

Rancho Seco

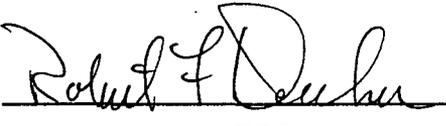
Final Status Survey Summary Report

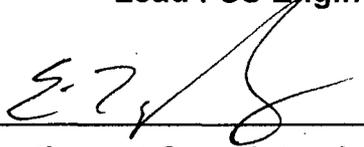
November 6, 2008

East Decay Heat Removal Pump Room - Upper Walls

Survey Unit F8130041

Prepared By: Dan A. Tallman  Date: November 19, 2008
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Reviewed By:  Date: 11/24/08
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Approved By:  Date: 2-20-09
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130041, East Decay Heat Removal Pump Room - Upper Walls

Survey Unit Description:

Operating History: The Auxiliary Building is a reinforced concrete structure that 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 -47' elevation showed a mean gross activity level of 320,071 dpm/100 cm² and a maximum value of 5,720,000 dpm/100 cm. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the upper walls of the East Decay Heat Removal Pump Room within the interior of the auxiliary building were determined to be a Class 1 area.

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 239.5 m² 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	East Decay Heat Removal Pump Room - Upper Walls
Survey Unit:	0041	Structure Surface
Class:	1	LTP Table 5-4
SU Area (m²):	239.5	
Evaluator:	D.A.Tallman	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	3.5	Class 1
Design DCGL_{me} (dpm/100 cm²):	152220	Class 1
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	9976	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	6.84	Class 1
Scan Area (m²):	239.5	
Scan Coverage (%):	100%	Class 1
Z_{1-α}:	1.645	
Z_{1-β}:	1.645	
Sign P:	0.97725	
Calculated Relative Shift:	2.1	
Relative Shift Used:	2.1	Uses 3.0 if Relative Shift is >3
N-Value:	12	
Design N-Value + 20%:	15	NUREG-1575 Table 5-5
Design Min Samples N:	35	Class 1
Grid Spacing L:	2.6	Class 1

Survey Results:

A total of 48 direct measurements were made in F8130041. The results including mean, median, standard deviation and range are shown in Table 2. All direct measurements were less than the DCGL. One of the scan measurements indicated areas of elevated activity. Scan activity ranged from 593 to 1356927 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)
F8130041-C0001BD	1369
F8130041-C0002BD	934
F8130041-C0003BD	1515
F8130041-C0004BD	1468
F8130041-C0005BD	1318
F8130041-C0006BD	1421
F8130041-C0007BD	1250
F8130041-C0008BD	1328
F8130041-C0009BD	1323
F8130041-C0010BD	1312
F8130041-C0011BD	1395
F8130041-C0012BD	1484
F8130041-C0013BD	1468
F8130041-C0014BD	1691
F8130041-C0015BD	1447
F8130041-C0016BD	1670
F8130041-C0017BD	1478
F8130041-C0018BD	1406
F8130041-C0019BD	1546
F8130041-C0020BD	1520
F8130041-C0021BD	1598
F8130041-C0022BD	1665
F8130041-C0023BD	1748
F8130041-C0024BD	788
F8130041-C0025BD	1515
F8130041-C0026BD	1385
F8130041-C0027BD	1385
F8130041-C0028BD	1437
F8130041-C0029BD	1494
F8130041-C0030BD	1235
F8130041-C0031BD	1950
F8130041-C0032BD	1629
F8130041-C0033BD	1292
F8130041-C0034BD	2267
F8130041-C0035BD	1452
F8130041-C0036BD	1349

F8130041-C0037BD	1426
F8130041-C0038BD	1411
F8130041-C0039BD	1406
F8130041-C0040BD	1276
F8130041-C0041BD	1421
F8130041-C0042BD	1328
F8130041-C0043BD	1473
F8130041-C0044BD	1530
F8130041-C0045BD	1572
F8130041-C0046BD	1359
F8130041-C0047BD	1650
F8130041-C0048BD	1318
Mean:	1452
Median:	1432
Standard Deviation:	221
Range:	788 - 2267

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm ²)
F8130041C0001SM	10.68
F8130041C0002SM	17.13
F8130041C0003SM	5.51
F8130041C0004SM	4.22
F8130041C0005SM	10.68
F8130041C0006SM	6.8
F8130041C0007SM	-0.95
F8130041C0008SM	9.38
F8130041C0009SM	42.96
F8130041C0010SM	-0.95
F8130041C0011SM	1.64
F8130041C0012SM	13.26
F8130041C0013SM	1.64
F8130041C0014SM	15.84
F8130041C0015SM	8.09
F8130041C0016SM	-4.82
F8130041C0017SM	13.26
F8130041C0018SM	1.64
F8130041C0019SM	-3.53
F8130041C0020SM	2.93
F8130041C0021SM	6.8
F8130041C0022SM	1.64
F8130041C0023SM	0.34
F8130041C0024SM	-3.53
F8130041C0025SM	-0.95
F8130041C0026SM	8.09
F8130041C0027SM	-3.53
F8130041C0028SM	4.22
F8130041C0029SM	2.93
F8130041C0030SM	1.64
F8130041C0031SM	4.22
F8130041C0032SM	13.26
F8130041C0033SM	-2.24
F8130041C0034SM	13.26
F8130041C0035SM	6.8
F8130041C0036SM	4.22
F8130041C0037SM	1.64
F8130041C0038SM	-0.95
F8130041C0039SM	10.68
F8130041C0040SM	6.8
F8130041C0041SM	4.22
F8130041C0042SM	0.34
F8130041C0043SM	1.64
F8130041C0044SM	-0.95
F8130041C0045SM	-0.95
F8130041C0046SM	1.64
F8130041C0047SM	0.34
F8130041C0048SM	2.93

Mean:	5
Median:	2.93
Standard Deviation:	7.82
Range:	-4.82 to 42.96

Survey Unit Data Assessment:

The survey design required 48 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):	48		
Median (dpm/100 cm ²):	1432		
Mean (dpm/100 cm ²):	1452		
Direct Measurement Standard Deviation (dpm/100 cm ²):	221		
Total Standard Deviation (dpm/100 cm ²):	221		Based on samples and backgrounds.
Maximum (dpm/100 cm ²):	2267		Background Subtract Not Applied
Material Type:	N/A		
Sign Test Final N Value:	48		Class 1
S+ Value:	48		
Critical Value:	30		
Sufficient Samples Collected:	Yes		
Maximum Value < DCGL:	Yes		
Median Value < DCGL:	Yes		
Mean Value < DCGL:	Yes		
Maximum Value < DCGL_{emc}:	Yes		
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:

One investigation was required for the scan measurements and the results are reported in Attachment 3. The discrete area, within scan grid 53, consisted of the lower lip area of the Decay Heat Removal pipe near its interface with the concrete support as it exited the wall plane. This feature is identified as the DHLIPAREA within the survey unit documentation. The EMC unity rule was not exceeded as shown in Table 3-1.

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. One potential area of elevated activity was detected and evaluated as shown in Attachment 3. Therefore the EMC criterion was met.

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 cm² and none of the removable surface activity measurements exceeded 10% of the DCGL. The required investigations were performed and evaluated.

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.

