

Rancho Seco

Final Status Survey Summary Report

August 25, 2008

North Diesel Generator Room (Class 2 Area)

Survey Unit F8131211

Prepared By: Evin L. Brown Date: 8/25/2008
FSS Engineer

Reviewed By: R. F. Decker Date: 11/17/08
Lead FSS Engineer

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Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8131211, North Diesel Generator Room (Class 2 Area)

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 cm² and a maximum value of 5,720,000 dpm/100 cm². Direct measurements on the -29' elevation showed a mean gross activity level of 544,756 dpm/100 cm² and a maximum value of 11,370,000 dpm/100 cm². Direct measurements on the -20' elevation showed a mean gross activity level of 247,831 dpm/100 cm² and a maximum value of 10,080,000 dpm/100 cm². Direct measurements on the grade elevation showed a mean gross activity level of 373,758 dpm/100 cm² and a maximum value of 5,800,000 dpm/100 cm². Direct measurements on the +20' elevation showed a mean gross activity level of 85,408 dpm/100 cm² and a maximum value of 1,900,000 dpm/100 cm². Direct measurements on the +40' elevation showed a mean gross activity level of 3,288 dpm/100 cm² and a maximum value of 24,781 dpm/100 cm². Direct measurements on the building exterior, including the mezzanine roof, showed a mean gross activity level of 1,897 dpm/100 cm² and a maximum value of 2,990 dpm/100 cm². (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 160 m² were scanned for approximately 16% 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	North Diesel Generator Room (Class 2 Area)
Survey Unit:	1211	Structure Surface
Class:	2	LTP Table 5-4
SU Area (m²):	995	
Evaluator:	Erin L. Brown	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	N/A	Class 2
Design DCGL_{emc} (dpm/100 cm²):	N/A	Class 2
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	6935	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	71.1	Class 2
Scan Area (m²):	160	
Scan Coverage (%):	16%	Class 2
Z_{1-α}:	1.645	
Z_{1-β}:	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	3.1	
Relative Shift Used:	3	Uses 3.0 if Relative Shift is >3
N-Value:	11	
Design N-Value + 20%:	14	NUREG-1575 Table 5-5
Design Min Samples N:	14	Class 2
Grid Spacing L:	8.4	Class 2

Survey Results:

A total of 14 direct measurements were made in F8131211. 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 1106 to 32968 dpm/100 cm², based on a surveyor efficiency of 0.5 and 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 ²)
F8131211-C0001BD	1950
F8131211-C0002BD	2137
F8131211-C0003BD	1592
F8131211-C0004BD	1463
F8131211-C0005BD	1499
F8131211-C0006BD	1437
F8131211-C0007BD	1826
F8131211-C0008BD	1592
F8131211-C0009BD	1873
F8131211-C0010BD	1338
F8131211-C0011BD	1266
F8131211-C0012BD	1691
F8131211-C0013BD	1800
F8131211-C0014BD	1504
Mean:	1641
Median:	1592
Standard Deviation:	249
Range:	1266 - 2137

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm ²)
F8131211C0001SM	0.34
F8131211C0002SM	1.64
F8131211C0003SM	17.13
F8131211C0004SM	0.34
F8131211C0005SM	-3.53
F8131211C0006SM	-2.24
F8131211C0007SM	-2.24
F8131211C0008SM	-0.95
F8131211C0009SM	-2.24
F8131211C0010SM	-0.95
F8131211C0011SM	-3.53
F8131211C0012SM	5.51
F8131211C0013SM	-2.24
F8131211C0014SM	-3.53
Mean:	0.25
Median:	-1.59
Standard Deviation:	5.44
Range:	-3.53 to 17.13

Survey Unit Data Assessment:

The survey design required 14 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

Survey Results Parameter	Value	Comment
Material Background Used (dpm/100 cm ²):	N/A	
Ambient Background Used (dpm/100 cm ²):	N/A	Average Ambient BKG = 0
Actual Direct Measurements (N):	14	
Median (dpm/100 cm ²):	1592	
Mean (dpm/100 cm ²):	1641	
Direct Measurement Standard Deviation (dpm/100 cm ²):	249	
Total Standard Deviation (dpm/100 cm ²):	249	Based on samples and backgrounds.
Maximum (dpm/100 cm ²):	2137	
Material Type:	N/A	Background Subtract Not Applied
Sign Test Final N Value:	14	
S+ Value:	14	
Critical Value:	10	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{emc}:	N/A	Class 2
Total Standard Deviation <= Sigma:	Yes	
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
Does the Survey Unit Pass All Criteria?	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, 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 43000 dpm/100 cm² 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.

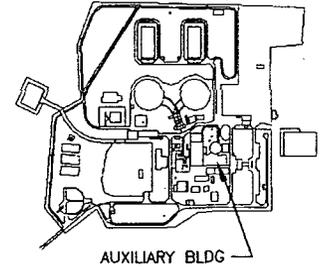
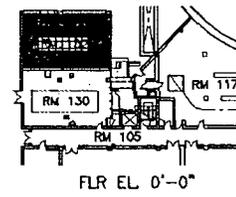
It is concluded that survey unit F8131211 meets the release criteria of 10CFR20.1402.

Attachment 1

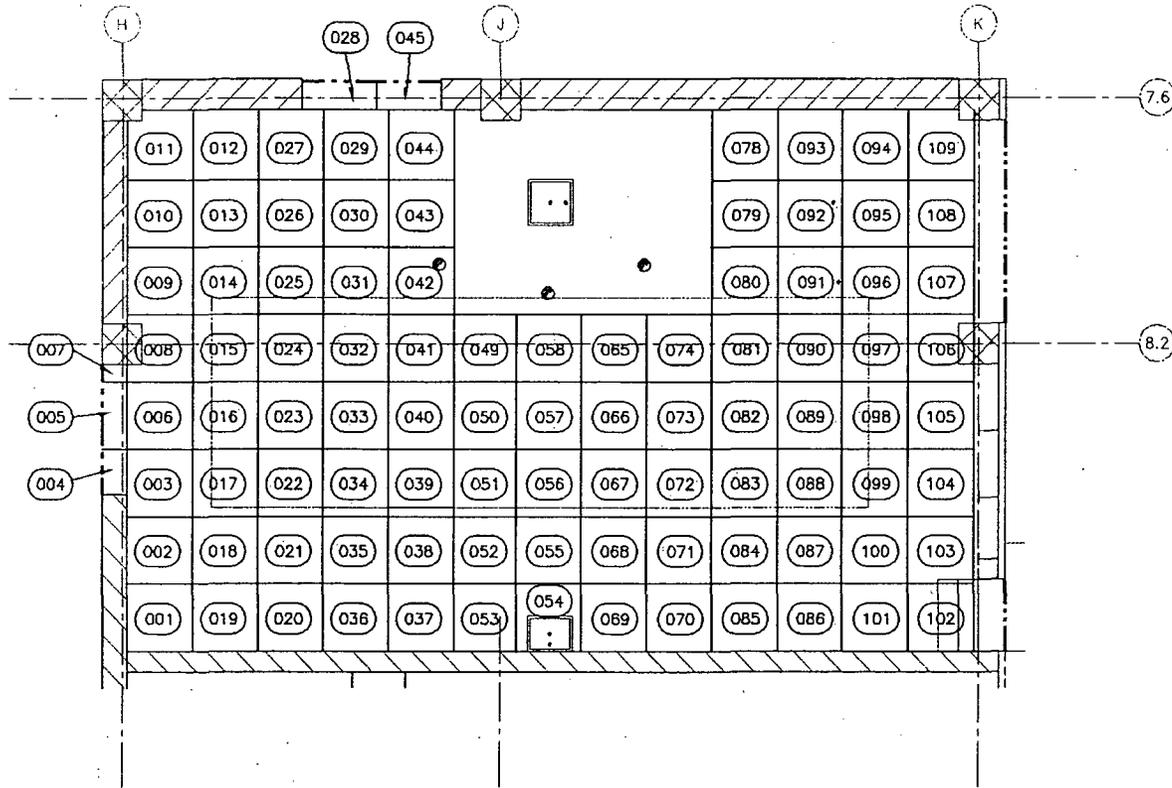
Maps

August 25, 2008

Survey Unit F8131211



KEY PLANS



FLOOR PLAN



SMUD

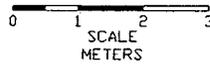
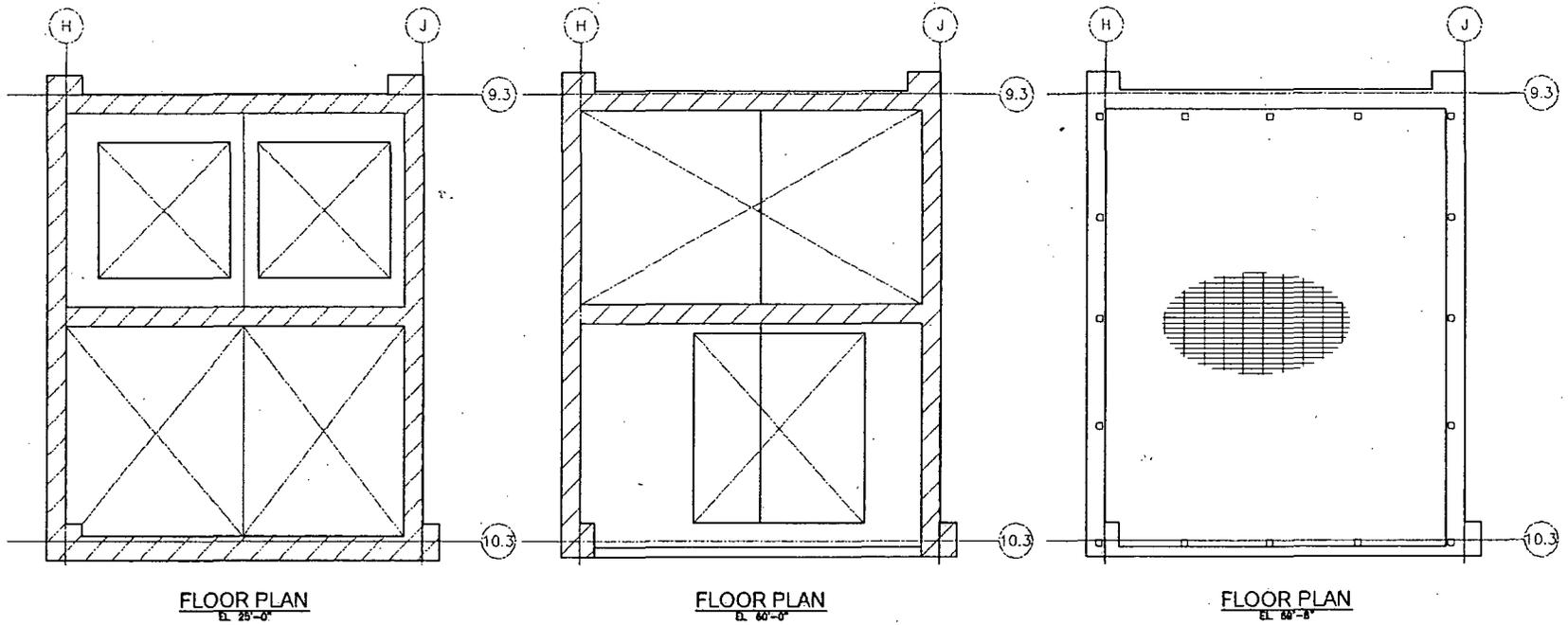
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

