

**Rancho Seco
Final Status Survey Summary Report**

July 2, 2008

Chemical Storage Balcony ceiling and upper walls Room 133

Survey Unit F8131222

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FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8131222, Chemical Storage Balcony ceiling and upper walls Room 133

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 90 m² were scanned for approximately 33% 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	Chemical Storage Balcony ceiling and upper walls Room 133
Survey Unit:	1222	Structure Surface
Class:	2	LTP Table 5-4
SU Area (m²):	270.9	
Evaluator:	Erin L. Brown	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	N/A	Class 2
Design DCGL_{me} (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):	19.35	Class 2
Scan Area (m²):	90	
Scan Coverage (%):	33%	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:	4.3	Class 2

Survey Results:

A total of 16 direct measurements were made in F8131222. 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 1318 to 24396 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)
F8131222-C0001BD	2260
F8131222-C0002BD	2337
F8131222-C0003BD	2381
F8131222-C0004BD	2127
F8131222-C0005BD	2690
F8131222-C0006BD	2712
F8131222-C0007BD	2646
F8131222-C0008BD	2094
F8131222-C0009BD	2293
F8131222-C0010BD	2690
F8131222-C0011BD	2745
F8131222-C0012BD	2502
F8131222-C0013BD	2480
F8131222-C0014BD	2579
F8131222-C0015BD	2094
F8131222-C0016BD	2260
Mean:	2431
Median:	2431
Standard Deviation:	230
Range:	2094 - 2745

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm²)
F8131222C0001SM	-3.53
F8131222C0002SM	1.64
F8131222C0003SM	-0.95
F8131222C0004SM	-2.24
F8131222C0005SM	-2.24
F8131222C0006SM	-4.82
F8131222C0007SM	1.64
F8131222C0008SM	-0.95
F8131222C0009SM	1.64
F8131222C0010SM	-2.24
F8131222C0011SM	0.34
F8131222C0012SM	-2.24
F8131222C0013SM	-4.82
F8131222C0014SM	-0.95
F8131222C0015SM	0.34
F8131222C0016SM	-2.24
Mean:	-1.35
Median:	-1.59
Standard Deviation:	2.09
Range:	-4.82 to 1.64

Survey Unit Data Assessment:

The survey design required 16 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	Average Ambient BKG = 0
Ambient Background Used (dpm/100 cm ²):	N/A	
Actual Direct Measurements (N):	16	
Median (dpm/100 cm ²):	2431	
Mean (dpm/100 cm ²):	2431	
Direct Measurement Standard Deviation (dpm/100 cm ²):	230	
Total Standard Deviation (dpm/100 cm ²):	230	Based on samples and backgrounds.
Maximum (dpm/100 cm ²):	2745	Background Subtract Not Applied
Material Type:	N/A	
Sign Test Final N Value:	16	
S+ Value:	16	
Critical Value:	11	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{mc}:	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 (i.e. the survey unit average activity 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.

