

Rancho Seco

Final Status Survey Summary Report

April 1, 2008

Misc. Waste Tank Room, Room 17

Survey Unit F8130191

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Dismantlement Superintendent, Radiological

## FINAL STATUS SURVEY SUMMARY REPORT

### Survey Unit:

F8130191, Misc. Waste Tank Room, Room 17

### 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 167 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

Survey Design Parameter	Value	Comment
Survey Area:	F813	Misc. Waste Tank Room, Room 17
Survey Unit:	0191	Structure Surface
Class:	1	LTP Table 5-4
SU Area (m <sup>2</sup> ):	167	
Evaluator:	Erin L. Brown	
DCGL (dpm/100 cm <sup>2</sup> ):	43000	Gross Activity DCGL
Area Factor:	3.3	Class 1
Design DCGL <sub>emc</sub> (dpm/100 cm <sup>2</sup> ):	141900	Class 1
LBGR (dpm/100 cm <sup>2</sup> ):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm <sup>2</sup> ):	12035	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m <sup>2</sup> ):	6.9	Class 1
Scan Area (m <sup>2</sup> ):	167	
Scan Coverage (%):	100%	Class 1
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:	24	Class 1
Grid Spacing L:	2.6	Class 1

**Survey Results:**

A total of 25 direct measurements were made in F8130191. 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 1496 to 132853 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> )
F8130191-C0001BD	2516
F8130191-C0002BD	2454
F8130191-C0003BD	2116
F8130191-C0004BD	2215
F8130191-C0005BD	4762
F8130191-C0006BD	4430
F8130191-C0007BD	2080
F8130191-C0008BD	2070
F8130191-C0009BD	1899
F8130191-C0010BD	2023
F8130191-C0011BD	2049
F8130191-C0012BD	2345
F8130191-C0013BD	1644
F8130191-C0014BD	2101
F8130191-C0015BD	2422
F8130191-C0016BD	1930
F8130191-C0017BD	2070
F8130191-C0018BD	2002
F8130191-C0019BD	1764
F8130191-C0020BD	1987
F8130191-C0021BD	2334
F8130191-C0022BD	2065
F8130191-C0023BD	2054
F8130191-C0024BD	1987
F8130191-C0025BD	2039
Mean:	2294
Median:	2070
Standard Deviation:	723
Range:	1644 - 4762

**Table 3. Removable Surface Activity Results**

Measurement ID	Surface Beta Activity (dpm/100 cm <sup>2</sup> )
F8130191C0001SM	11.97
F8130191C0002SM	1.64
F8130191C0003SM	6.8
F8130191C0004SM	30.05
F8130191C0005SM	4.22
F8130191C0006SM	10.68
F8130191C0007SM	-0.95
F8130191C0008SM	6.8
F8130191C0009SM	77.83
F8130191C0010SM	9.38
F8130191C0011SM	13.26
F8130191C0012SM	10.68
F8130191C0013SM	-0.95
F8130191C0014SM	0.34
F8130191C0015SM	13.26
F8130191C0016SM	5.51
F8130191C0017SM	5.51
F8130191C0018SM	6.8
F8130191C0019SM	18.42
F8130191C0020SM	0.34
F8130191C0021SM	14.55
F8130191C0022SM	-3.53
F8130191C0023SM	-0.95
F8130191C0024SM	1.64
F8130191C0025SM	4.22
Mean:	9.9
Median:	6.8
Standard Deviation:	15.98
Range:	-3.53 to 77.83

**Survey Unit Data Assessment:**

The survey design required 25 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	
<b>Ambient Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A	Average Ambient BKG = 0
<b>Actual Direct Measurements (N):</b>	25	
<b>Median</b> (dpm/100 cm <sup>2</sup> ):	2070	
<b>Mean</b> (dpm/100 cm <sup>2</sup> ):	2294	
<b>Direct Measurement Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	723	
<b>Total Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	723	Based on samples and backgrounds.
<b>Maximum</b> (dpm/100 cm <sup>2</sup> ):	4762	
<b>Material Type:</b>	N/A	Background Subtract Not Applied
<b>Sign Test Final N Value:</b>	25	
<b>S+ Value:</b>	25	
<b>Critical Value:</b>	17	
<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>mc</sub>:</b>	Yes	Class 1
<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 F8130191 meets the release criteria of 10CFR20.1402.