AUXILIARY BUILDING EL 0'-0"
ROOM 132 FLOOR PLAN
BETA SCAN
MEASUREMENT LOCATIONS
F8131211-M1

FILE: 813000.03f

SHEET 1 of 7

RC RAYMOND

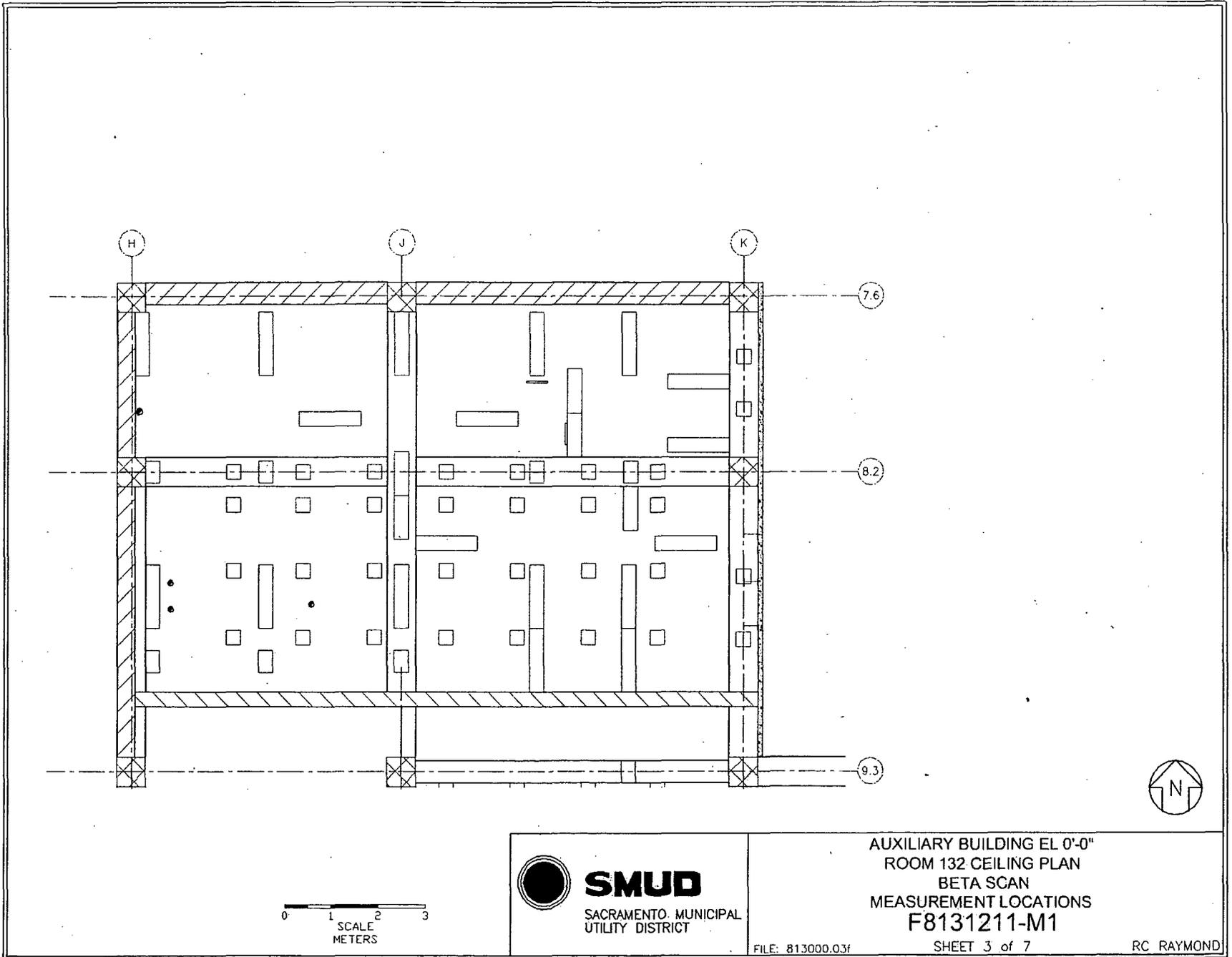


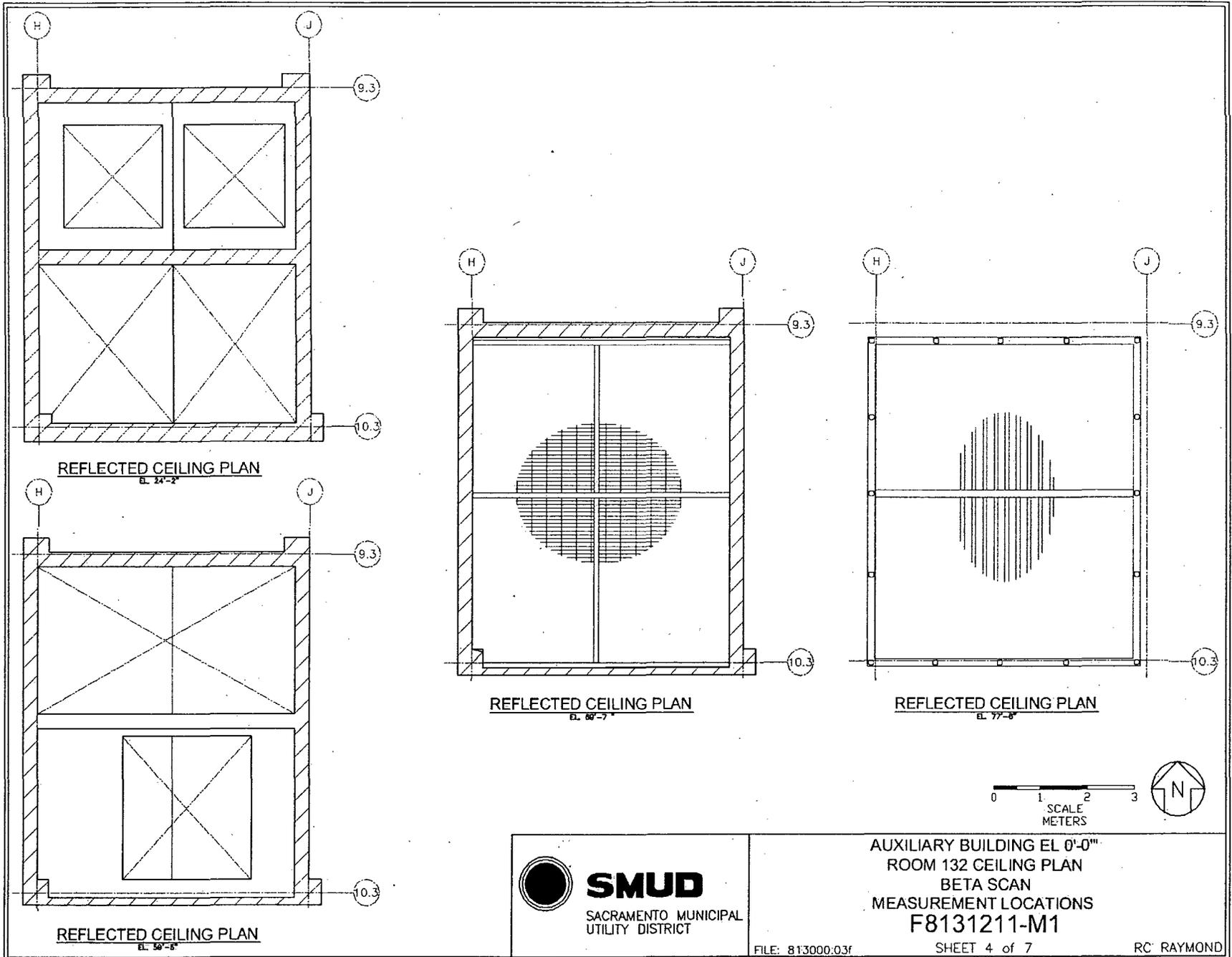
AUXILIARY BUILDING EL 25', 60', 69'-4"
ROOM 132 FLOOR PLANS
BETA SCAN
MEASUREMENT LOCATIONS
F8131211-M1

