

Rancho Seco
Final Status Survey Summary Report
July 3, 2008
Rooms 102 and 103 of the AB
Survey Unit F8130861

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FSS Engineer

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Lead FSS Engineer

Approved By: E. J. [Signature] Date: 7-24-08
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130861, Rooms 102 and 103 of the AB

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 159 m² were scanned for approximately 65% 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	Rooms 102 and 103 of the AB
Survey Unit:	0861	Structure Surface
Class:	2	LTP Table 5-C
SU Area (m²):	246	
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):	17.5	Class 2
Scan Area (m²):	159	
Scan Coverage (%):	65%	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:	4.1	Class 2

Survey Results:

A total of 14 direct measurements were made in F8130861. 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 1459 to 25067 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 cm²)
F8130861-C0001BD	3450
F8130861-C0002BD	3318
F8130861-C0003BD	3119
F8130861-C0004BD	3406
F8130861-C0005BD	3142
F8130861-C0006BD	3329
F8130861-C0007BD	3108
F8130861-C0008BD	3737
F8130861-C0009BD	3208
F8130861-C0010BD	3616
F8130861-C0011BD	2899
F8130861-C0012BD	2701
F8130861-C0013BD	2414
F8130861-C0014BD	2039
Mean:	3106
Median:	3175
Standard Deviation:	464
Range:	2039 - 3737

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm ²)
F8130861C0001SM	-6.11
F8130861C0002SM	-3.53
F8130861C0003SM	-2.24
F8130861C0004SM	-0.95
F8130861C0005SM	-2.24
F8130861C0006SM	-2.24
F8130861C0007SM	-0.95
F8130861C0008SM	-3.53
F8130861C0009SM	-2.24
F8130861C0010SM	-4.82
F8130861C0011SM	-6.11
F8130861C0012SM	-3.53
F8130861C0013SM	-3.53
F8130861C0014SM	-3.53
Mean:	-3.25
Median:	-3.53
Standard Deviation:	1.62
Range:	-6.11 to -0.95

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):	3175	
Mean (dpm/100 cm ²):	3106	
Direct Measurement Standard Deviation	464	
(dpm/100 cm ²):		
Total Standard Deviation (dpm/100 cm ²):	464	Based on samples and backgrounds.
Maximum (dpm/100 cm ²):	3737	
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 (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.

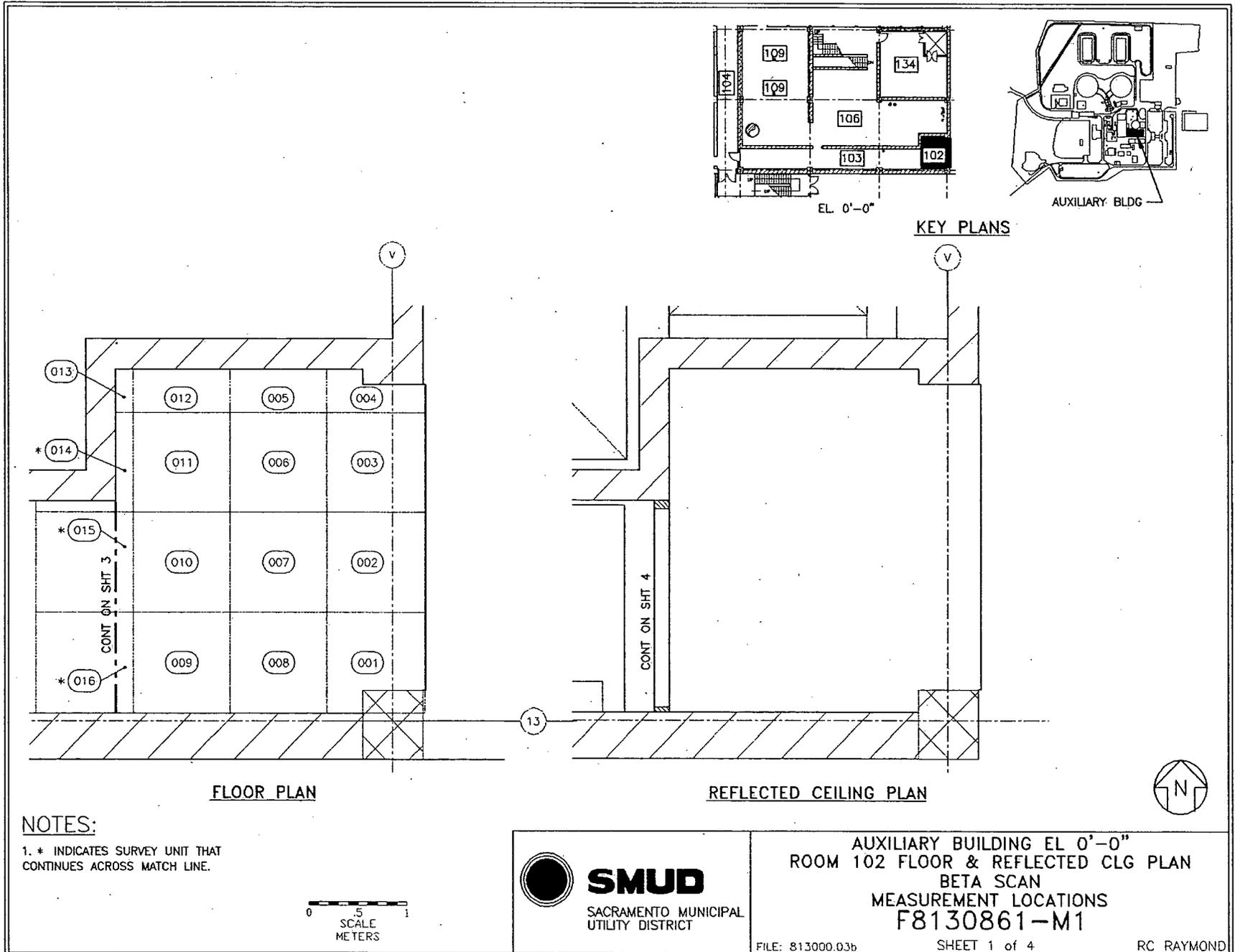
It is concluded that survey unit F8130861 meets the release criteria of 10CFR20.1402.

