

Rancho Seco
Final Status Survey Summary Report

November 7, 2007

**"A" High Pressure Injection Pump Room Upper Walls and Ceiling
(Room 053)**

Survey Unit F8130782

Prepared By:  Date: 11/7/2007
FSS Engineer

Reviewed By:  Date: 11/7/07
Lead FSS Engineer

Approved By:  Date: 11-14-07
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130782, "A" High Pressure Injection Pump Room Upper Walls and Ceiling
(Room053)

Survey Unit Description:

Operating History: The "A" High Pressure Injection Pump Room is located on the -20' elevation of the Auxiliary Building. The Auxiliary Building is a reinforced concrete structure that, during power operations, contained the Radwaste processing and supporting systems. The building has six main elevations. Residual levels of surface radioactivity were detected on all interior elevations of the building. Operating records and the HSA document several events with the potential for a release of radioactivity inside this structure.

Site Characterization: Direct measurements were taken on each interior elevation of the Auxiliary Building. These measurements confirmed the presence of plant-derived radionuclides. Direct measurements taken 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. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the interior surfaces of the Auxiliary Building were determined primarily to be a Class 1 for the floors and lower walls (bottom 2 meters of the walls), and Class 2 for the upper walls and ceiling. Inside the "A" High Pressure Injection Pump Room the gross surface activity levels on the upper walls and ceiling were less than the DCGL prior to remediation. Therefore, a Class 2 final status survey was performed on the upper wall and ceiling surfaces of the room.

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 50 m² were scanned for approximately 35% 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	"A" High Pressure Injection
Survey Unit:	0782	Pump Room (Room)
Class:	2	Structure Surface
SU Area (m²):	141	LTP Table 5-4
Evaluator:	Michael Stein	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	N/A	Class 2
Design DCGL_{mc}	N/A	Class 2
(dpm/100 cm²):		
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	12035	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	8.3	Class 2
Scan Area (m²):	50	
Scan Coverage (%):	35%	Class 2
Z_{1-α} :	1.645	
Z_{1-β} :	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:	2.9	Class 2

Survey Results:

A total of 17 direct measurements were made in F8130782. 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 2,934 to 15,398 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)
F8130782-C0001BD	1359
F8130782-C0002BD	1758
F8130782-C0003BD	1535
F8130782-C0004BD	1717
F8130782-C0005BD	1535
F8130782-C0006BD	1426
F8130782-C0007BD	1401
F8130782-C0008BD	1442
F8130782-C0009BD	1546
F8130782-C0010BD	1380
F8130782-C0011BD	1624
F8130782-C0012BD	1390
F8130782-C0013BD	1385
F8130782-C0014BD	1095
F8130782-C0015BD	1390
F8130782-C0016BD	763
F8130782-C0017BD	1484
Mean:	1425
Median:	1426
Standard Deviation:	229
Range:	763 - 1758

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm²)
F8130782C0001SM	2.29
F8130782C0002SM	3.58
F8130782C0003SM	2.29
F8130782C0004SM	3.58
F8130782C0005SM	-0.27
F8130782C0006SM	3.58
F8130782C0007SM	4.86
F8130782C0008SM	7.42
F8130782C0009SM	4.86
F8130782C0010SM	8.7
F8130782C0011SM	8.7
F8130782C0012SM	4.86
F8130782C0013SM	8.7
F8130782C0014SM	6.14
F8130782C0015SM	2.29
F8130782C0016SM	4.86
F8130782C0017SM	9.98
Mean:	5.08
Median:	4.86
Standard Deviation:	2.84
Range:	-0.27 to 9.98

Survey Unit Data Assessment:

The survey design required 17 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):	17	
Median (dpm/100 cm ²):	1426	
Mean (dpm/100 cm ²):	1425	
Direct Measurement Standard Deviation	229	Based on samples and backgrounds.
(dpm/100 cm ²):		
Total Standard Deviation (dpm/100 cm ²):	229	
Maximum (dpm/100 cm ²):	1758	Background Subtract Not Applied
Material Type:	N/A	
Sign Test Final N Value:	17	
S+ Value:	17	
Critical Value:	12	
Sufficient Samples Collected:	Yes	Class 2
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{emc}:	N/A	
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 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.