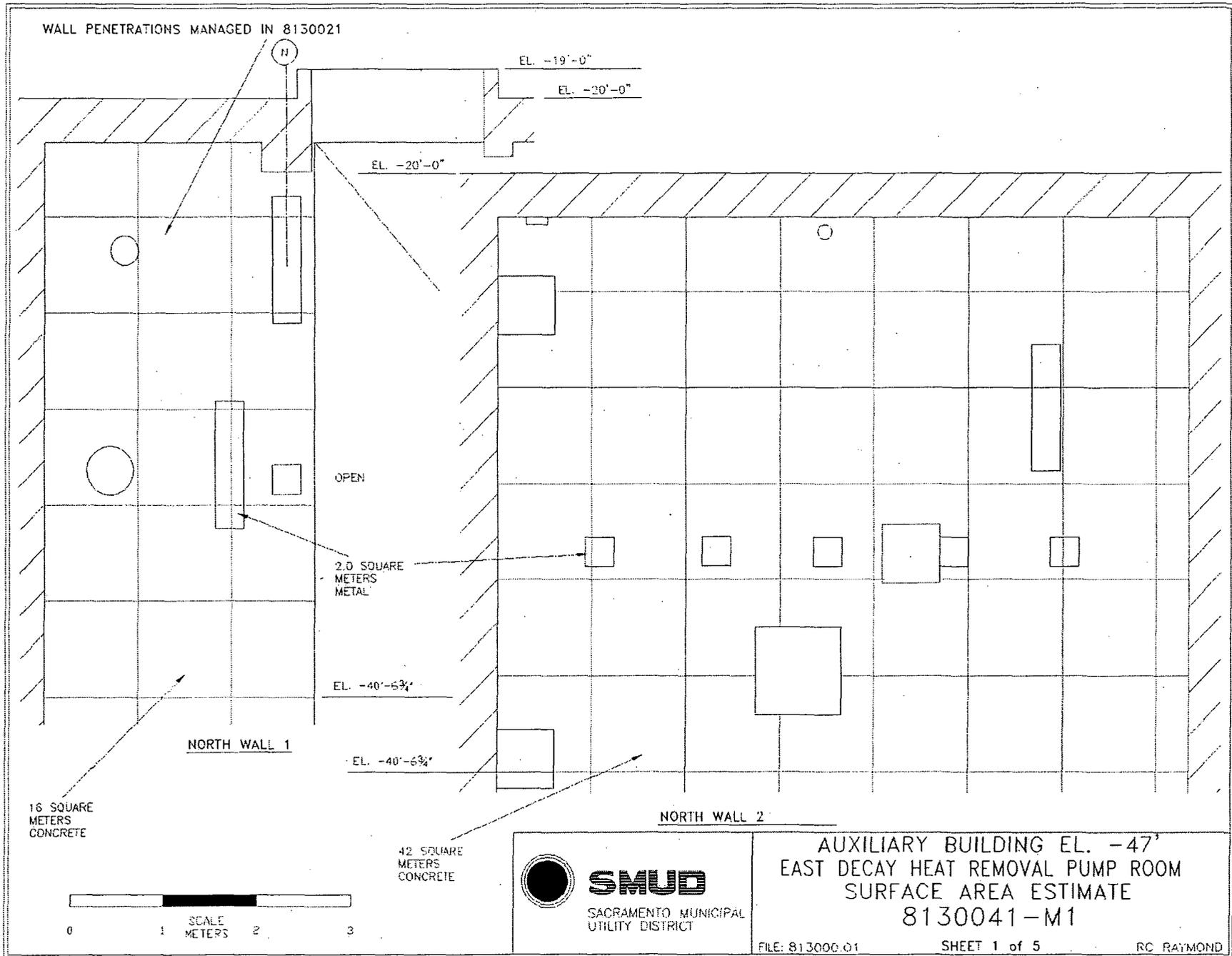
It is concluded that survey unit F8130041 meets the release criteria of 10CFR20.1402.