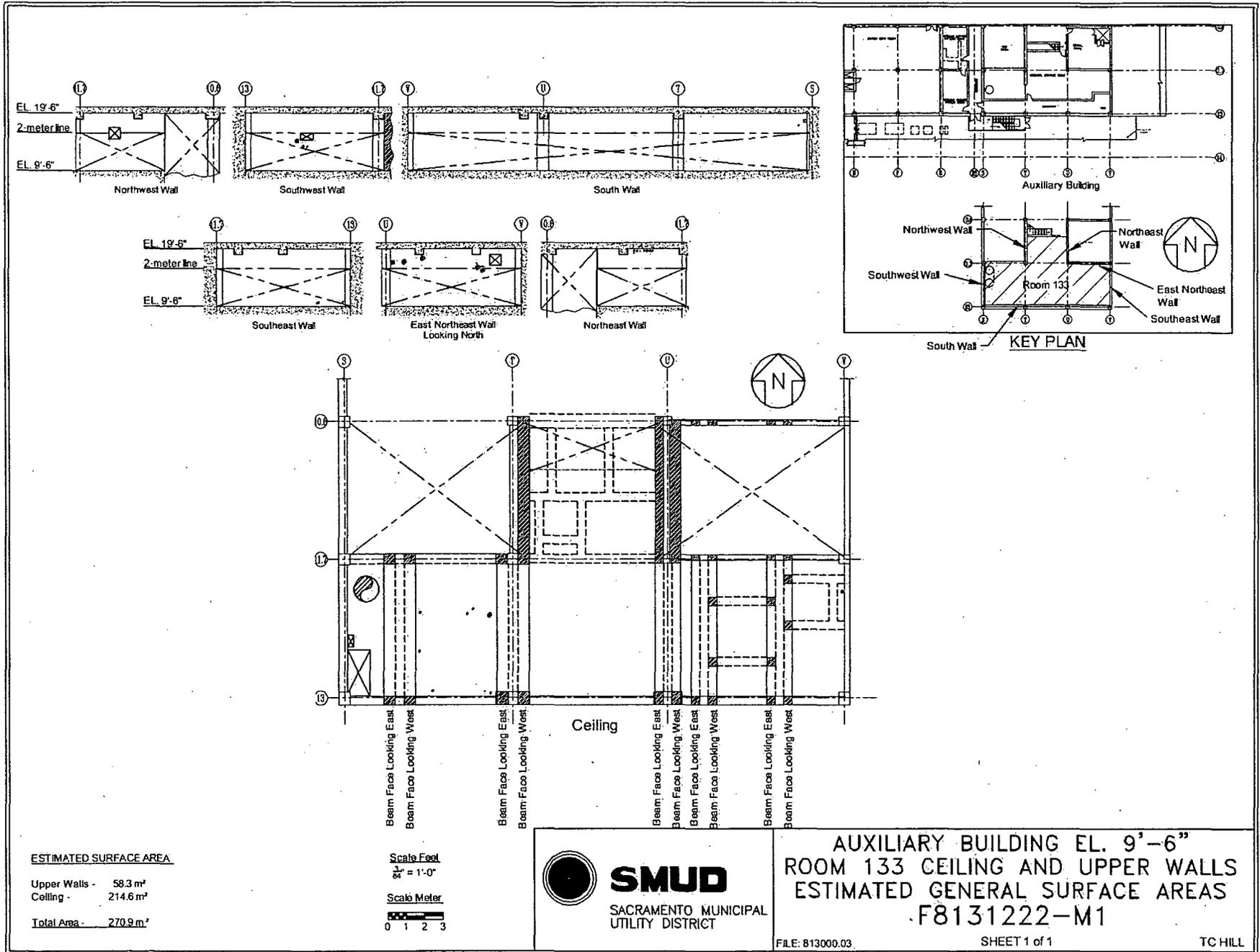
It is concluded that survey unit F8131222 meets the release criteria of 10CFR20.1402.