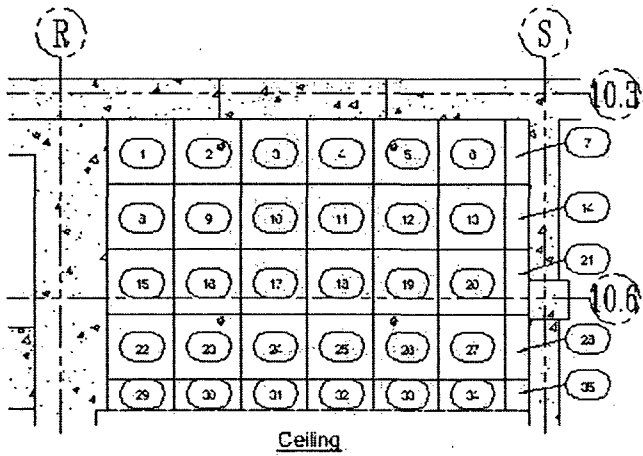
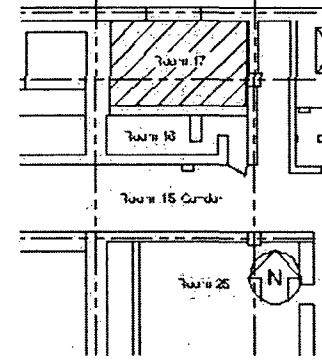
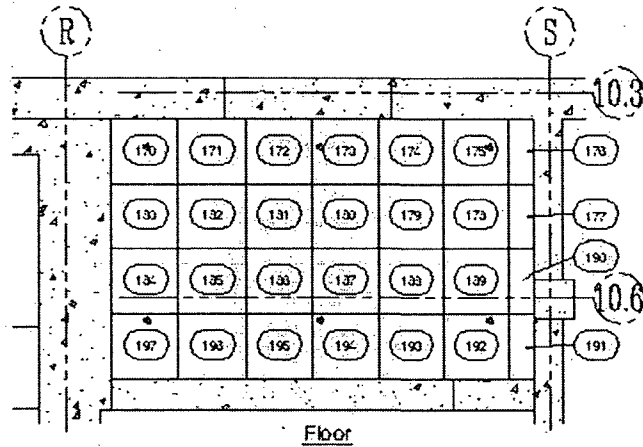


**Attachment 1**

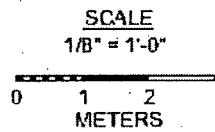
**Maps**

**April 1, 2008**

**Survey Unit F8130191**



Estimated Surface Area:  
 Floor - 24.7 m<sup>2</sup>  
 Ceiling - 27.7 m<sup>2</sup>