Attachment 1

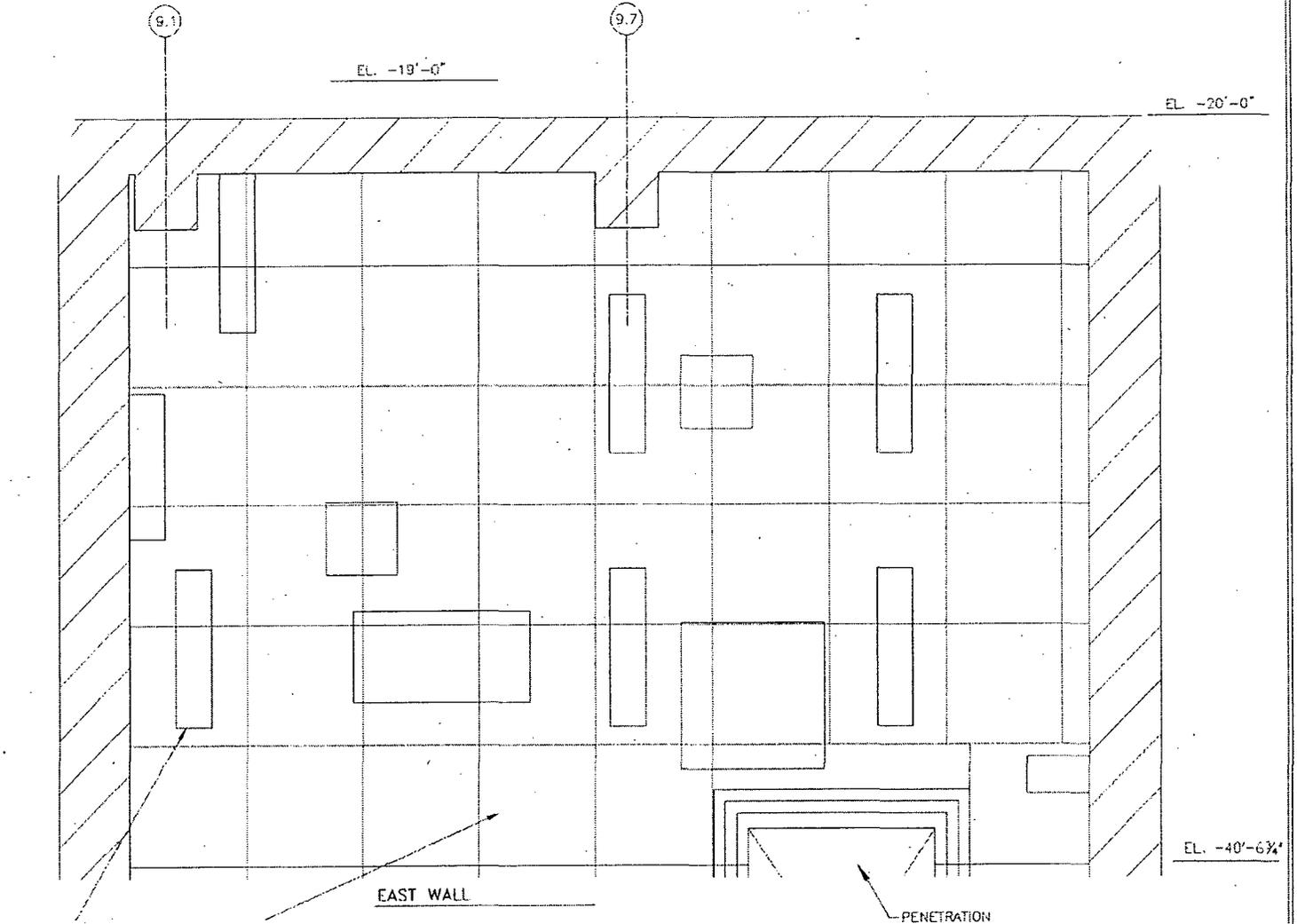
Maps

November 6, 2008

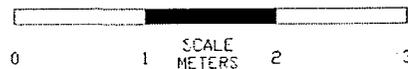
Survey Unit F8130041



EAST WALL PENETRATIONS MANAGED IN 8130061



2.6 SQUARE METERS METAL
 44 SQUARE METERS CONCRETE



SMUD

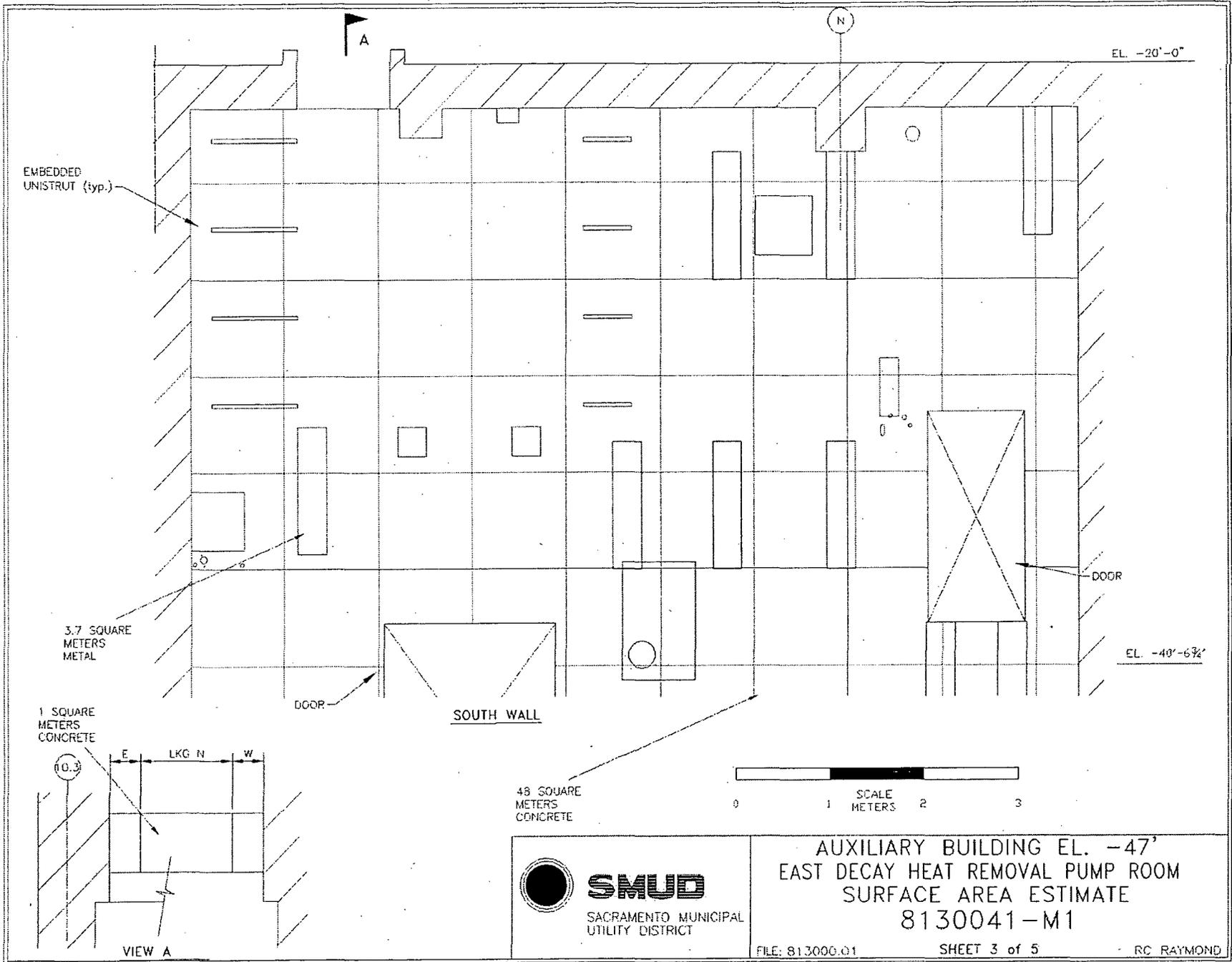
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL. -47'
 EAST DECAY HEAT REMOVAL PUMP ROOM
 SURFACE AREA ESTIMATE
 8130041-M1

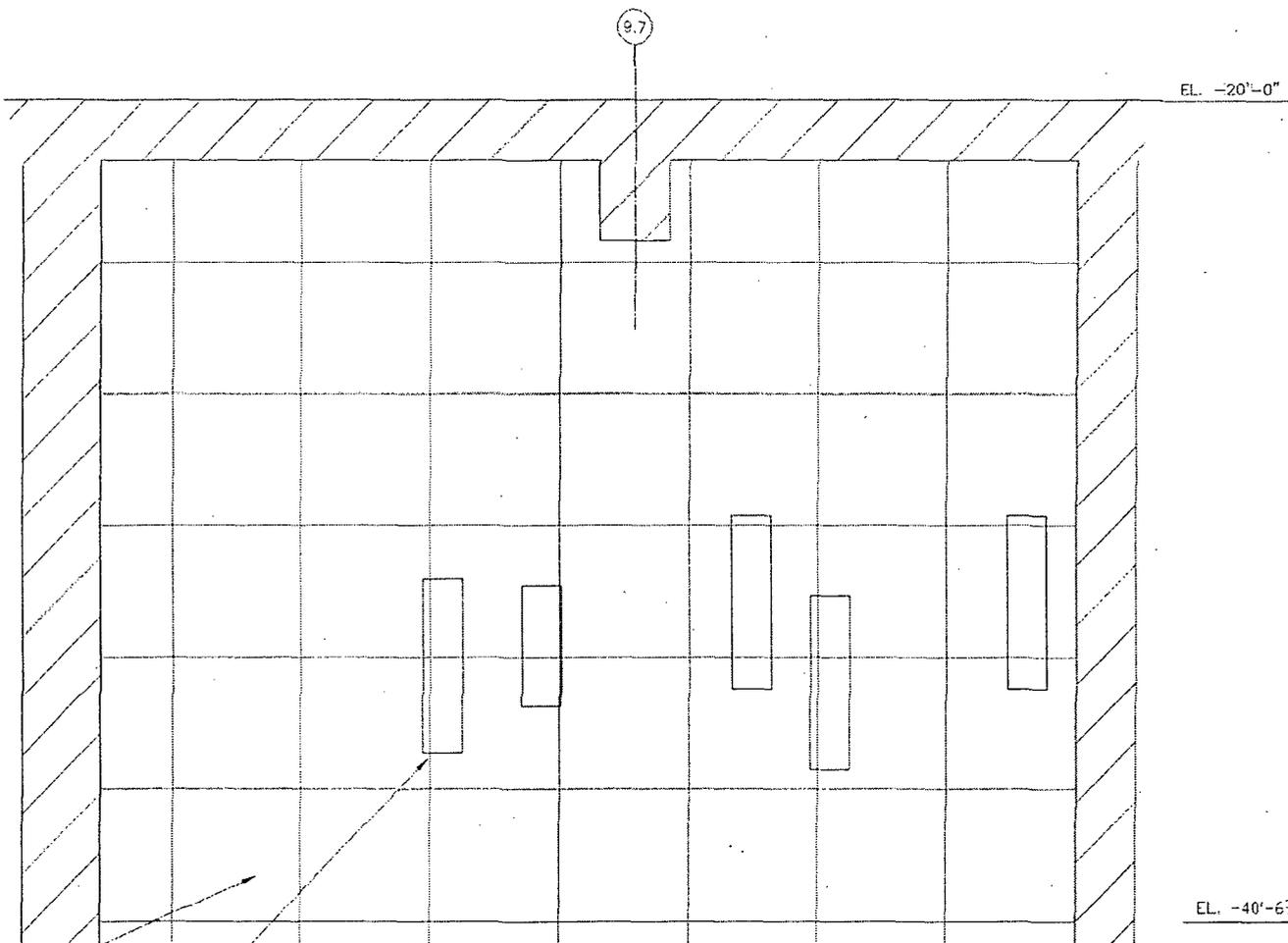
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SHEET 2 of 5

RC RAYMOND

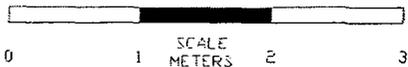


WEST WALL PENETRATIONS MANAGED IN 8130021



42 SQUARE METERS CONCRETE

2 SQUARE METERS METAL



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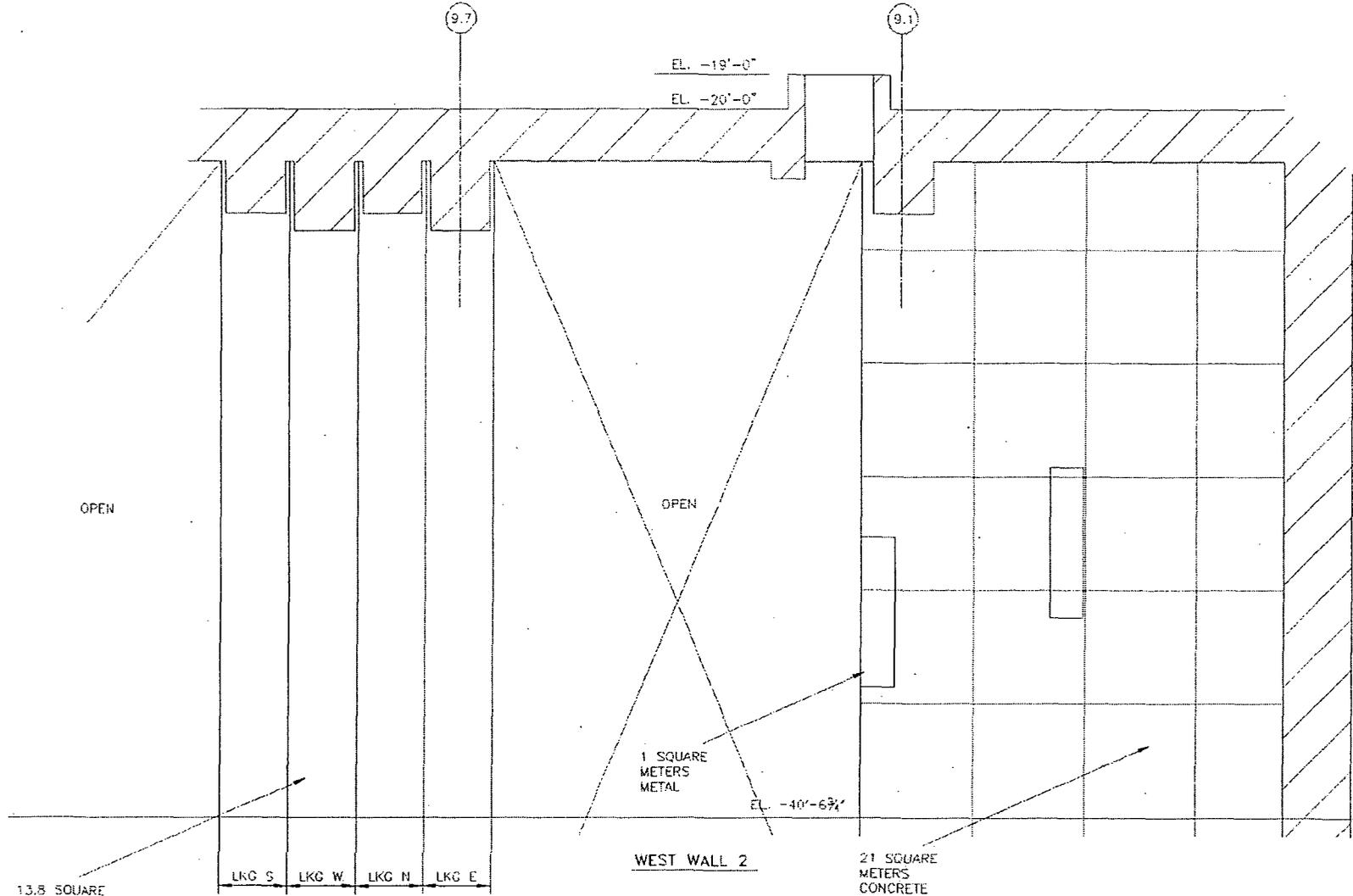
AUXILIARY BUILDING EL. -47'
 EAST DECAY HEAT REMOVAL PUMP ROOM
 SURFACE AREA ESTIMATE
 8130041-M1

