

**Rancho Seco**

**Final Status Survey Summary Report**

**June 30, 2008**

**East Heat Removal Cooler Room Between Columns 10.3 and 9.7, Room 051  
Floor and Lower Walls**

**Survey Unit F8130691**

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## **FINAL STATUS SURVEY SUMMARY REPORT**

### **Survey Unit:**

F8130691, East Heat Removal Cooler Room Between Columns 10.3 and 9.7, Room 051 Floor and Lower Walls

### **Survey Unit Description:**

**Operating History:** The East Heat Removal Cooler 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 cm<sup>2</sup> and a maximum value of 10,080,000 dpm/100 cm<sup>2</sup>. 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 East Heat Removal Cooler Room there were a number of areas on the floor and lower walls where the gross surface activity levels were higher than the DCGL prior to remediation. Therefore, a Class 1 final status survey was performed on the floor and lower walls of the East Heat Removal Cooler Room Between Columns 10.3 and 9.7, Room 051.

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 125 m<sup>2</sup> were scanned for 100% 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**

<b>Survey Design Parameter</b>	<b>Value</b>	<b>Comment</b>
<b>Survey Area:</b>	F813	East Heat Removal Cooler Room Between Columns 10.3 and 9.7, Room 051 Floor and Lower Walls
<b>Survey Unit:</b>	0691	Structure Surface
<b>Class:</b>	1	LTP Table 5-4
<b>SU Area (m<sup>2</sup>):</b>	125	
<b>Evaluator:</b>	Michael Stein	
<b>DCGL (dpm/100 cm<sup>2</sup>):</b>	43000	Gross Activity DCGL
<b>Area Factor:</b>	3.6	Class 1
<b>Design DCGL<sub>emc</sub> (dpm/100 cm<sup>2</sup>):</b>	154800	Class 1
<b>LBGR (dpm/100 cm<sup>2</sup>):</b>	21500	Default = 50% DCGL
<b>Design Sigma (dpm/100 cm<sup>2</sup>):</b>	12035	
<b>Type I Error:</b>	0.05	
<b>Type II Error:</b>	0.05	
<b>Predominant Nuclide:</b>	Cs-137	
<b>Sample Area (m<sup>2</sup>):</b>	6.9	Class 1
<b>Scan Area (m<sup>2</sup>):</b>	125	
<b>Scan Coverage (%):</b>	100%	Class 1
<b>Z<sub>1-α</sub>:</b>	1.645	
<b>Z<sub>1-β</sub>:</b>	1.645	
<b>Sign P:</b>	0.955435	
<b>Calculated Relative Shift:</b>	1.7	
<b>Relative Shift Used:</b>	1.7	Uses 3.0 if Relative Shift is >3
<b>N-Value:</b>	14	
<b>Design N-Value + 20%:</b>	17	NUREG-1575 Table 5-5
<b>Design Min Samples N:</b>	18	Class 1
<b>Grid Spacing L:</b>	2.6	Class 1

### Survey Results:

A total of 18 direct measurements were made in F8130691. 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 3,276 to 140,042 dpm/100 cm<sup>2</sup>, 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 <sup>2</sup> )
F8130691-C0001BD	7044
F8130691-C0002BD	2739
F8130691-C0003BD	1390
F8130691-C0004BD	3050
F8130691-C0005BD	1997
F8130691-C0006BD	11609
F8130691-C0007BD	3055
F8130691-C0008BD	1416
F8130691-C0009BD	4809
F8130691-C0010BD	2677
F8130691-C0011BD	3548
F8130691-C0012BD	2153
F8130691-C0013BD	1743
F8130691-C0014BD	1862
F8130691-C0015BD	1701
F8130691-C0016BD	2402
F8130691-C0017BD	1743
F8130691-C0018BD	2018
Mean:	3164
Median:	2277
Standard Deviation:	2521
Range:	1390 - 11609