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.

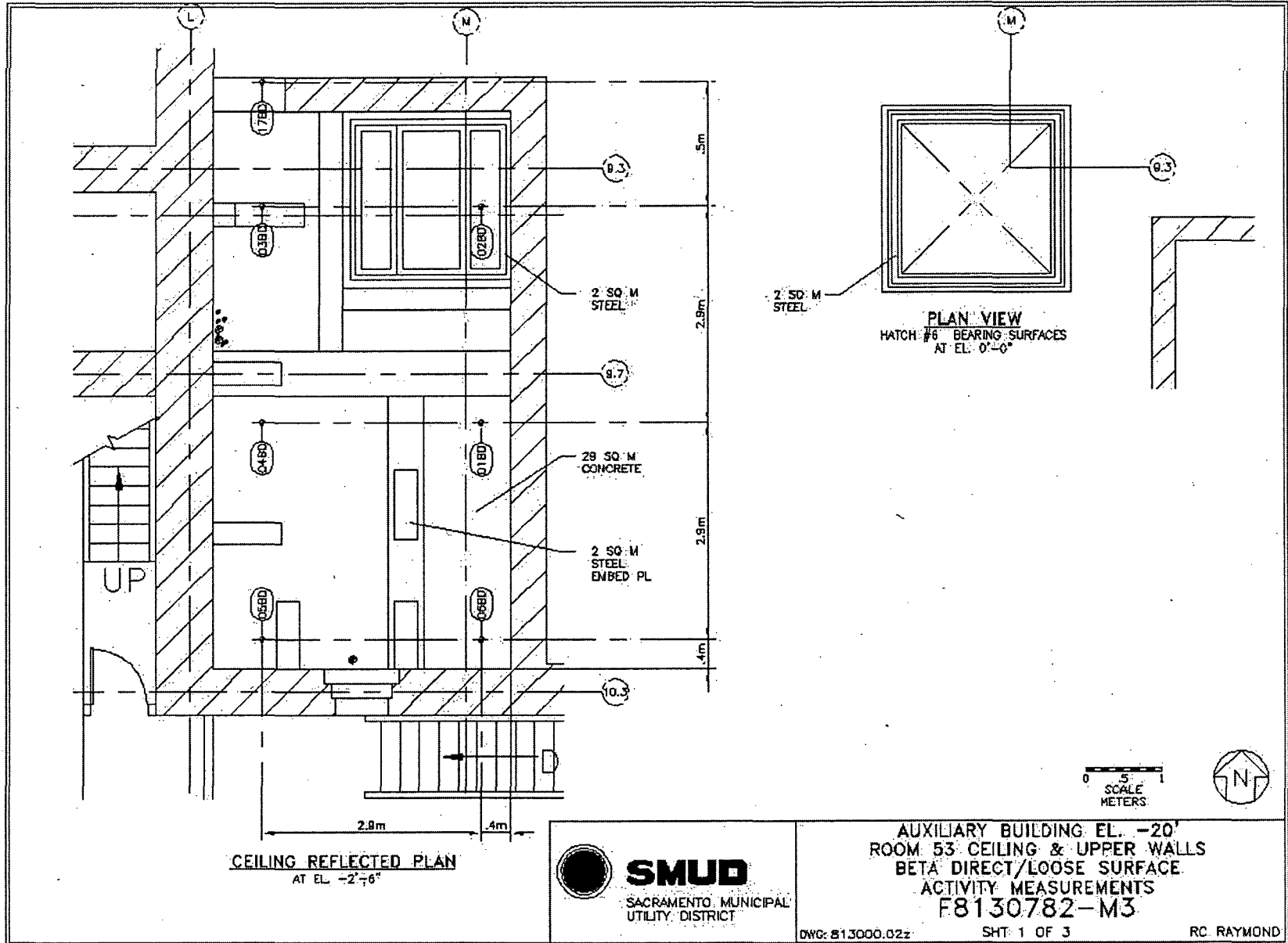
It is concluded that survey unit F8130782 meets the release criteria of 10CFR20.1402.