FILE: 813000.03f

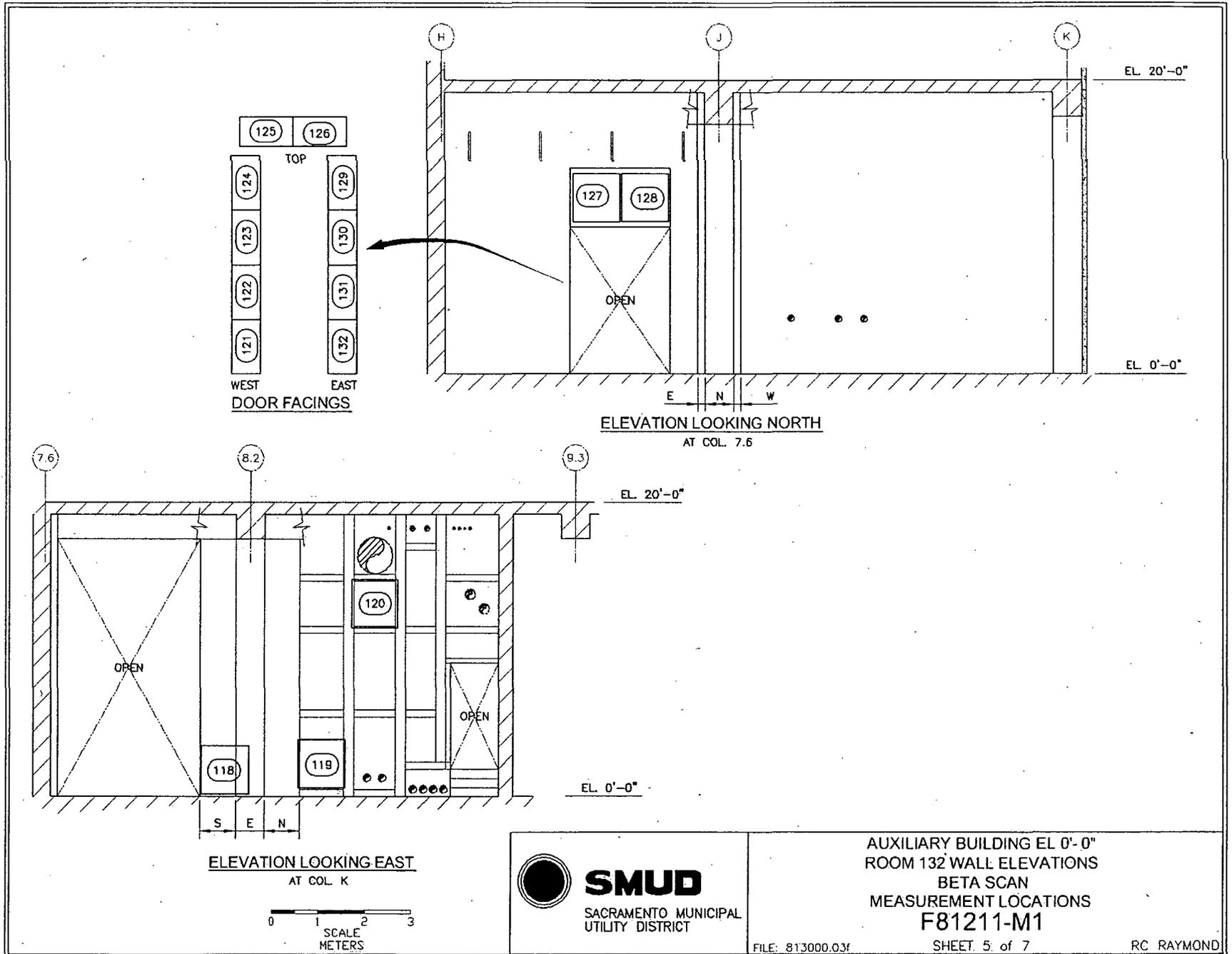
SHEET 2 of 7

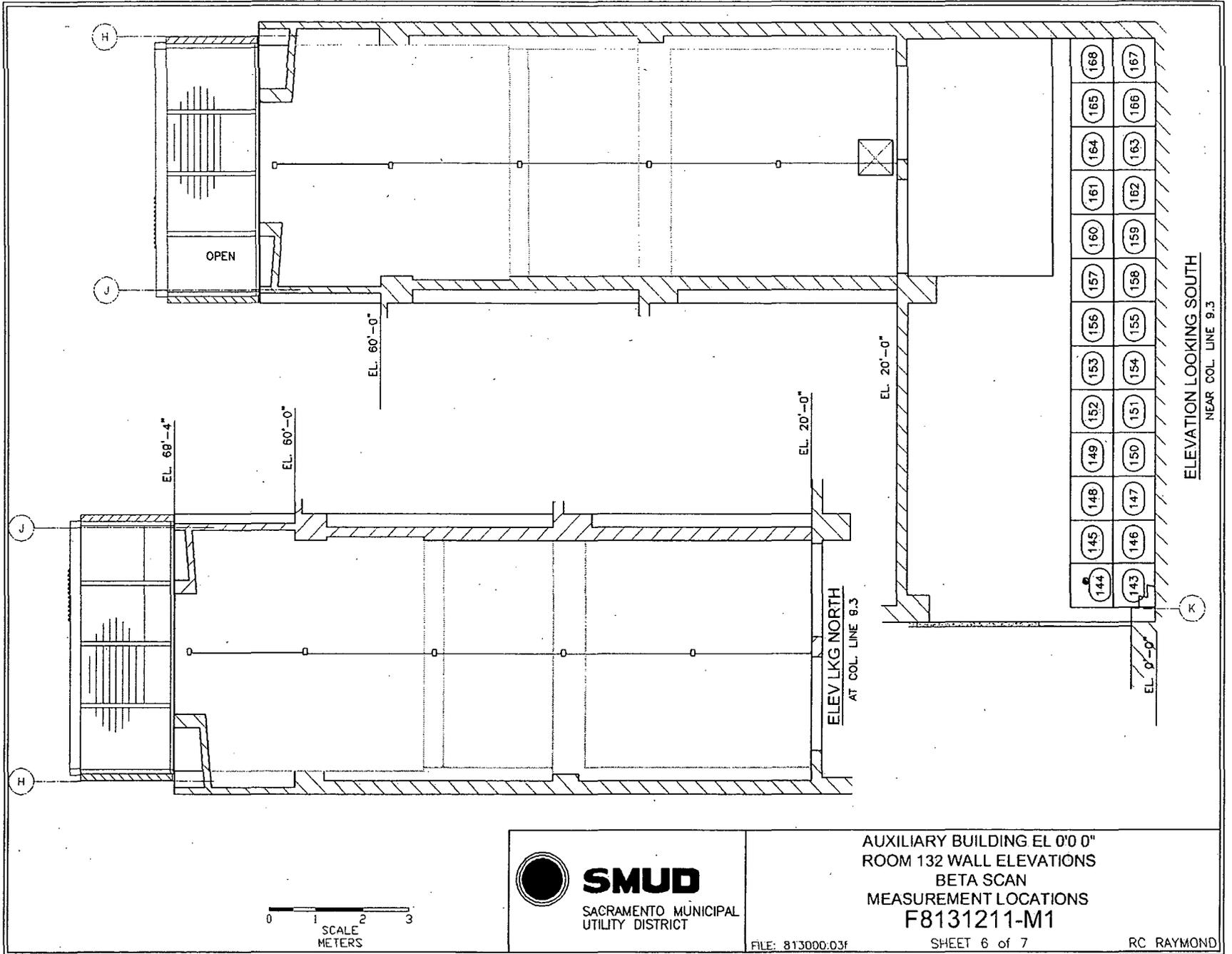
RC RAYMOND

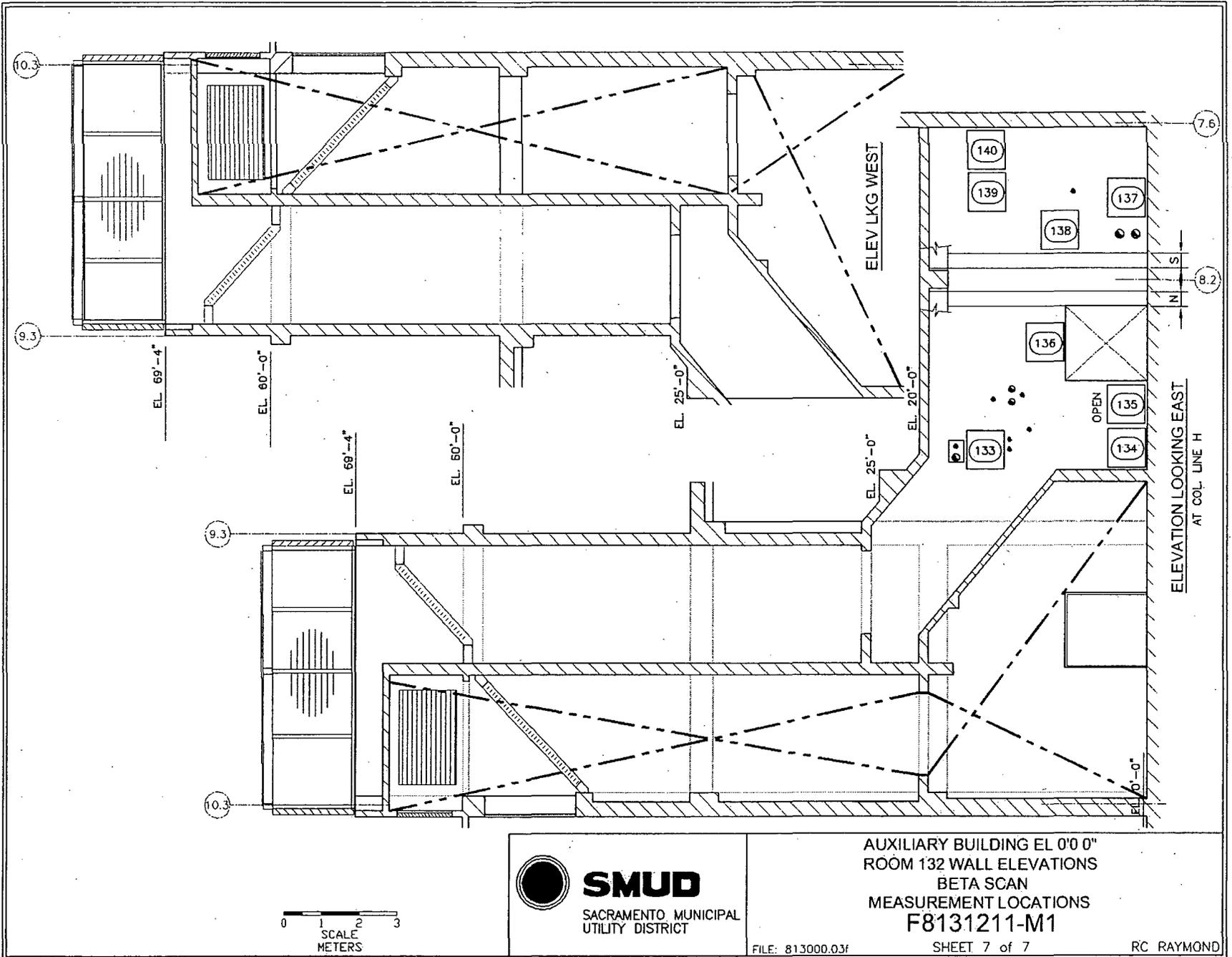


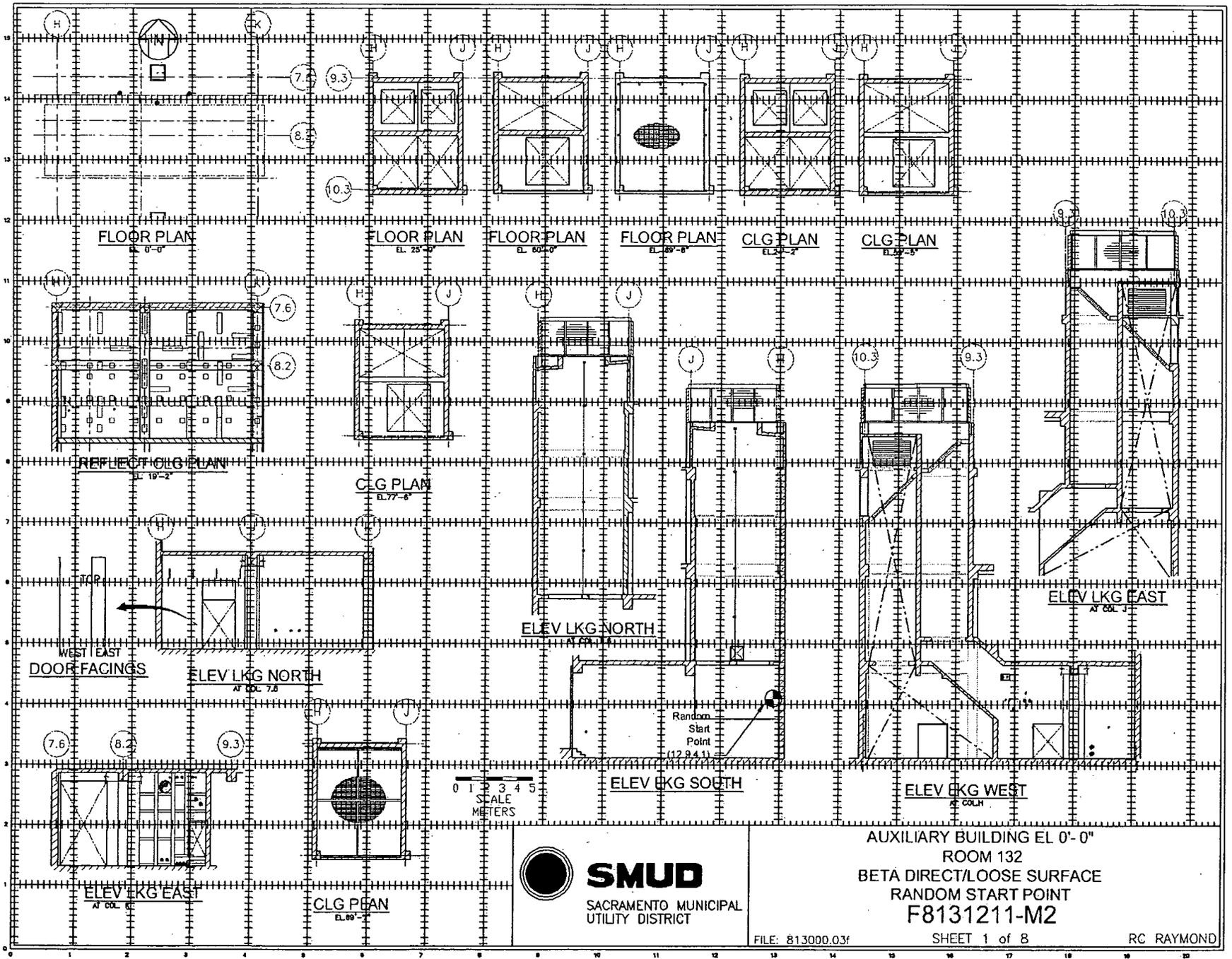


AUXILIARY BUILDING EL 0'-0"
ROOM 132 CEILING PLAN
BETA SCAN
MEASUREMENT LOCATIONS
F8131211-M1



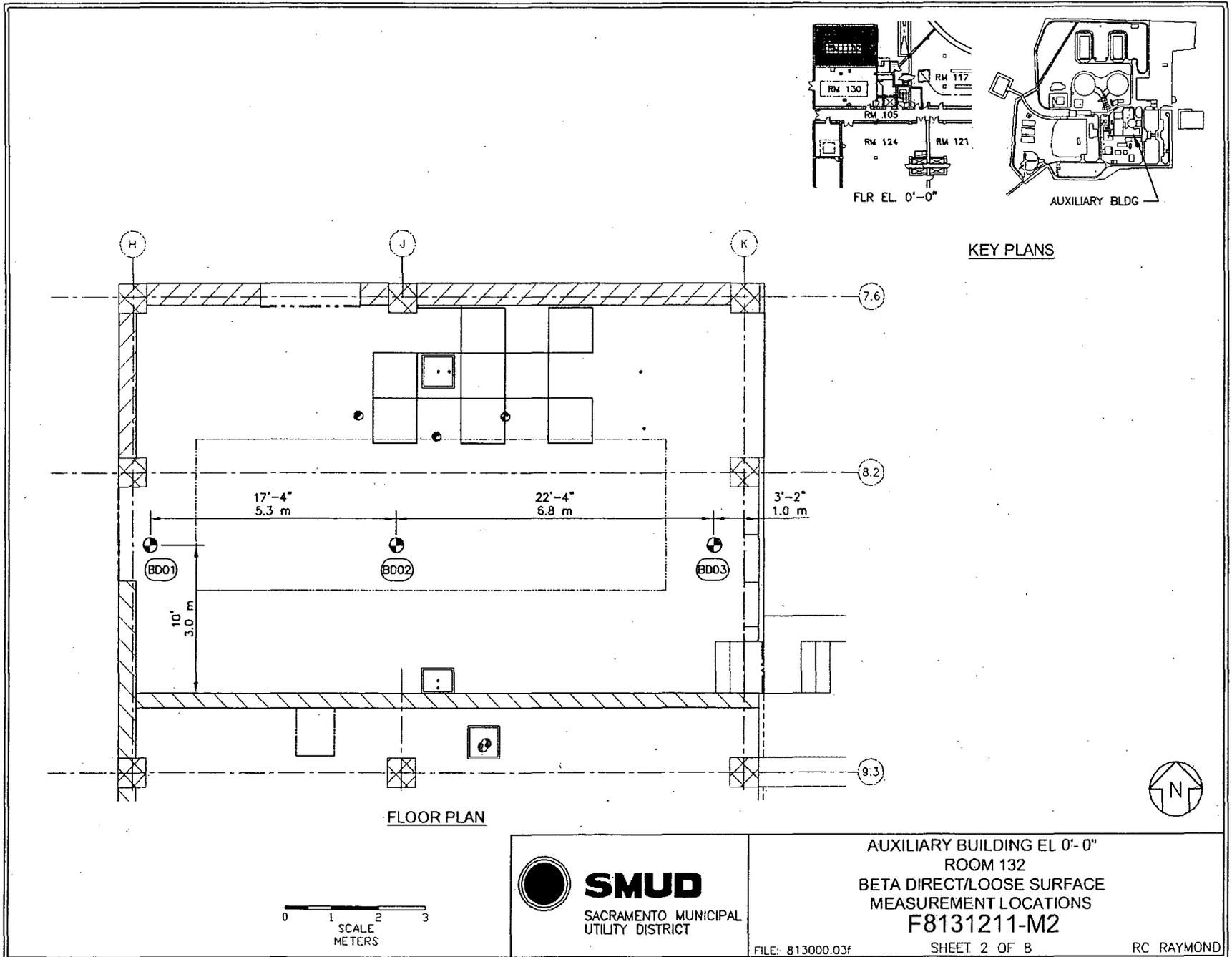


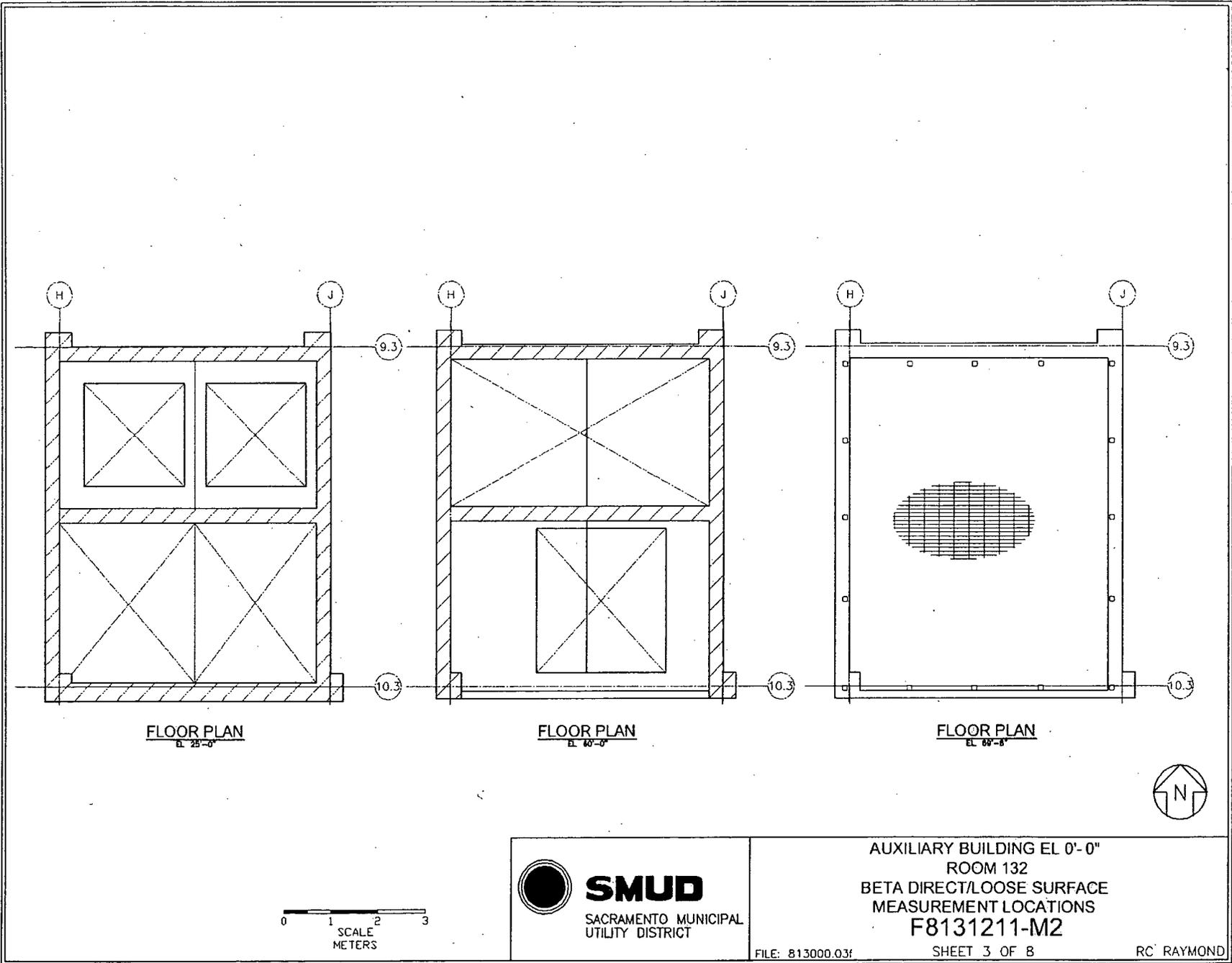