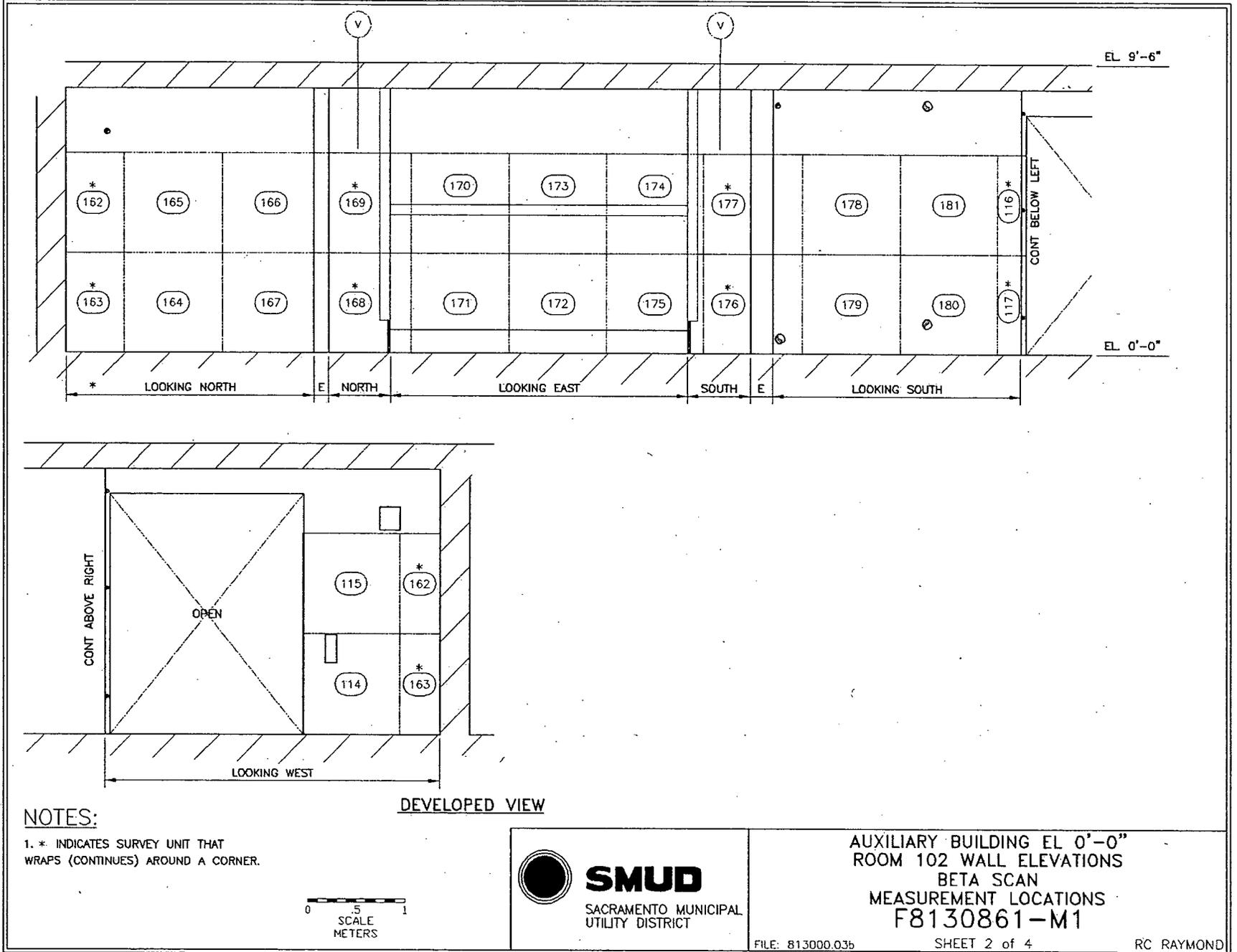
Attachment 1

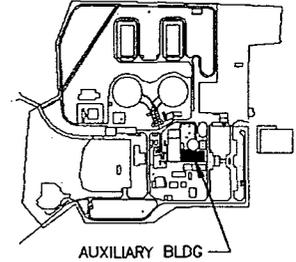
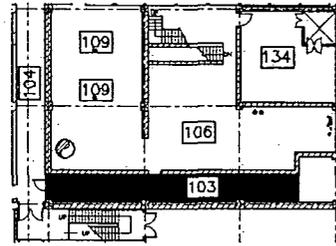
Maps

July 3, 2008

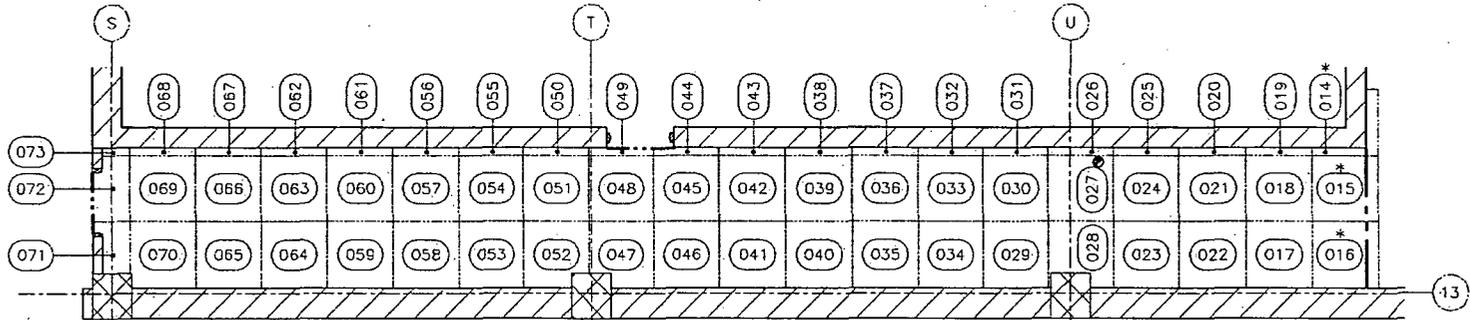
Survey Unit F8130861



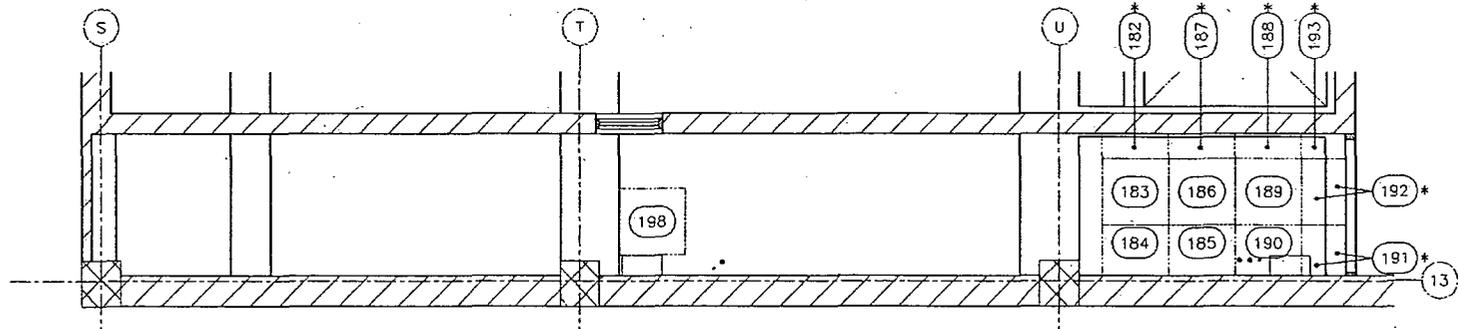




KEY PLANS



FLOOR PLAN



REFLECTED CEILING PLAN

NOTES:

1. FLOOR PLAN ONLY: * INDICATES SURVEY UNIT THAT CONTINUES ACROSS MATCH LINE.

2. CEILING PLAN ONLY: * INDICATES SURVEY UNIT WRAPS (CONTINUES) AROUND A CORNER.



SMUD

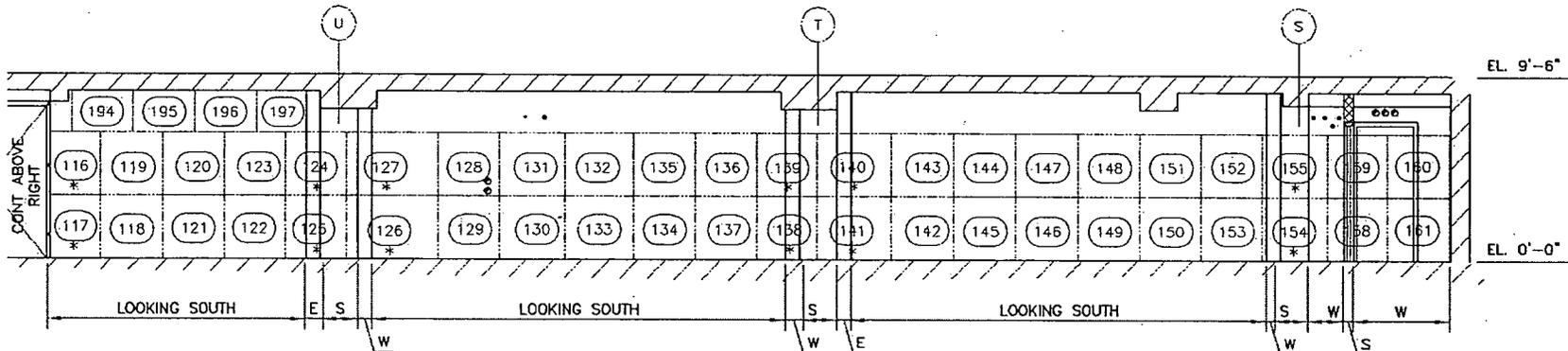
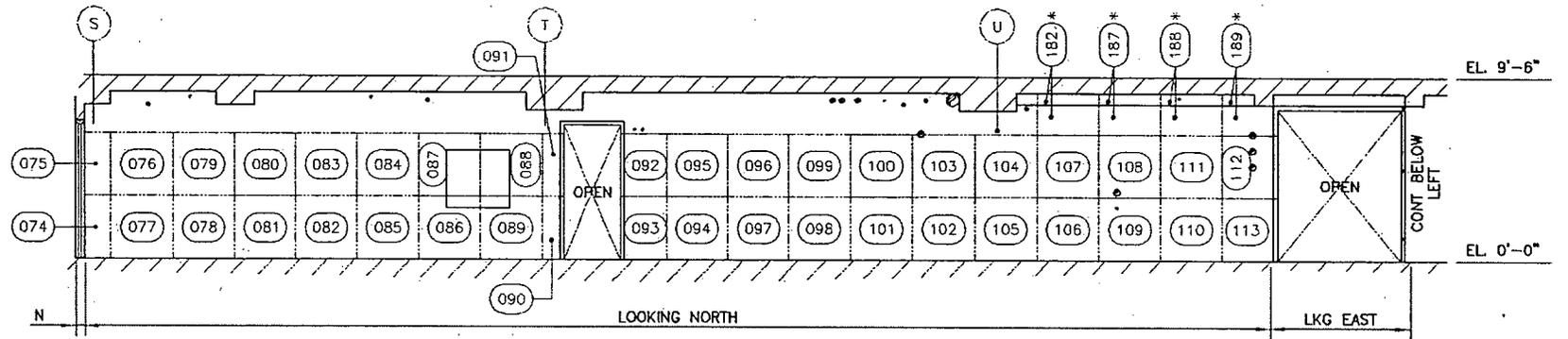
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL 0'-0"
 ROOM 103 FLOOR & CEILING PLANS
 BETA SCAN
 MEASUREMENT LOCATIONS
 F8130861-M1