**Table 3. Removable Surface Activity Results**

<b>Measurement ID</b>	<b>Surface Beta Activity (dpm/100 cm<sup>2</sup>)</b>
F8130691C0001SM	-4.82
F8130691C0002SM	-0.95
F8130691C0003SM	-0.95
F8130691C0004SM	-2.24
F8130691C0005SM	-3.53
F8130691C0006SM	-4.82
F8130691C0007SM	-0.95
F8130691C0008SM	-2.24
F8130691C0009SM	-0.95
F8130691C0010SM	-2.24
F8130691C0011SM	2.93
F8130691C0012SM	-3.53
F8130691C0013SM	-2.24
F8130691C0014SM	-3.53
F8130691C0015SM	-4.82
F8130691C0016SM	-3.53
F8130691C0017SM	1.64
F8130691C0018SM	-4.82
Mean:	-2.31
Median:	-2.24
Standard Deviation:	2.19
Range:	-4.82 to 2.93

**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> ):	2277	
<b>Mean</b> (dpm/100 cm <sup>2</sup> ):	3164	
<b>Direct Measurement Standard Deviation</b>	2521	Based on samples and backgrounds.
(dpm/100 cm <sup>2</sup> ):		
<b>Total Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	2521	
<b>Maximum</b> (dpm/100 cm <sup>2</sup> ):	11609	Background Subtract Not Applied
<b>Material Type:</b>	N/A	
<b>Sign Test Final N Value:</b>	18	Class 1
<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>	Yes	
<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 1 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 1 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 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 F8130691 meets the release criteria of 10CFR20.1402.

