

Rancho Seco
Final Status Survey Summary Report
May 29, 2008
Aux. Bldg +40' Rm 322-324, & 351
Survey Unit F8131811

Prepared By: Dan A. Tallman  **Date:** May 29, 2008

FSS Engineer

Reviewed By:  **Date:** 5/29/08

Lead FSS Engineer

Approved By:  **Date:** 7-29-08

Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8131811, Aux. Bldg +40' Rm 322-324, & 351

Survey Unit Description:

Operating History: The Auxiliary Building is a reinforced concrete structure which 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.

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 +40' elevation showed a mean gross activity level of 3,288 dpm/100 cm² and a maximum value of 24,781 dpm/100 cm². Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the interior of rooms 322-324, & 351 of the auxiliary building was determined to be a Class 3

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 randomly determined and 137.75 m² were scanned for approximately 16% 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	Aux. Bldg +40' Rm 322-324, & 351
Survey Unit:	1811	Structure Surface
Class:	3	LTP Table 5-4
SU Area (m²):	853	
Evaluator:	D.A.Tallman	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	N/A	Class 3
Design DCGL_{mc} (dpm/100 cm²):	N/A	Class 3
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	3627	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	N/A	Class 3
Scan Area (m²):	137.75	
Scan Coverage (%):	16%	Class 3
Z_{1-α} :	1.645	
Z_{1-β} :	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	5.9	
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 3
Grid Spacing L:	N/A	Class 3

Survey Results:

A total of 14 direct measurements were made in F8131811. 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 1929 to 6155 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)
F8131811-C0001BD	1592
F8131811-C0002BD	1048
F8131811-C0003BD	1359
F8131811-C0004BD	1447
F8131811-C0005BD	1105
F8131811-C0006BD	1276
F8131811-C0007BD	1790
F8131811-C0008BD	1354
F8131811-C0009BD	1484
F8131811-C0010BD	1618
F8131811-C0011BD	1172
F8131811-C0012BD	1354
F8131811-C0013BD	1572
F8131811-C0014BD	1478
Mean:	1404
Median:	1403
Standard Deviation:	209
Range:	1048 - 1790

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm²)
F8131811C0004SM	8.09
F8131811C0001SM	-2.24
F8131811C0002SM	4.22
F8131811C0003SM	-4.82
F8131811C0004SM	1.64
F8131811C0005SM	-4.82
F8131811C0006SM	-4.82
F8131811C0007SM	5.51
F8131811C0008SM	0.34
F8131811C0009SM	-3.53
F8131811C0010SM	-2.24
F8131811C0011SM	-4.82
F8131811C0012SM	-2.24
F8131811C0013SM	-3.53
F8131811C0014SM	-0.95
Mean:	-0.95
Median:	-2.24
Standard Deviation:	4.11
Range:	-4.82 to 8.09

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	Average Ambient BKG = 0
Ambient Background Used (dpm/100 cm ²):	N/A	
Actual Direct Measurements (N):	14	
Median (dpm/100 cm ²):	1403	
Mean (dpm/100 cm ²):	1404	
Direct Measurement Standard Deviation	209	Based on samples and backgrounds.
(dpm/100 cm ²):		
Total Standard Deviation (dpm/100 cm ²):	209	
Maximum (dpm/100 cm ²):	1790	
Material Type:	N/A	
Sign Test Final N Value:	14	Background Subtract Not Applied
S+ Value:	14	
Critical Value:	10	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	Class 3
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), the ALARA criterion has been met.

Changes in Initial Survey Unit Assumptions:

The survey unit was designed as a Class 3 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 3 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.

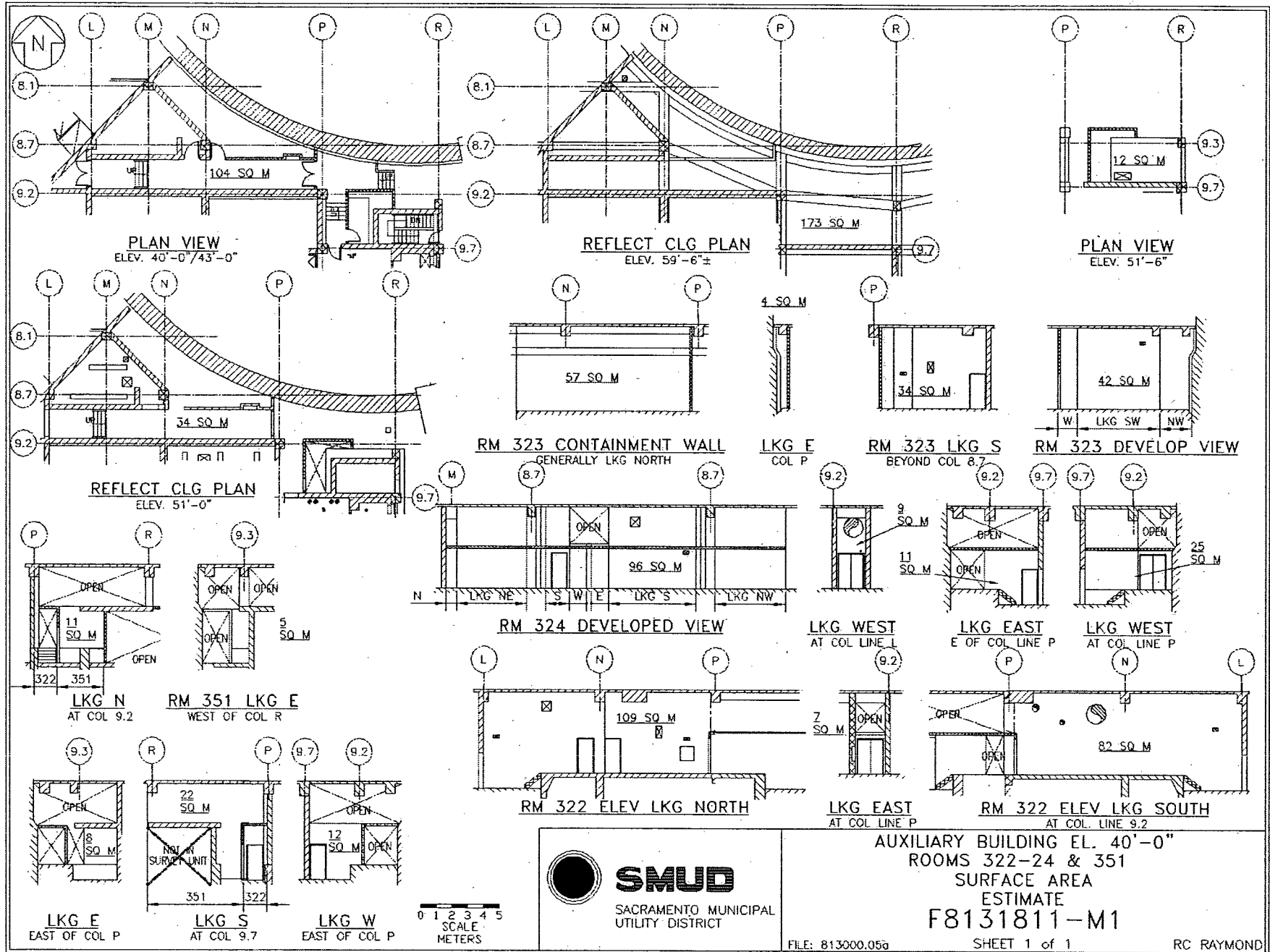
It is concluded that survey unit F8131811 meets the release criteria of 10CFR20.1402.