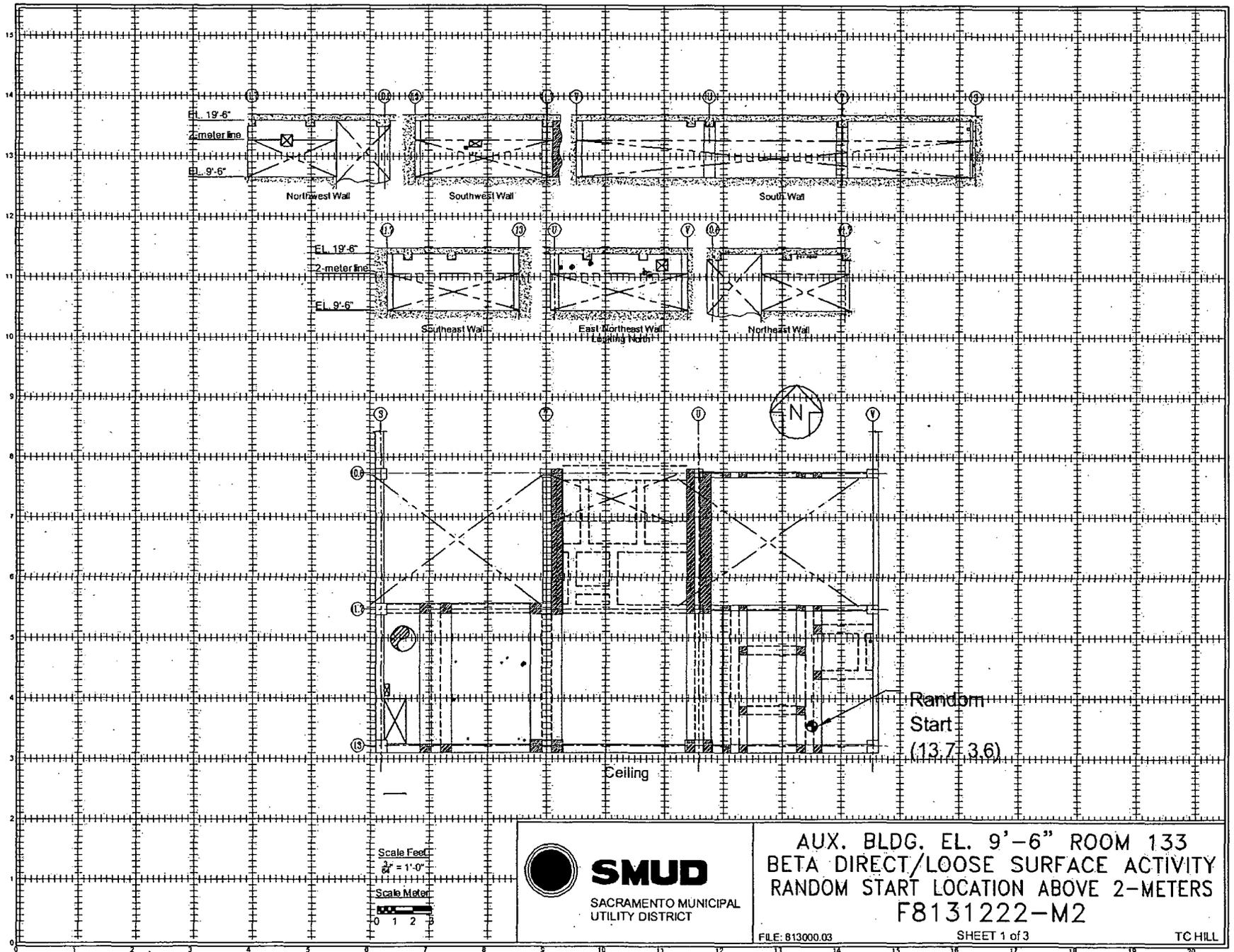
Attachment 1

Maps

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Survey Unit F8131222