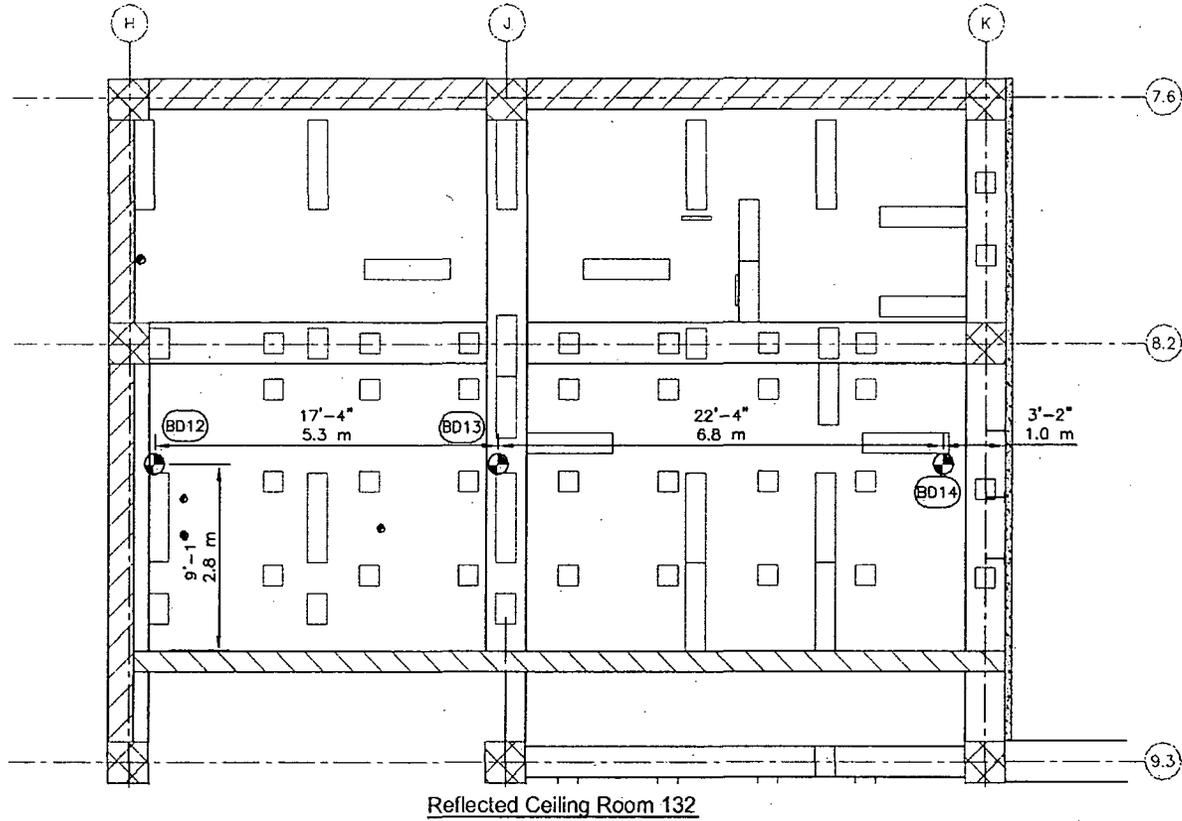


SMUD
 SACRAMENTO MUNICIPAL
 UTILITY DISTRICT

AUXILIARY BUILDING EL 0'-0"
 ROOM 132
 BETA DIRECT/LOOSE SURFACE
 RANDOM START POINT
F8131211-M2
 FILE: 813000.03f SHEET 1 of 8 RC RAYMOND







SMUD

SACRAMENTO MUNICIPAL
UTILITY DISTRICT

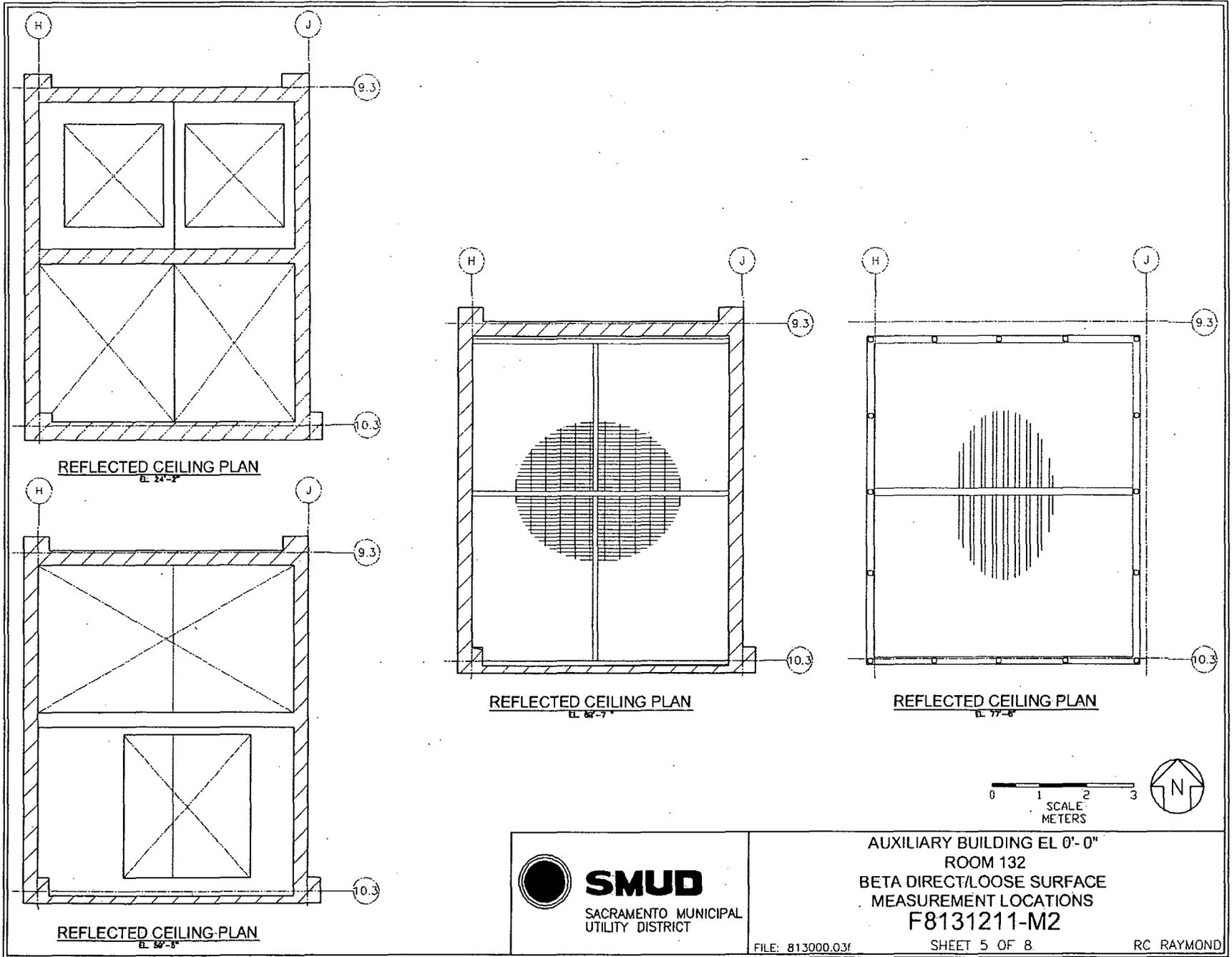
AUXILIARY BUILDING EL 0'-0"
ROOM 132
BETA DIRECT/LOOSE SURFACE
MEASUREMENT LOCATIONS
F8131211-M2