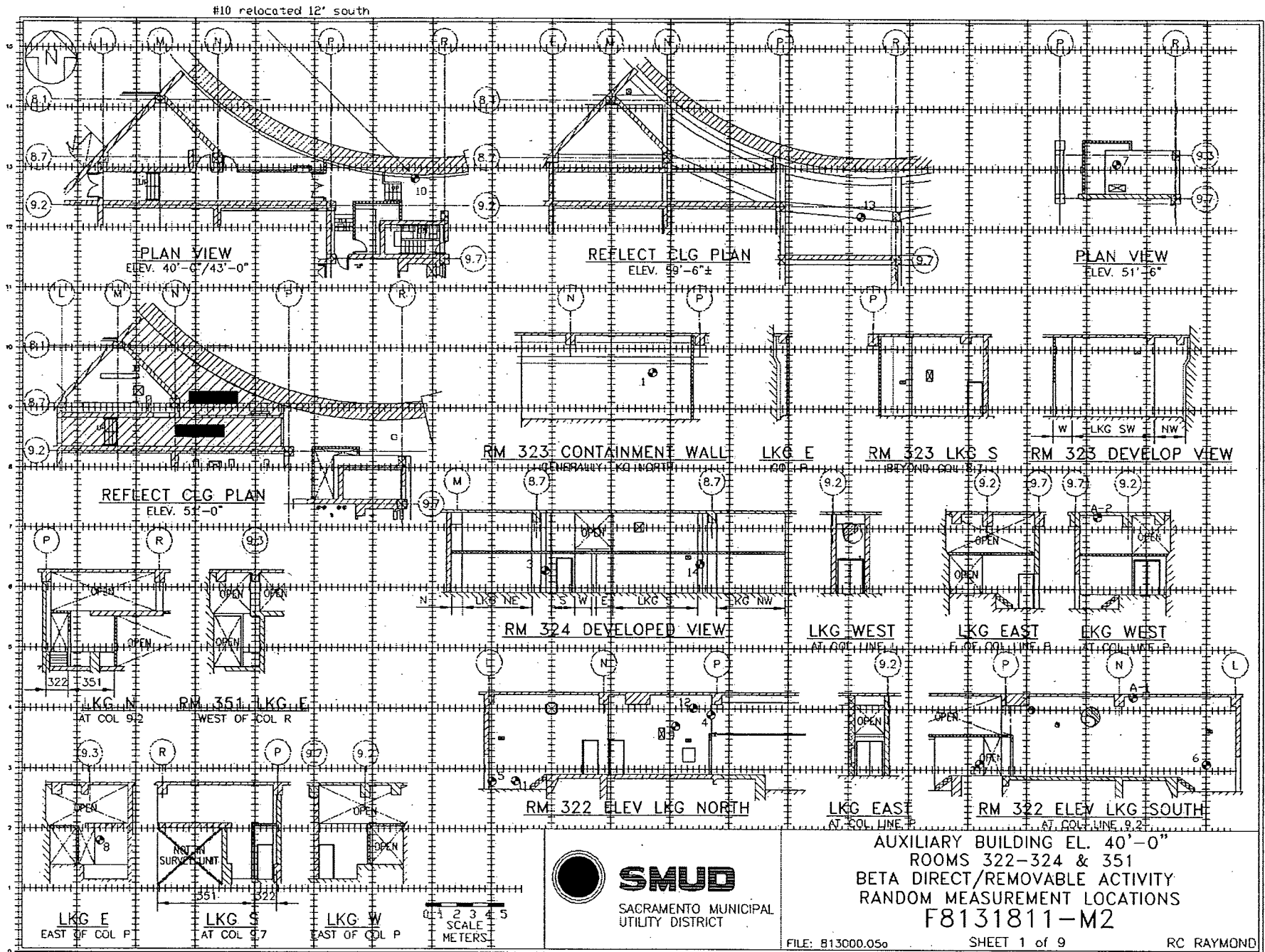
Attachment 1

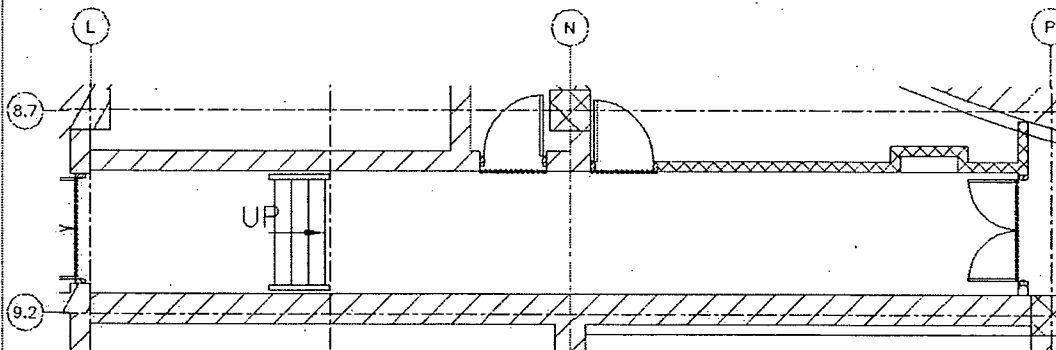
Maps

May 29, 2008

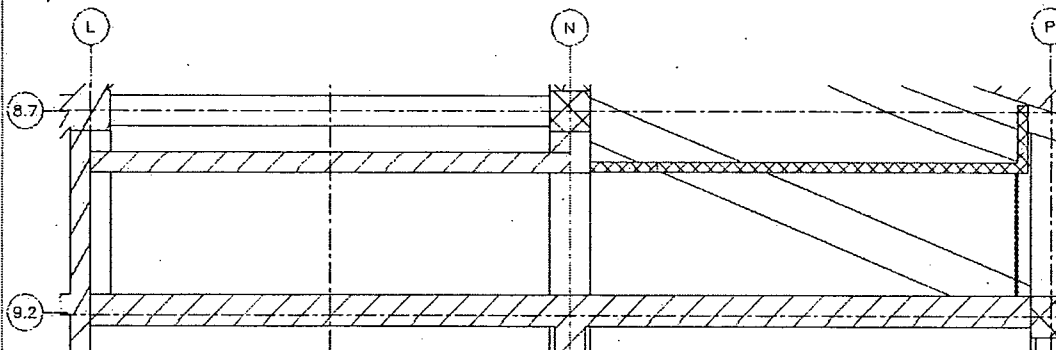
Survey Unit F8131811



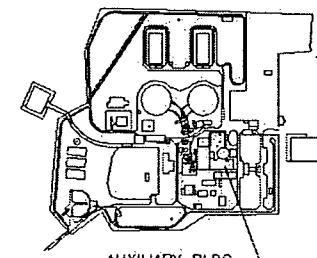
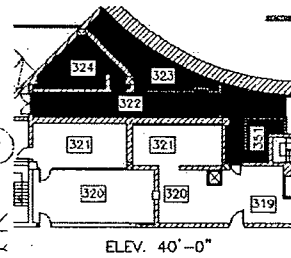




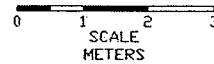
ROOM 322 PLAN VIEW
ELEV. 43'-0"



ROOM 322 REFLECTED CEILING VIEW
ELEV. 59'-6"±



KEY PLANS



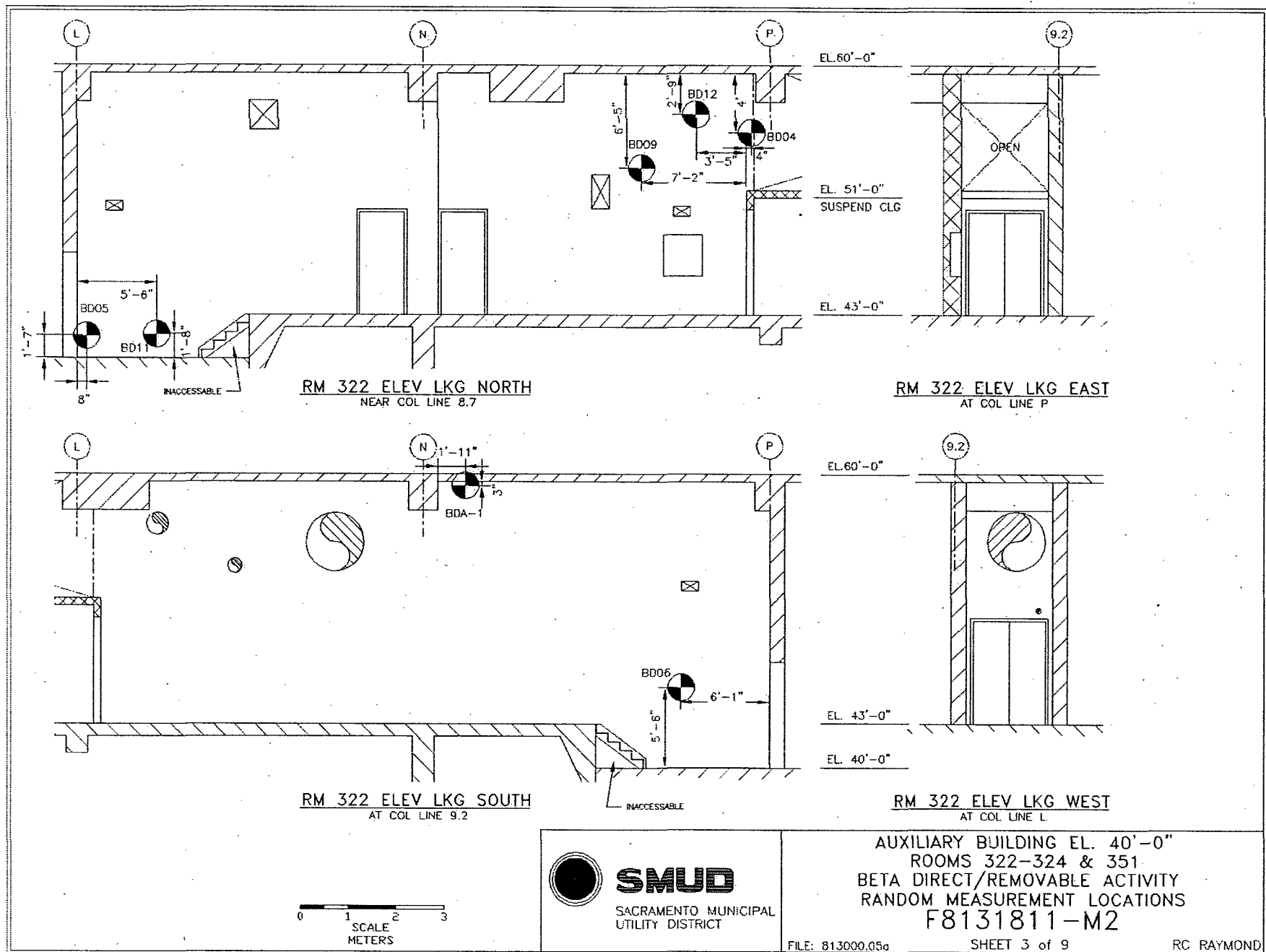
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

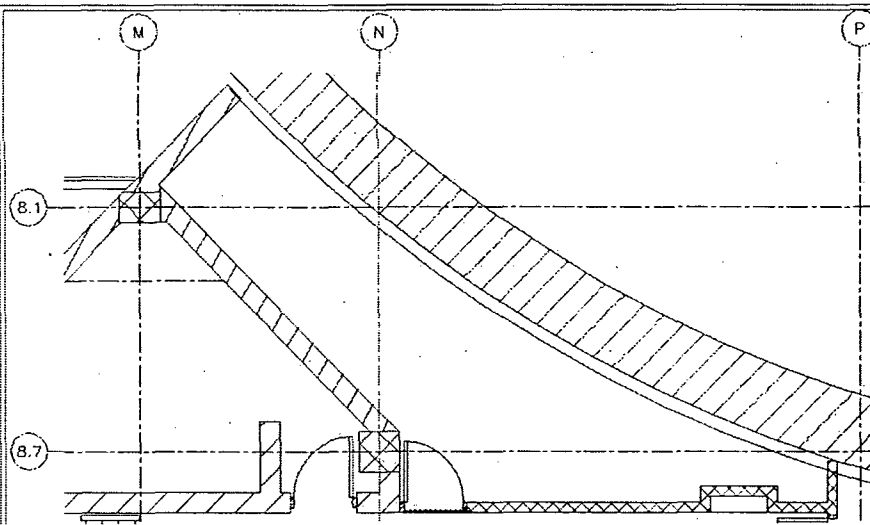
AUXILIARY BUILDING EL. 40'-0"
ROOMS 322-324 & 351
BETA DIRECT/REMOVABLE ACTIVITY
RANDOM MEASUREMENT LOCATIONS
F8131811-M2