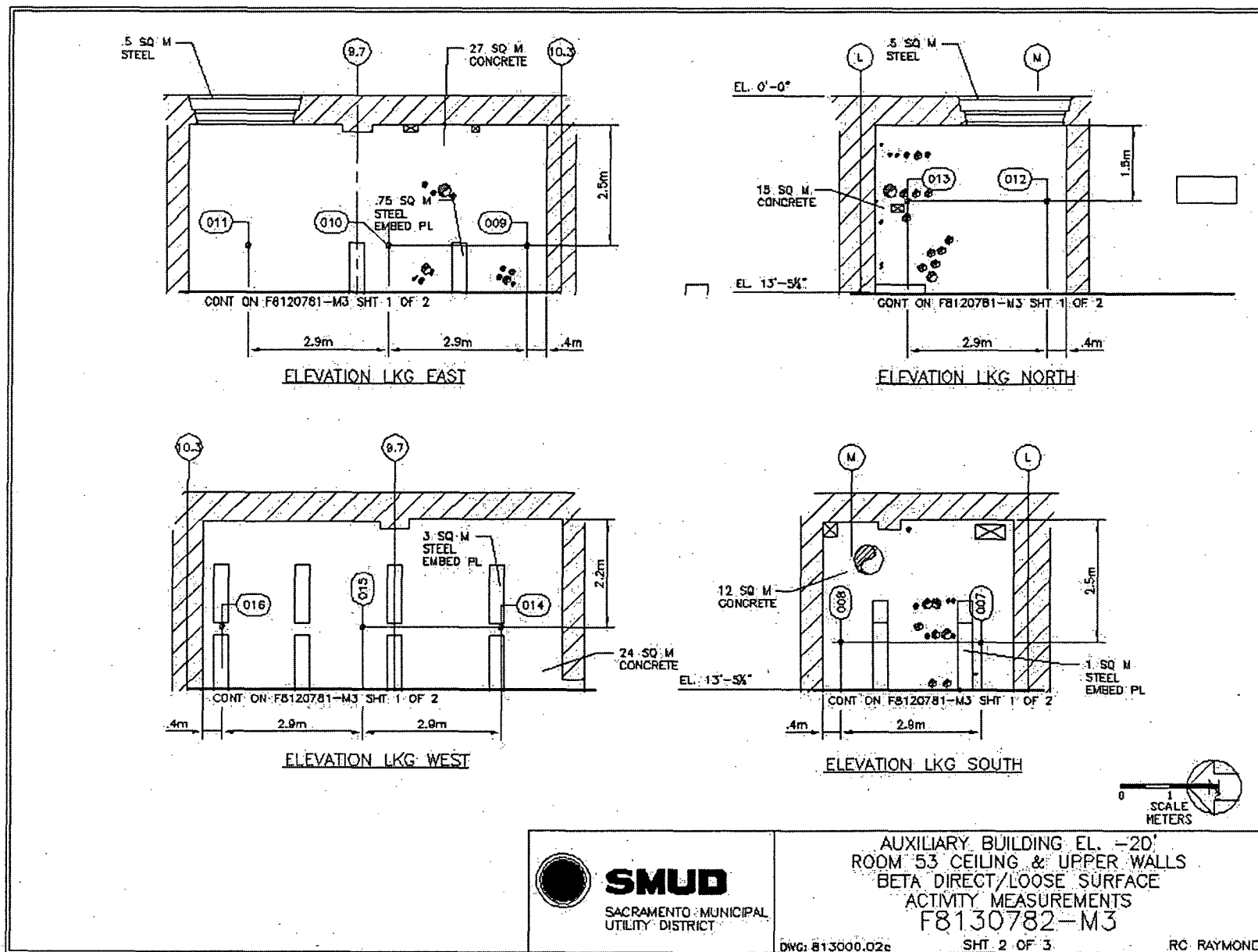
Attachment 1

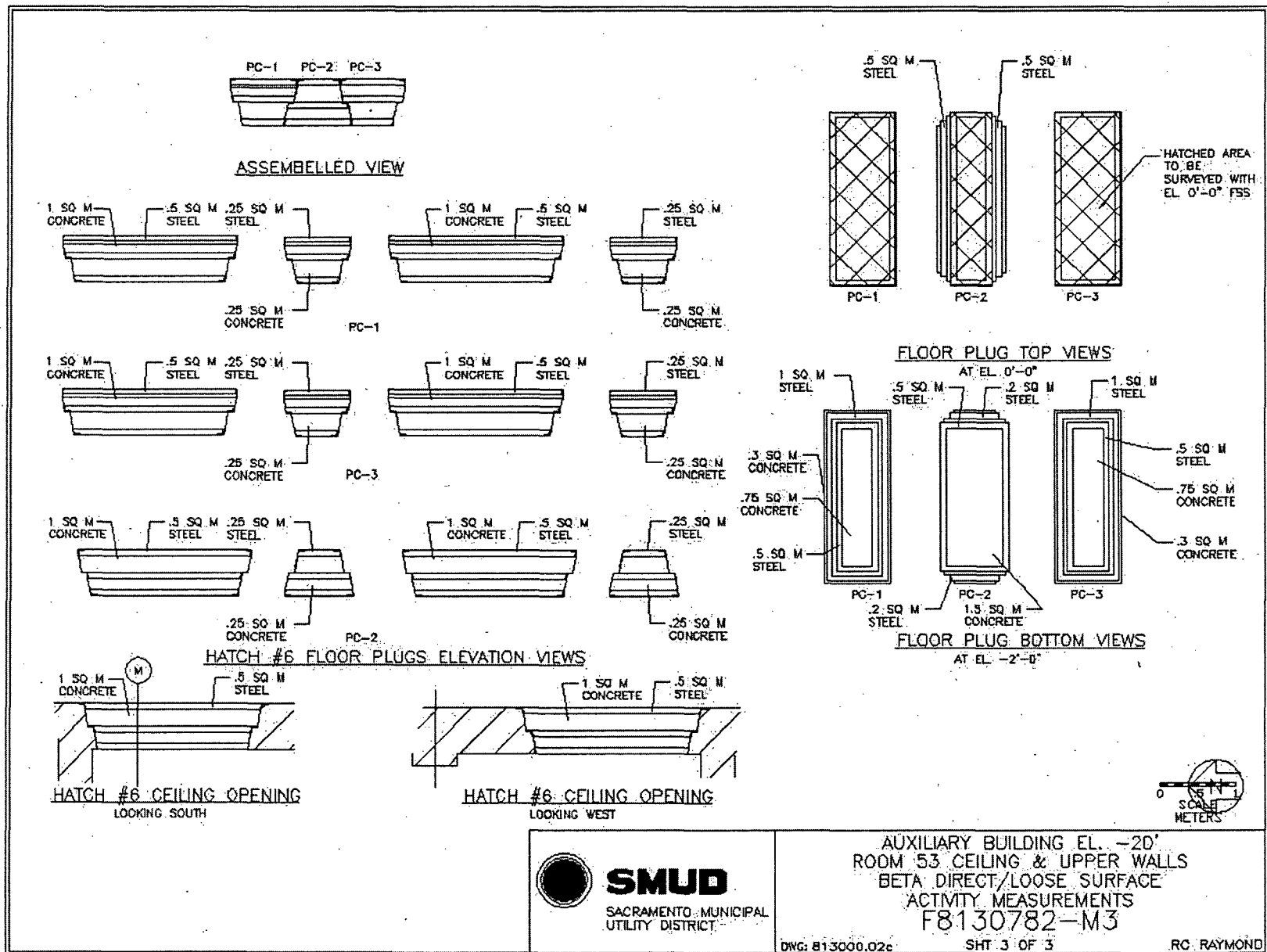
Maps

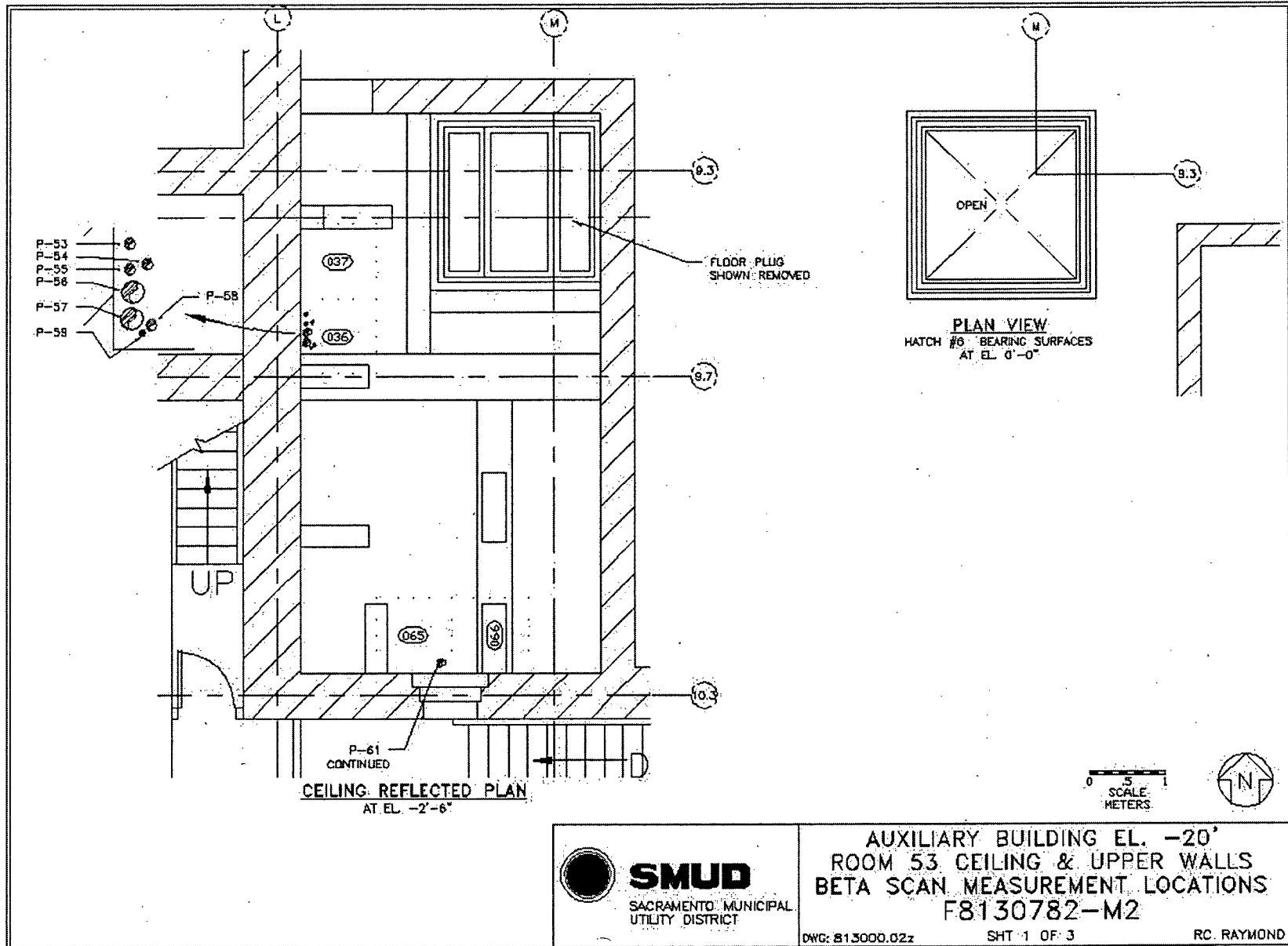
November 7, 2007