FILE: 813000.03b

SHEET 3 of 4

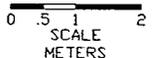
RC RAYMOND



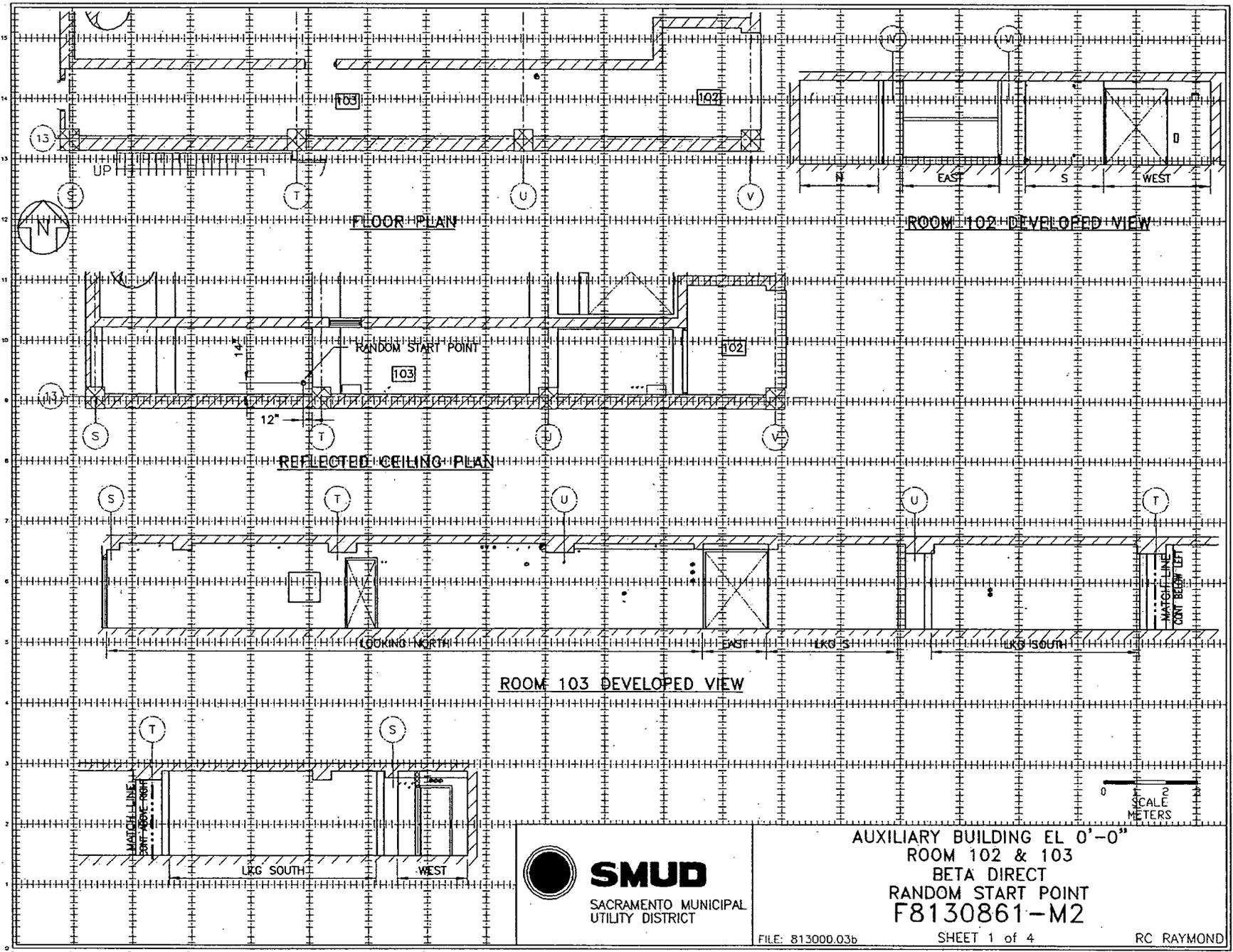
DEVELOPED VIEW
ROOM 103

NOTES:

- 1. * INDICATES SURVEY UNIT THAT WRAPS (CONTINUES) AROUND A CORNER.