FILE: 813000.01

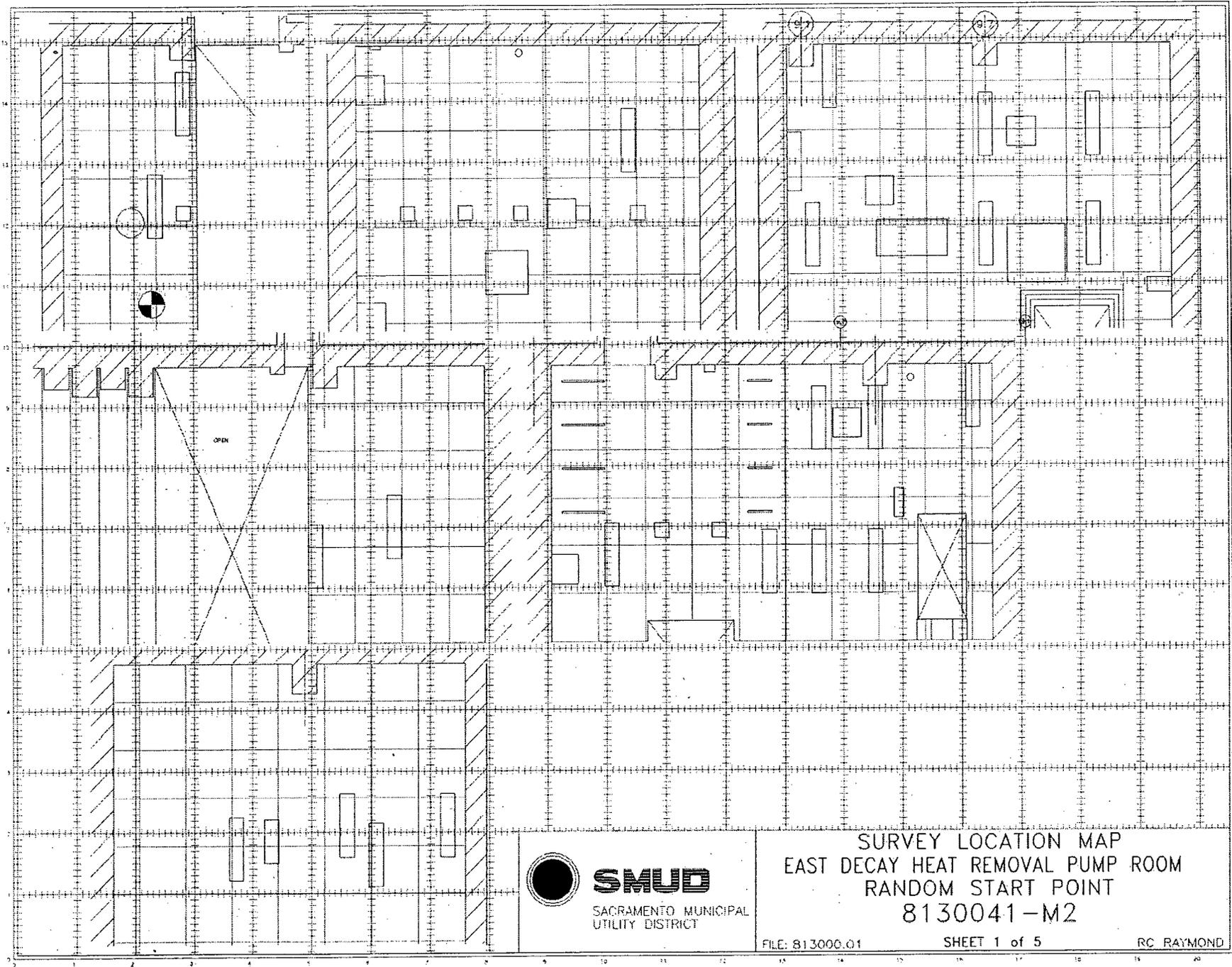
SHEET 4 of 5

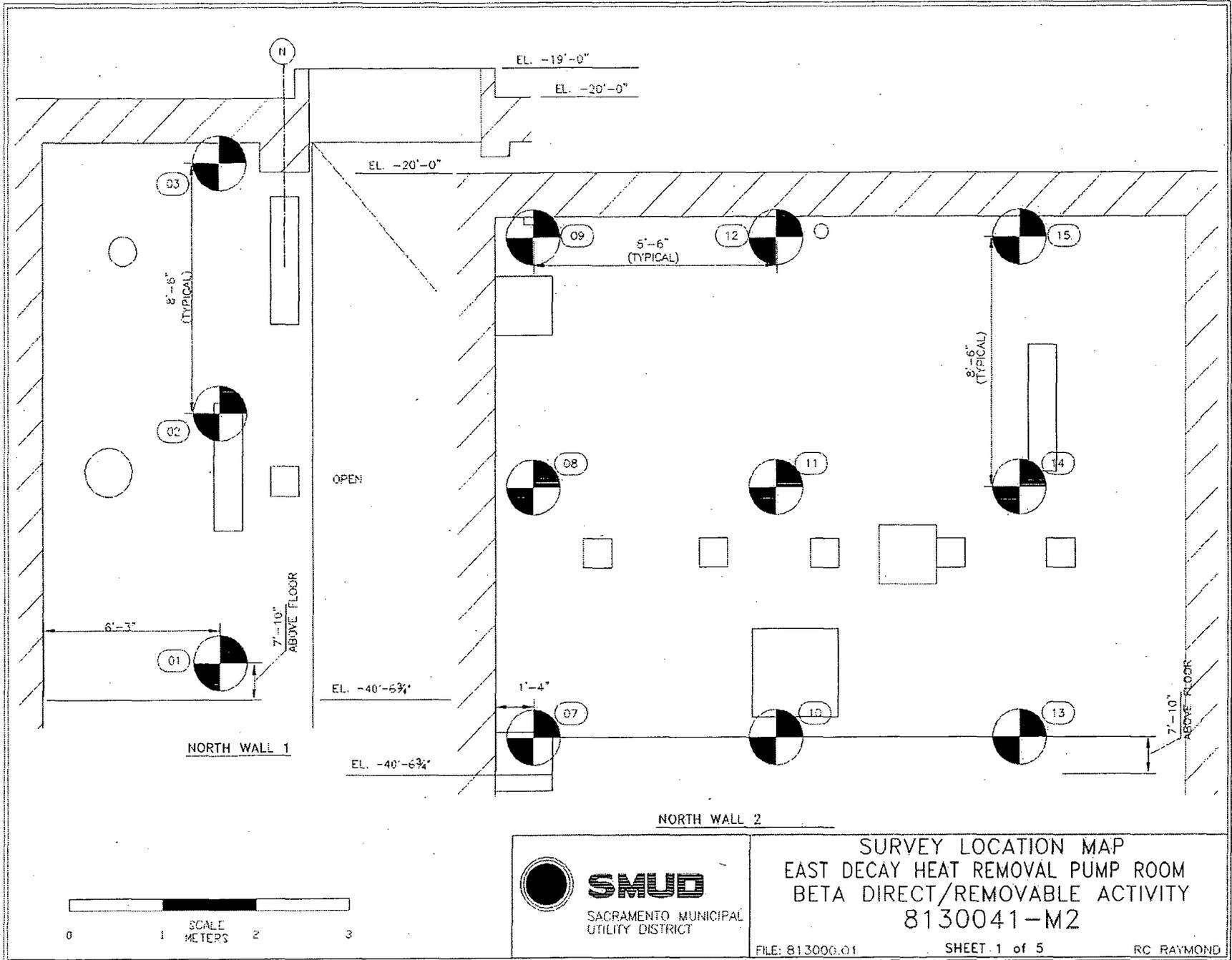
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WEST WALL PENETRATIONS MANAGED IN 8130021