FILE: 813000.05a

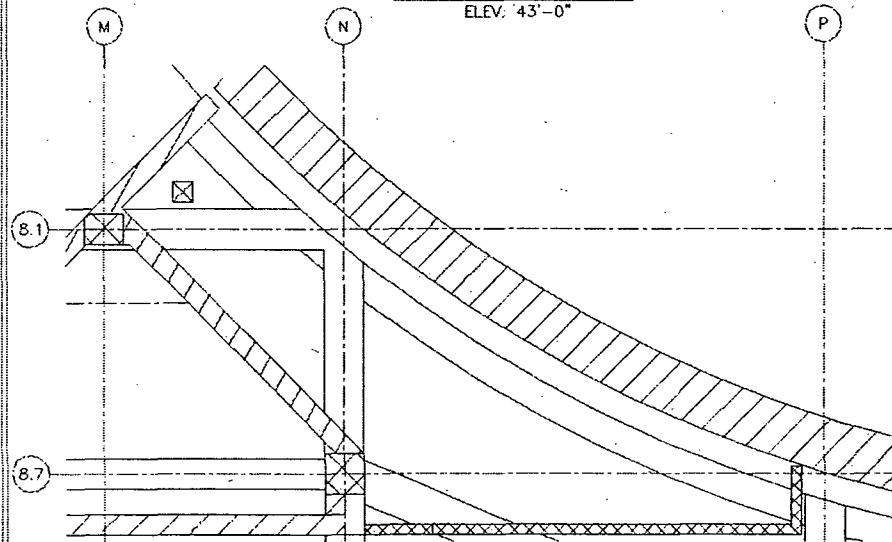
SHEET 2 of 9

RC RAYMOND

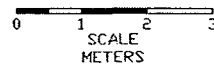




RM 323 PLAN VIEW
ELEV. 43'-0"



RM 323 REFLECTED CEILING VIEW
ELEV. 59'-6"±



SMUD

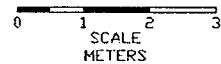
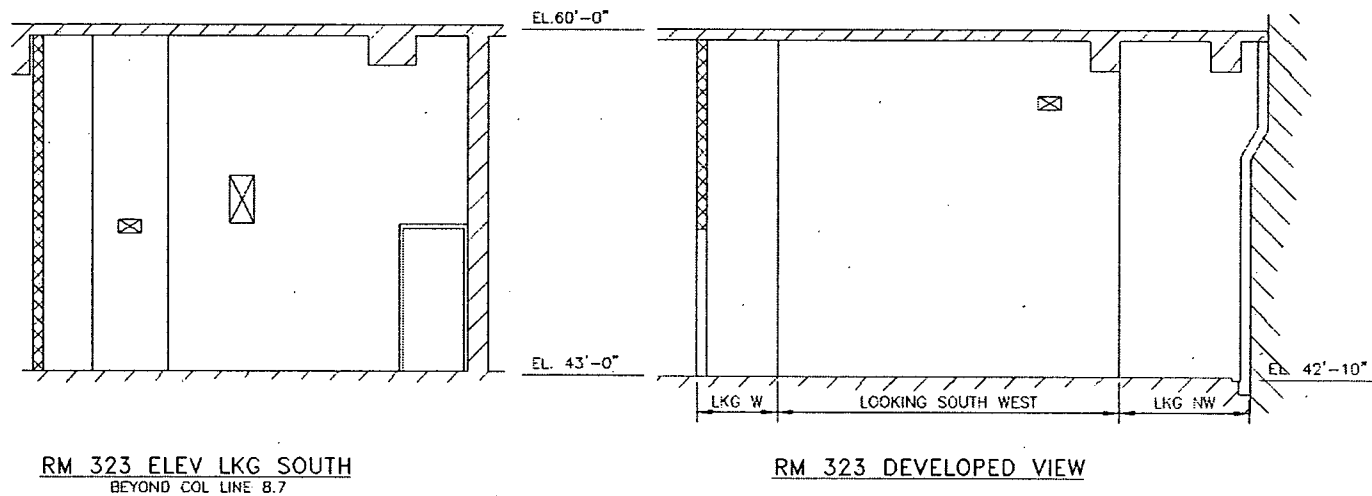
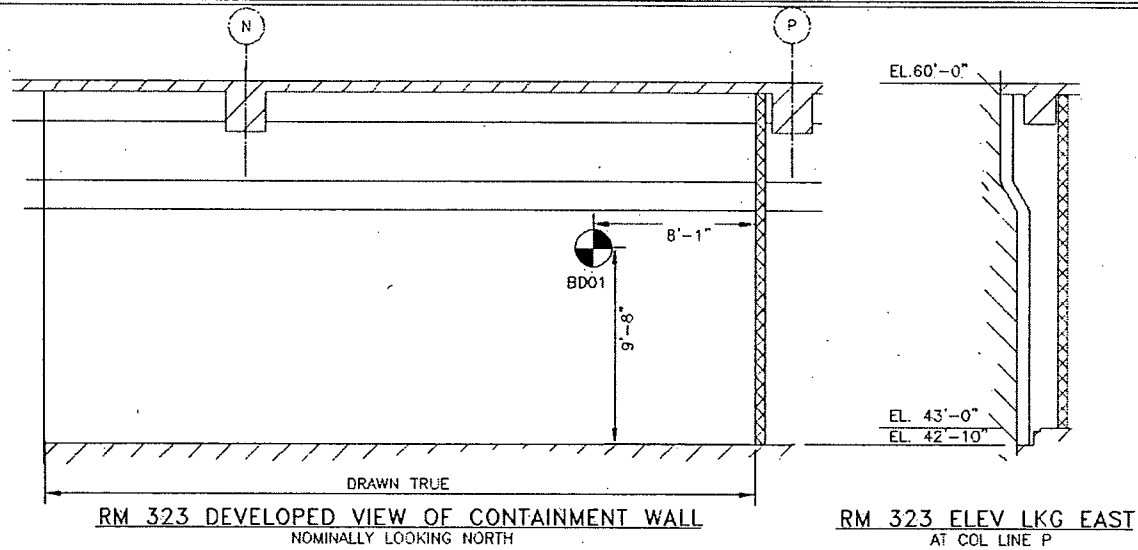
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

AUXILIARY BUILDING EL. 40'-0"
ROOMS 322-324 & 351
BETA DIRECT/REMOVABLE ACTIVITY
RANDOM MEASUREMENT LOCATIONS
F8131811-M2

FILE: 813000.05g

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RC RAYMOND



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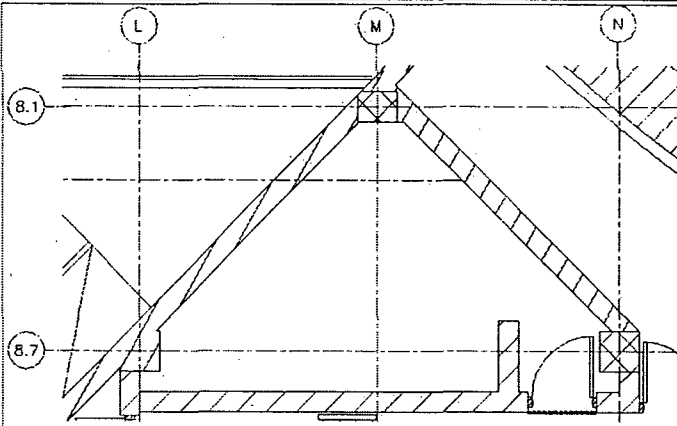
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UTILITY DISTRICT

AUXILIARY BUILDING EL. 40'-0"
ROOMS 322-324 & 351
BETA DIRECT/REMOVABLE ACTIVITY
RANDOM MEASUREMENT LOCATIONS
F8131811-M2

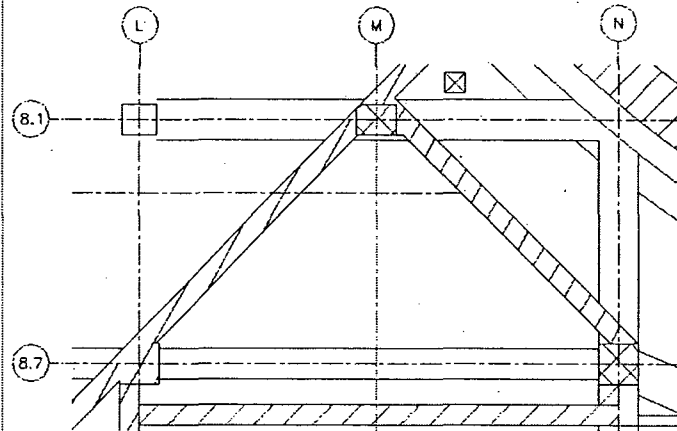
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SHEET 5 of 9

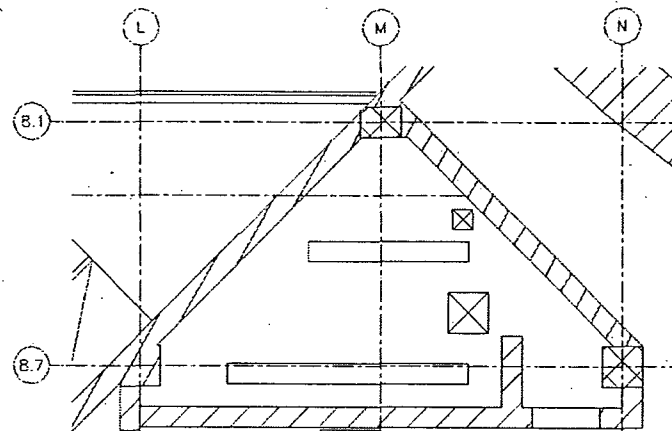
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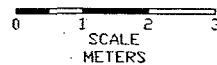
RM 324 PLAN VIEW
ELEV. 43'-0"



RM 324 REFLECTED CEILING VIEW
ELEV. 59'-6"±



RM 324 REFLECTED CEILING VIEW
ELEV. 53'-0"