**SMUD**

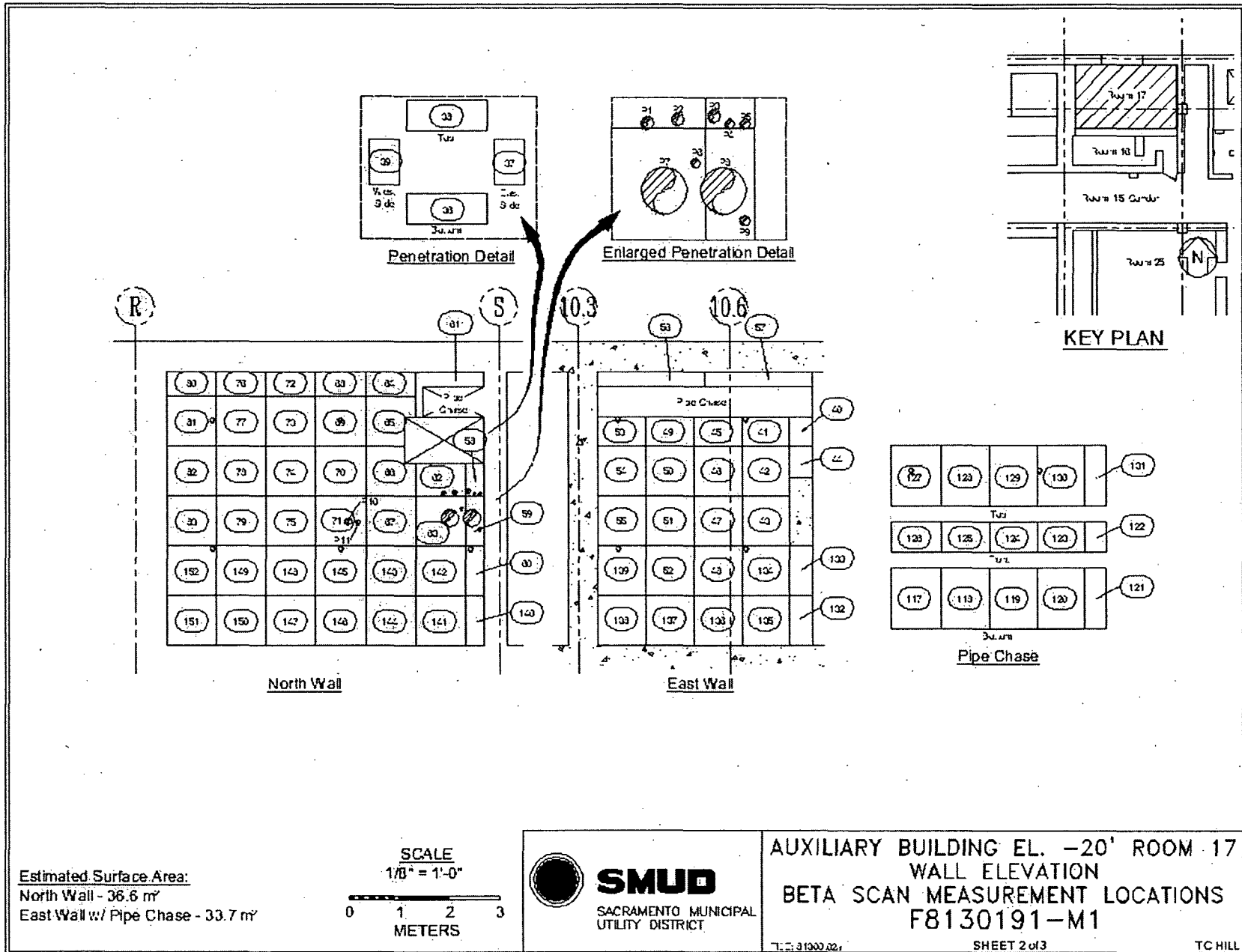
SACRAMENTO MUNICIPAL  
 UTILITY DISTRICT

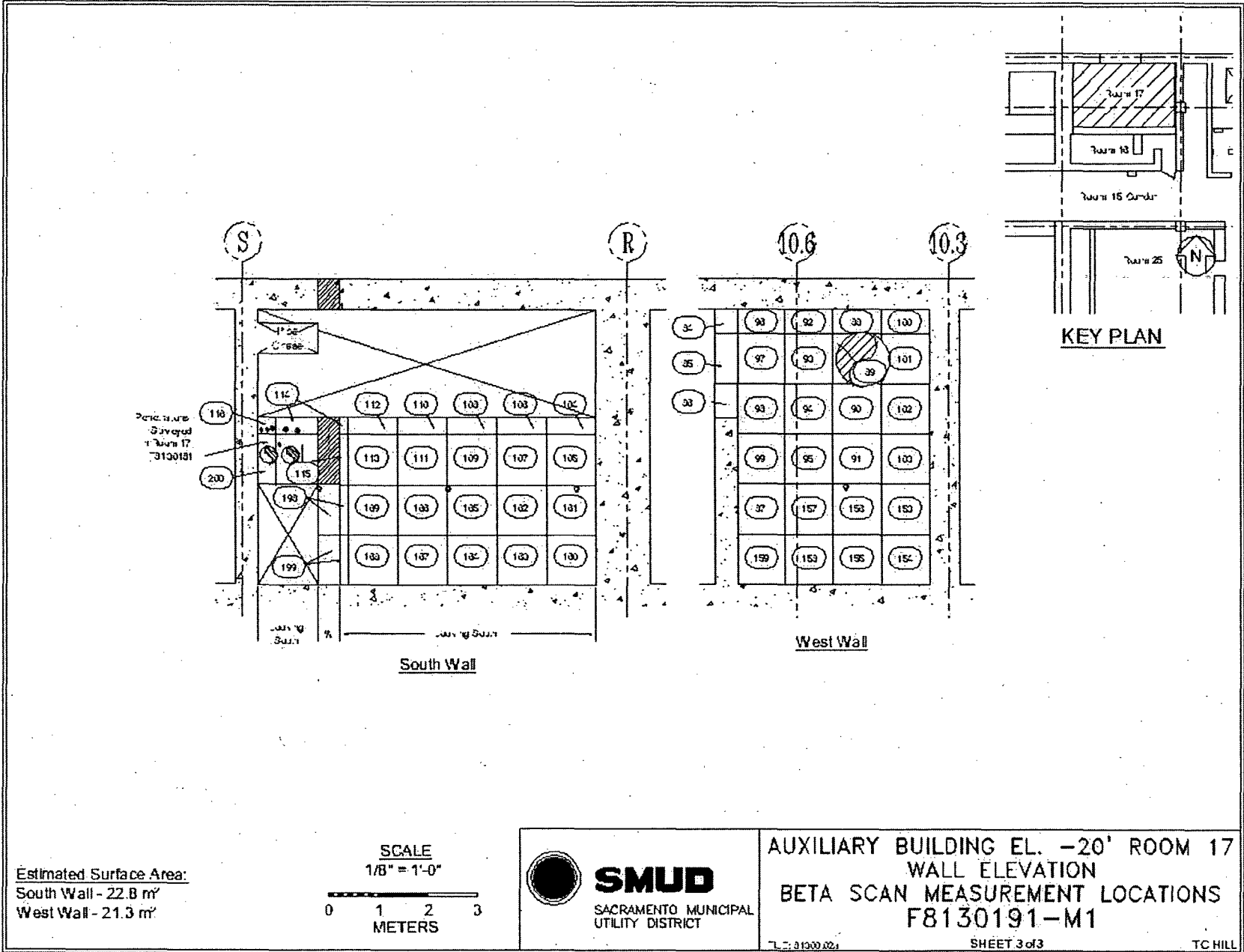
AUXILIARY BUILDING EL. -20' ROOM 17  
 FLOOR AND CEILING  
 BETA SCAN MEASUREMENT LOCATIONS  
 F8130191-M1