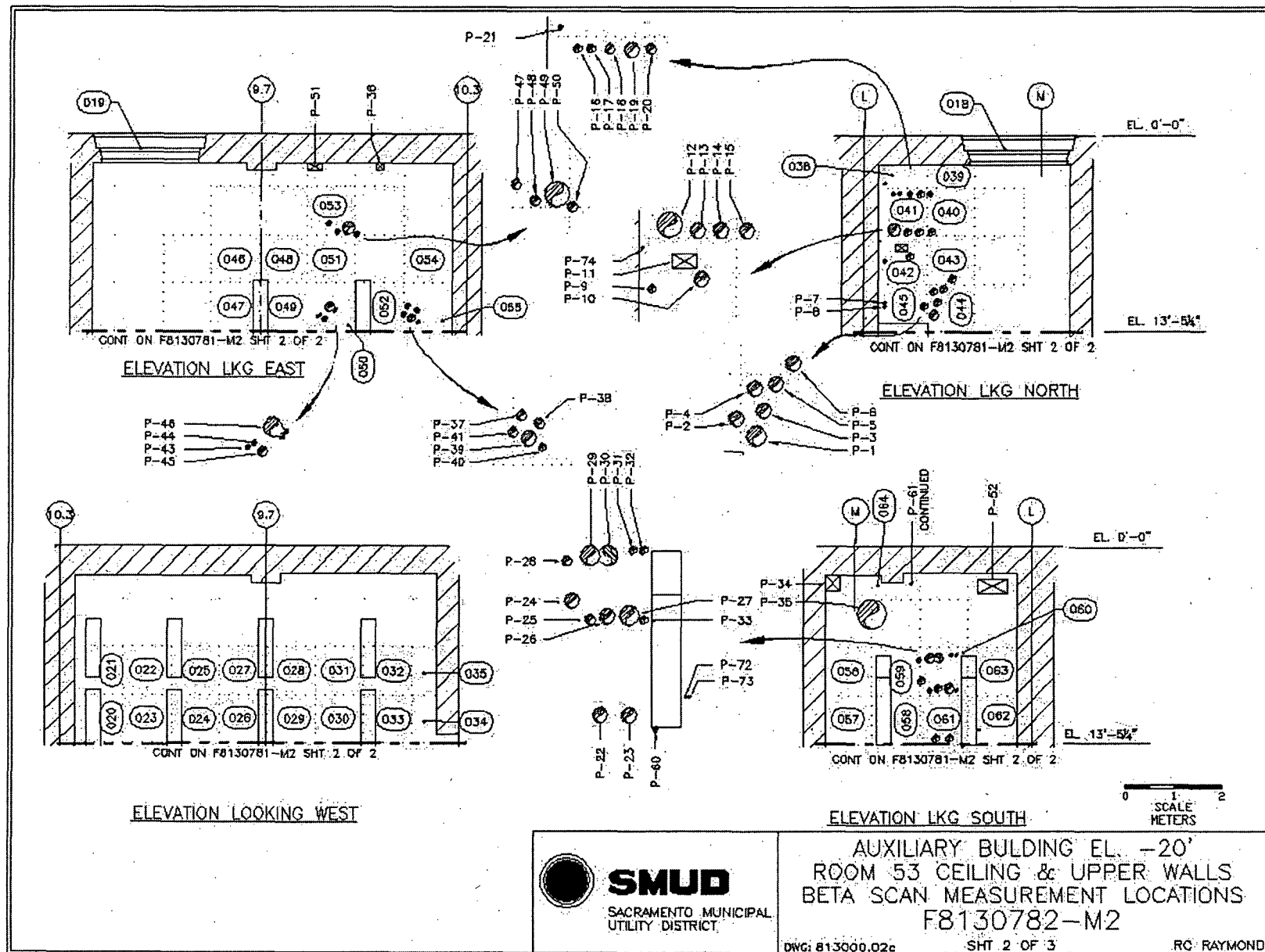
Survey Unit F8130782

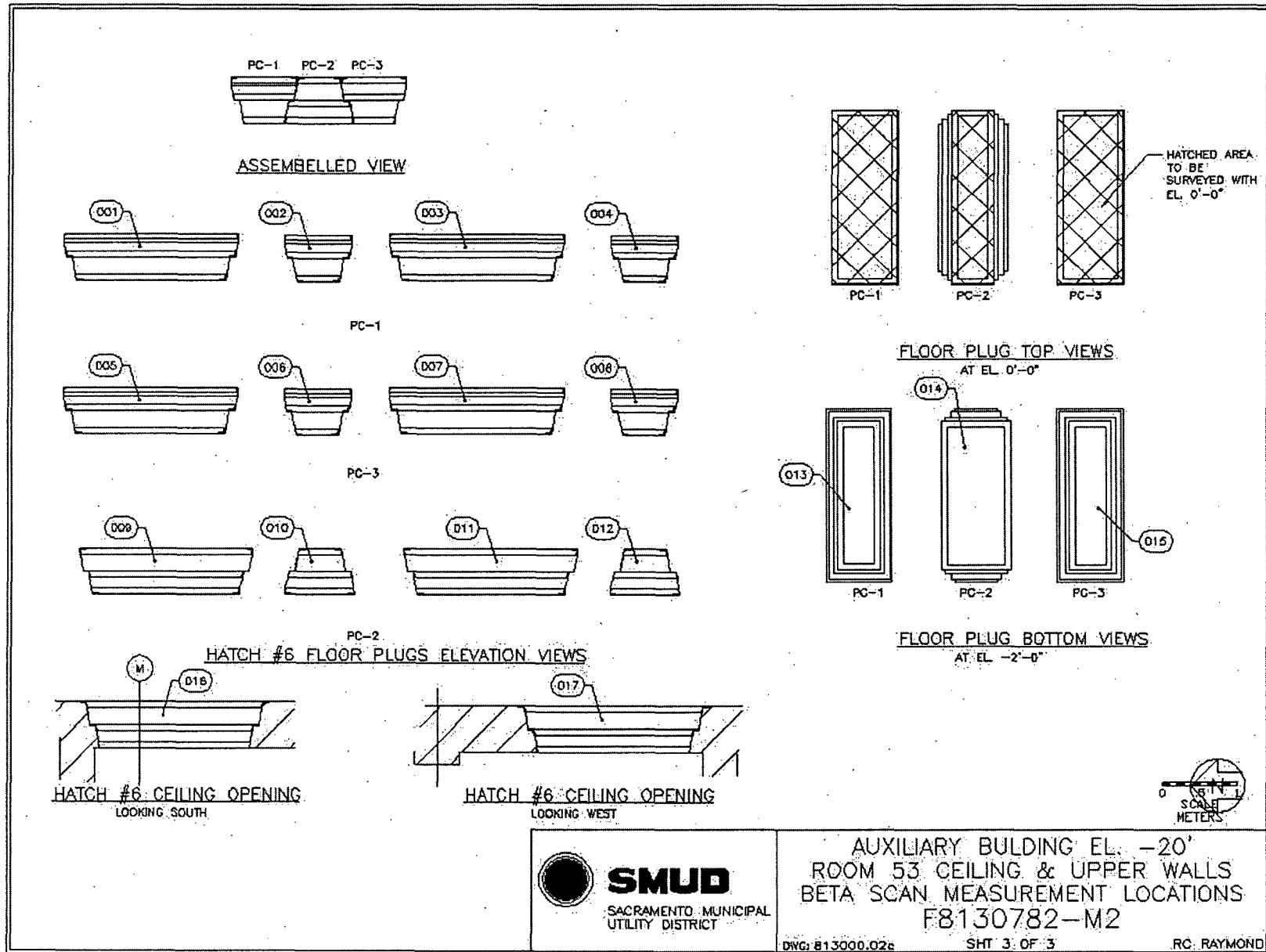












Attachment 2

Instrumentation

November 7, 2007

Survey Unit F8130782

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	1400	2520
M2350; 180733	43-94; 148620	1610	2800
M2350; 193700	43-68B; 190294	433	1033
M2350; 193715	43-68B; 160703	433	1033
M2350; 203465	43-116-1B; 216073	796	5895
Tennelec; 0401171	N/A	5 dpm α , 11 dpm β	N/A

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

November 7, 2007

Survey Unit F8130782

(none required)

Attachment 4

Data Assessment

November 7, 2007

Survey Unit F8130782