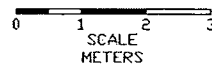
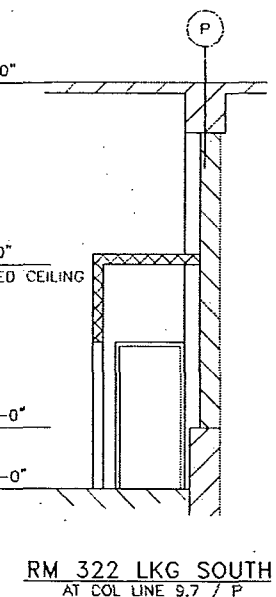
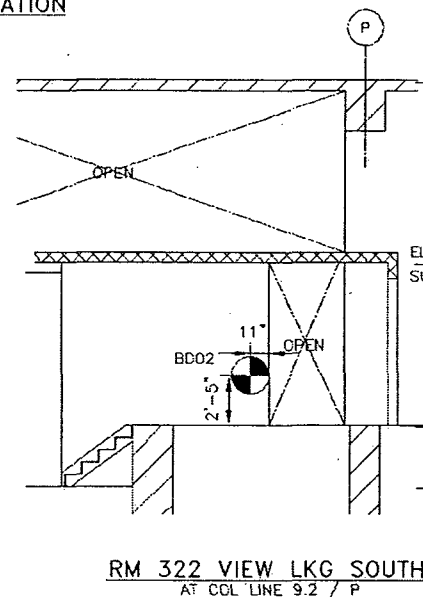
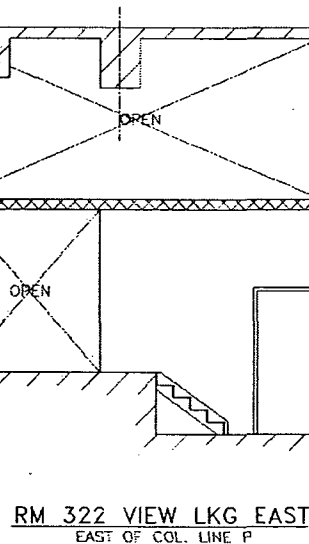
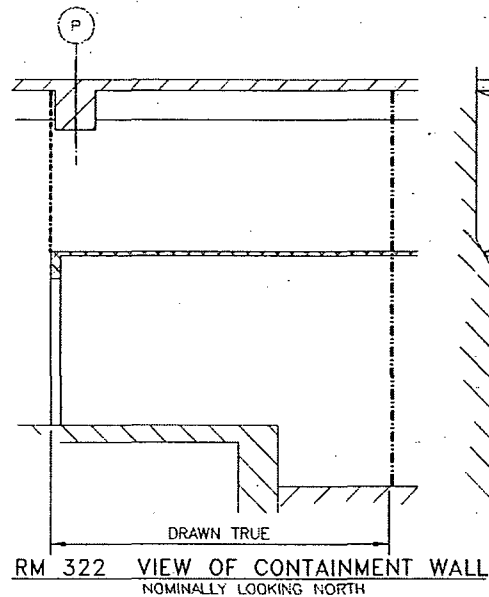
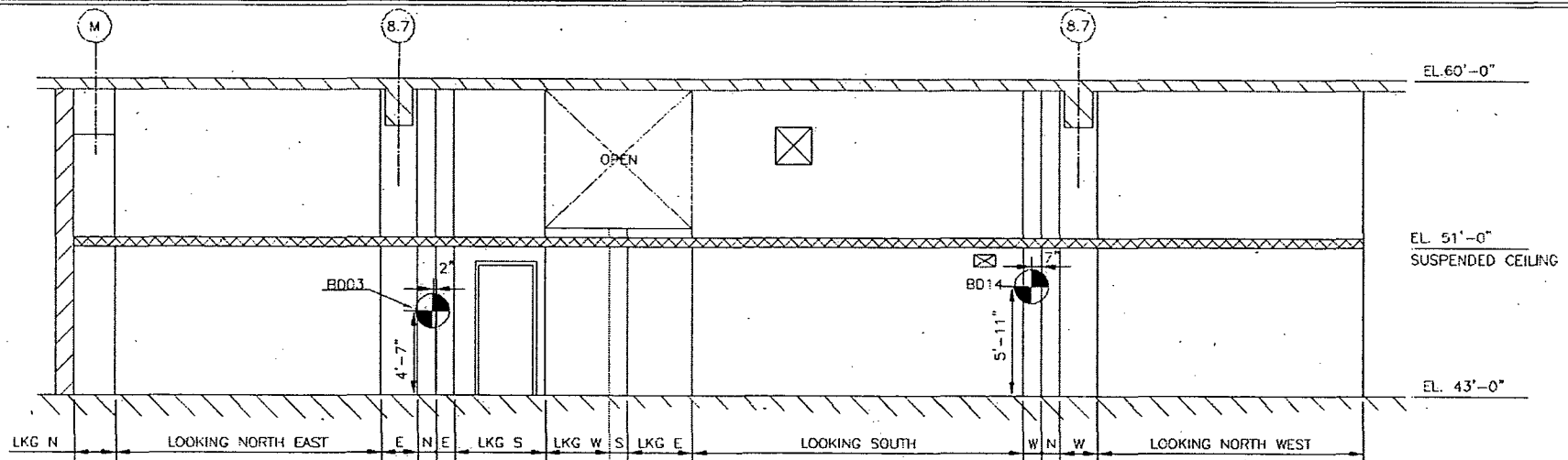
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

AUXILIARY BUILDING EL. 40'-0"
ROOMS 322-324 & 351
BETA DIRECT/REMOVABLE ACTIVITY
RANDOM MEASUREMENT LOCATIONS
F8131811-M2

FILE: 813000.05a

SHEET 6 of 9

RC RAYMOND

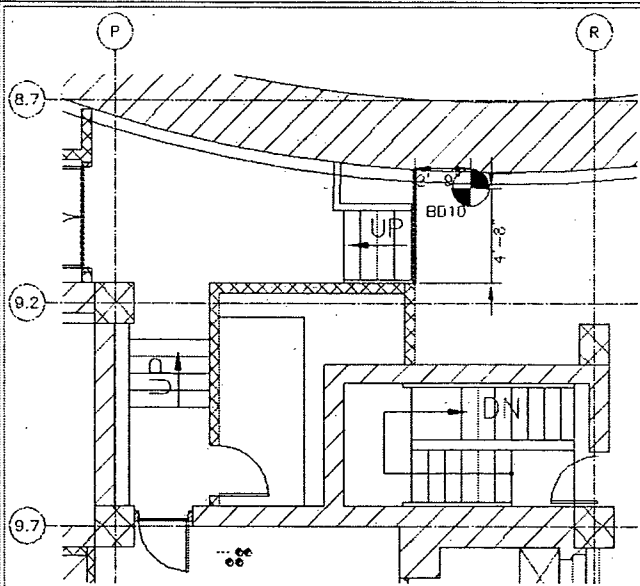


AUXILIARY BUILDING EL. 40'-0"
ROOMS 322-324 & 351
BETA DIRECT/REMOVABLE ACTIVITY
RANDOM MEASUREMENT LOCATIONS
F8131811-M2

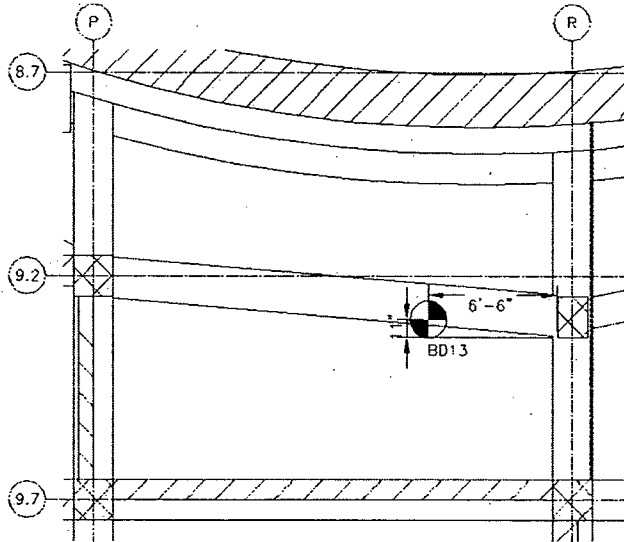
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SHEET 7 of 9

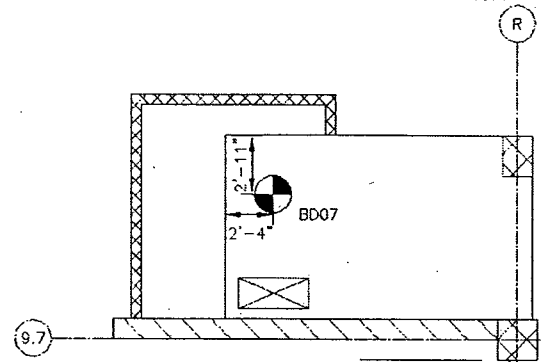
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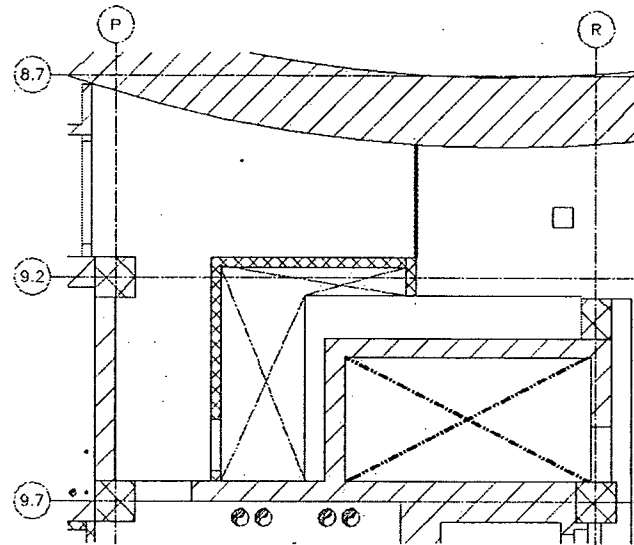
ROOM 322/351 PLAN VIEW
ELEV. 40'-0"/43'-0"



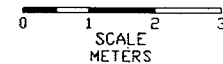
ROOM 322/351 REFLECTED CEILING VIEW
ELEV. 59'-6"±



ROOM 351 PLAN VIEW
ELEV. 51'-6"



ROOM 322/351 REFLECTED CEILING VIEW
ELEV. 51'-0"



SMUD

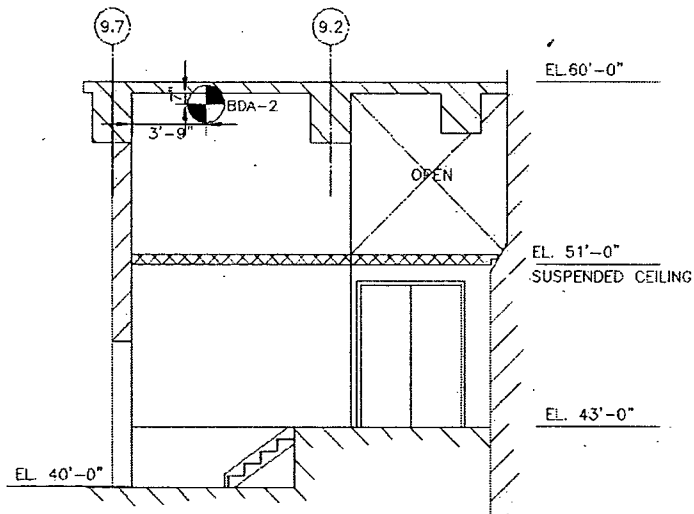
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