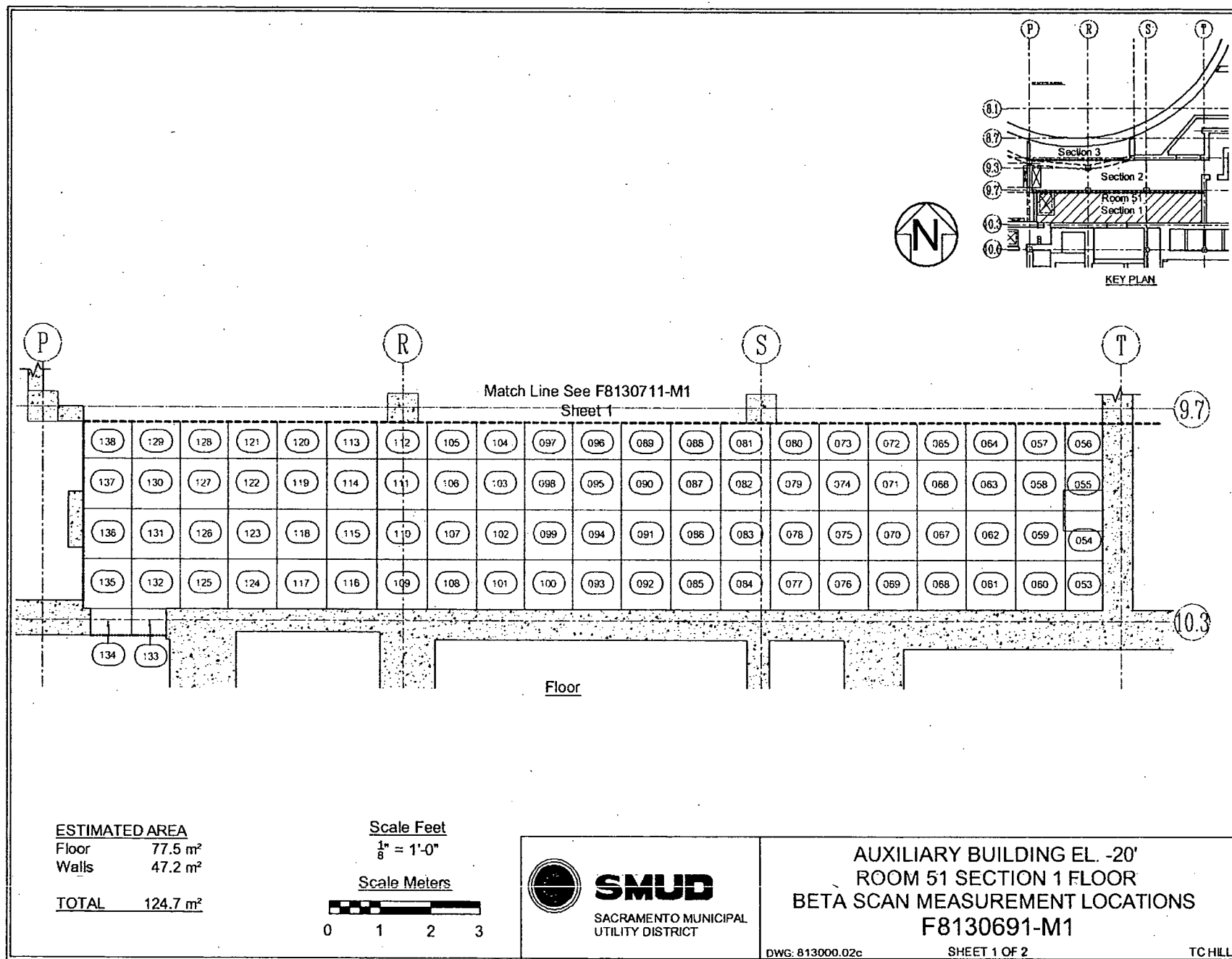


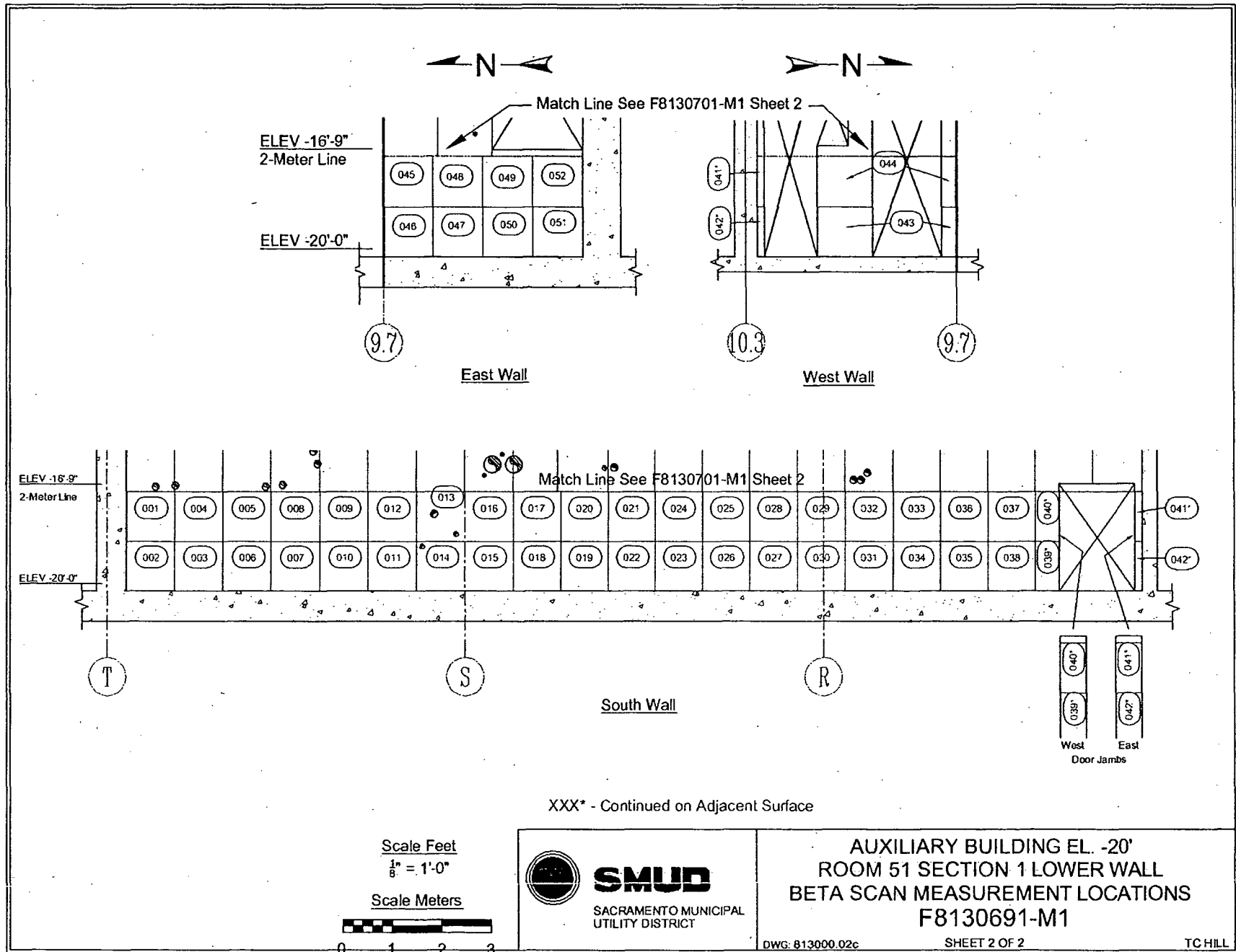