FILE: 813000.03f

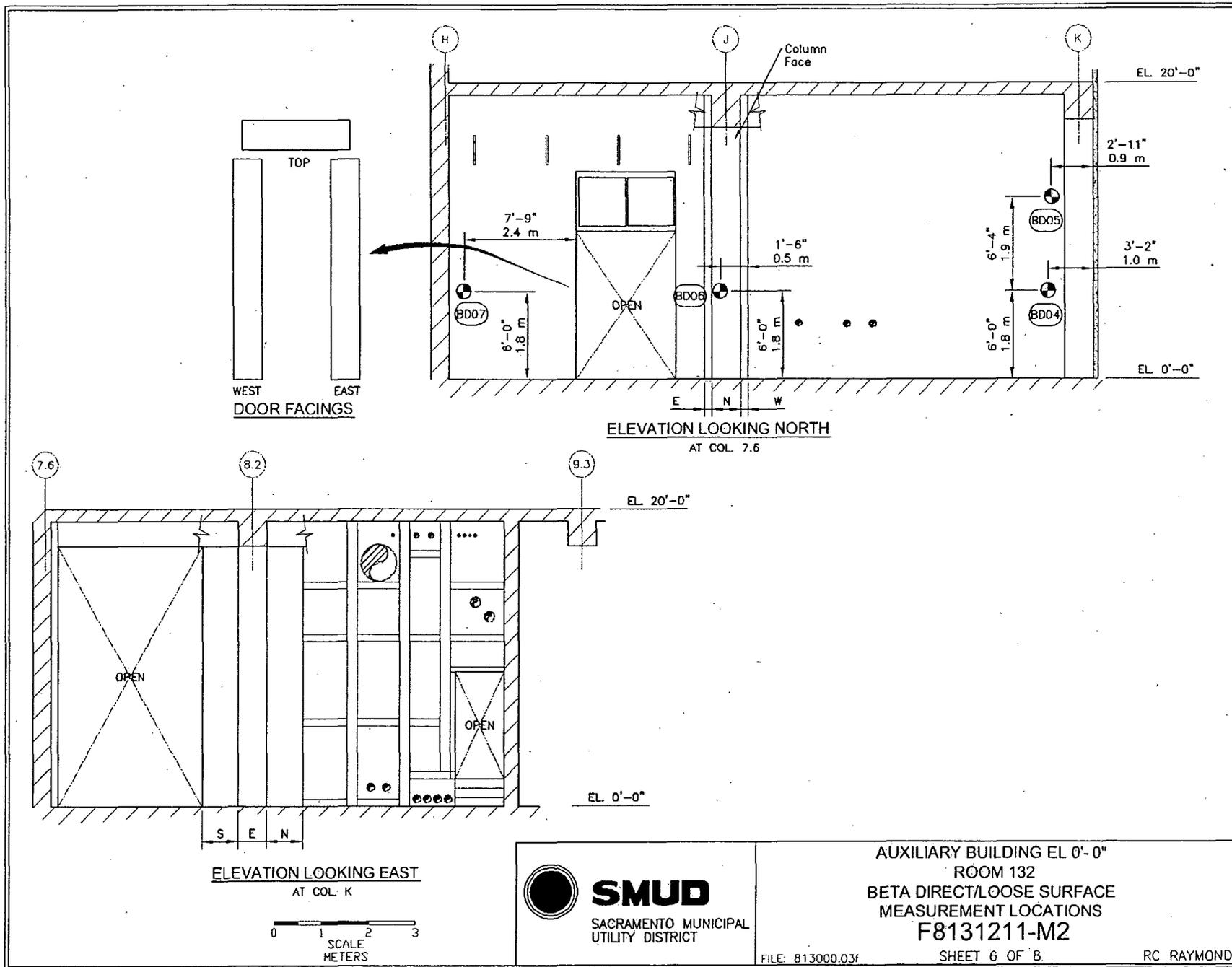
SHEET 4 OF 8

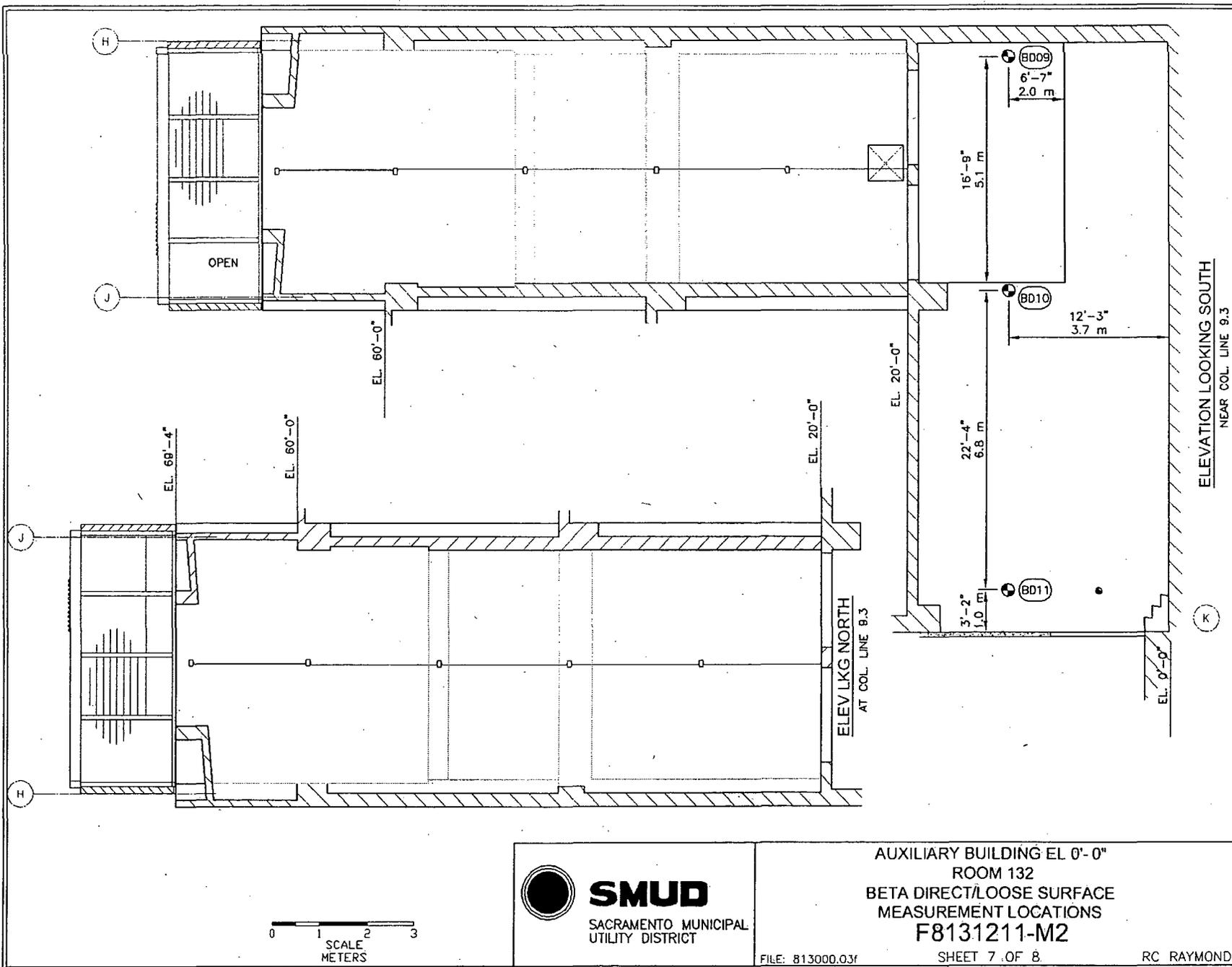
RC. RAYMOND

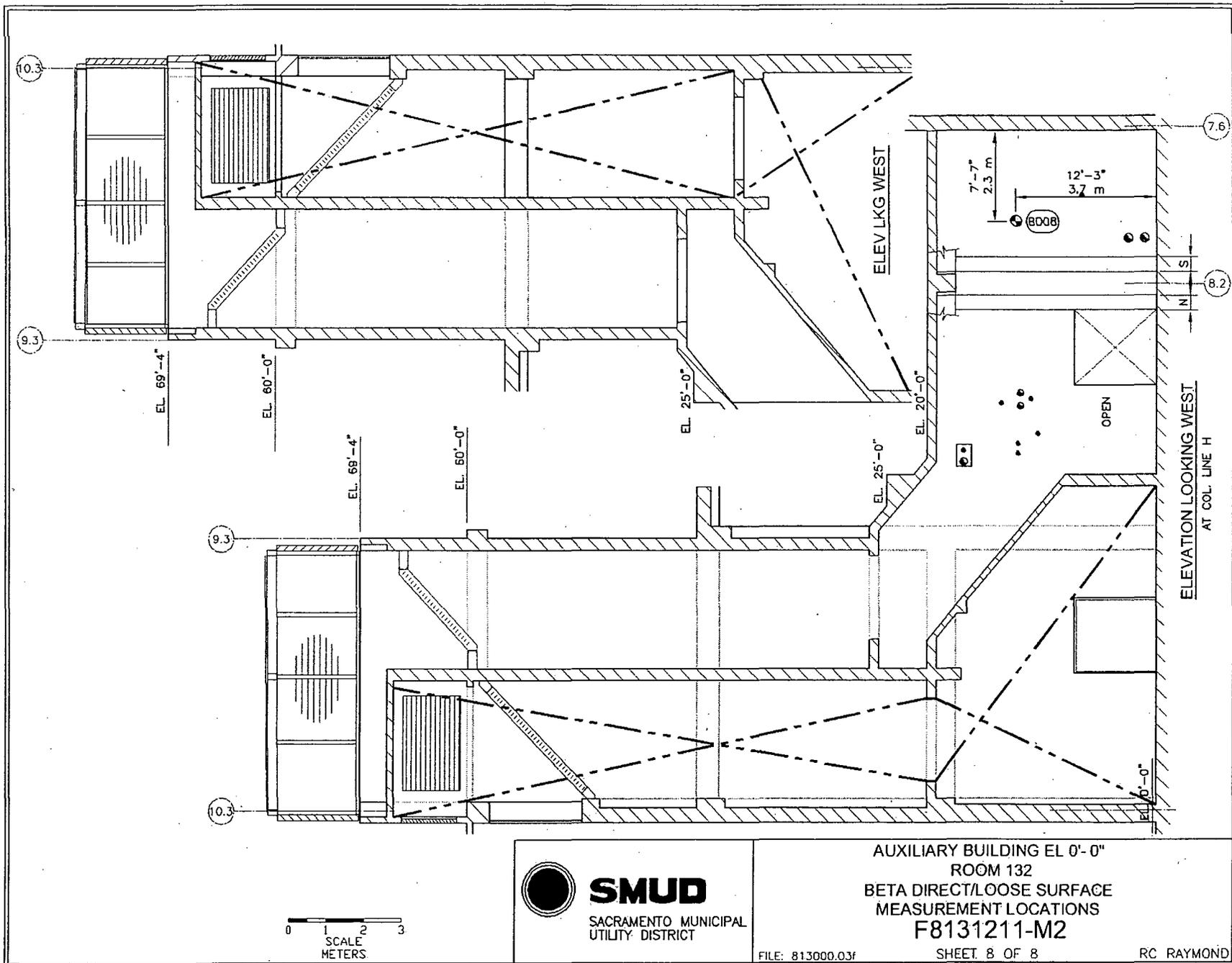


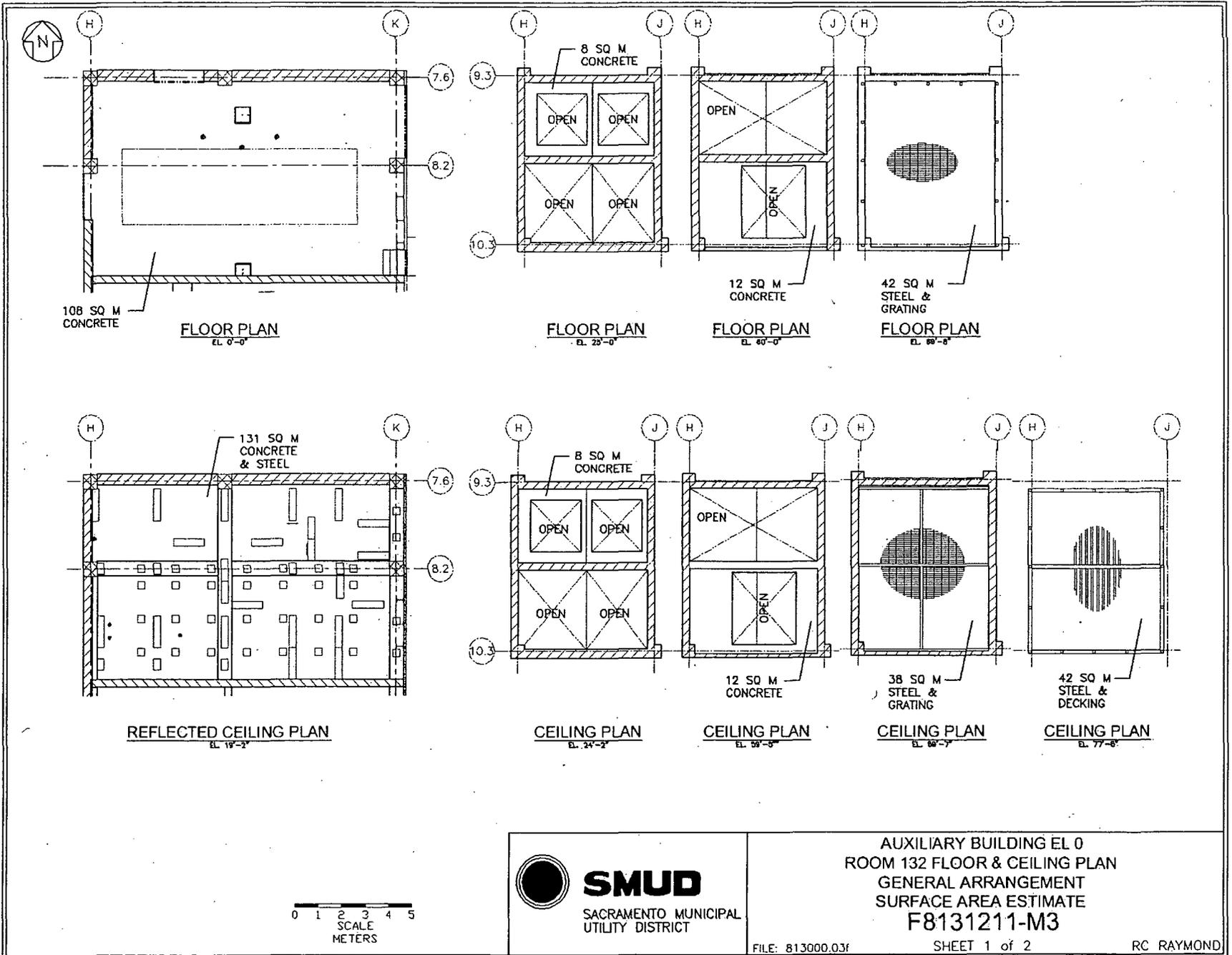


AUXILIARY BUILDING EL 0'-0"
ROOM 132
BETA DIRECT/LOOSE SURFACE
MEASUREMENT LOCATIONS
F8131211-M2









SMUD