AUXILIARY BUILDING EL 0'-0"
 ROOM 103 WALL ELEVATIONS
 BETA SCAN
 MEASUREMENT LOCATIONS
 F8130861-M1

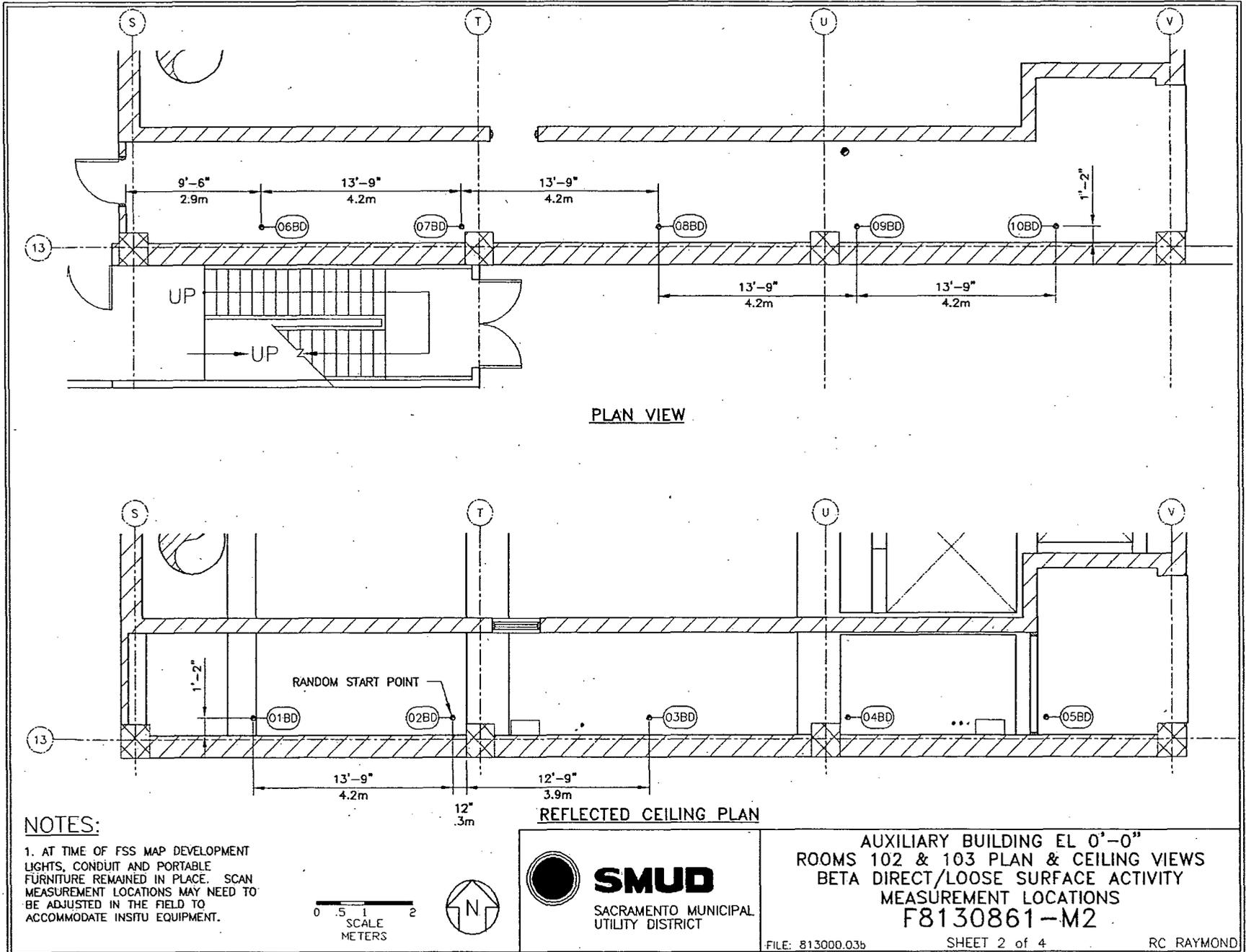


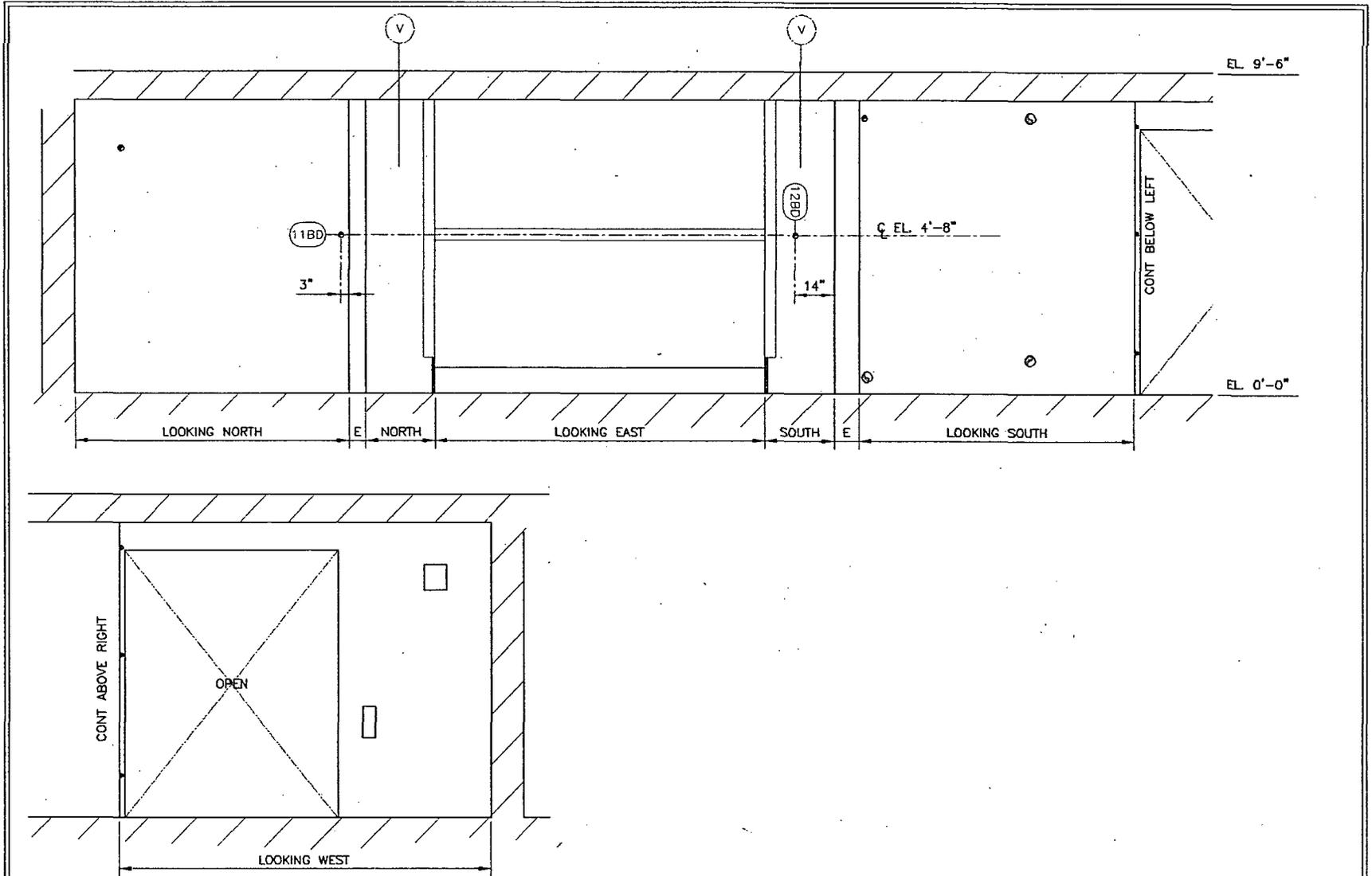
SMUD
 SACRAMENTO MUNICIPAL
 UTILITY DISTRICT

FILE: 813000.03b

SHEET 1 of 4

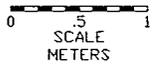
RC RAYMOND



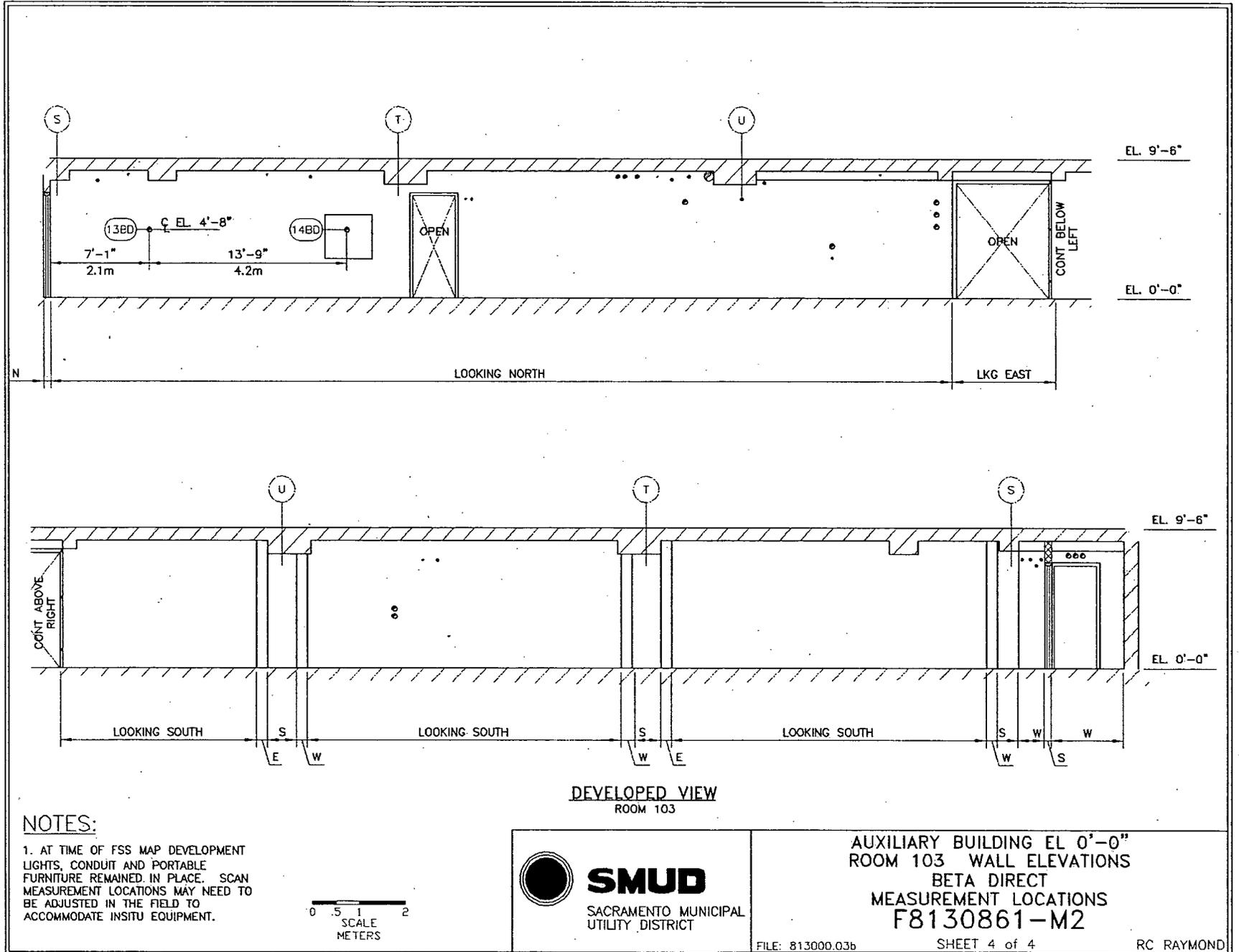


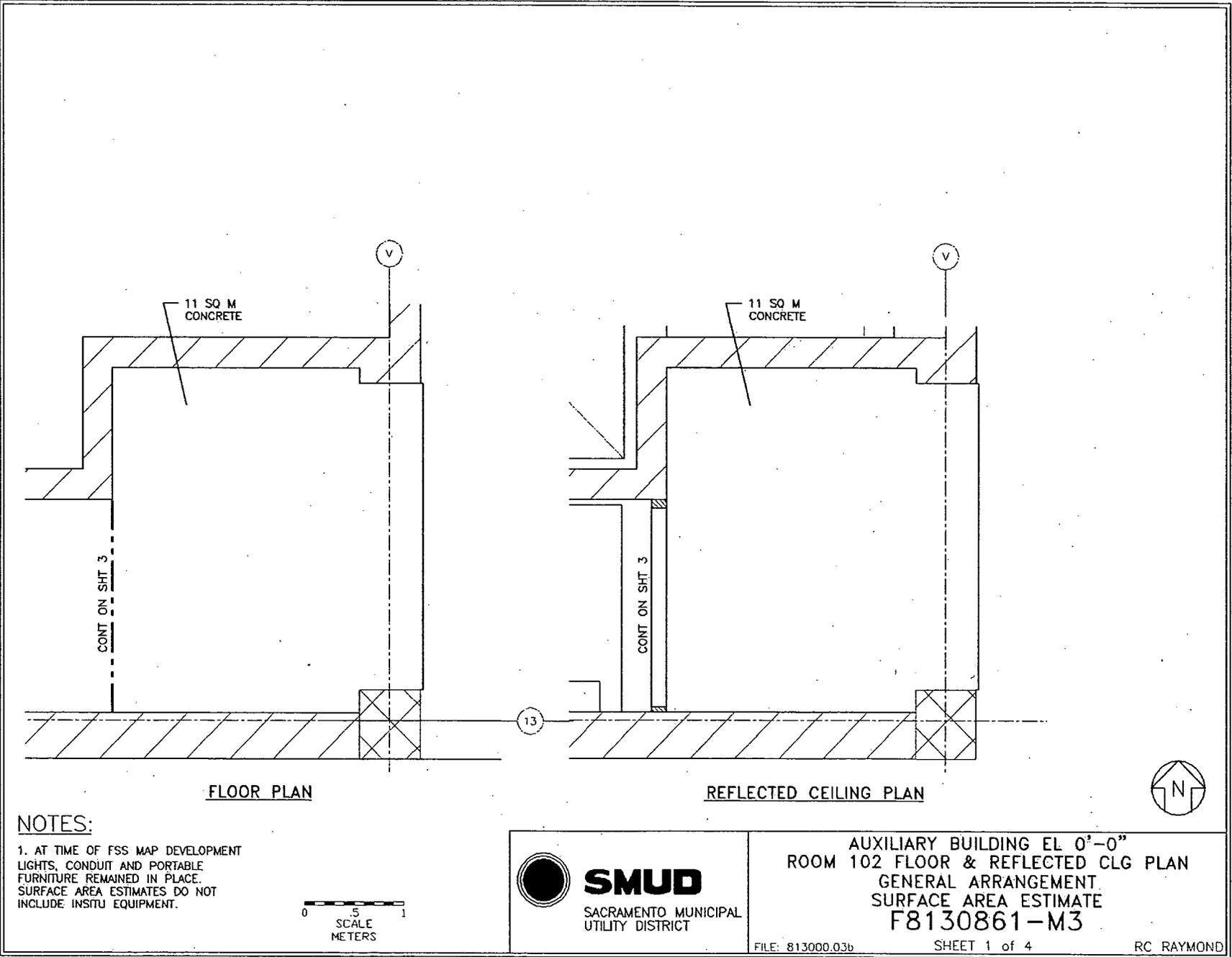
DEVELOPED VIEW

NOTES:
 1. AT TIME OF FSS MAP DEVELOPMENT LIGHTS, CONDUIT AND PORTABLE FURNITURE REMAINED IN PLACE. SCAN MEASUREMENT LOCATIONS MAY NEED TO BE ADJUSTED IN THE FIELD TO ACCOMMODATE INSITU EQUIPMENT.