**Attachment 1**

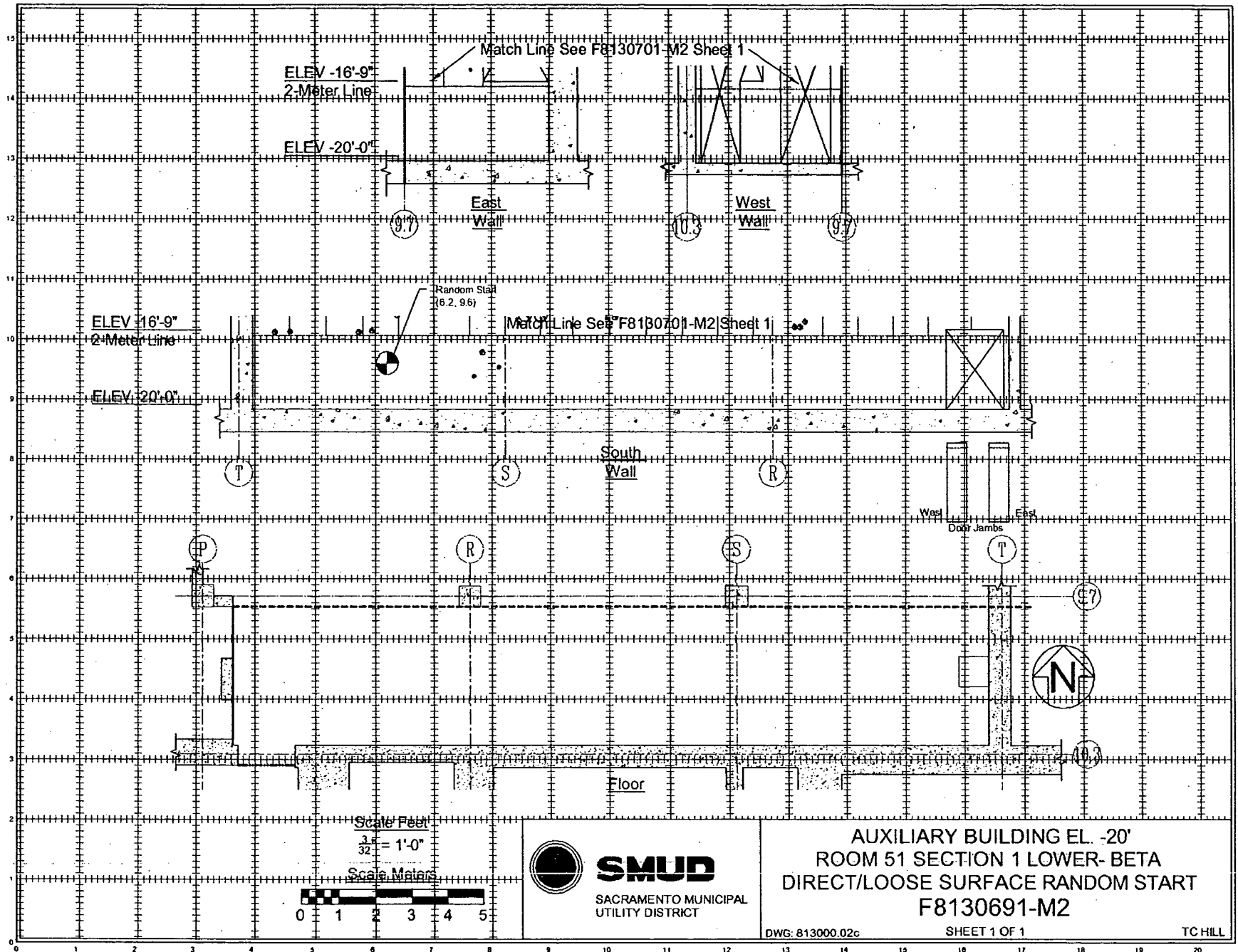
**Maps**