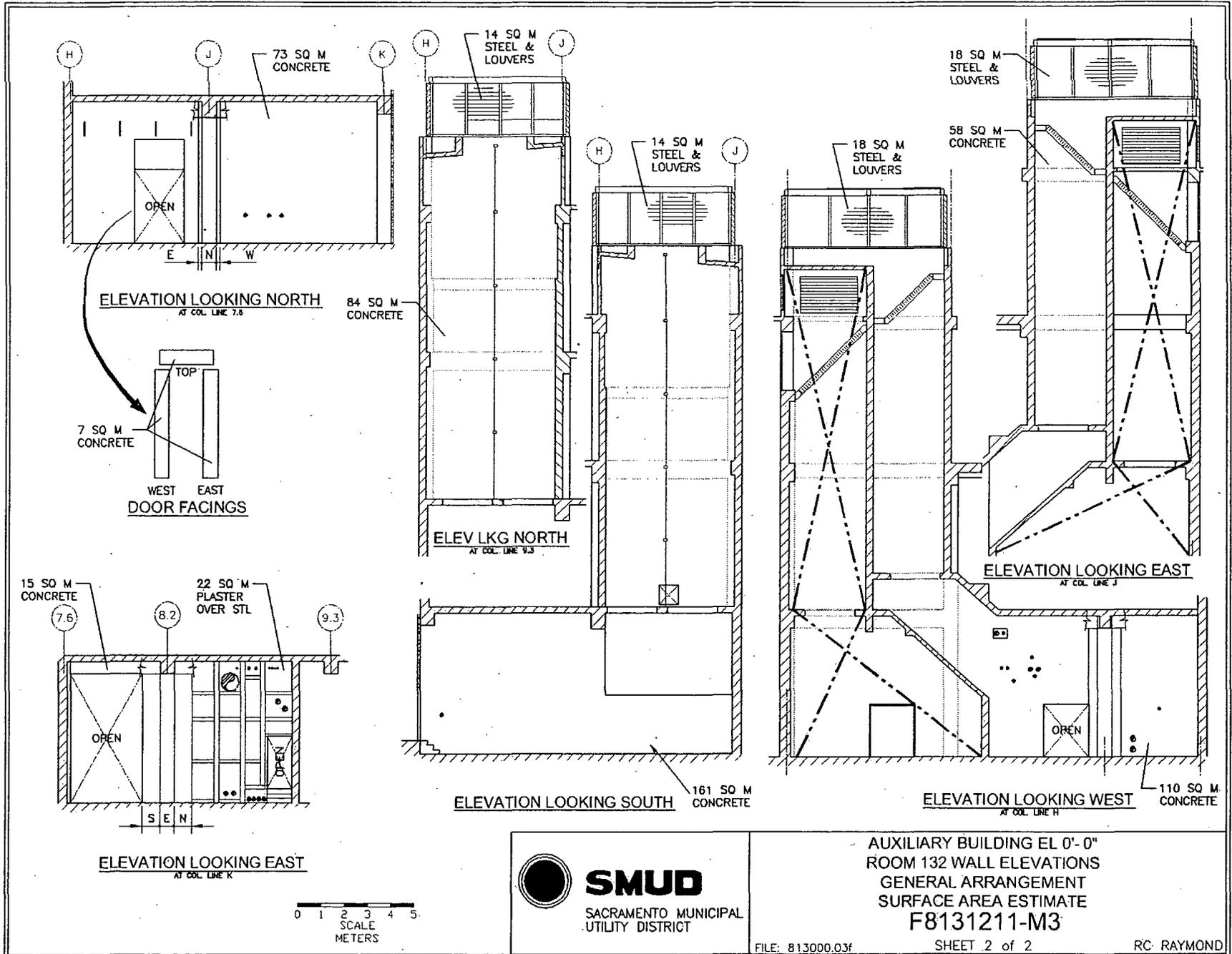
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

AUXILIARY BUILDING EL 0
ROOM 132 FLOOR & CEILING PLAN
GENERAL ARRANGEMENT
SURFACE AREA ESTIMATE
F8131211-M3

FILE: 813000.03f

SHEET 1 of 2

RC RAYMOND



SMUD

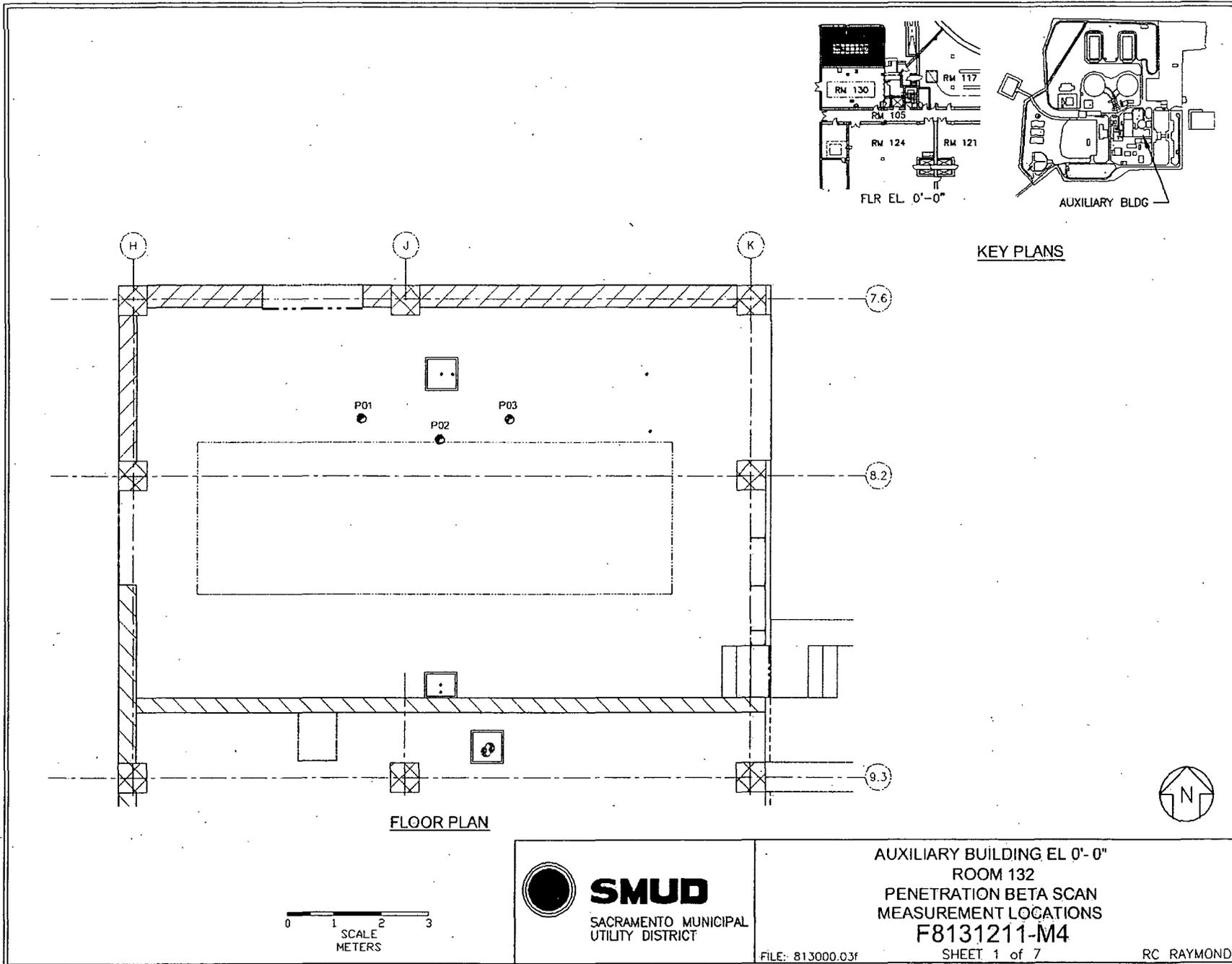
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