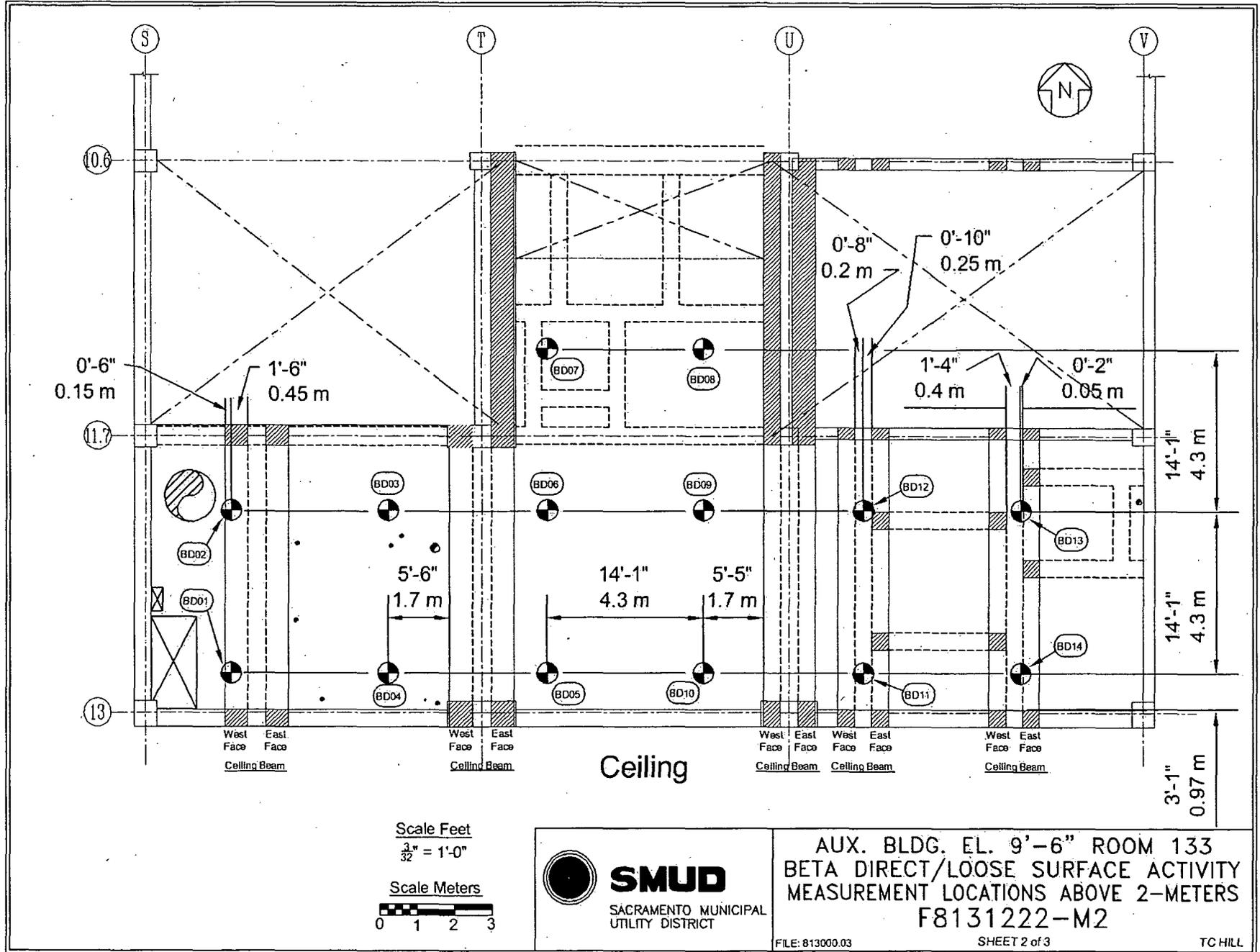


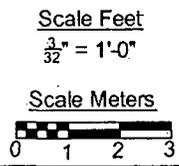
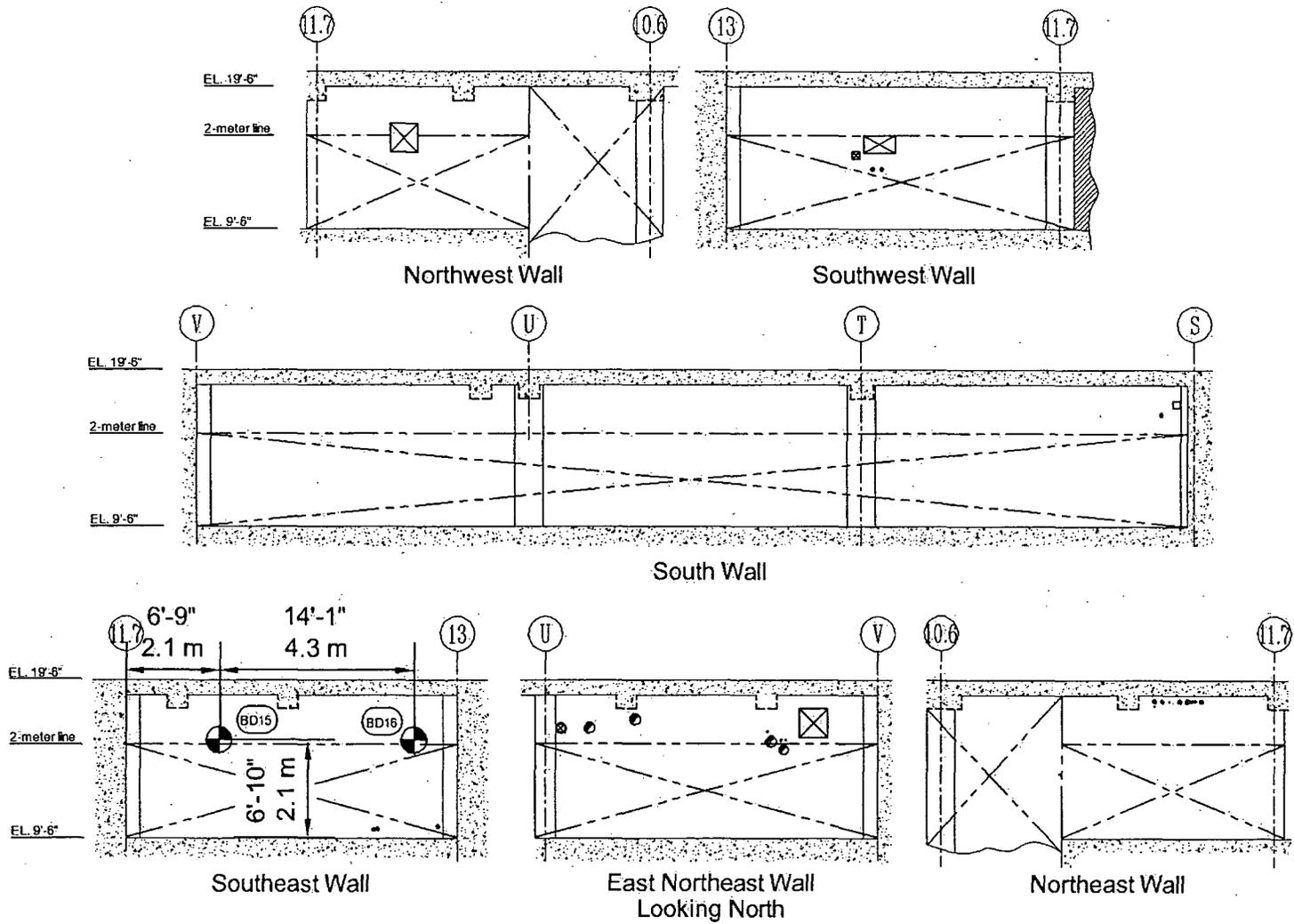
Scale Feet
 1/4" = 1'-0"
 Scale Meter
 0 1 2