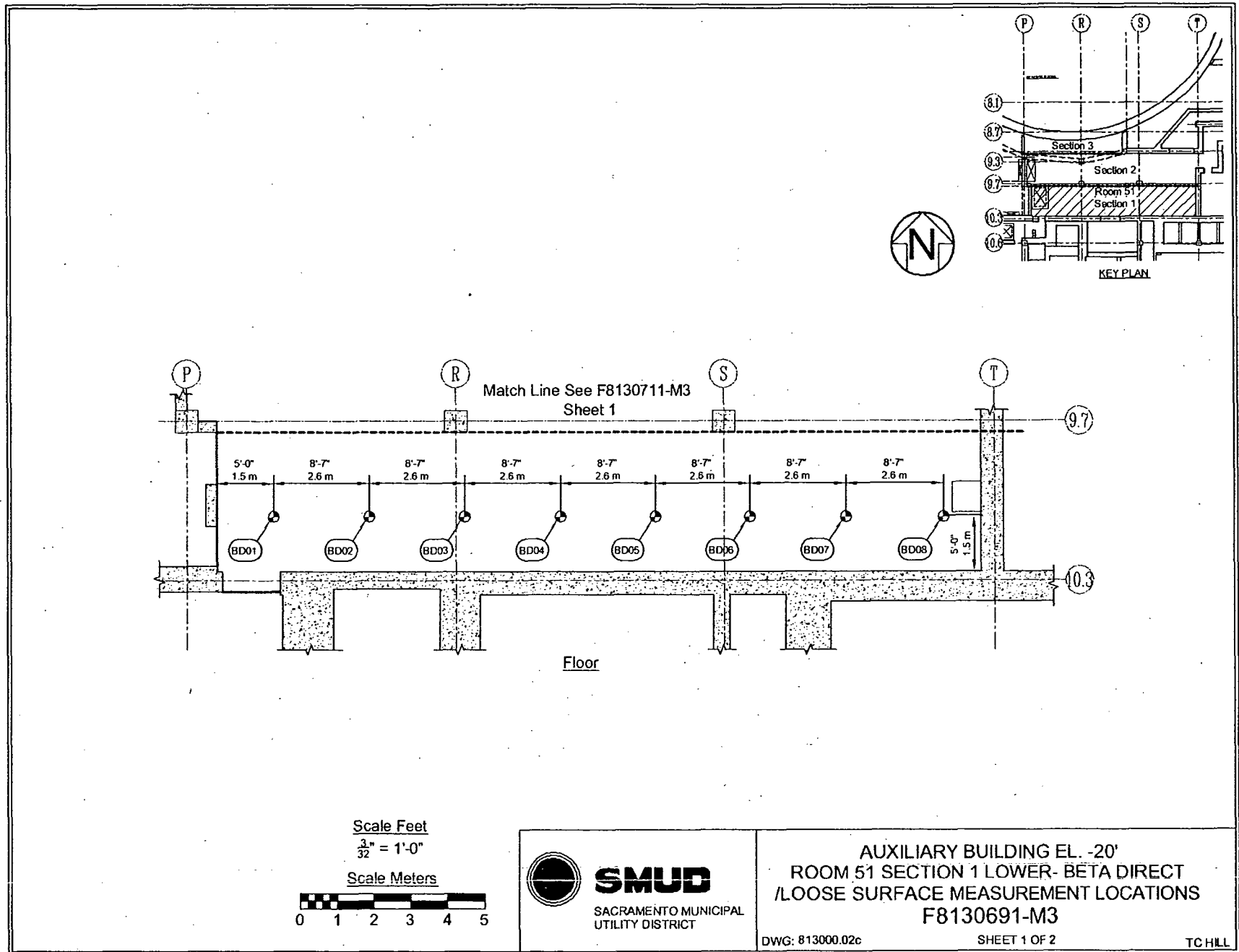
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