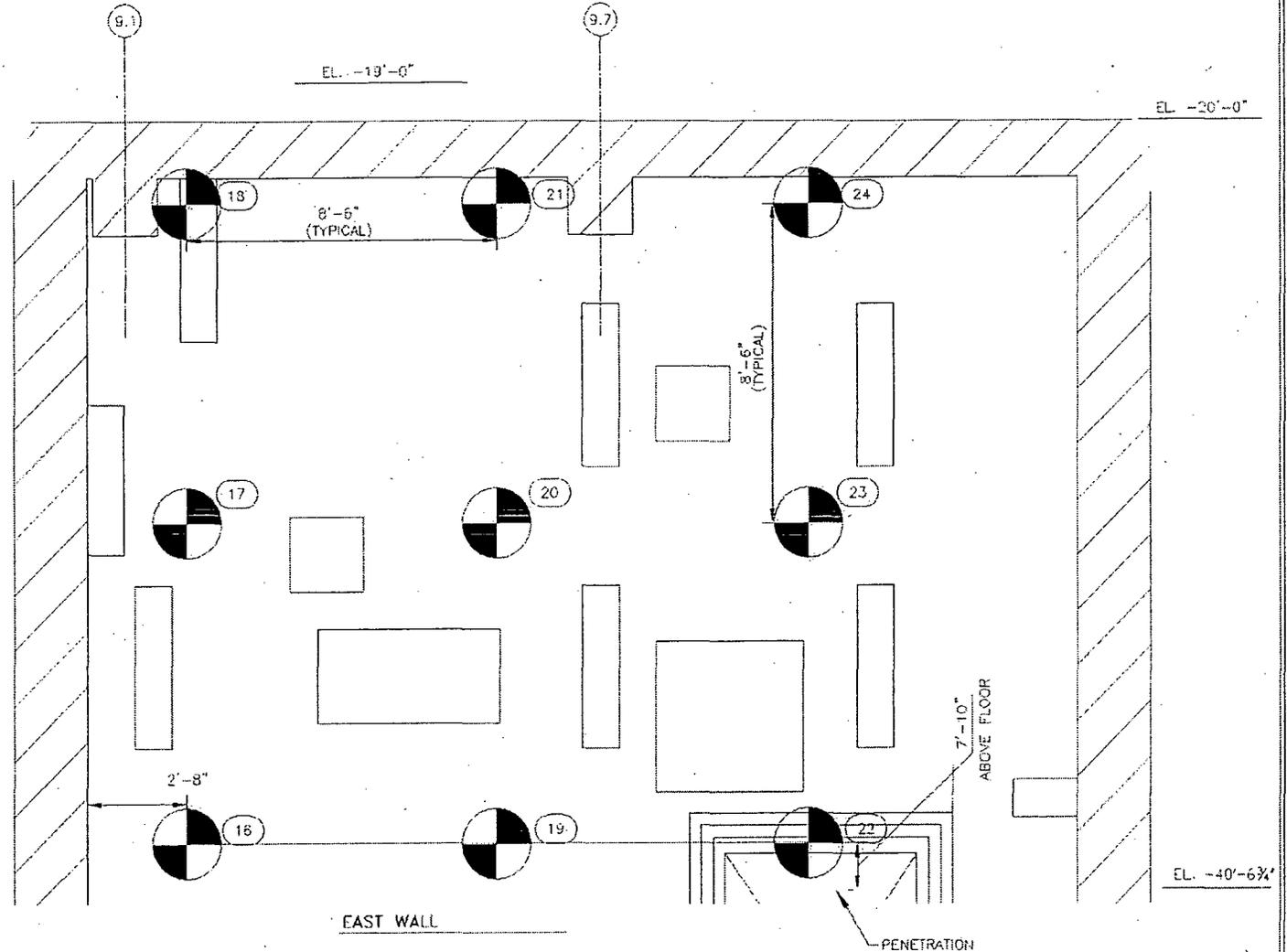
AUXILIARY BUILDING EL. -47'
EAST DECAY HEAT REMOVAL PUMP ROOM
SURFACE AREA ESTIMATE
8130041-M1
FILE: 813000.01 SHEET 5 of 5 RC RAYMOND