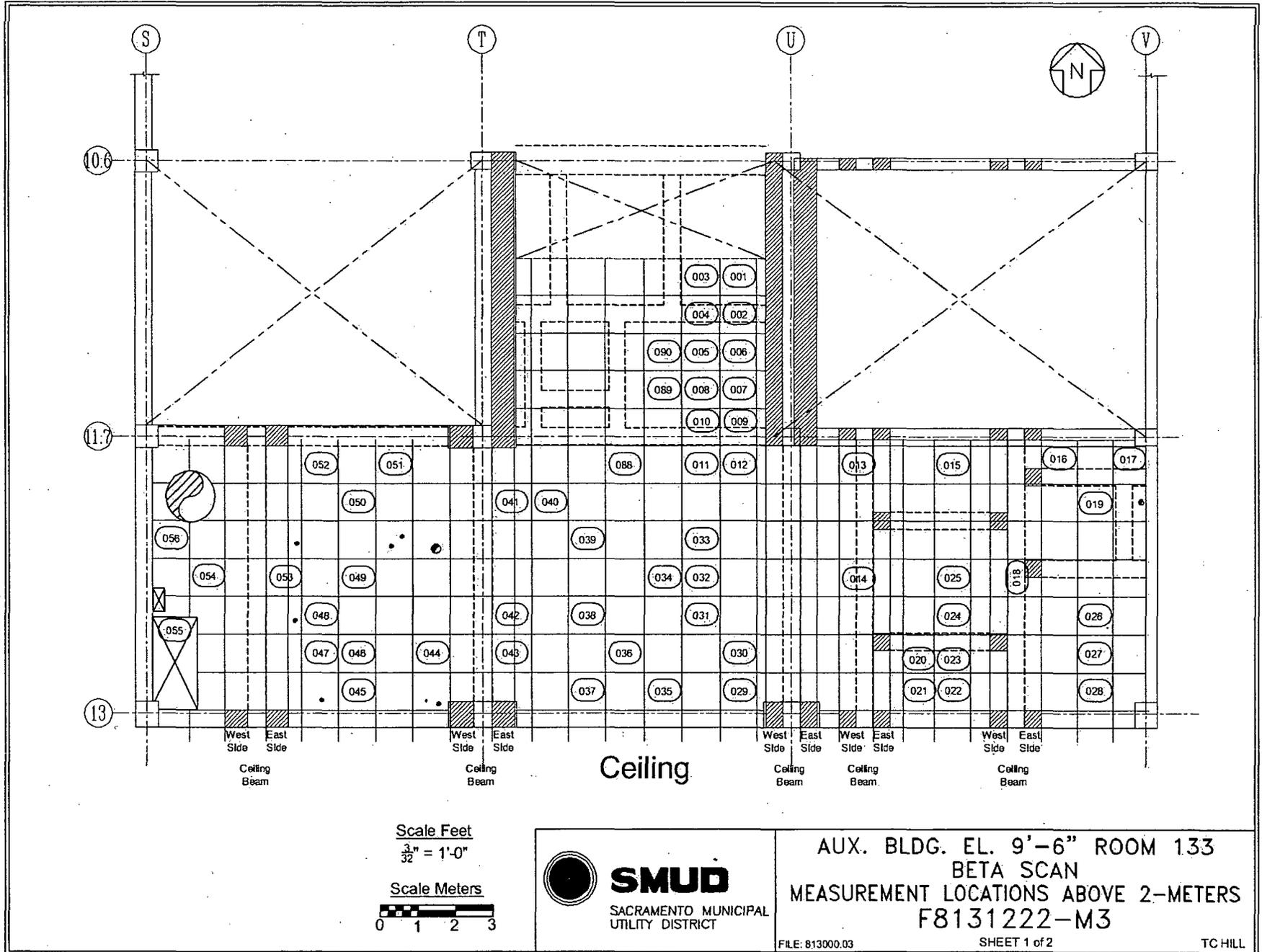
SMUD
 SACRAMENTO MUNICIPAL
 UTILITY DISTRICT

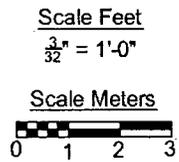