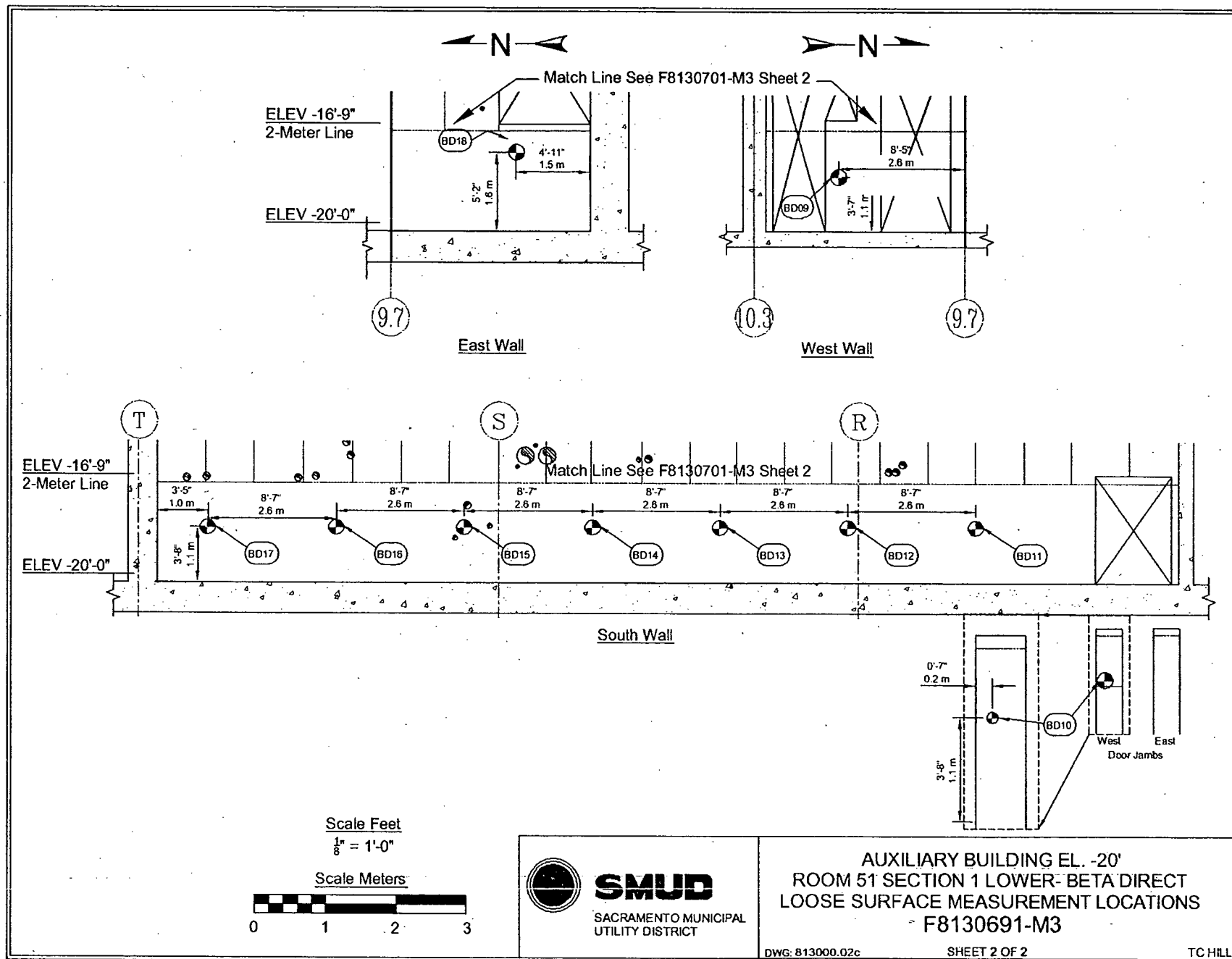
**Survey Unit F8130691**

