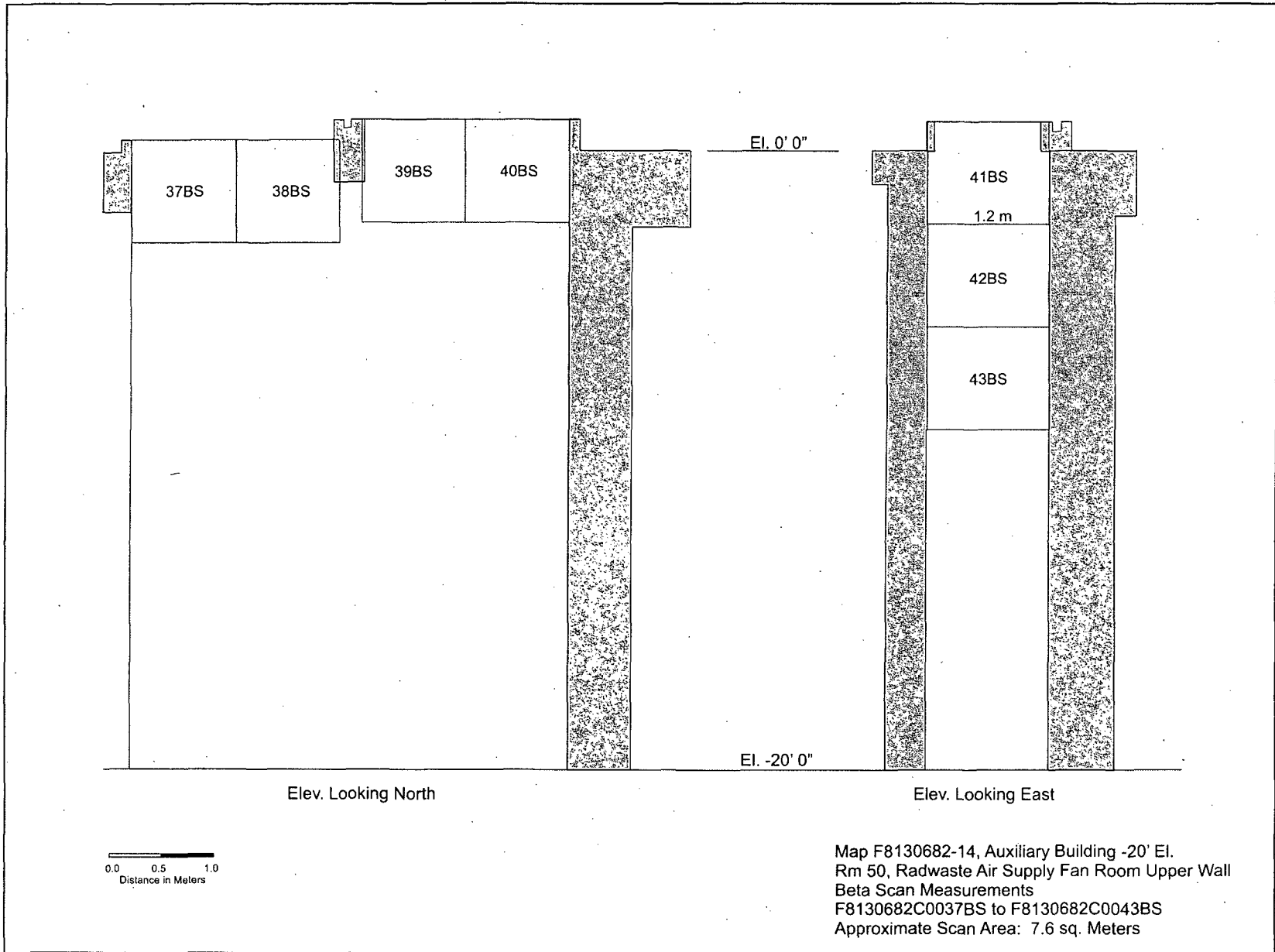


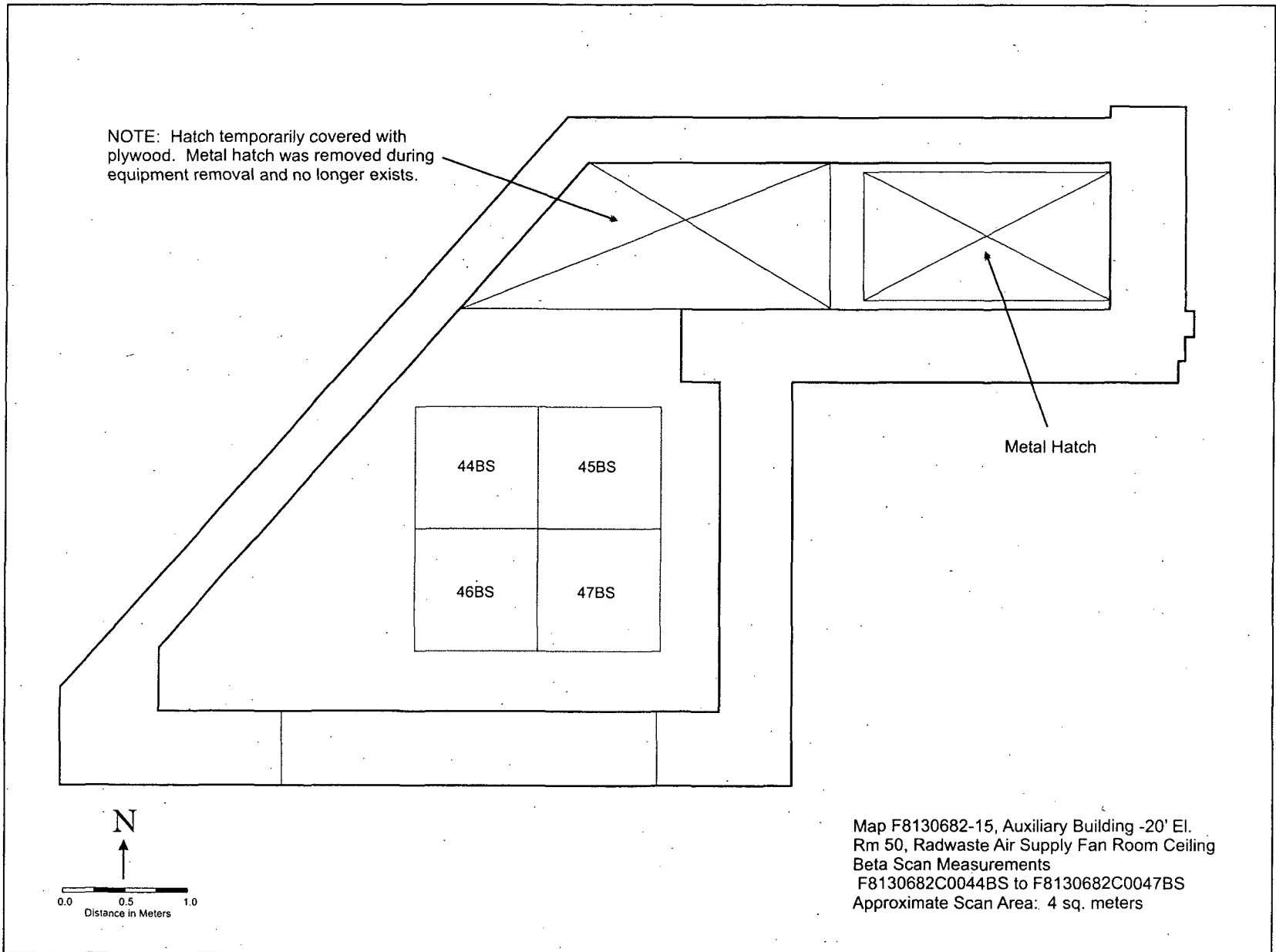






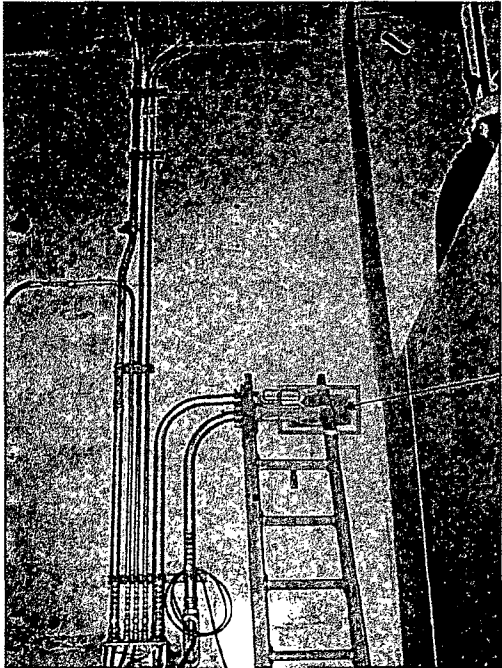






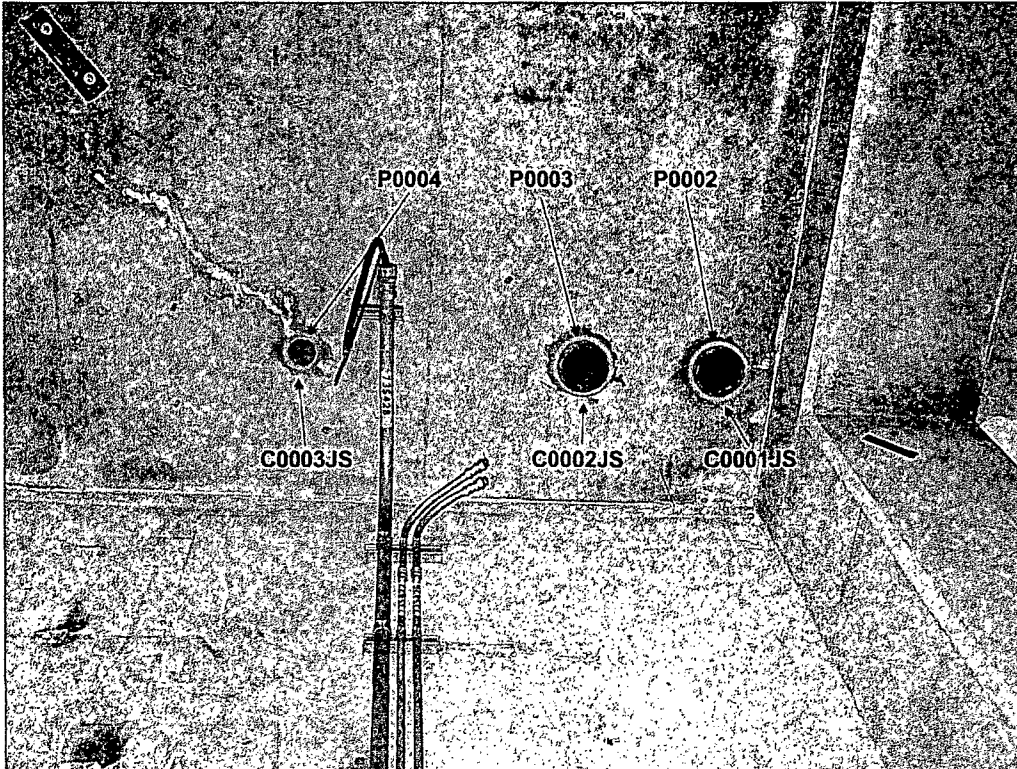


Penetrations -1



P0001

Rm 50, Radwaste Air Supply Fan Room,  
South Wall Penetration P0001



Rm 50, Radwaste Air Supply Fan Room  
Ceiling Penetration P0001 to P0003  
Juncture Scans F8130682C0001JS to F8130682C0003JS

**Attachment 2**

**Instrumentation**

**October 29, 2007**

**Survey Unit F8130682**

**Table 2-1. Survey Unit Instrumentation**

<b>Instrument Model; Serial No.