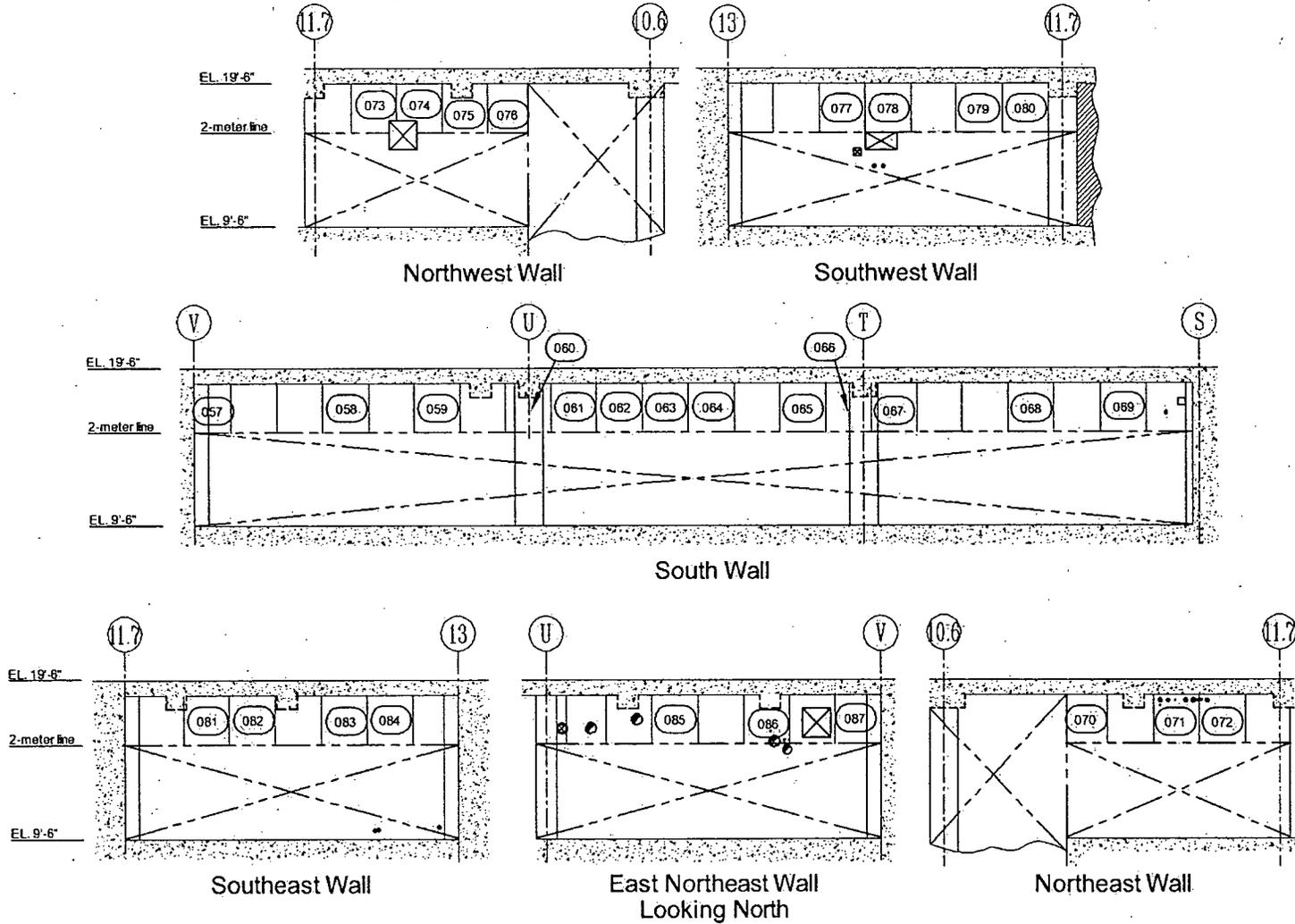
AUX. BLDG. EL. 9'-6" ROOM 133
 BETA DIRECT/LOOSE SURFACE ACTIVITY
 RANDOM START LOCATION ABOVE 2-METERS
 F8131222-M2