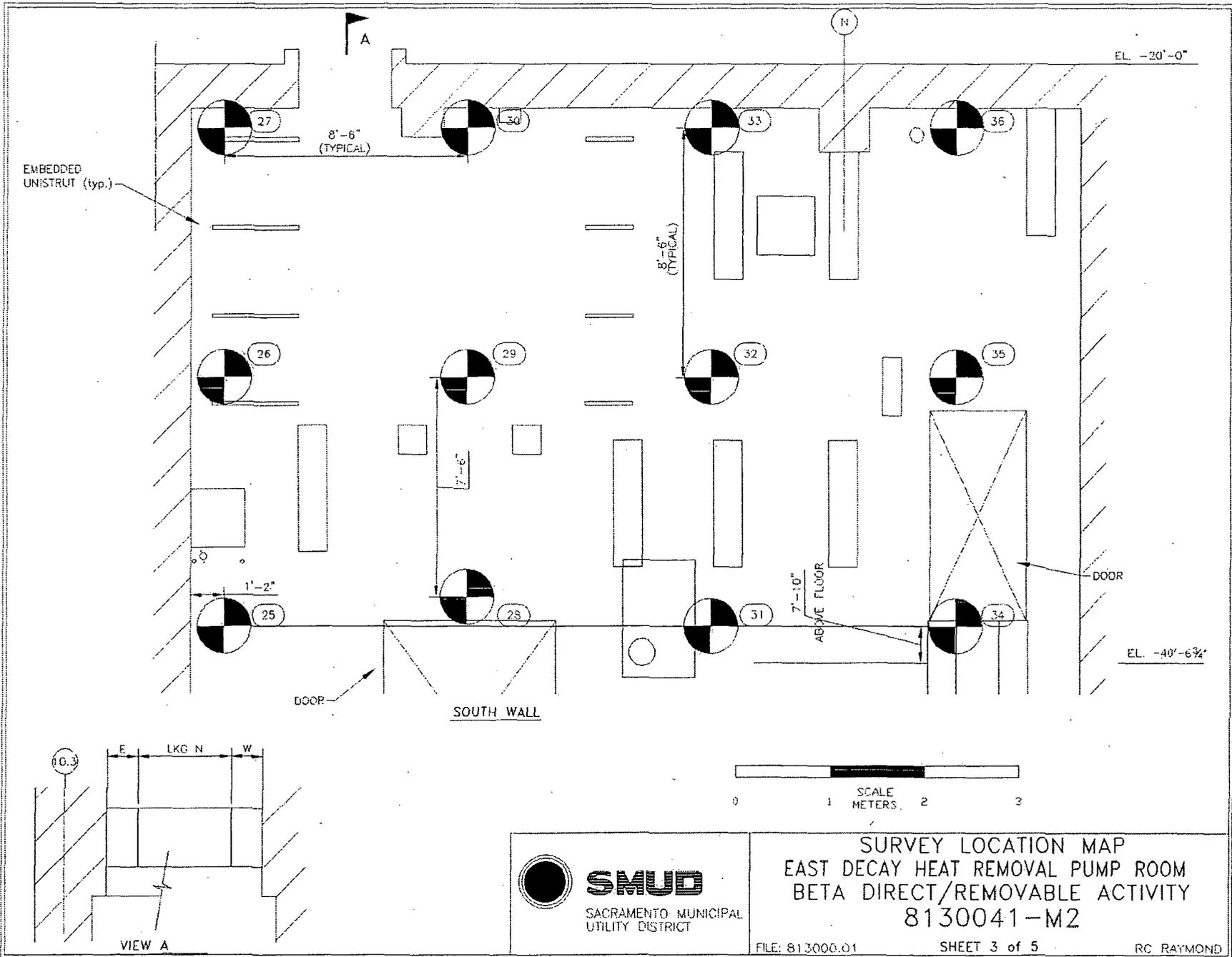


SURVEY LOCATION MAP
 EAST DECAY HEAT REMOVAL PUMP ROOM
 BETA DIRECT/REMOVABLE ACTIVITY
 8130041-M2

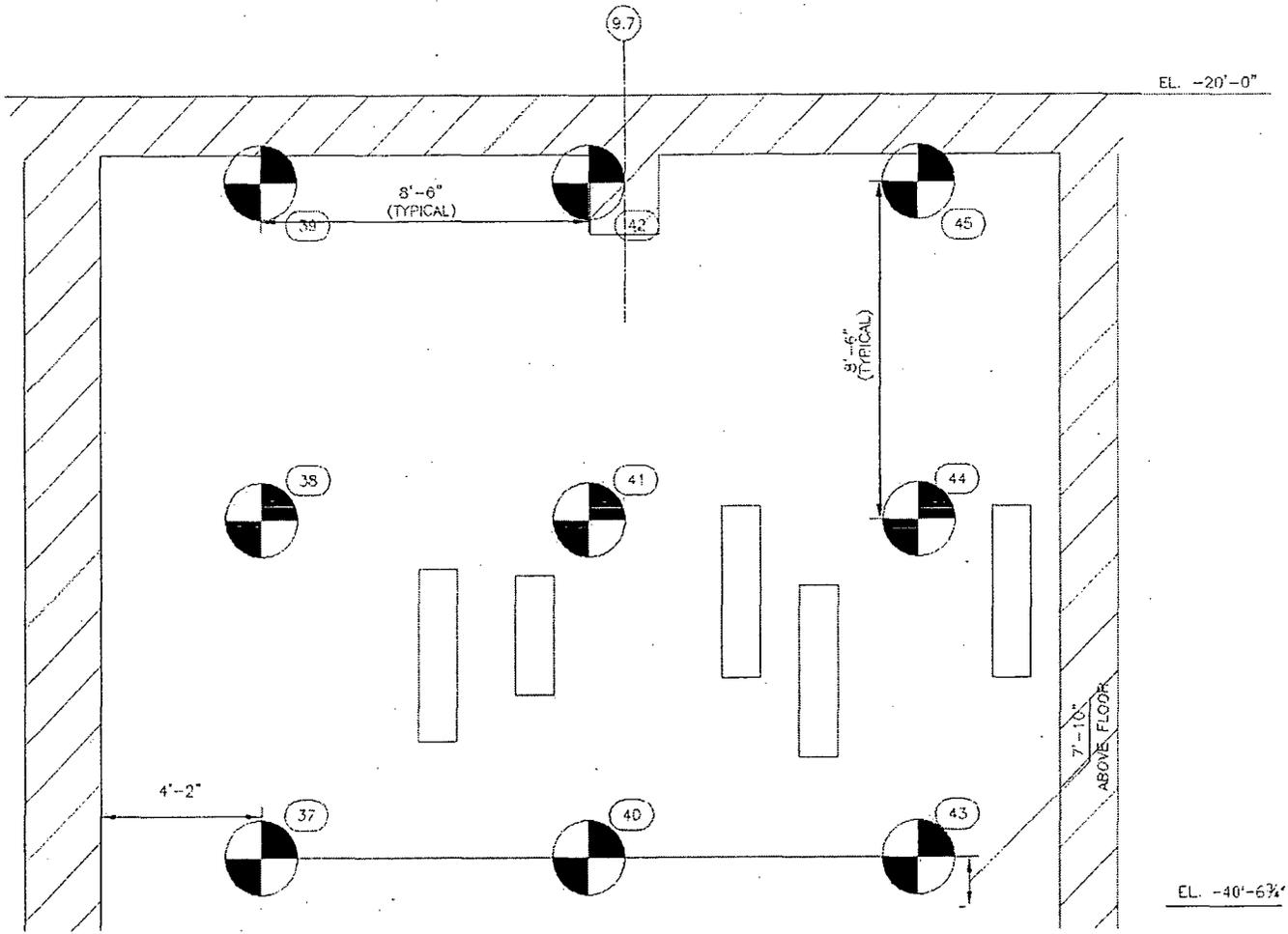
EAST WALL PENETRATIONS MANAGED IN 8130061