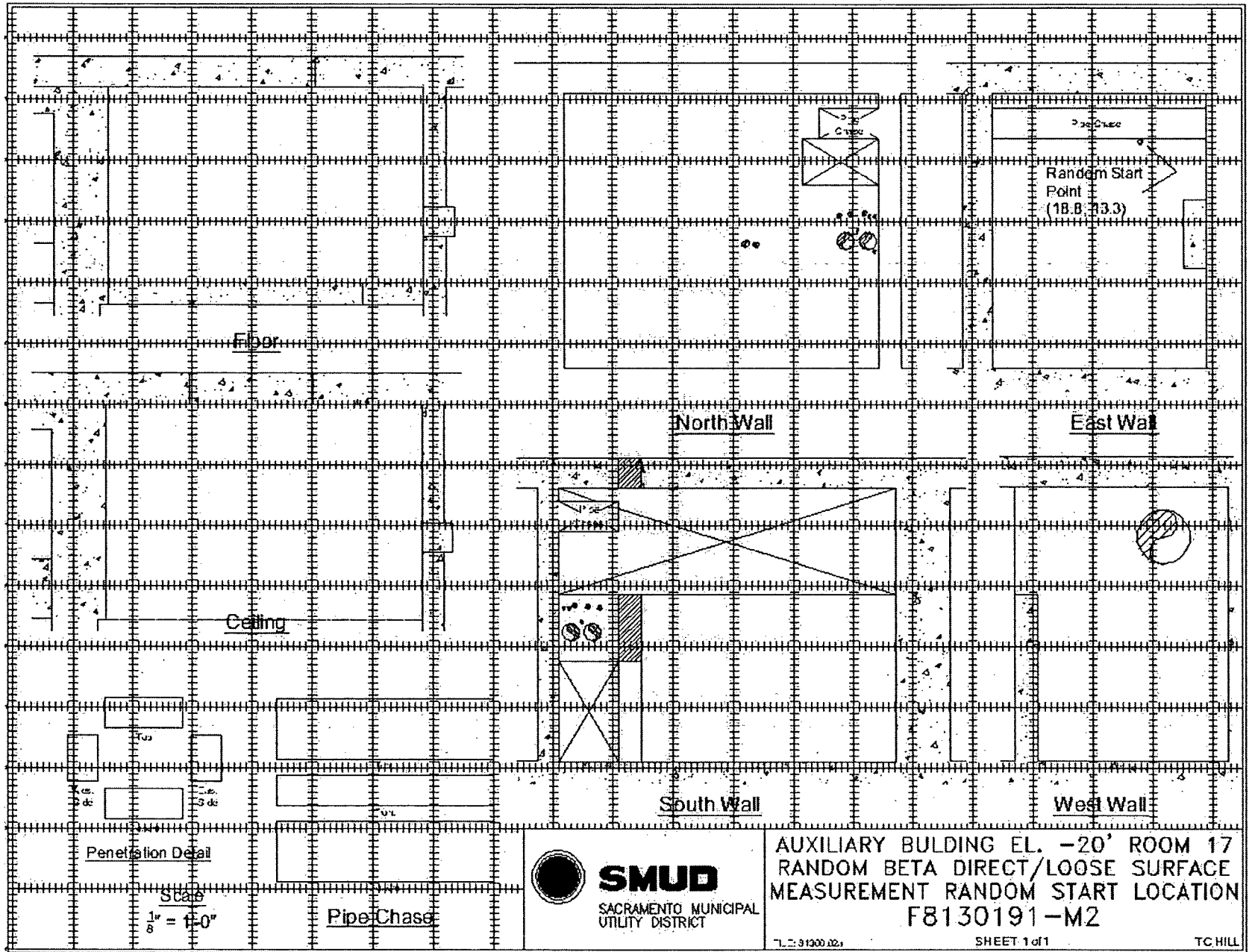
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SHEET 1 of 3

TC HILL

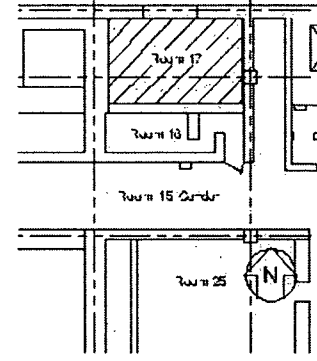
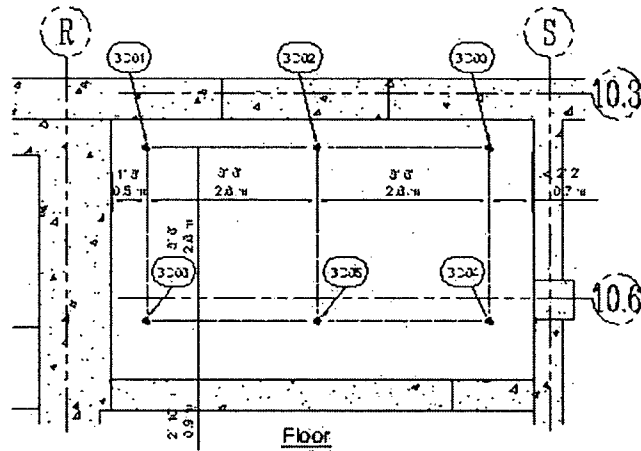