AUX. BLDG. EL. 9'-6" ROOM 133
 BETA DIRECT/LOOSE SURFACE ACTIVITY
 MEASUREMENT LOCATIONS ABOVE 2-METERS
 F8131222-M2



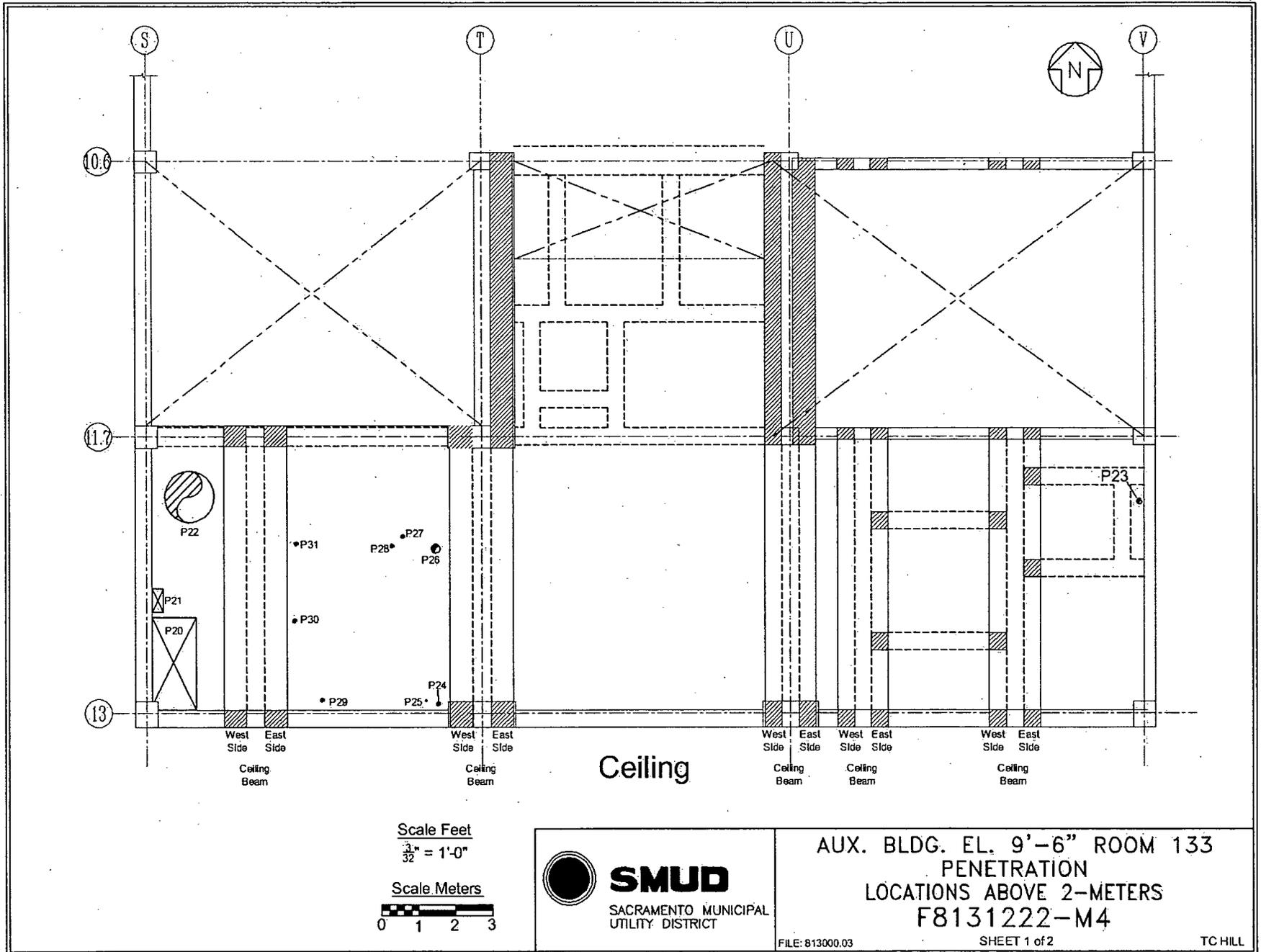


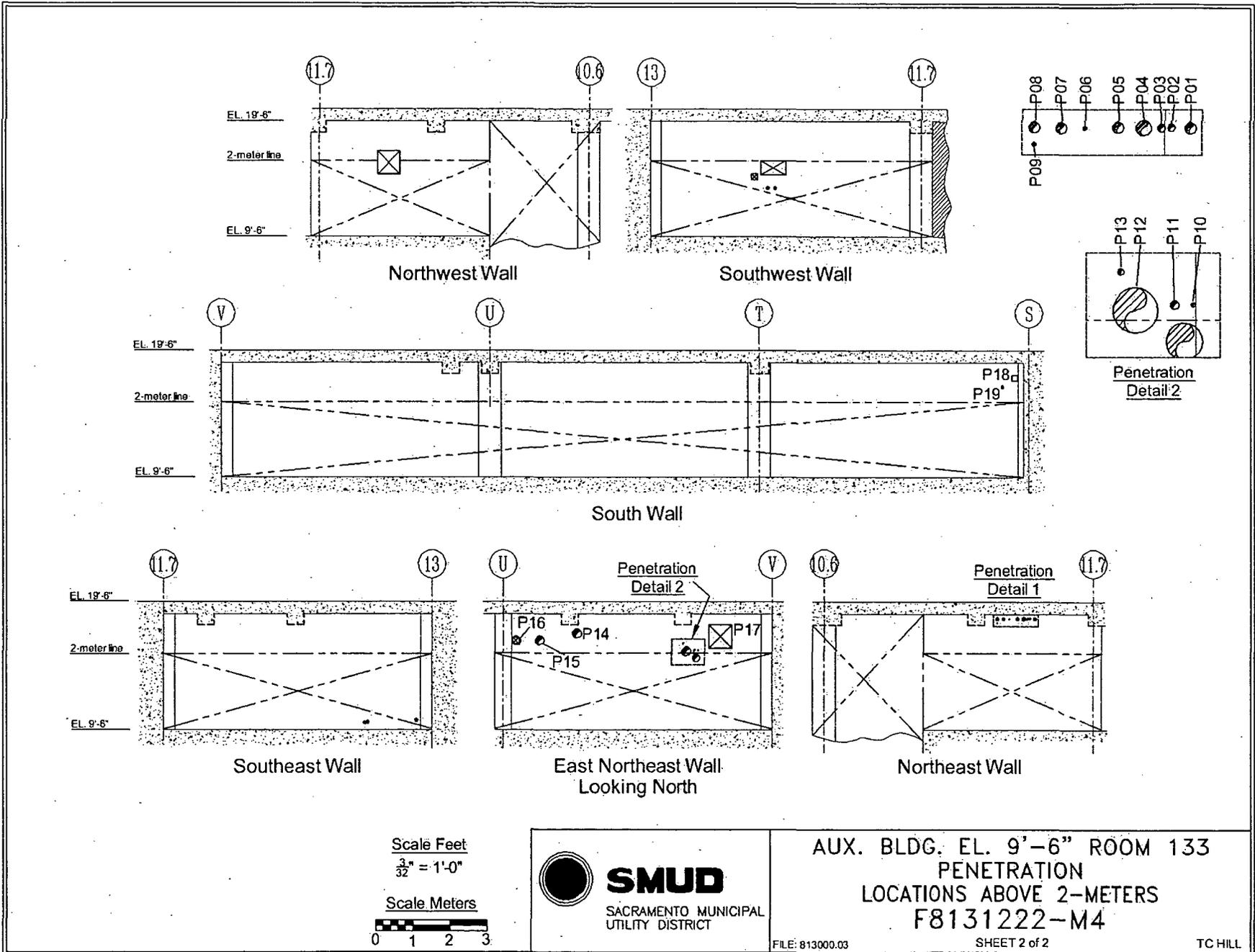
AUX. BLDG. EL. 9'-6" ROOM 133
 BETA SCAN
 MEASUREMENT LOCATIONS ABOVE 2-METERS
 F8131222-M3

FILE: 813000.03

SHEET 2 of 2

TC HILL





Scale Feet

$\frac{3}{32}'' = 1'-0''$

Scale Meters



AUX. BLDG. EL. 9'-6" ROOM 133
 PENETRATION
 LOCATIONS ABOVE 2-METERS
 F8131222-M4

FILE: 813000.03

SHEET 2 of 2

TC HILL

Attachment 2

Instrumentation

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Survey Unit F8131222

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; 180733	43-98B; 148638	N/A	1680
M2350; 180733	43-94; 148620	N/A	1610
M2350; 175834	43-68B; 190482	909	2169
M2350; 203486	43-68B; 161400	909	2169
M2350; 203486	43-116-1B; 190173	N/A	6854
Tennelec; 0401171	N/A	5.9 dpm α , 11.7 dpm β	N/A

The MDC noted for the detector model 43-98B is for the 3" diameter piping and detector model 43-94 is for the 2" diameter piping which is the most conservative.

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

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(none required)

Attachment 4

Data Assessment

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