AUXILIARY BUILDING EL. 40'-0"
ROOMS 322-324 & 351
BETA DIRECT/REMOVABLE ACTIVITY
RANDOM MEASUREMENT LOCATIONS
F8131811-M2

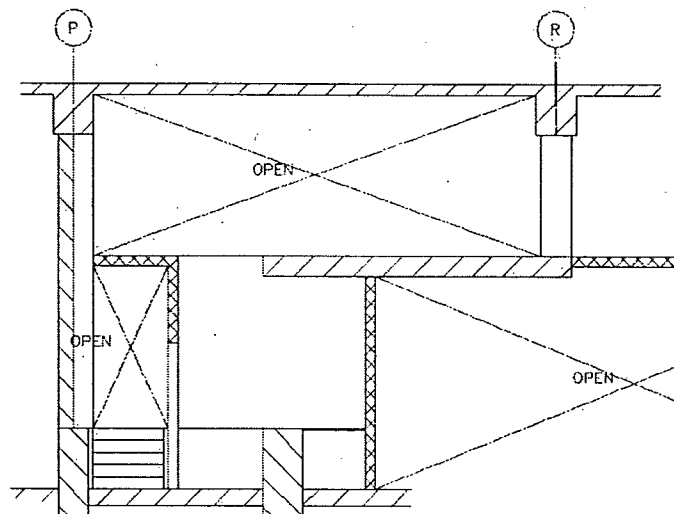
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SHEET 8 of 9

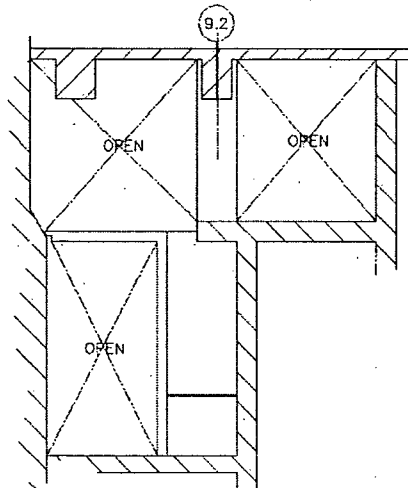
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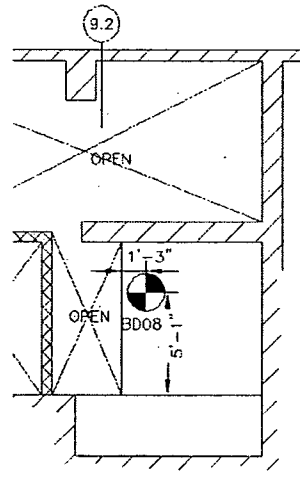
RM 322 VIEW LKG WEST
AT COL LINE P



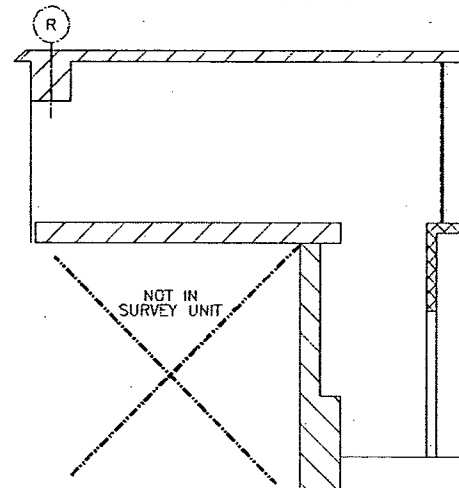
RM 322/351 VIEW LKG NORTH
AT COL LINE 9.2



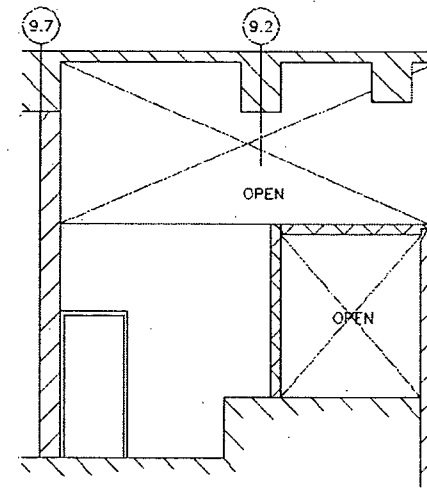
RM 351 VIEW LKG EAST
WEST OF COL LINE R



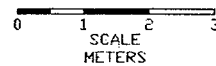
RM 351 VIEW LKG EAST
EAST OF COL LINE P



RM 351 VIEW LKG SOUTH
AT COL LINE 9.7



RM 351 VIEW LKG WEST
EAST OF COL LINE P



SMUD

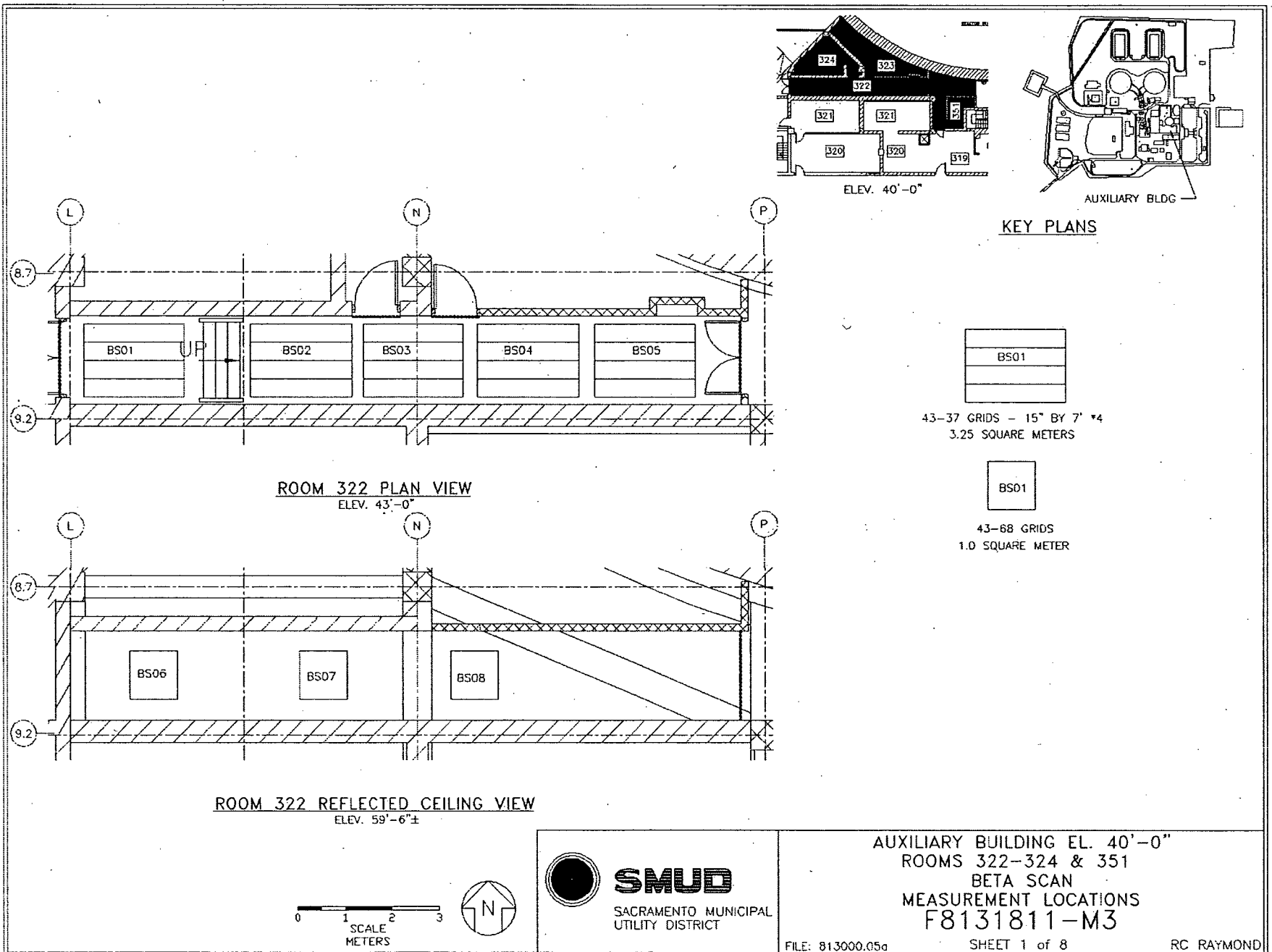
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

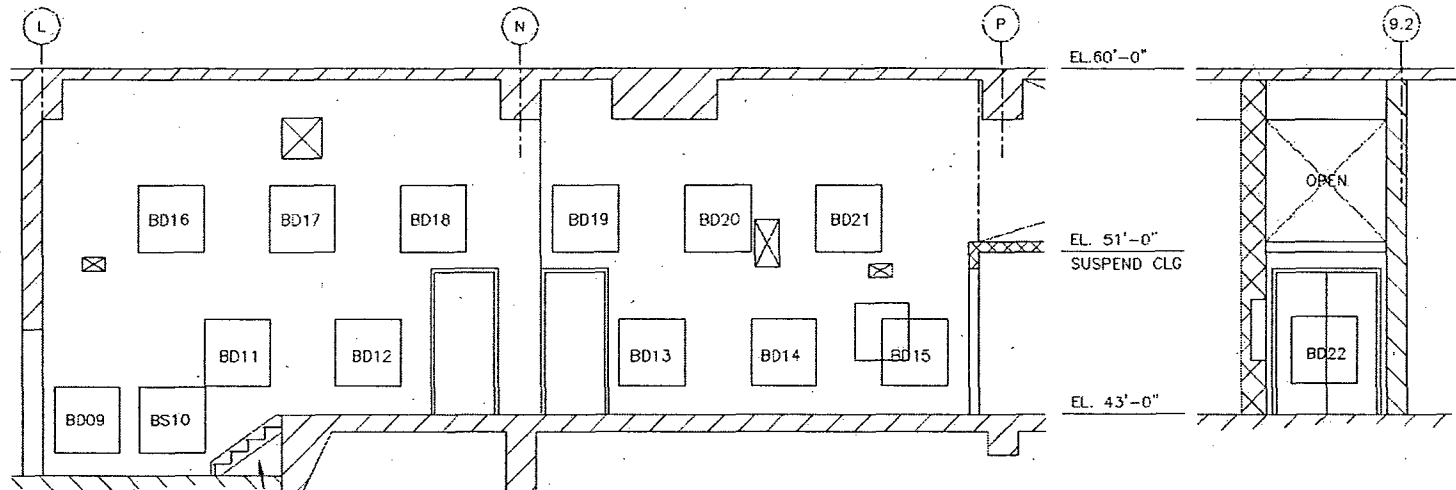
AUXILIARY BUILDING EL. 40'-0"
ROOMS 322-324 & 351
BETA DIRECT/REMOVABLE ACTIVITY
RANDOM MEASUREMENT LOCATIONS
F8131811-M2