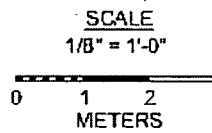
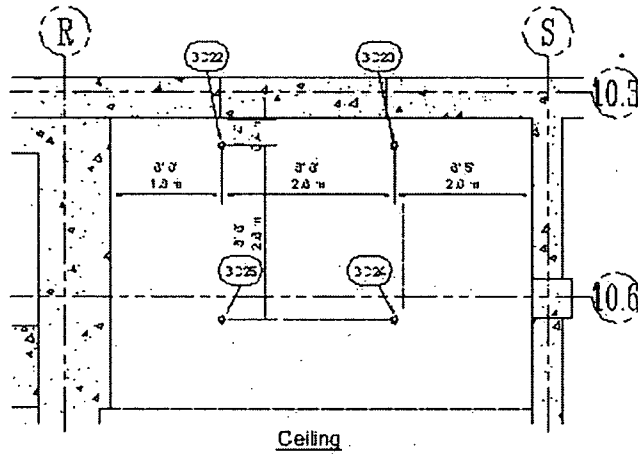


**SMUD**  
SACRAMENTO MUNICIPAL  
UTILITY DISTRICT

AUXILIARY BUILDING EL. -20' ROOM 17  
RANDOM BETA DIRECT/LOOSE SURFACE  
MEASUREMENT RANDOM START LOCATION  
F8130191-M2



KEY PLAN