AUXILIARY BUILDING EL 0'-0"
 ROOM 102 WALL ELEVATIONS
 BETA DIRECT/LOOSE SURFACE ACTIVITY
 MEASUREMENT LOCATIONS
F8130861-M2

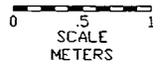




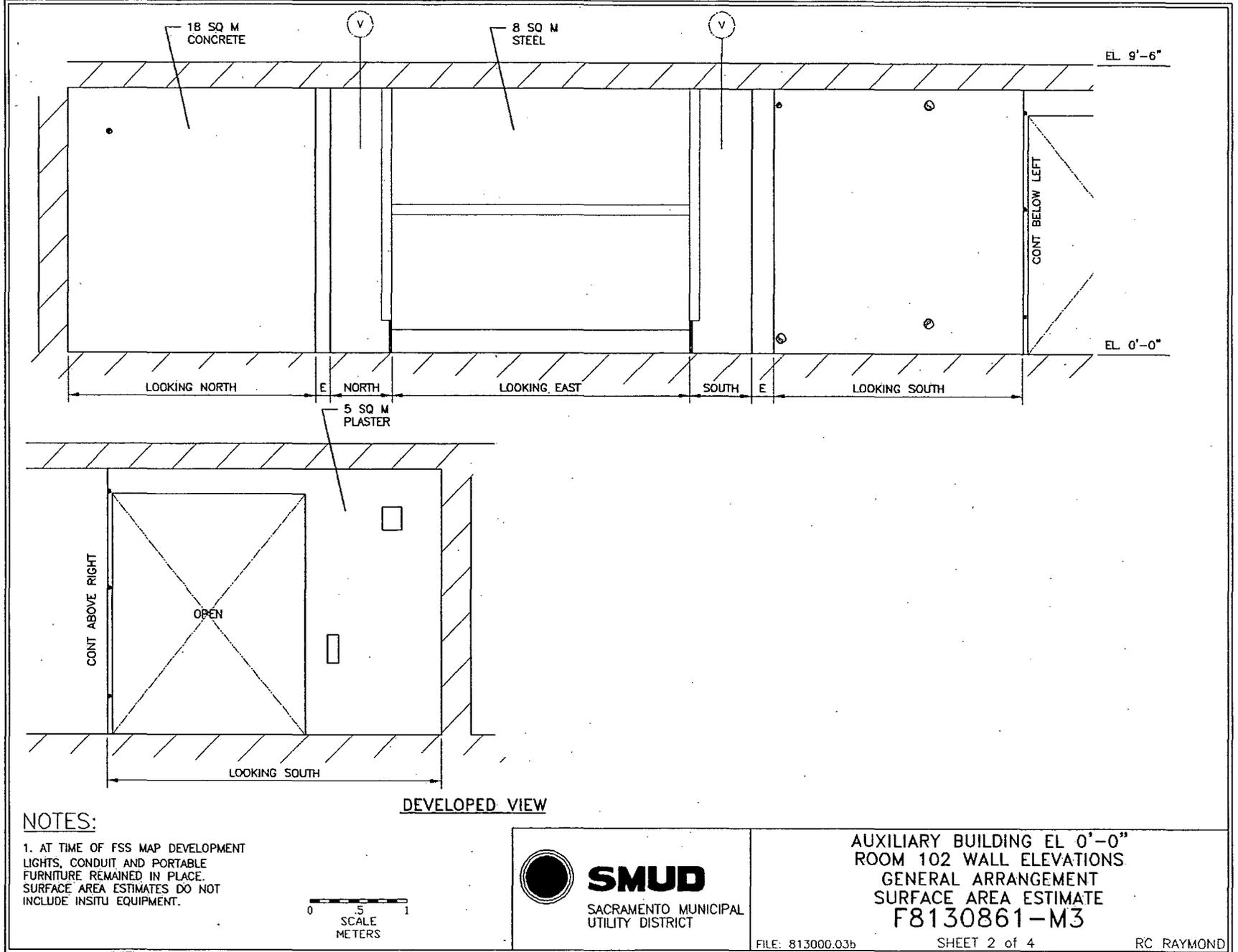
FLOOR PLAN

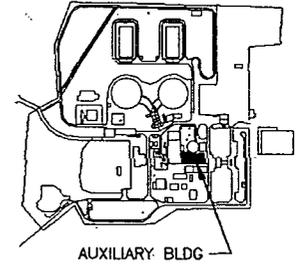
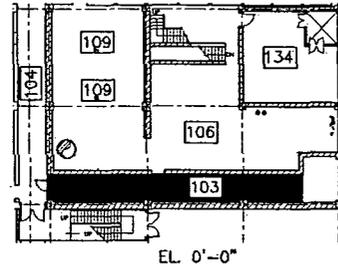
REFLECTED CEILING PLAN

NOTES:
 1. AT TIME OF FSS MAP DEVELOPMENT LIGHTS, CONDUIT AND PORTABLE FURNITURE REMAINED IN PLACE. SURFACE AREA ESTIMATES DO NOT INCLUDE INSITU EQUIPMENT.