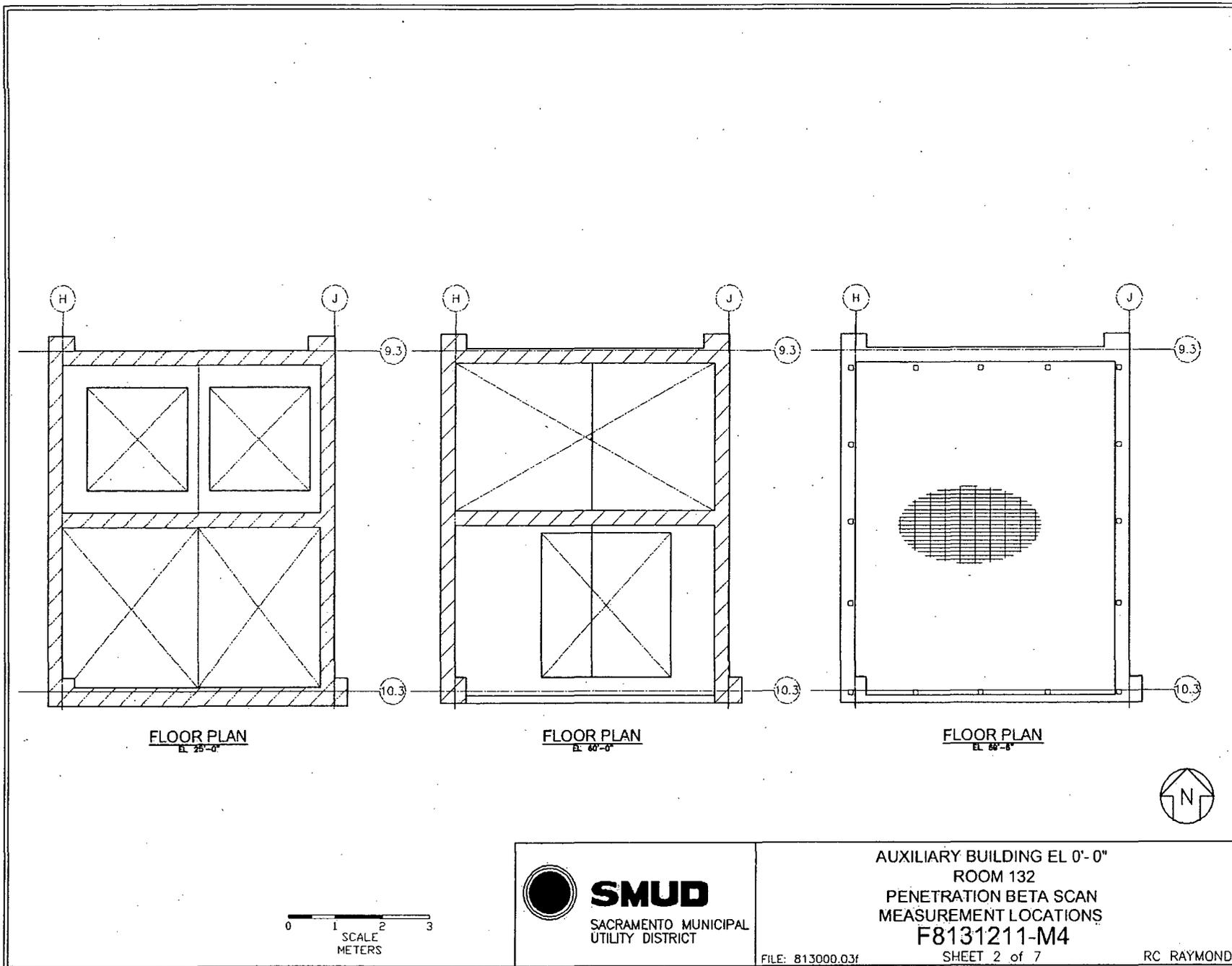
AUXILIARY BUILDING EL 0'-0"
ROOM 132 WALL ELEVATIONS
GENERAL ARRANGEMENT
SURFACE AREA ESTIMATE
F8131211-M3