**SMUD**

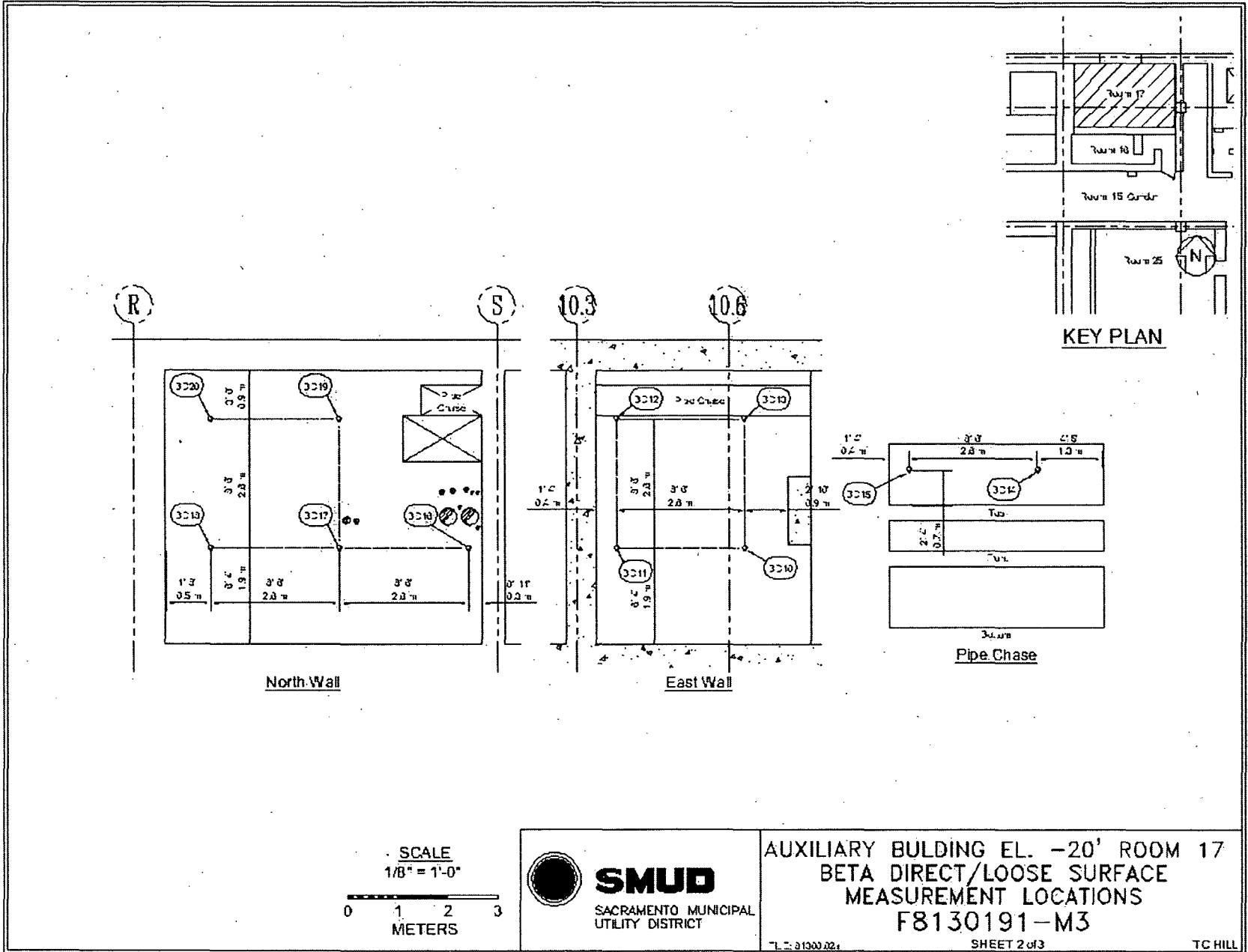
SACRAMENTO MUNICIPAL  
UTILITY DISTRICT

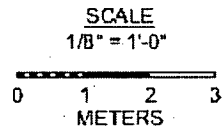
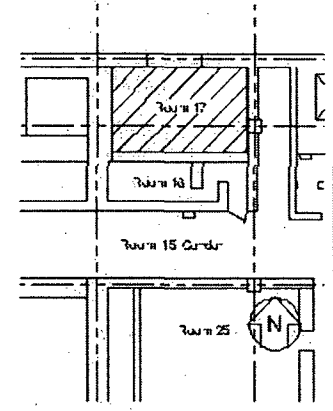
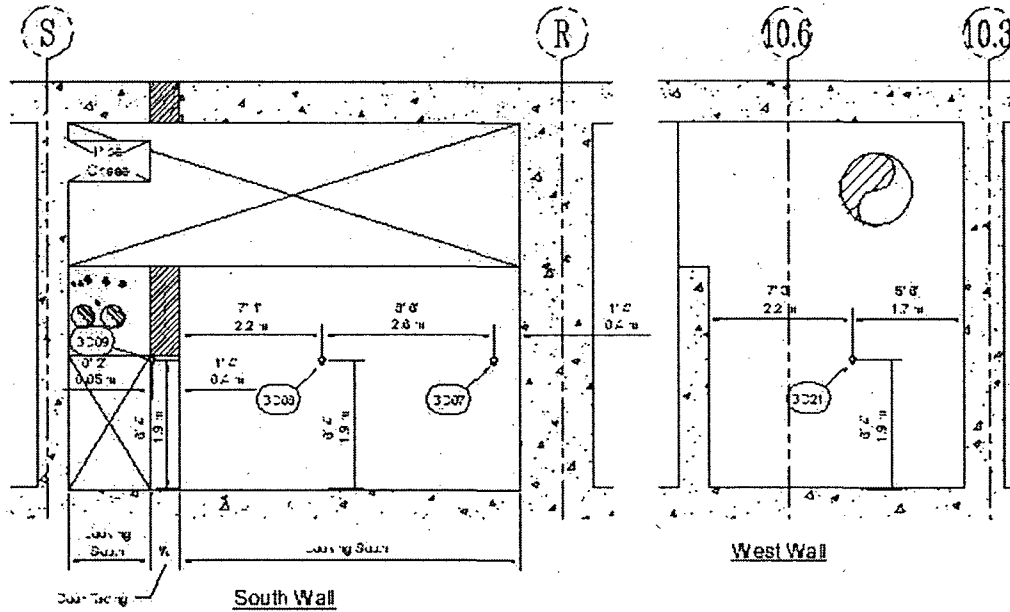
AUXILIARY BUILDING EL. -20' ROOM 17  
BETA DIRECT/LOOSE SURFACE  
MEASUREMENT LOCATIONS  
F8130191-M3