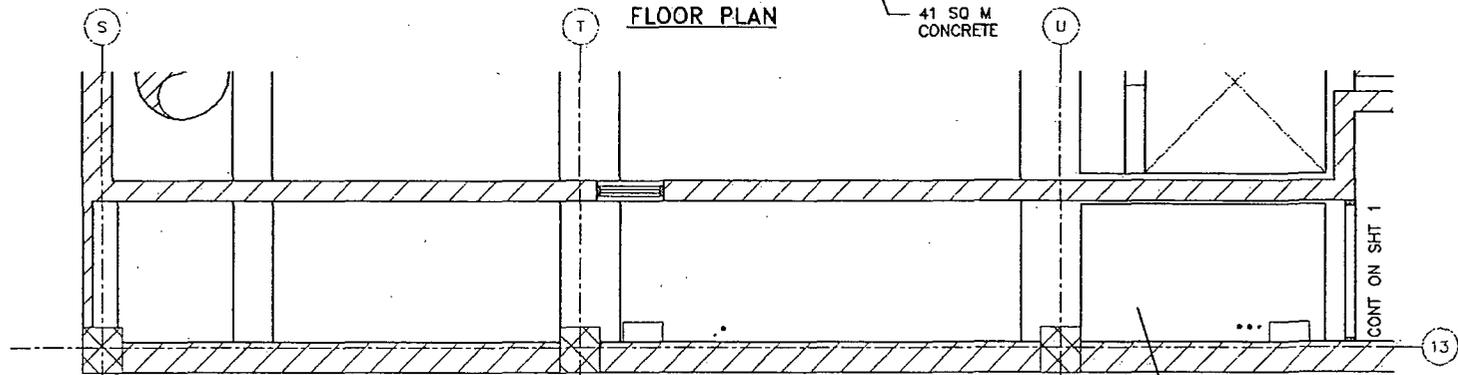
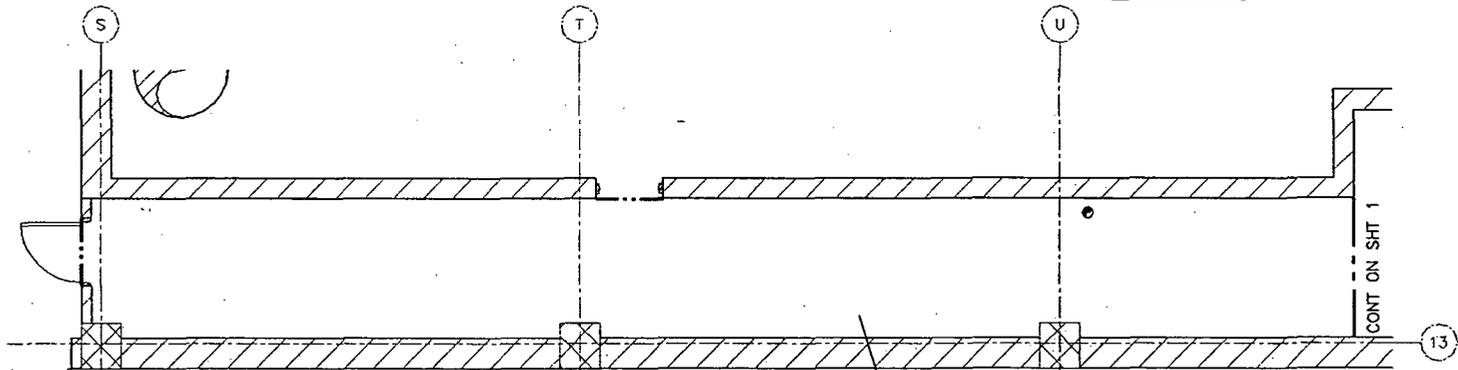


AUXILIARY BUILDING EL 0'-0"
 ROOM 102 FLOOR & REFLECTED CLG PLAN
 GENERAL ARRANGEMENT
 SURFACE AREA ESTIMATE
F8130861-M3





KEY PLANS



NOTES:

- 1. AT TIME OF FSS MAP DEVELOPMENT LIGHTS, CONDUIT AND PORTABLE FURNITURE REMAINED IN PLACE. SURFACE AREA ESTIMATES DO NOT INCLUDE INSITU EQUIPMENT.



SMUD

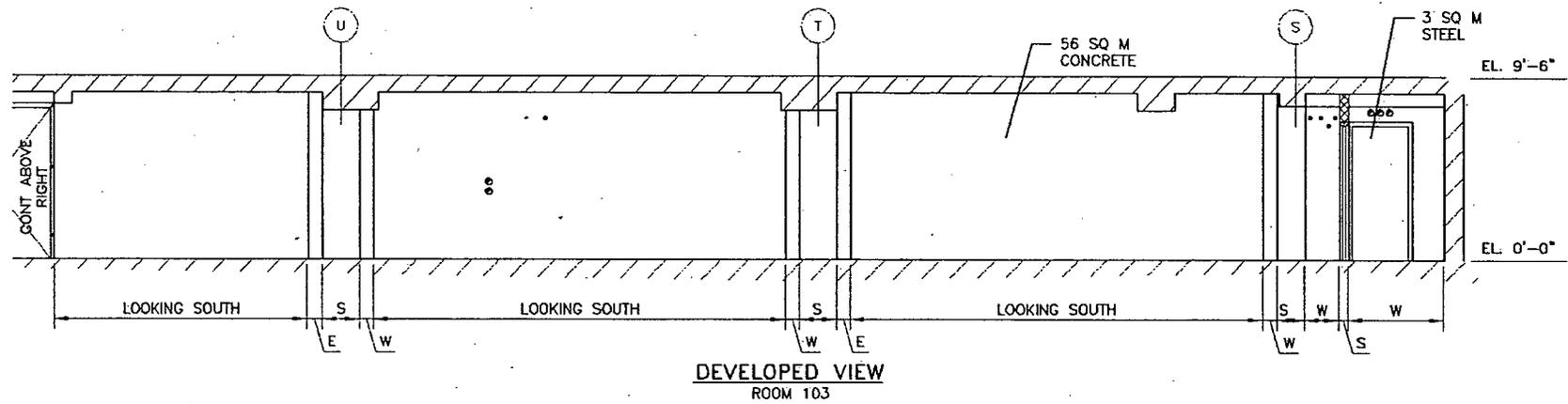
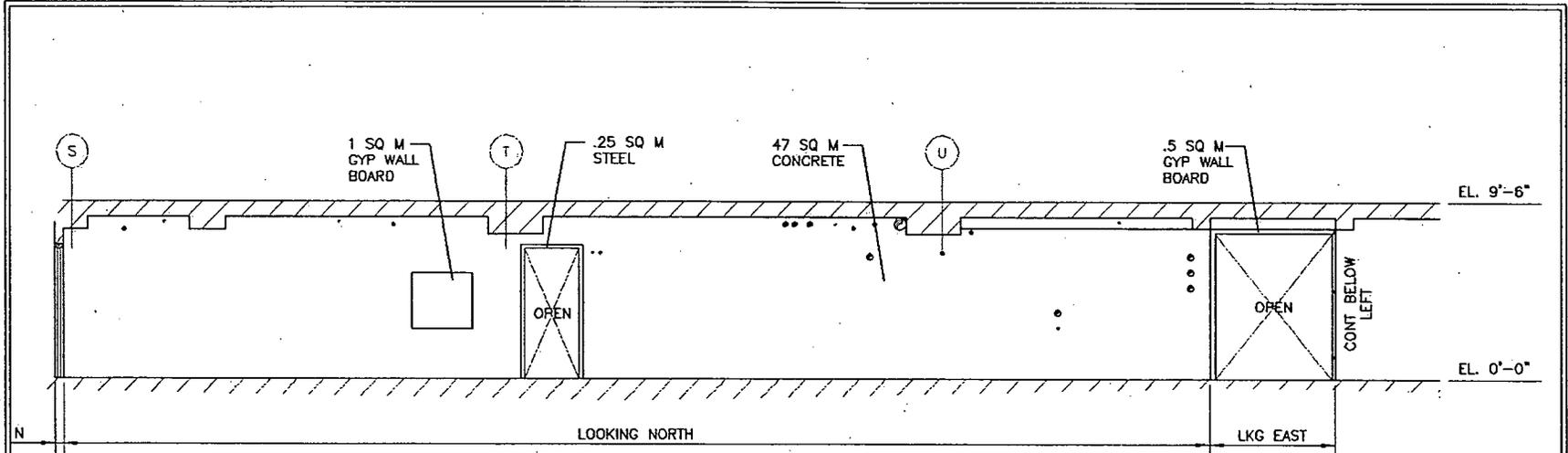
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL 0'-0"
 ROOM 103 FLOOR & CEILING PLAN
 GENERAL ARRANGEMENT
 SURFACE AREA ESTIMATE
F8130861-M3

FILE: 813000.035

SHEET 3 of 4

RC RAYMOND



NOTES:

1. AT TIME OF FSS MAP DEVELOPMENT LIGHTS, CONDUIT AND PORTABLE FURNITURE REMAINED IN PLACE. SURFACE AREA ESTIMATES DO NOT INCLUDE INSITU EQUIPMENT.