SURVEY LOCATION MAP
 EAST DECAY HEAT REMOVAL PUMP ROOM
 BETA DIRECT/REMOVABLE ACTIVITY
 8130041-M2



WEST WALL PENETRATIONS MANAGED IN DRWP-013

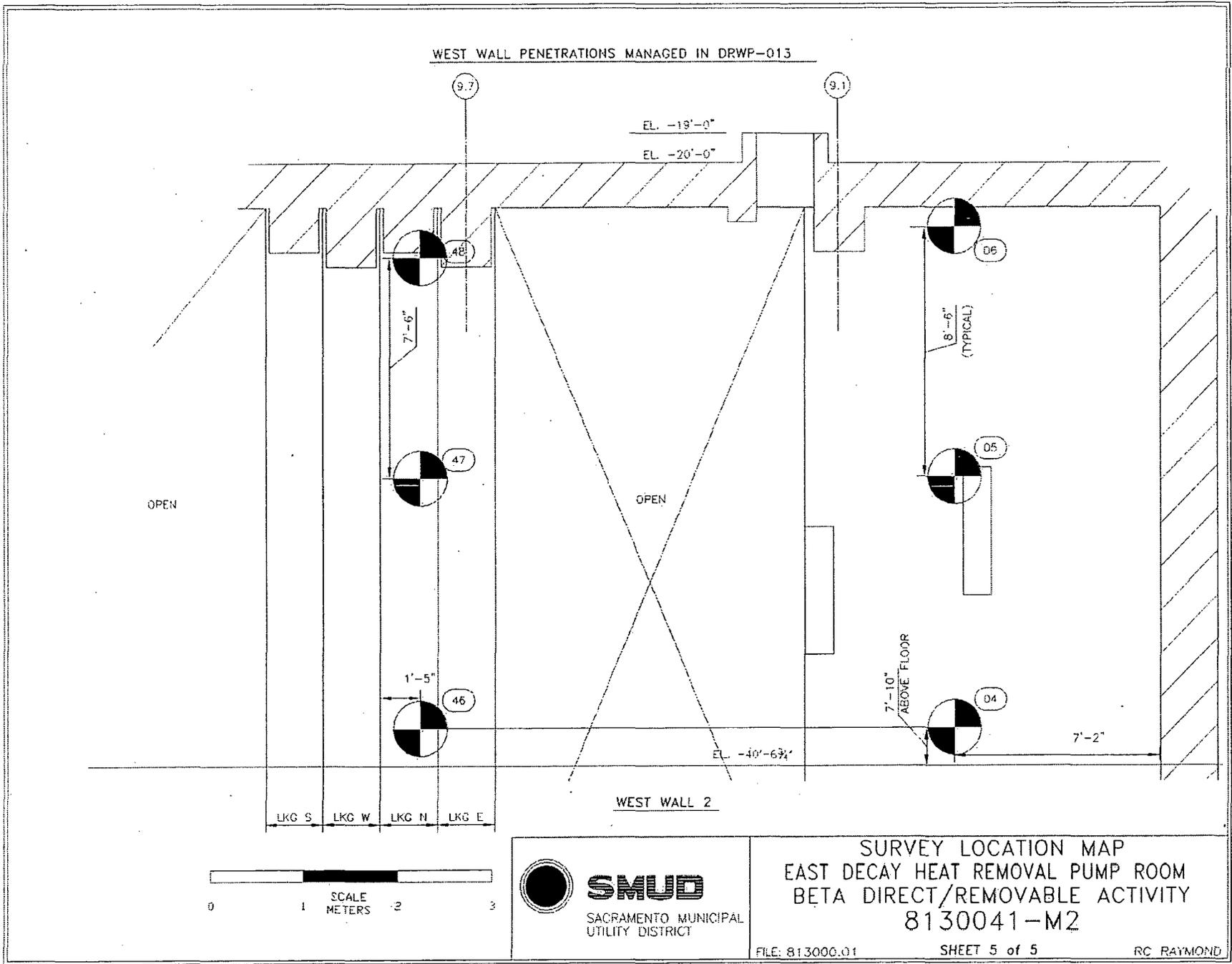


SURVEY LOCATION MAP
EAST DECAY HEAT REMOVAL PUMP ROOM
BETA DIRECT/REMOVABLE ACTIVITY
8130041-M2

FILE: 813000.01

SHEET 4 of 5

RC RAYMOND



WEST WALL PENETRATIONS MANAGED IN DRWP-013

OPEN

OPEN

WEST WALL 2

7'-10"
REMOVE FLOOR

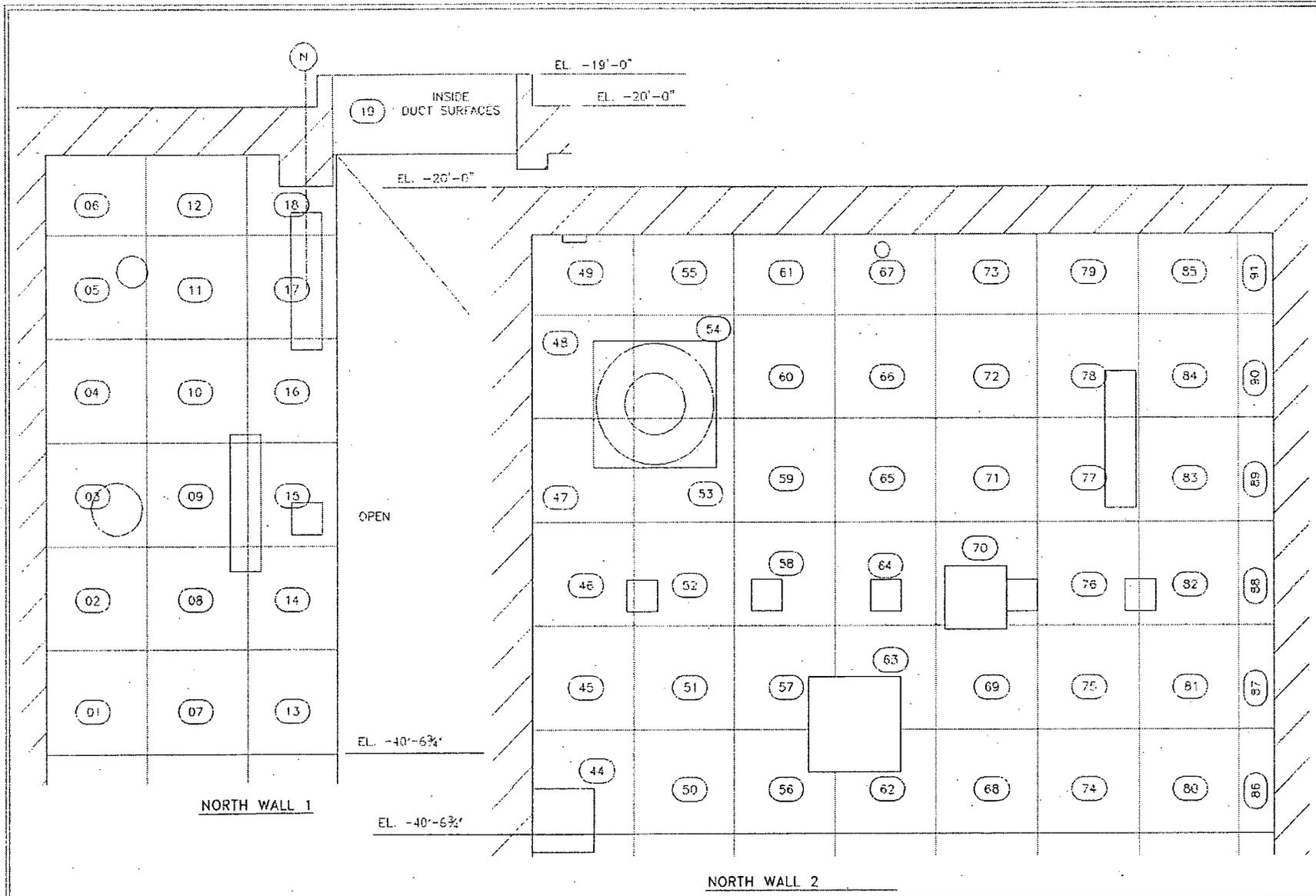


SURVEY LOCATION MAP
EAST DECAY HEAT REMOVAL PUMP ROOM
BETA DIRECT/REMOVABLE ACTIVITY
8130041-M2

FILE: 813006.01

SHEET 5 of 5

RC RAYMOND

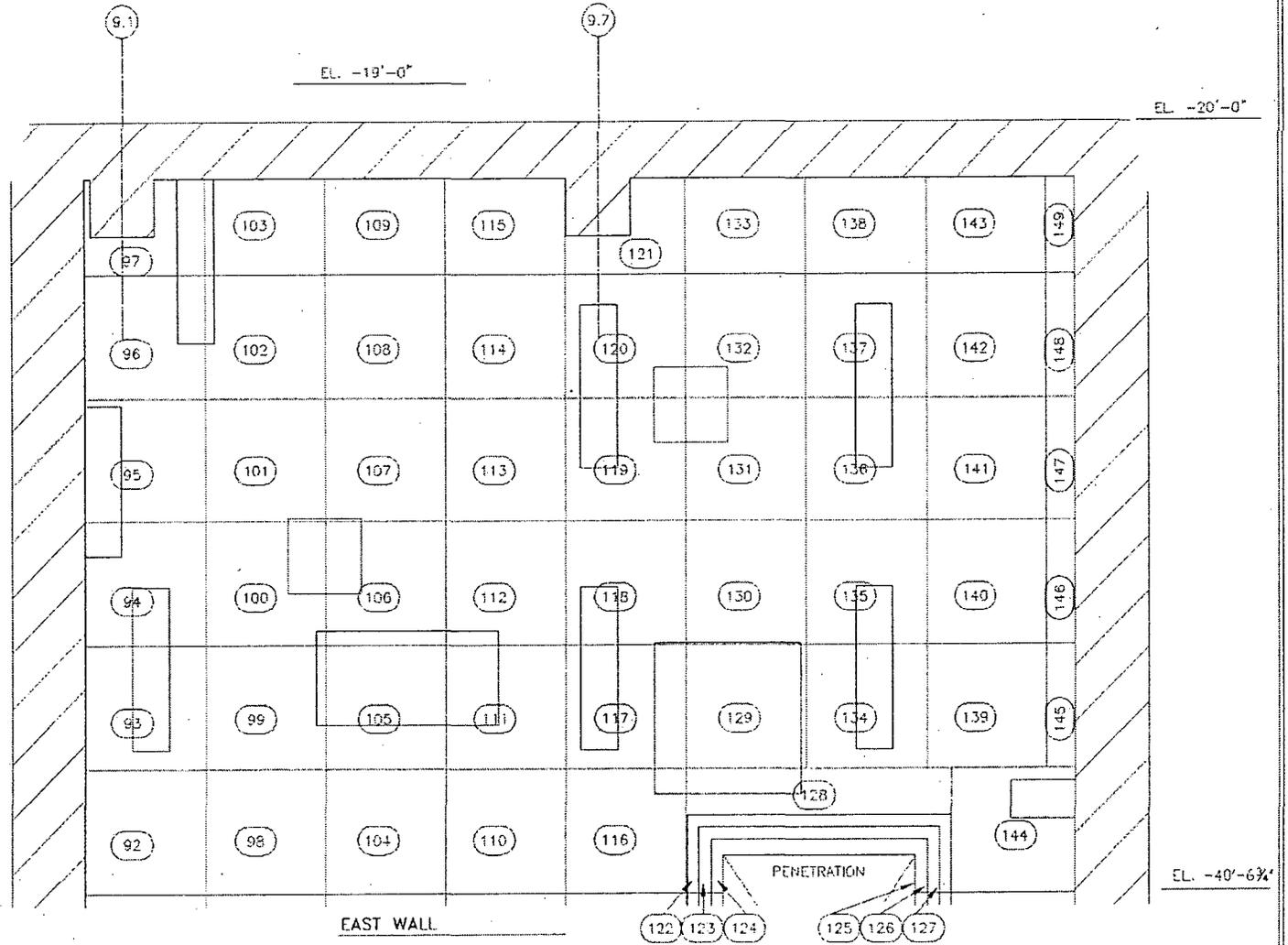


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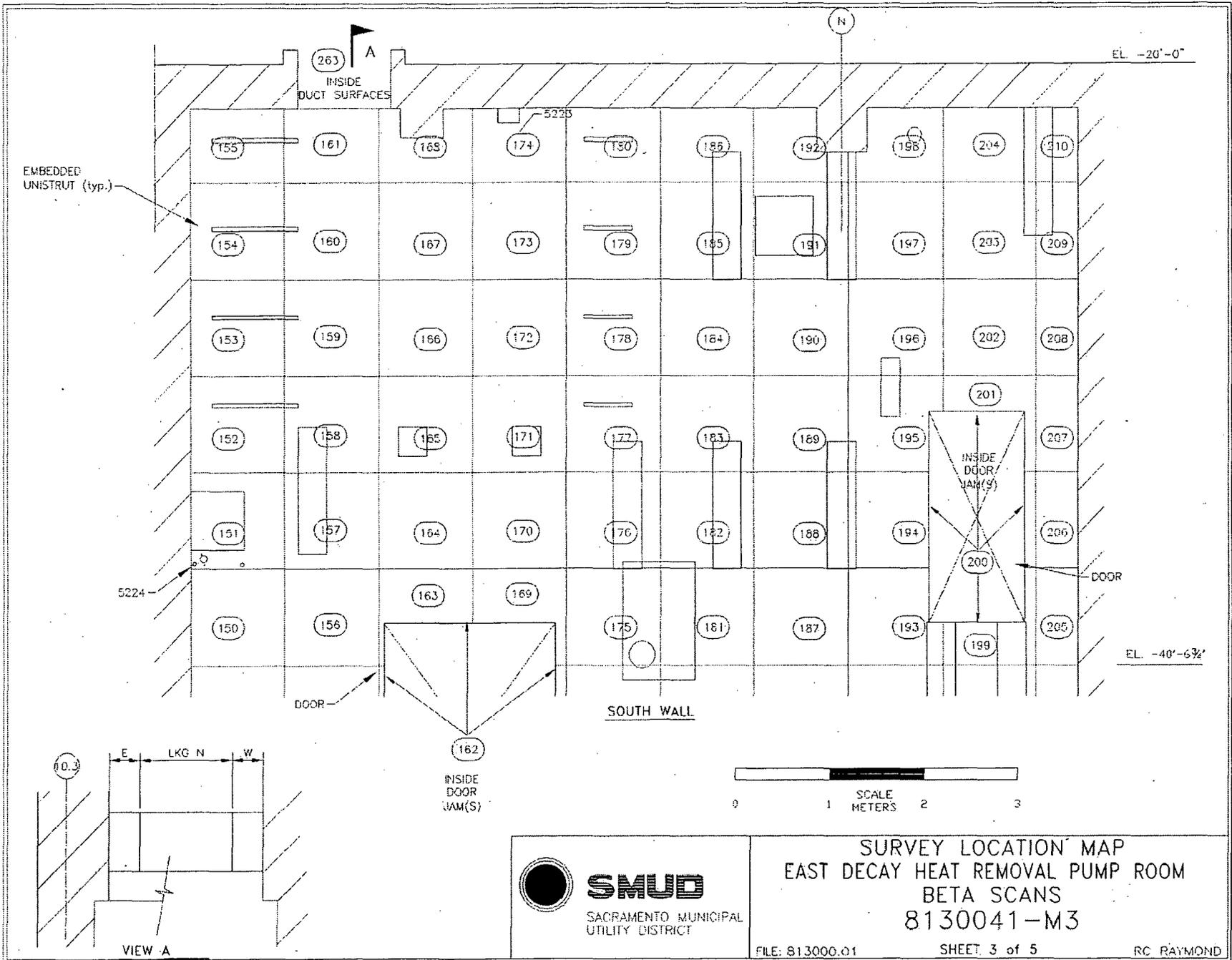