</b>	<b>Detector Model; Serial No.</b>	<b>MDC Static (dpm/100 cm<sup>2</sup>)</b>	<b>MDC Scan (dpm/100 cm<sup>2</sup>)</b>
M2350; 142514	43-98B; 148639	1,400	2,520
M2350; 203481	43-68B; 161405 <sup>1</sup>	433	1,033
M2350; 203481	43-68B; 161405 <sup>2</sup>	433	1,084
M2350; 149794	43-116-1B; 216072 <sup>3</sup>	491	739
M2350; 149794	43-116-1B; 216072 <sup>4</sup>	472	3,492
Tennelec; 0401171	N/A	5 dpm $\alpha$ , 11 dpm $\beta$	N/A

<sup>1</sup>43-68B Concrete surfaces

<sup>2</sup>43-68B Concrete penetrations

<sup>3</sup>43-116-1B Concrete junctures

<sup>4</sup>43-116-1B Metal penetrations

**Table 2-2. Investigation Criteria and DCGL**

<b>Parameter</b>	<b>Value (dpm/100 cm<sup>2</sup>)</b>
Investigation Criteria - Direct	43,000
Investigation Criteria – Scan	43,000
DCGL <sub>w</sub>	43,000
DCGL <sub>EMC</sub>	N/A

**Attachment 3**

**Investigation**

**October 29, 2007**

**Survey Unit F8130682**

**(none required)**

**Attachment 4**

**Data Assessment**

**October 29, 2007**

**Survey Unit F8130682**