SMUD

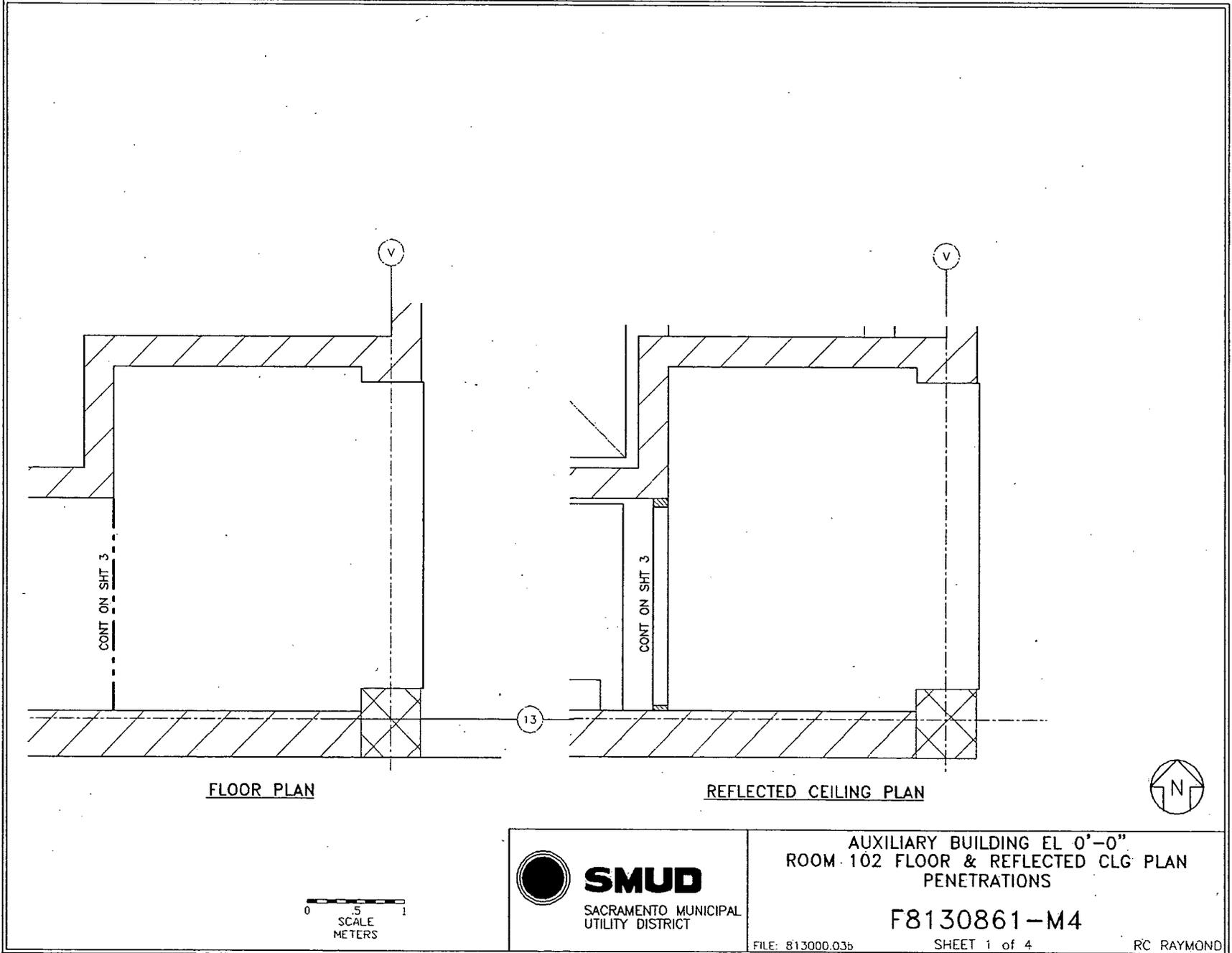
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

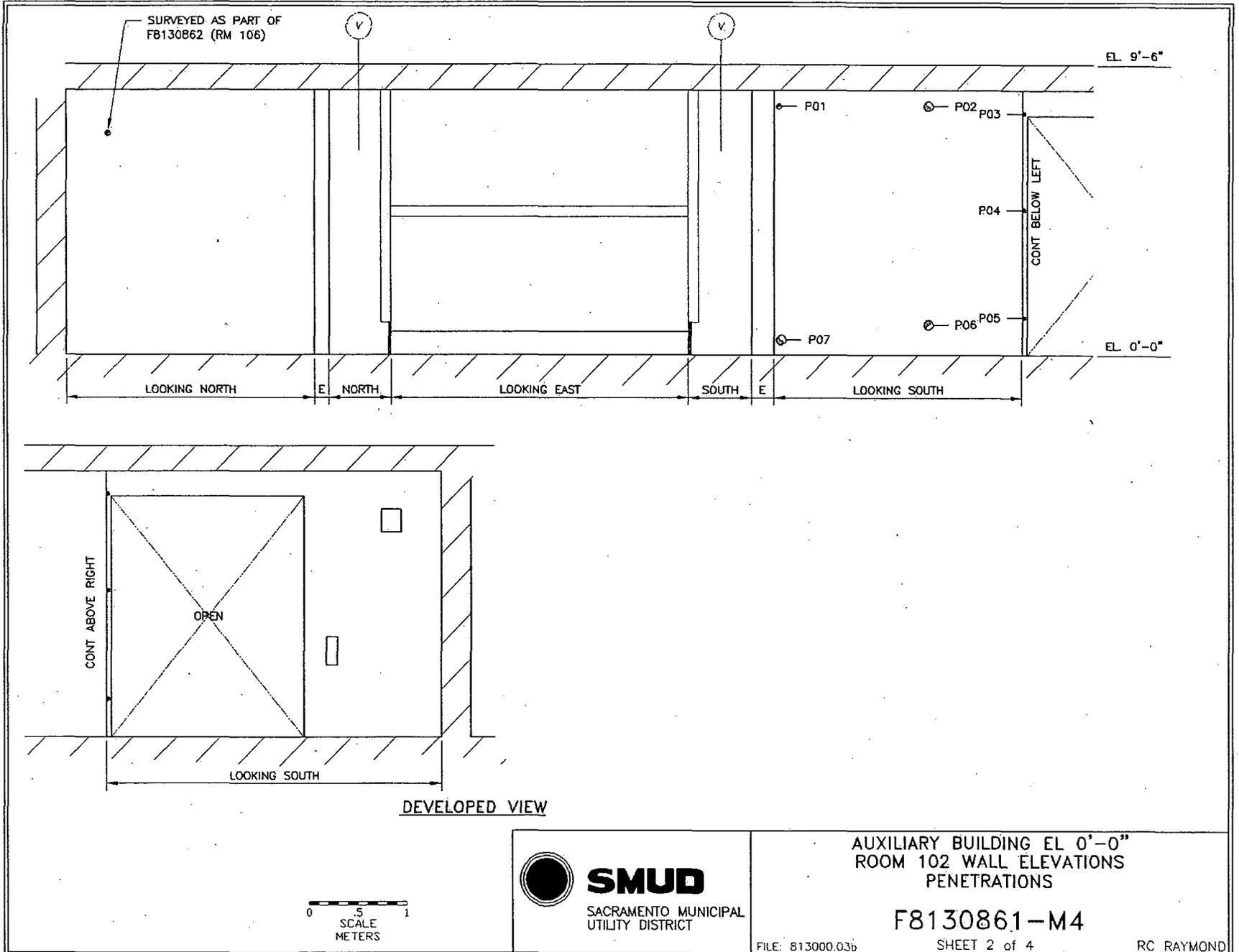
AUXILIARY BUILDING EL 0'-0"
ROOM 103 WALL ELEVATIONS
GENERAL ARRANGEMENT
SURFACE AREA ESTIMATE
F8130861-M3

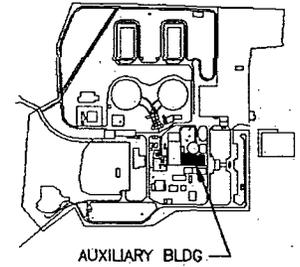
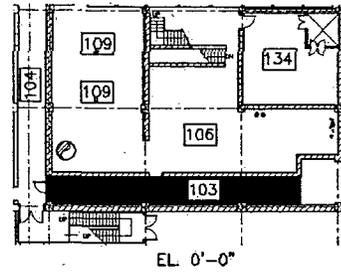
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SHEET 4 of 4