FILE: 813000.05a

SHEET 9 of 9

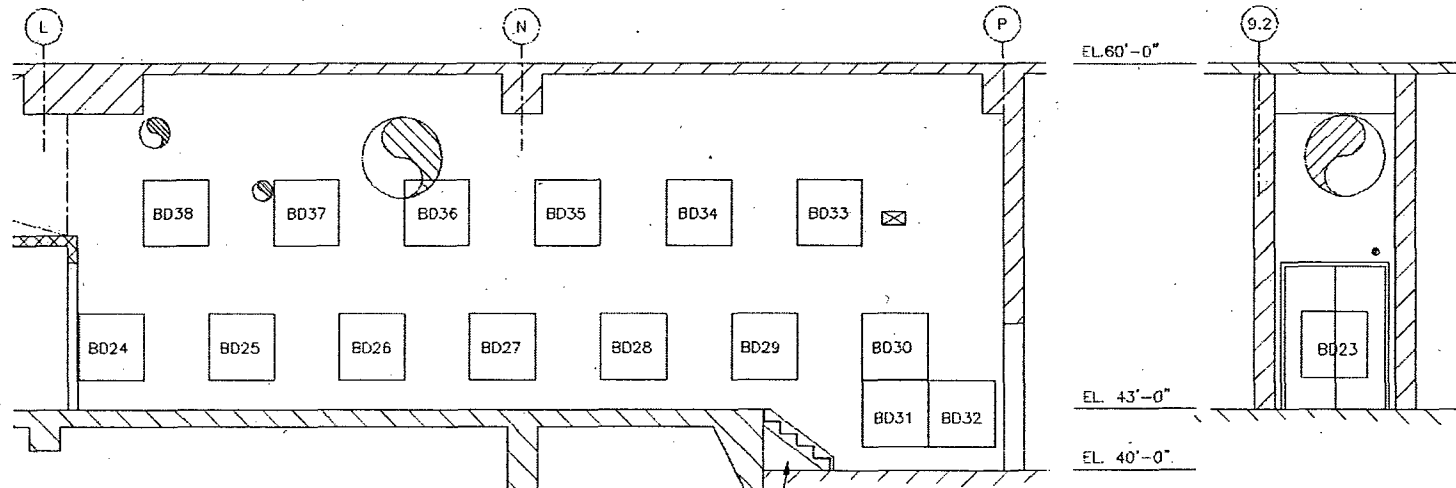
RC RAYMOND





RM 322 ELEV LKG NORTH
NEAR COL LINE 8.7

RM 322 ELEV LKG EAST
AT COL LINE P



RM 322 ELEV LKG SOUTH
AT COL LINE 9.2

RM 322 ELEV LKG WEST
AT COL LINE L

43-68 GRIDS
1.0 SQUARE METER

0 1 2 3
SCALE
METERS

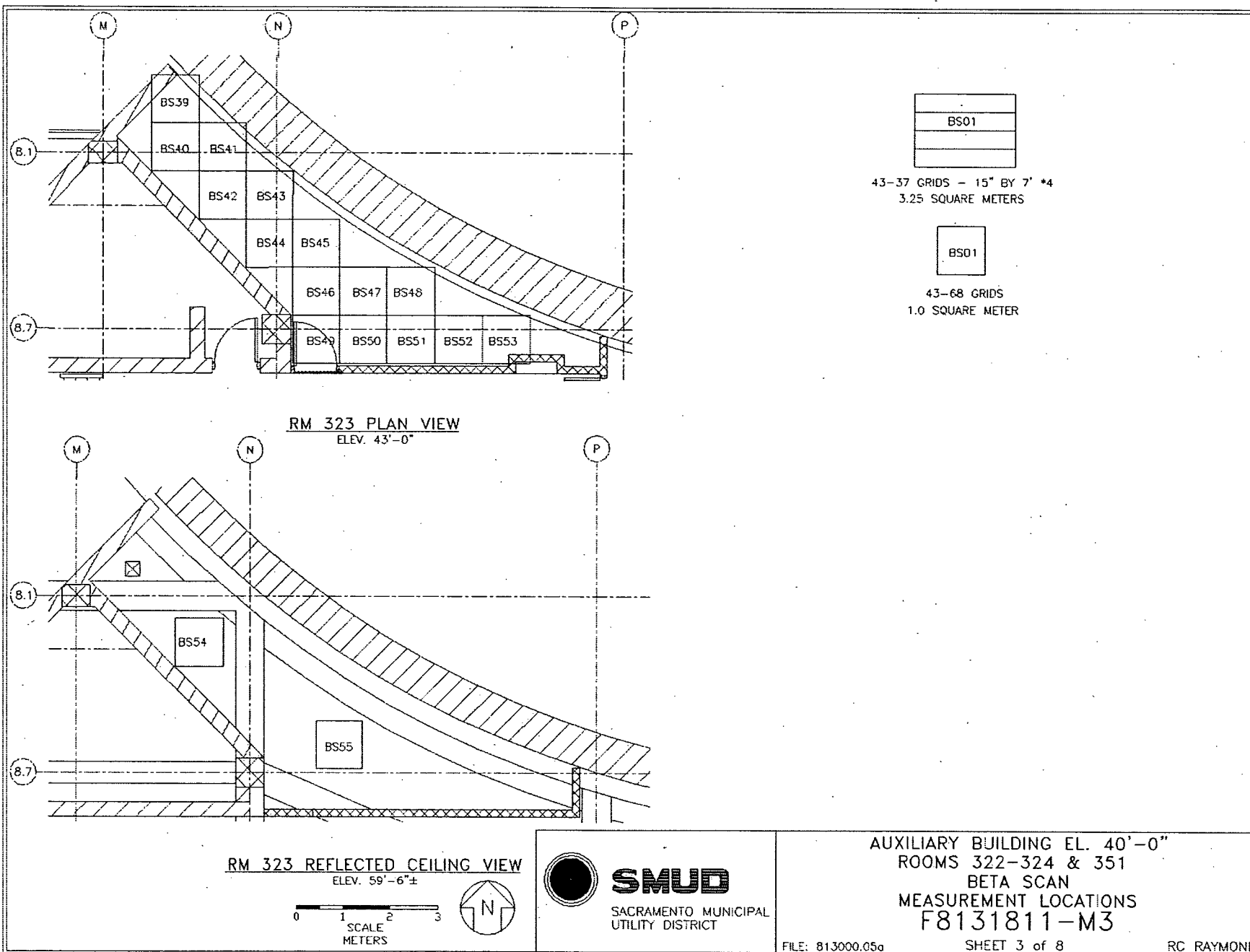


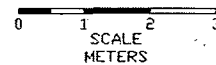
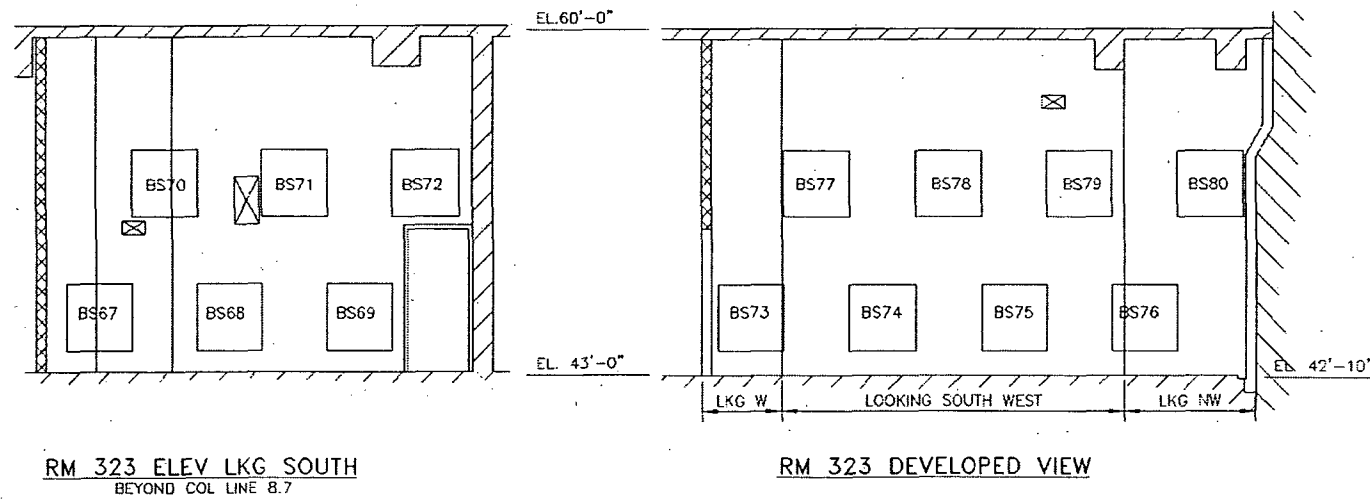
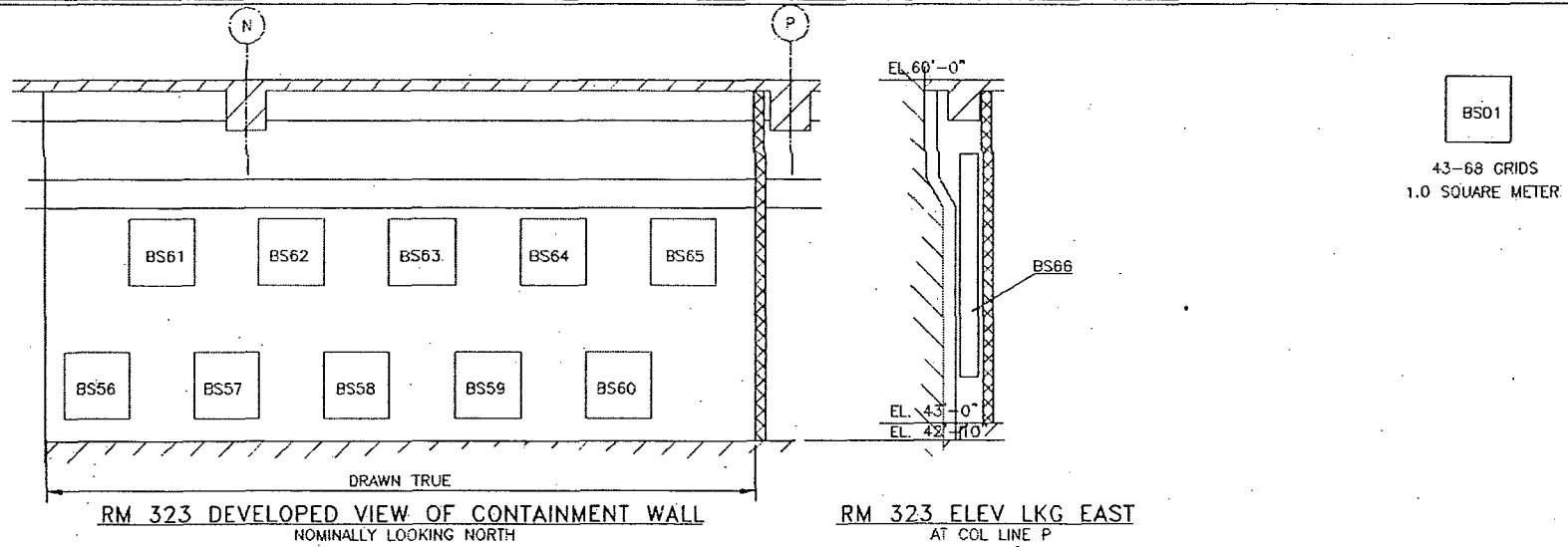
AUXILIARY BUILDING EL. 40'-0"
ROOMS 322-324 & 351
BETA SCAN
MEASUREMENT LOCATIONS
F8131811-M3