FILE: 813000.03f

SHEET 2 of 2

RC RAYMOND



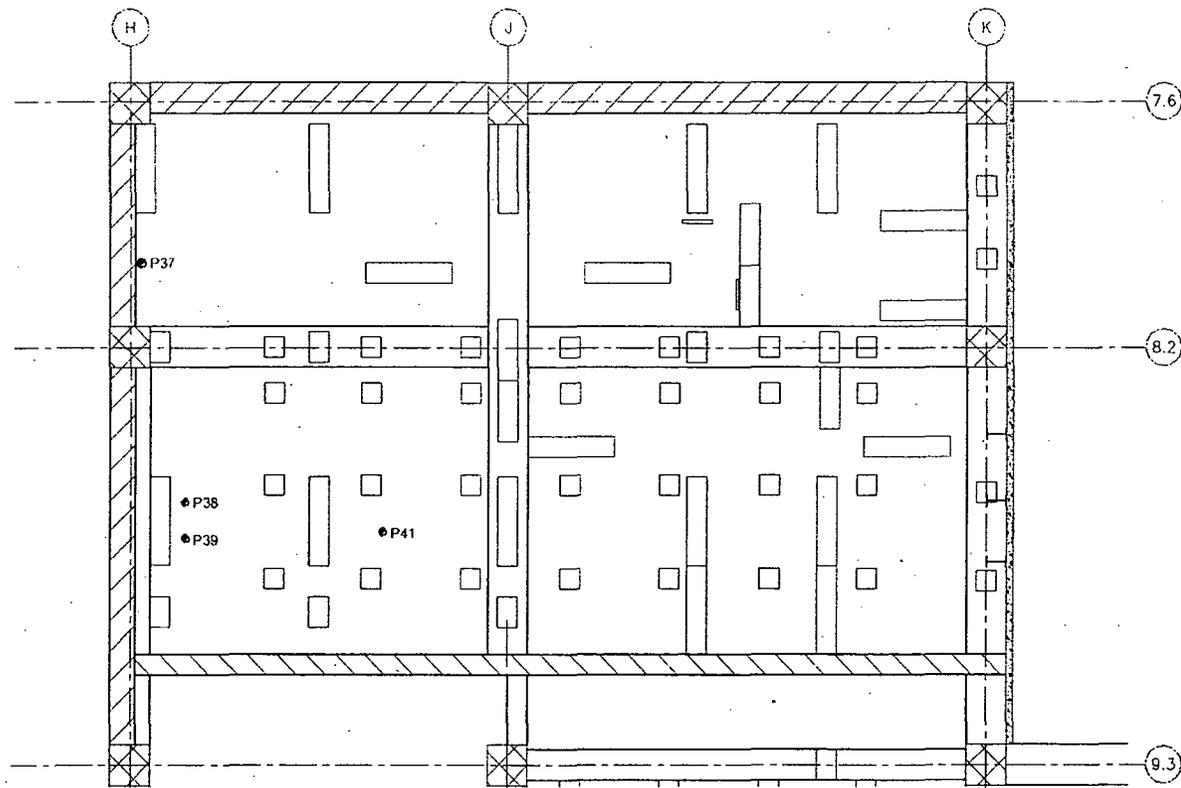


AUXILIARY BUILDING EL 0'-0"
ROOM 132
PENETRATION BETA SCAN
MEASUREMENT LOCATIONS
F8131211-M4

FILE: 813000.03f

SHEET 2 of 7

RC RAYMOND



Reflected Ceiling Room 132

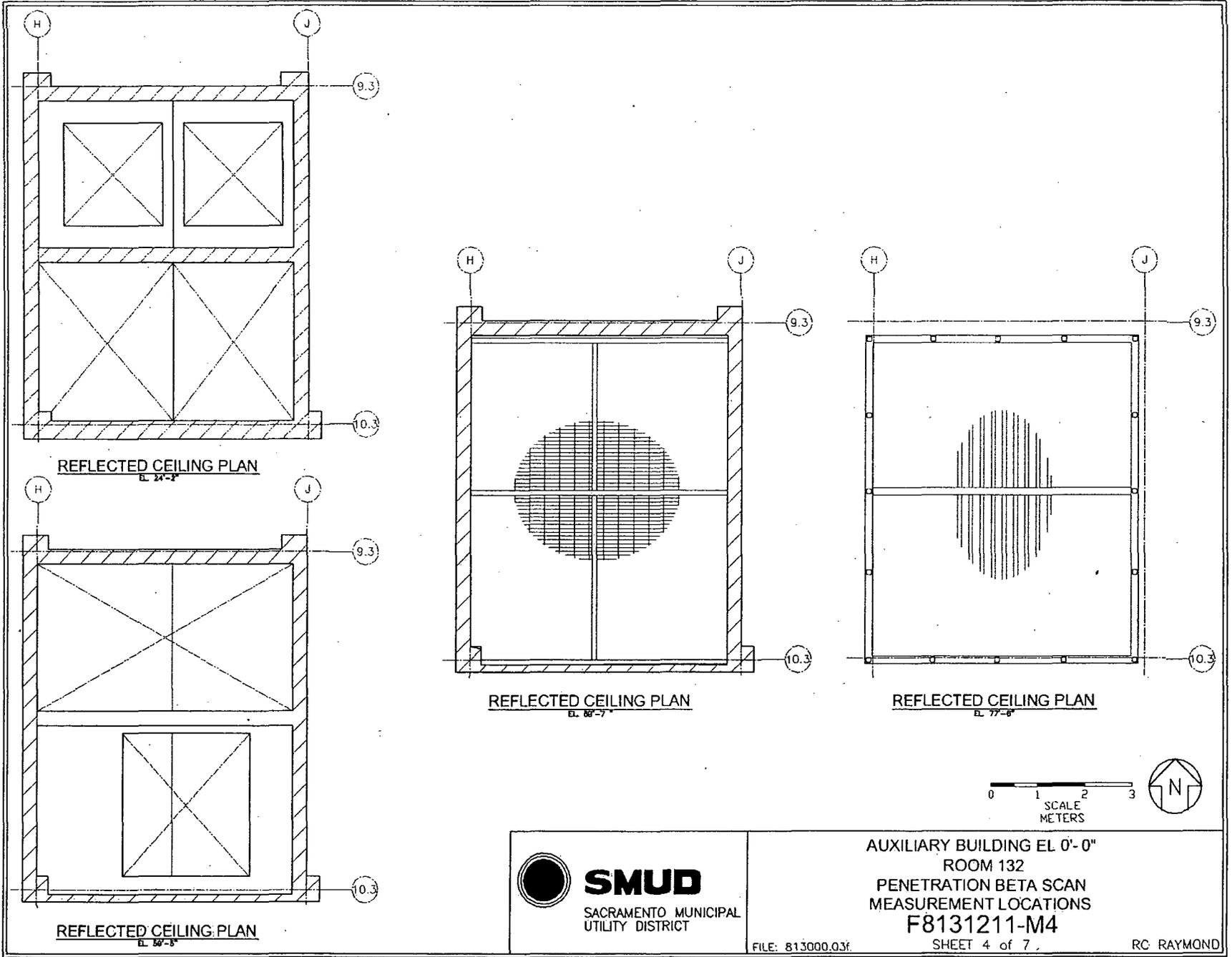


AUXILIARY BUILDING EL 0'-0"
ROOM 132
PENETRATION BETA SCAN
MEASUREMENT LOCATIONS
F8131211-M4

FILE: 813000.03f

SHEET 3 of 7

RC RAYMOND

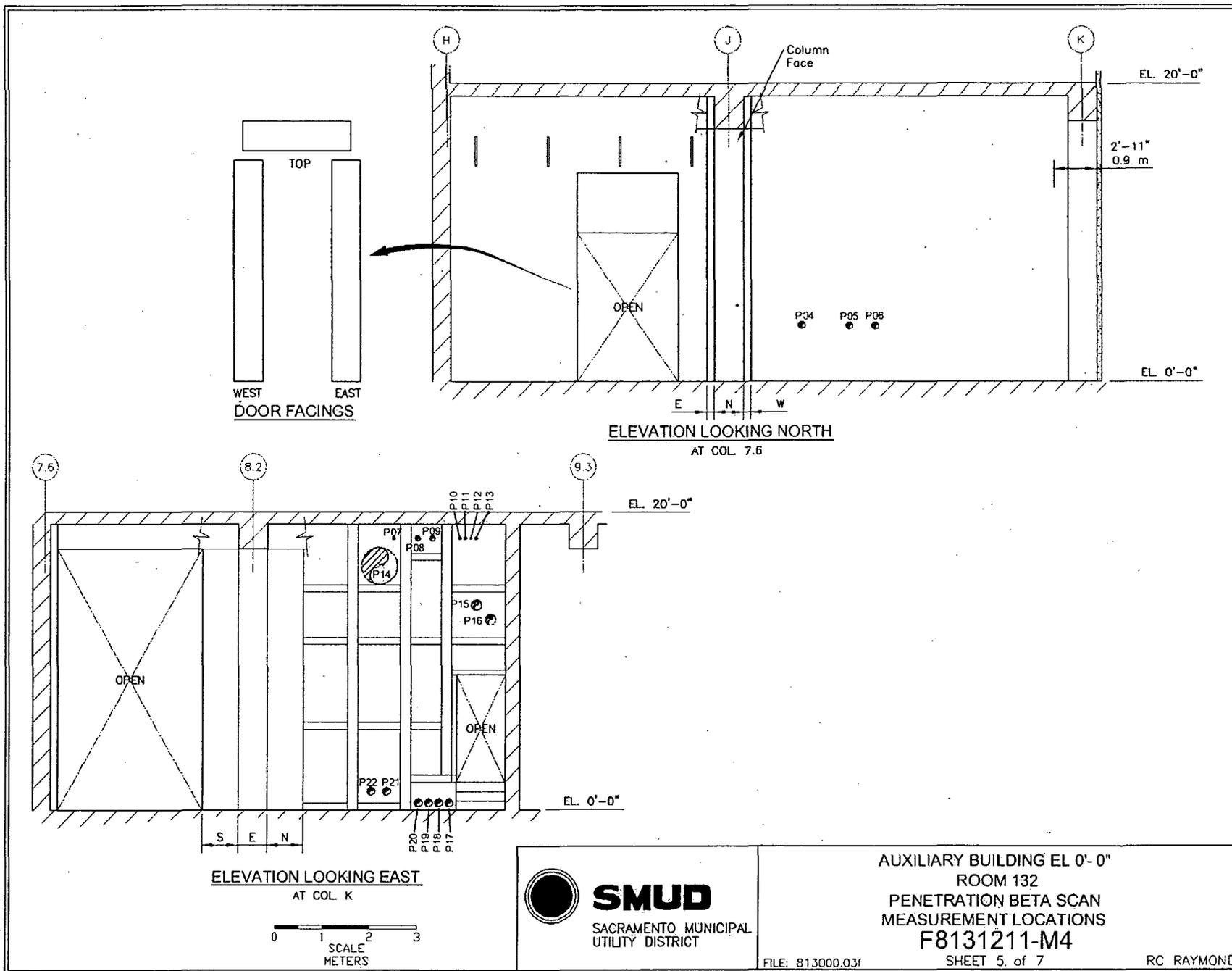


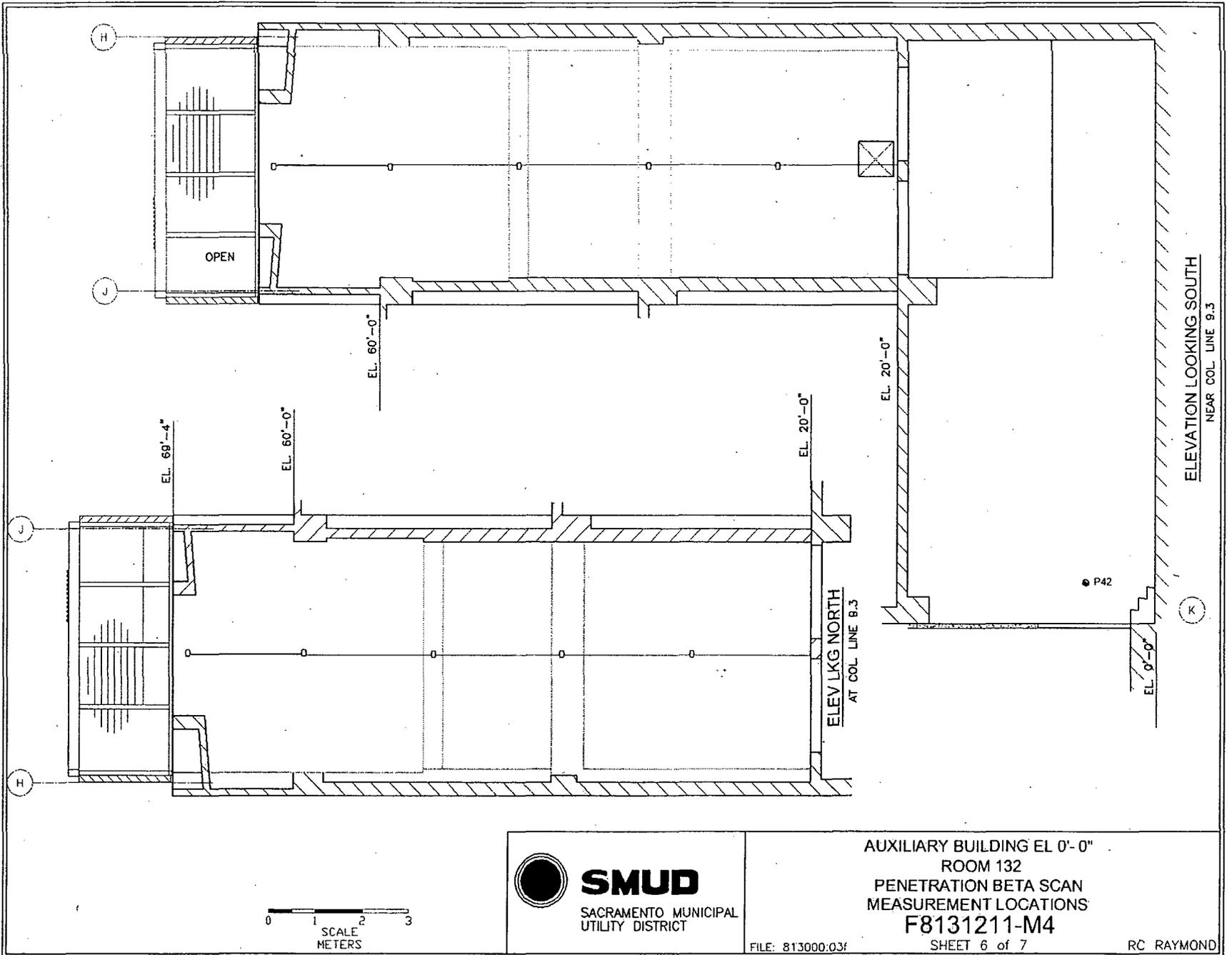
AUXILIARY BUILDING EL 0'-0"
ROOM 132
PENETRATION BETA SCAN
MEASUREMENT LOCATIONS
F8131211-M4

FILE: 813000.03f

SHEET 4 of 7

RC RAYMOND



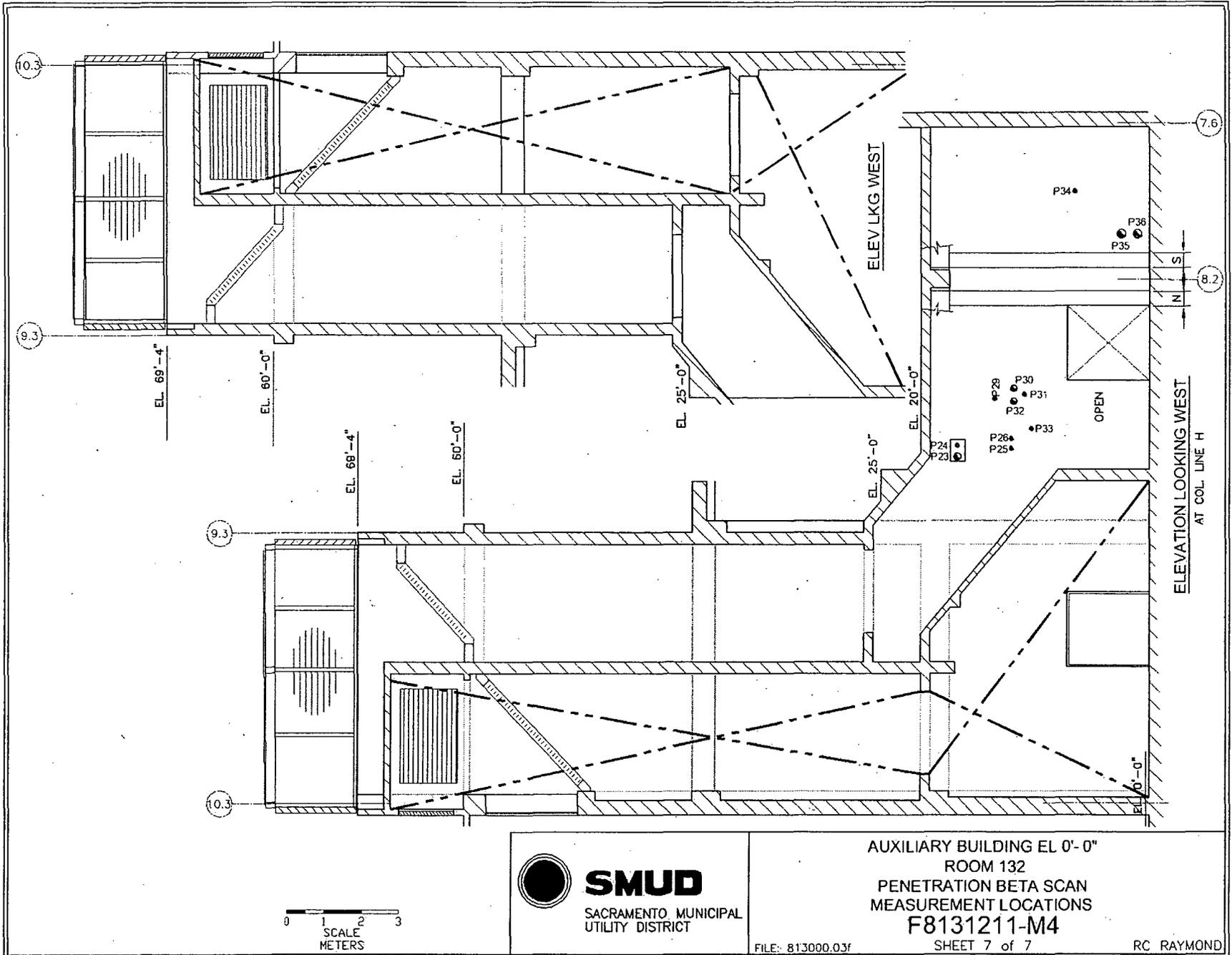


AUXILIARY BUILDING EL 0'-0"
ROOM 132
PENETRATION BETA SCAN
MEASUREMENT LOCATIONS
F8131211-M4

FILE: 813000.03f

SHEET 6 of 7

RC RAYMOND



Attachment 2
Instrumentation
August 25, 2008
Survey Unit F8131211

Table 2-1. Survey Unit Instrumentation

Instrument Model; Serial No.	Detector Model; Serial No.	MDC Static (dpm/100 cm²)	MDC Scan (dpm/100 cm²)
M2350; 142514	43-111B; 148642	N/A	1320
M2350; 180733	43-98B; 148638	N/A	2520
M2350; 180733	43-94B; 148620	N/A	1030
M2350; 175834	43-68B; 148634	433	1033
M2350; 180738	43-51B; 190666	N/A	4494
M2350; 180738	43-116-1B; 216073	N/A	3258
Tennelec; 0401171	N/A	5.9 dpm α , 11.7 dpm β	N/A

The MDC's noted are the most conservative for the survey performed.

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	43000
Investigation Criteria - Scan	43000
DCGL _w	43000
DCGL _{EMC}	N/A

Attachment 3

Investigation

August 25, 2008

Survey Unit F8131211

(none required)

Attachment 4

Data Assessment

August 25, 2008

Survey Unit F8131211