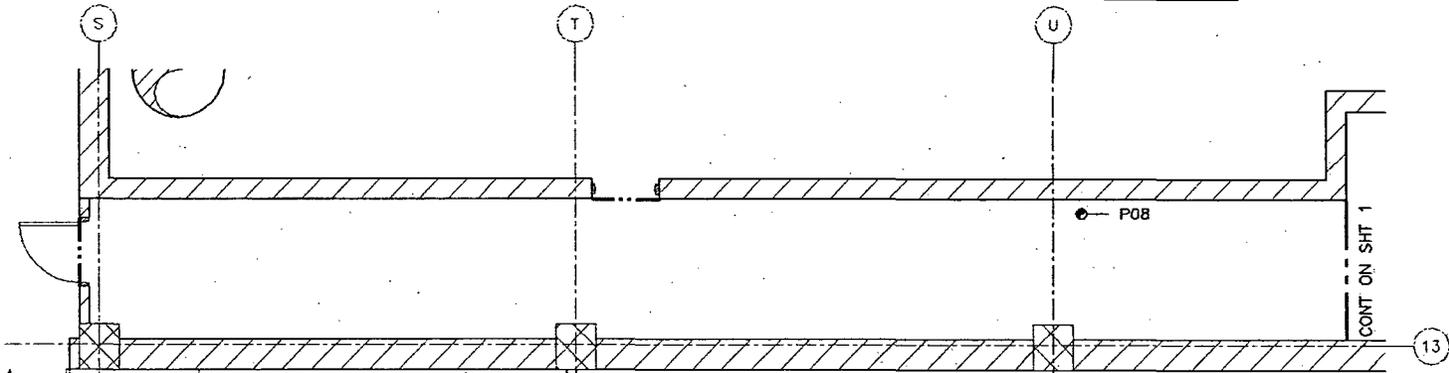
RC RAYMOND



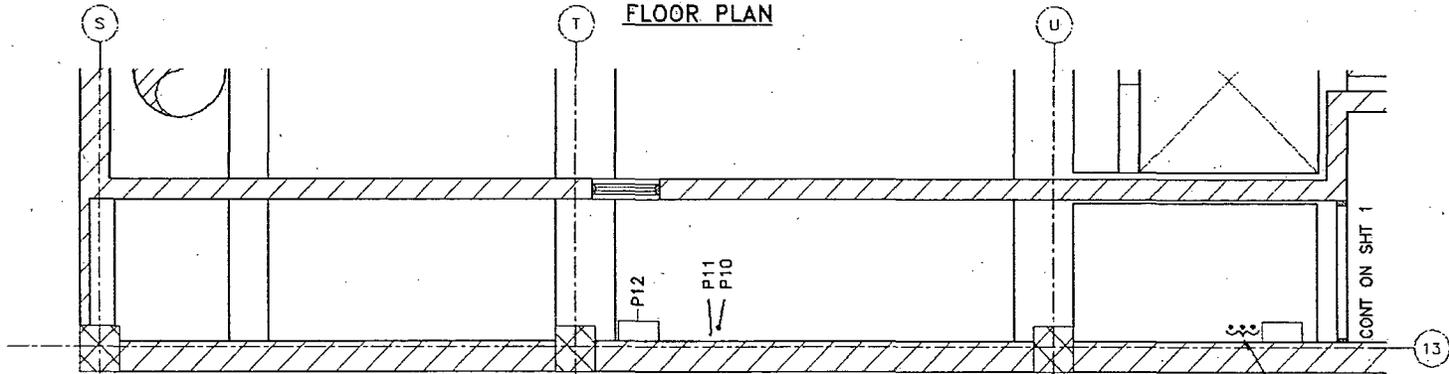




KEY PLANS



FLOOR PLAN



REFLECTED CEILING PLAN

SURVEYED AS PART OF
F8131221 (RM 133)



SMUD

SACRAMENTO MUNICIPAL
UTILITY DISTRICT

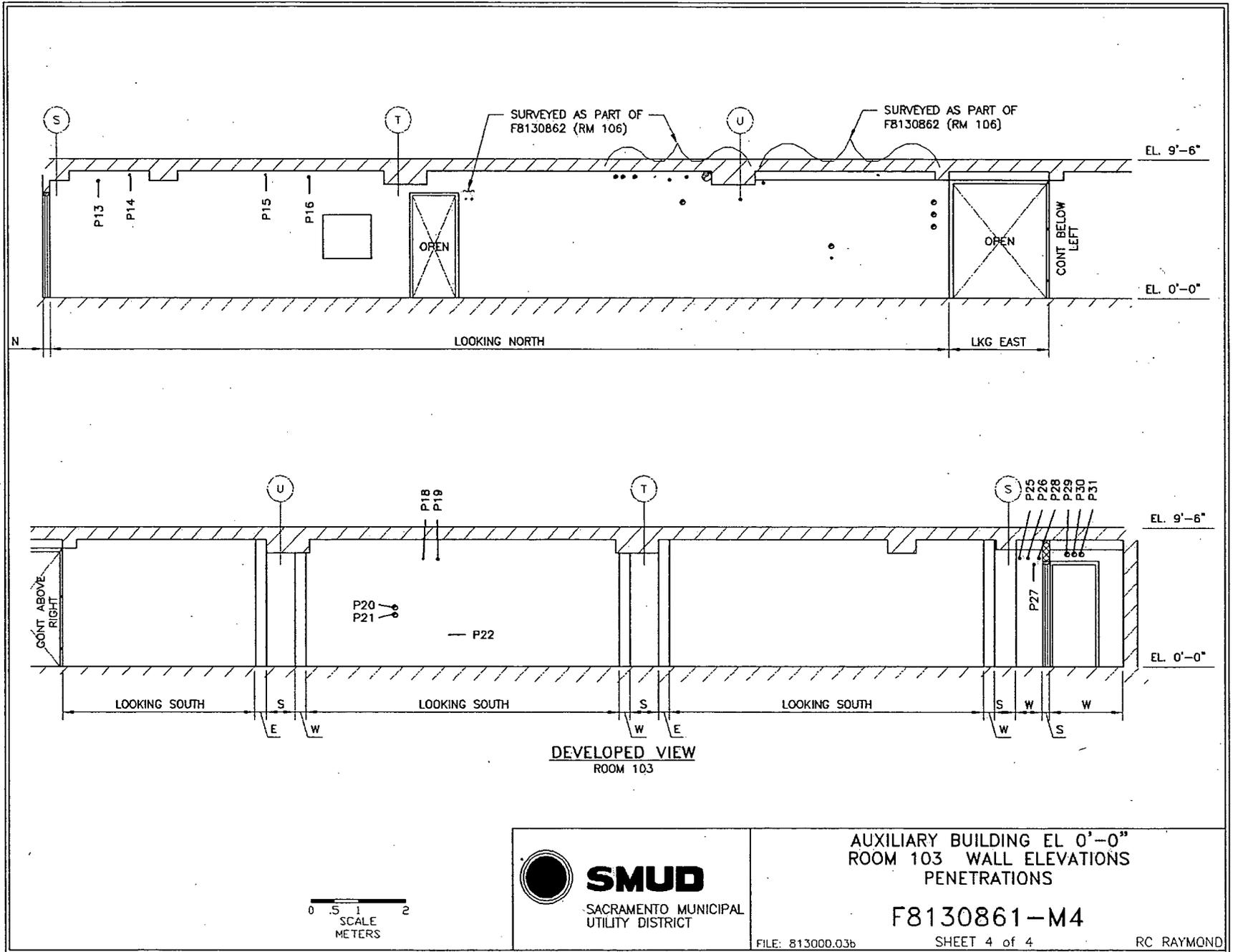
AUXILIARY BUILDING EL. 0'-0"
ROOM 103 FLOOR & CEILING PLAN
PENETRATIONS

F8130861-M4

FILE: 813000.03b

SHEET 3 of 4

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Attachment 2

Instrumentation

July 3, 2008

Survey Unit F8130861

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	43-94B; 148620	N/A	610
M2350; 203486	43-68B; 190476	912	2176
M2350; 203486	43-116-1B; 190173	N/A	2925
M2350; 180733	43-111B; 148641	N/A	4160
Tennelec; 0401171	N/A	5.9 dpm α , 11.8 dpm β	N/A

The MDC noted for the detector model 43-98B is for 3" concrete piping, for detector model 43-94B is for 1" metal piping and for detector 43-111B is for 3" metal 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

July 3, 2008

Survey Unit F8130861

(none required)

Attachment 4

Data Assessment

July 3, 2008

Survey Unit F8130861