FILE: 813000.05d

SHEET 2 of 8

RC. RAYMOND





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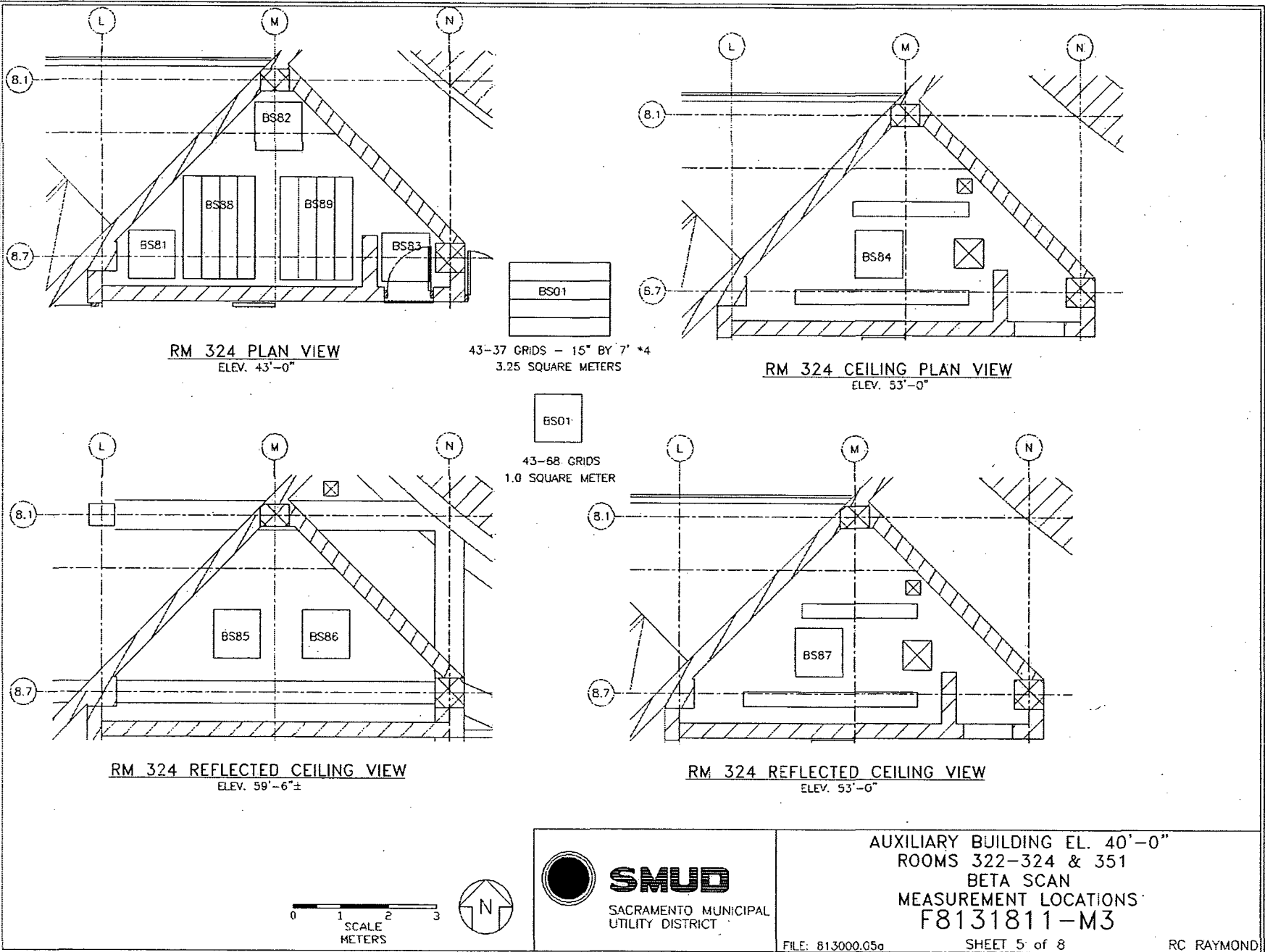
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

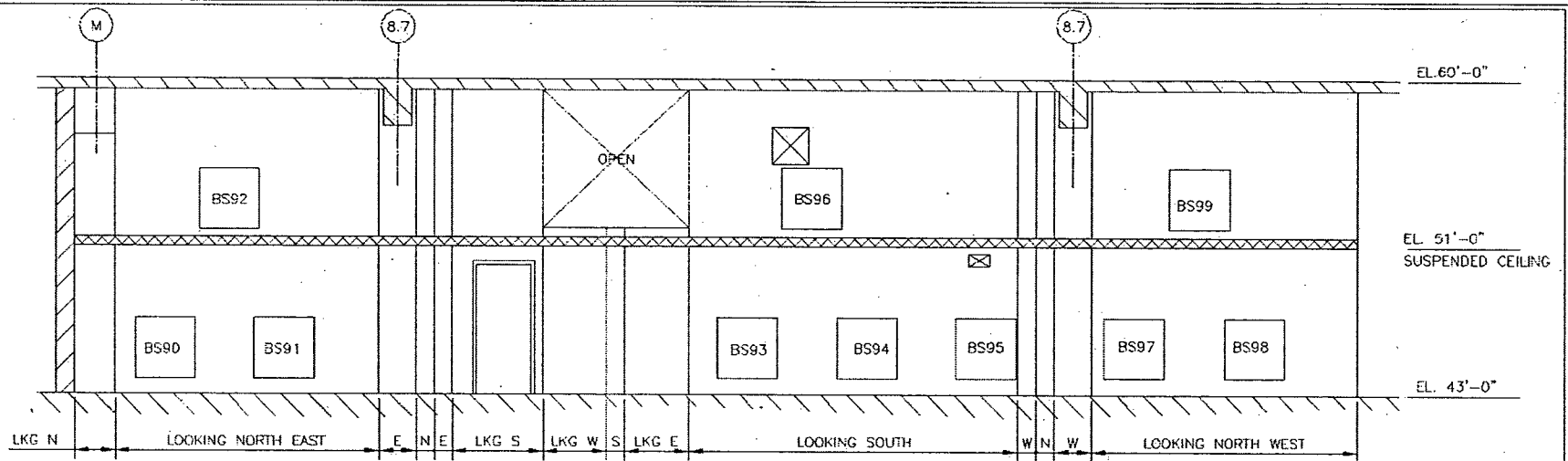
AUXILIARY BUILDING EL. 40'-0"
ROOMS 322-324 & 351
BETA SCAN
MEASUREMENT LOCATIONS
F8131811-M3

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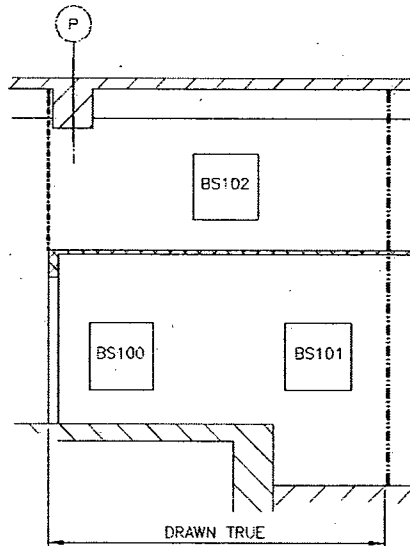
SHEET 4 of 8