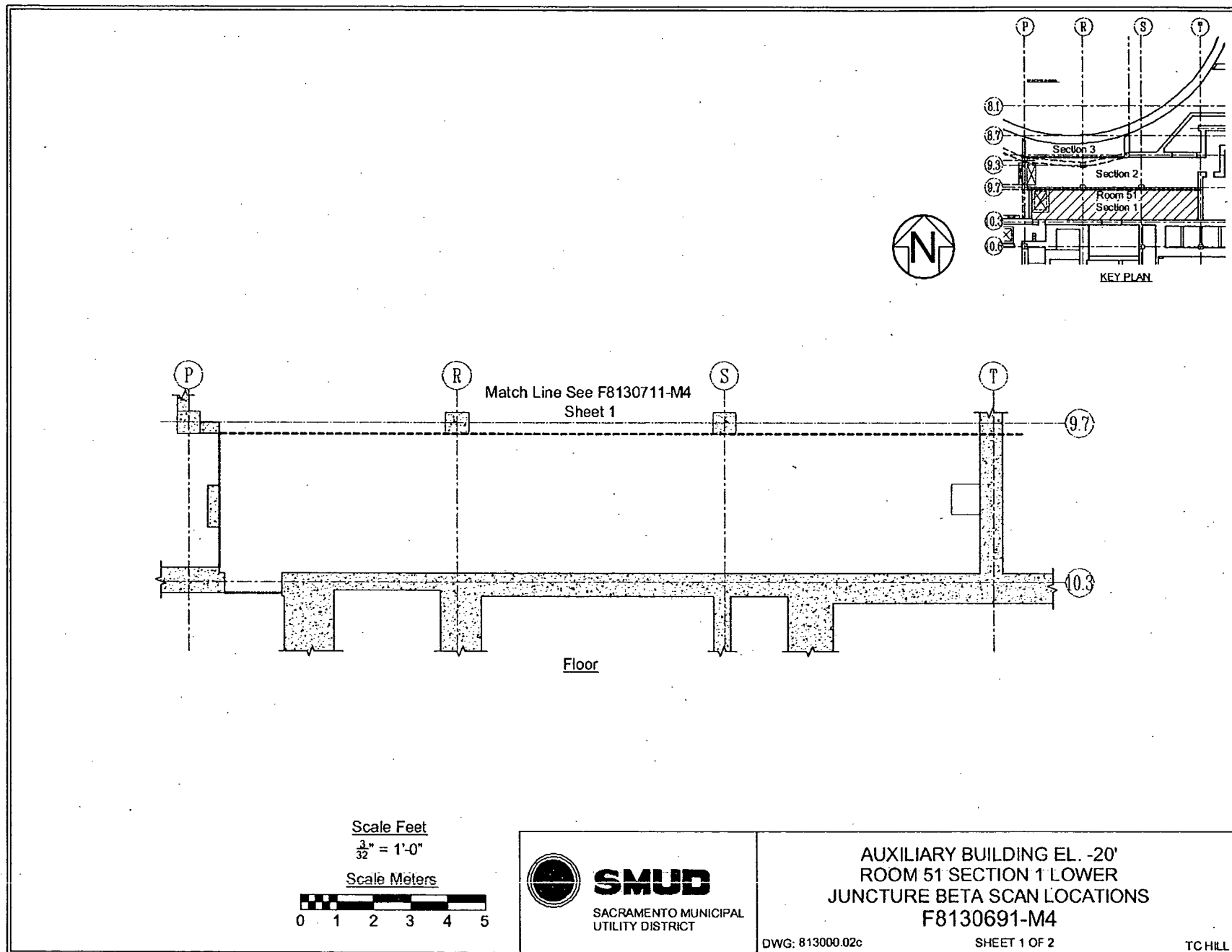


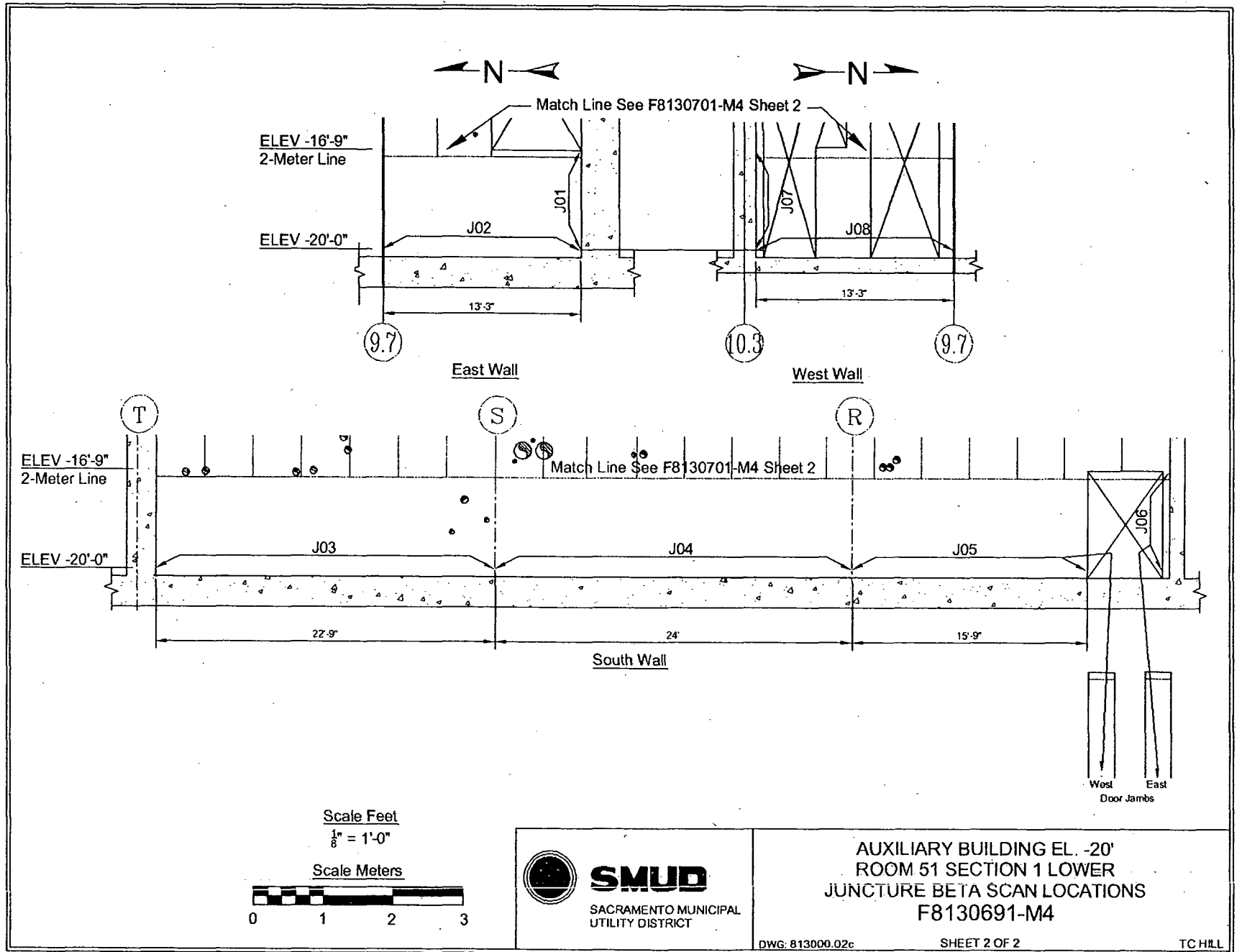














**Attachment 2**

**Instrumentation**

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**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; 149789	43-68B; 161397	433	1033
M2350; 193715	43-68B; 160703	433	1033
M2350; 149789	43-116-1B; 256006	491 $\beta$ Junctions	739 $\beta$ Junctions
M2350; 193715	43-116-1B; 190643	796	3258
M2350; 175834	43-116-1B; 190642	491 $\beta$ Junctions	739 $\beta$ Junctions
Tennelec; 0401171	N/A	5.9 dpm $\alpha$ , 11.7 dpm $\beta$	N/A

The scan and static MDC's provided represent the most conservative MDC values for the survey conducted.

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

<b>Parameter</b>	<b>Value (dpm/100 cm<sup>2</sup>)</b>
Investigation Criteria - Direct	154800
Investigation Criteria - Scan	154800
DCGL <sub>w</sub>	43000
DCGL <sub>EMC</sub>	154800

**Attachment 3**

**Investigation**

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**(none required)**

**Attachment 4**

**Data Assessment**

**June 30, 2008**

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