T.L. 3/13/00.02

SHEET 1 of 3

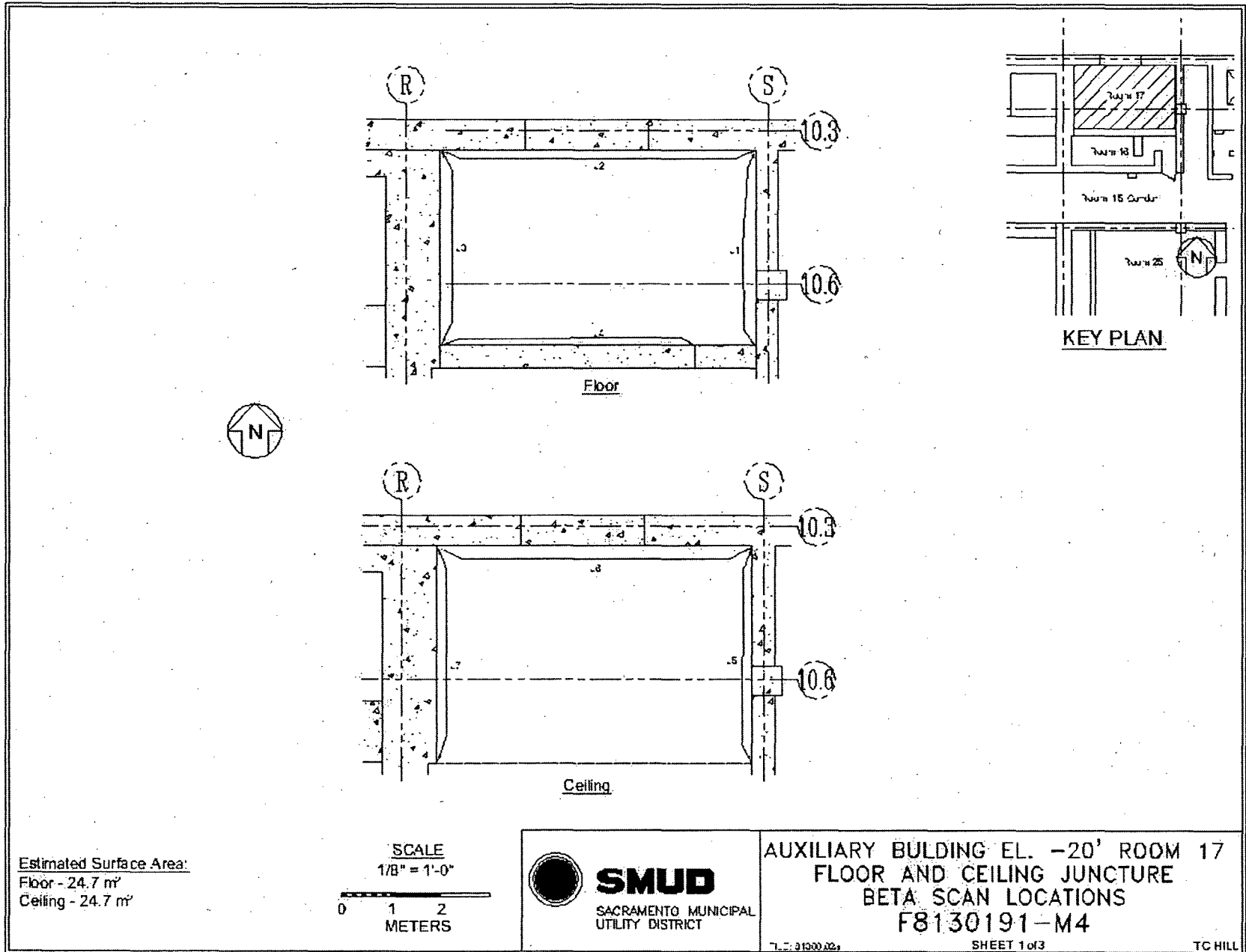
TC HILL

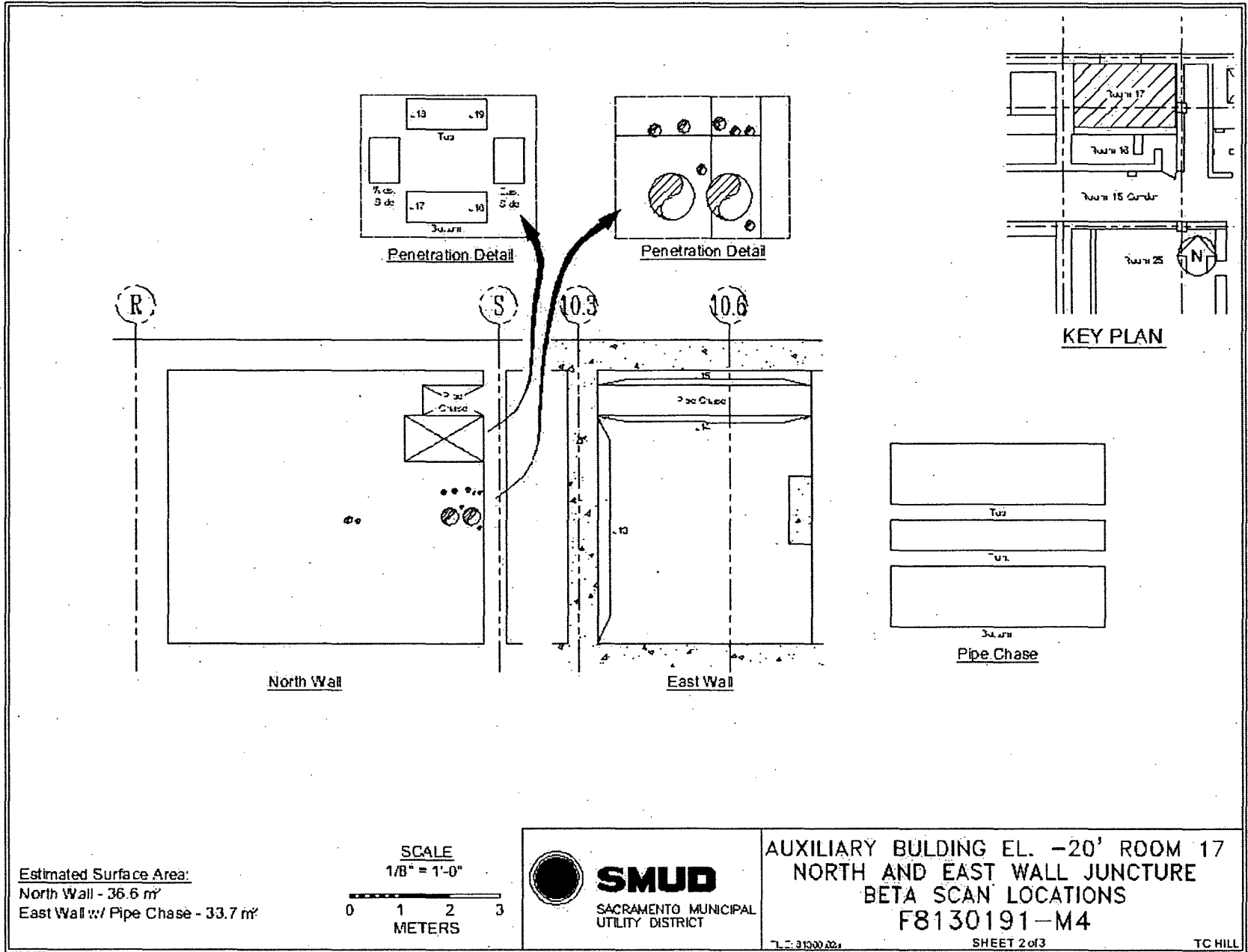


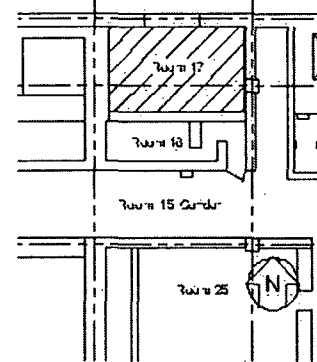
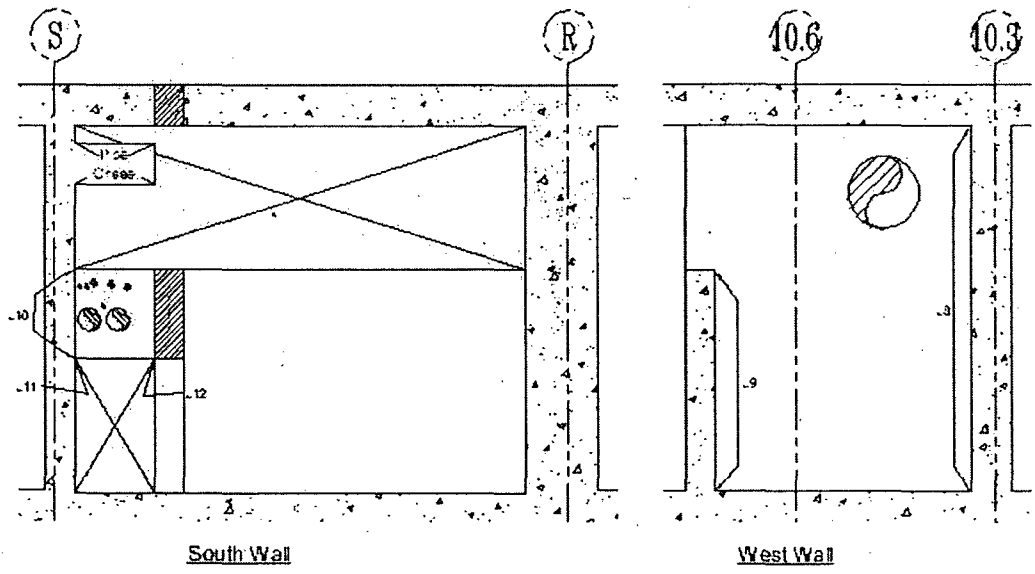


 <b>SMUD</b> SACRAMENTO MUNICIPAL UTILITY DISTRICT	AUXILIARY BULDING EL. -20' ROOM 17 BETA DIRECT/LOOSE SURFACE MEASUREMENT LOCATIONS <b>F8130191-M3</b>
	<small>TC HILL</small>



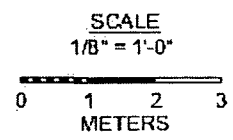






KEY PLAN

Estimated Surface Area:  
 South Wall - 21.8 m<sup>2</sup>  
 West Wall - 21.3 m<sup>2</sup>



**SMUD**  
 SACRAMENTO MUNICIPAL  
 UTILITY DISTRICT

AUXILIARY BULDING EL. -20' ROOM 17  
 SOUTH AND WEST WALL JUNCTURE  
 BETA SCAN LOCATIONS  
 F8130191-M4

**Attachment 2**

**Instrumentation**

**April 1, 2008**

**Survey Unit F8130191**

**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; 180733	43-98B; 148638	N/A	1490
M2350; 175834	43-68B; 190482	433	1033
M2350; 175834	43-116-1B; 190642	N/A	3258
Tennelec; 0401171	N/A	5.9 dpm $\alpha$ , 11.7 dpm $\beta$	N/A
Inspector	N/A	N/A	2113

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

<b>Parameter</b>	<b>Value (dpm/100 cm<sup>2</sup>)</b>
Investigation Criteria - Direct	141900
Investigation Criteria – Scan	141900
DCGL <sub>w</sub>	43000
DCGL <sub>EMC</sub>	141900

**Attachment 3**

**Investigation**

**April 1, 2008**

**Survey Unit F8130191**

**(none required)**

**Attachment 4**

**Data Assessment**

**April 1, 2008**

**Survey Unit F8130191**