RC RAYMOND

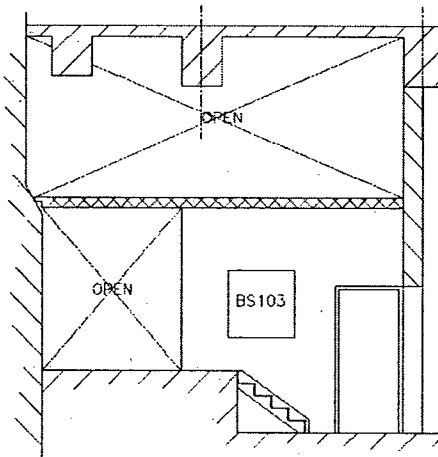




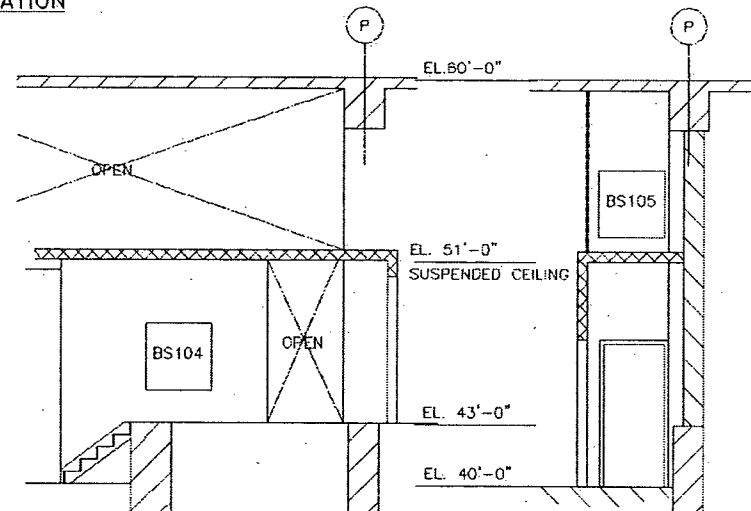
RM 324 DEVELOPED WALL ELEVATION



RM 322 VIEW OF CONTAINMENT WALL
NOMINALLY LOOKING NORTH



RM 322 VIEW LKG EAST
EAST OF COL. LINE P



RM 322 VIEW LKG SOUTH
AT COL LINE 9.2

RM 322 LKG SOUTH
AT COL LINE 9.7

BS01
43-68 GRIDS
1.0 SQUARE METER

0 1 2 3
SCALE
METERS



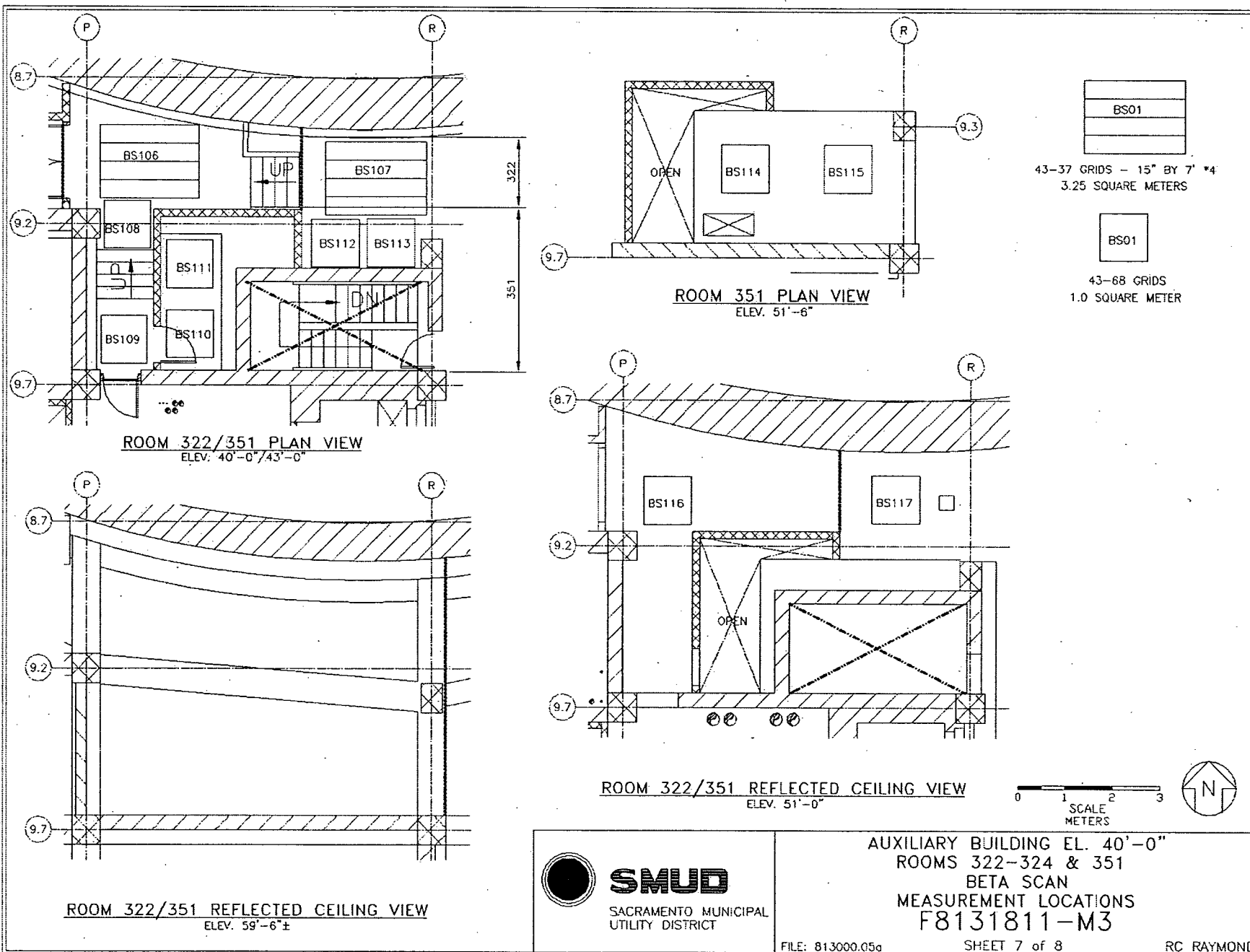
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

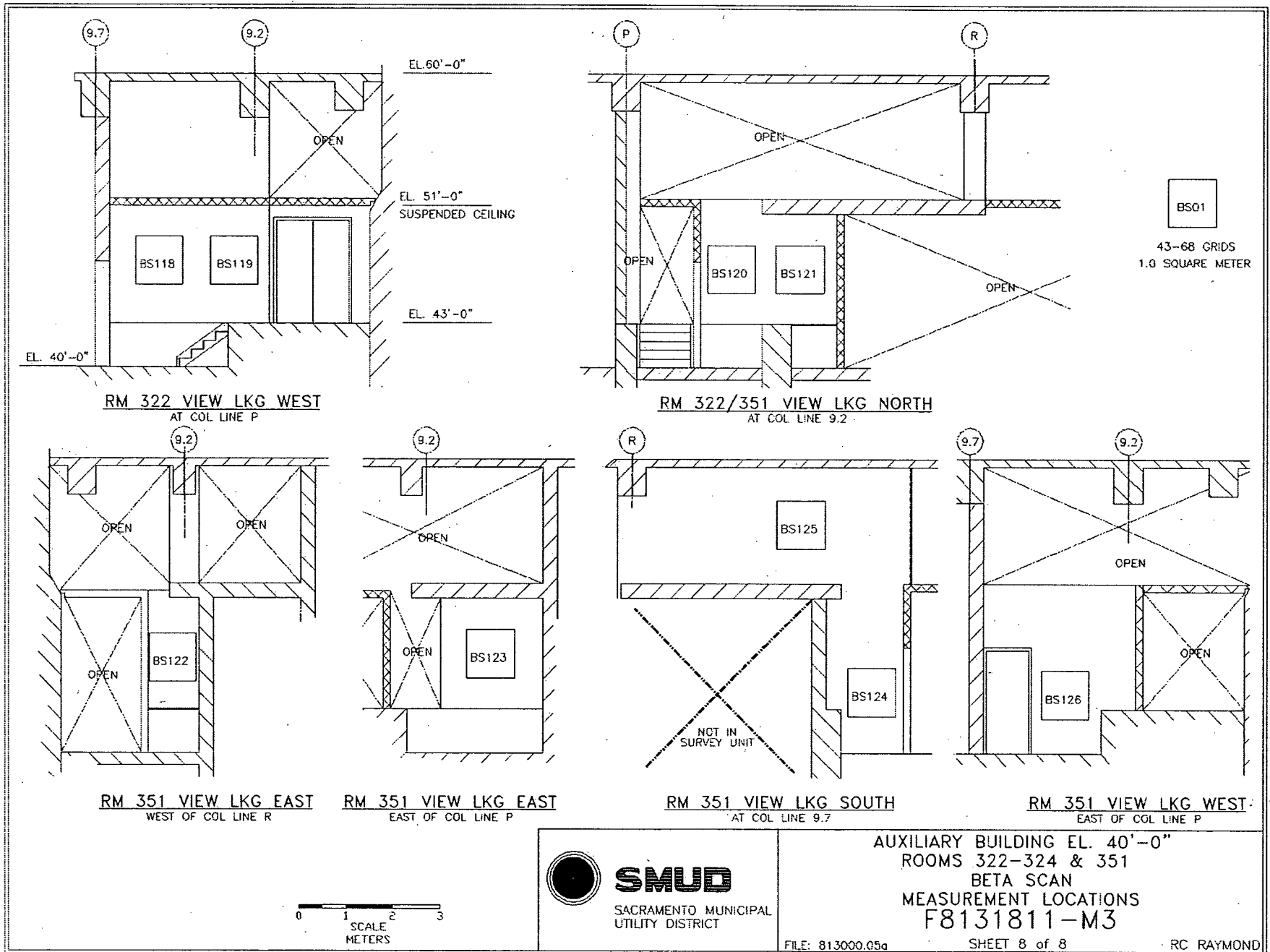
AUXILIARY BUILDING EL. 40'-0"
ROOMS 322-324 & 351
BETA SCAN
MEASUREMENT LOCATIONS
F8131811-M3

FILE: 813000.05a

SHEET 6 of 6

RC RAYMOND





Attachment 2

Instrumentation

May 29, 2008

Survey Unit F8131811

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; 175884	43-68B; 190482	433	1033
M2350; 175834	43-68B; 190482	433	1033
M2350; 203486	43-68B; 190476	433	1033
M2350; 142499	43-37; 148502	198	616
Tennelec; 0401171	N/A	6 dpm α , 12 dpm β	N/A

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	21500
Investigation Criteria – Scan	43000
DCGL _w	43000
DCGL _{EMC}	N/A

Attachment 3

Investigation

May 29, 2008

Survey Unit F8131811

(none required)

Attachment 4

Data Assessment

May 29, 2008

Survey Unit F8131811