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

SURVEY LOCATION MAP
EAST DECAY HEAT REMOVAL PUMP ROOM
BETA SCANS
8130041-M3

EAST WALL PENETRATIONS MANAGED IN 8130061



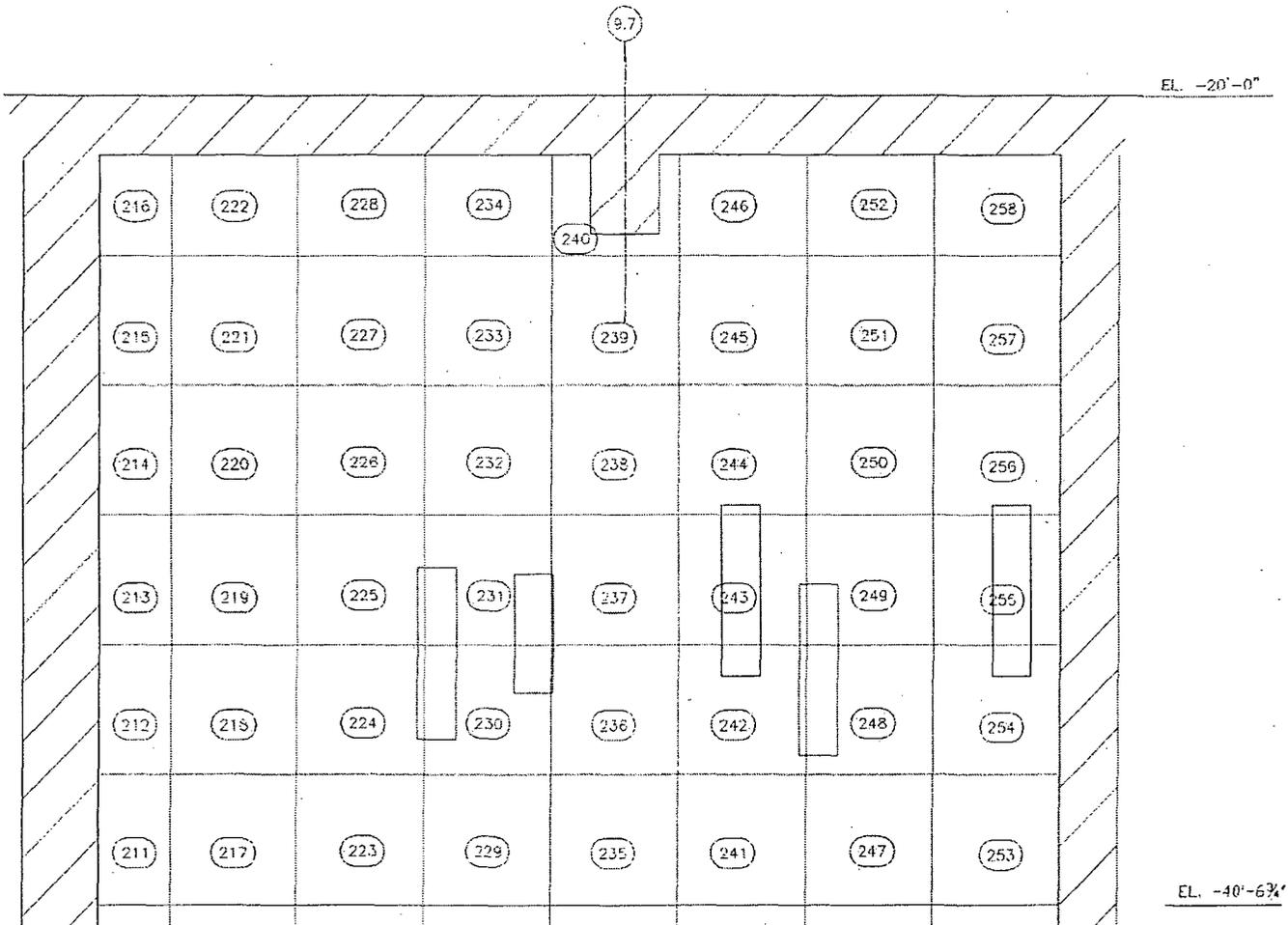
SURVEY LOCATION MAP
EAST DECAY HEAT REMOVAL PUMP ROOM
BETA SCANS
8130041-M3



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SACRAMENTO MUNICIPAL
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SURVEY LOCATION MAP
EAST DECAY HEAT REMOVAL PUMP ROOM
BETA SCANS
8130041-M3
FILE: 813000.01 SHEET 3 of 5 RC RAYMOND

WEST WALL PENETRATIONS MANAGED IN DRWP-013



WEST WALL 1



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UTILITY DISTRICT

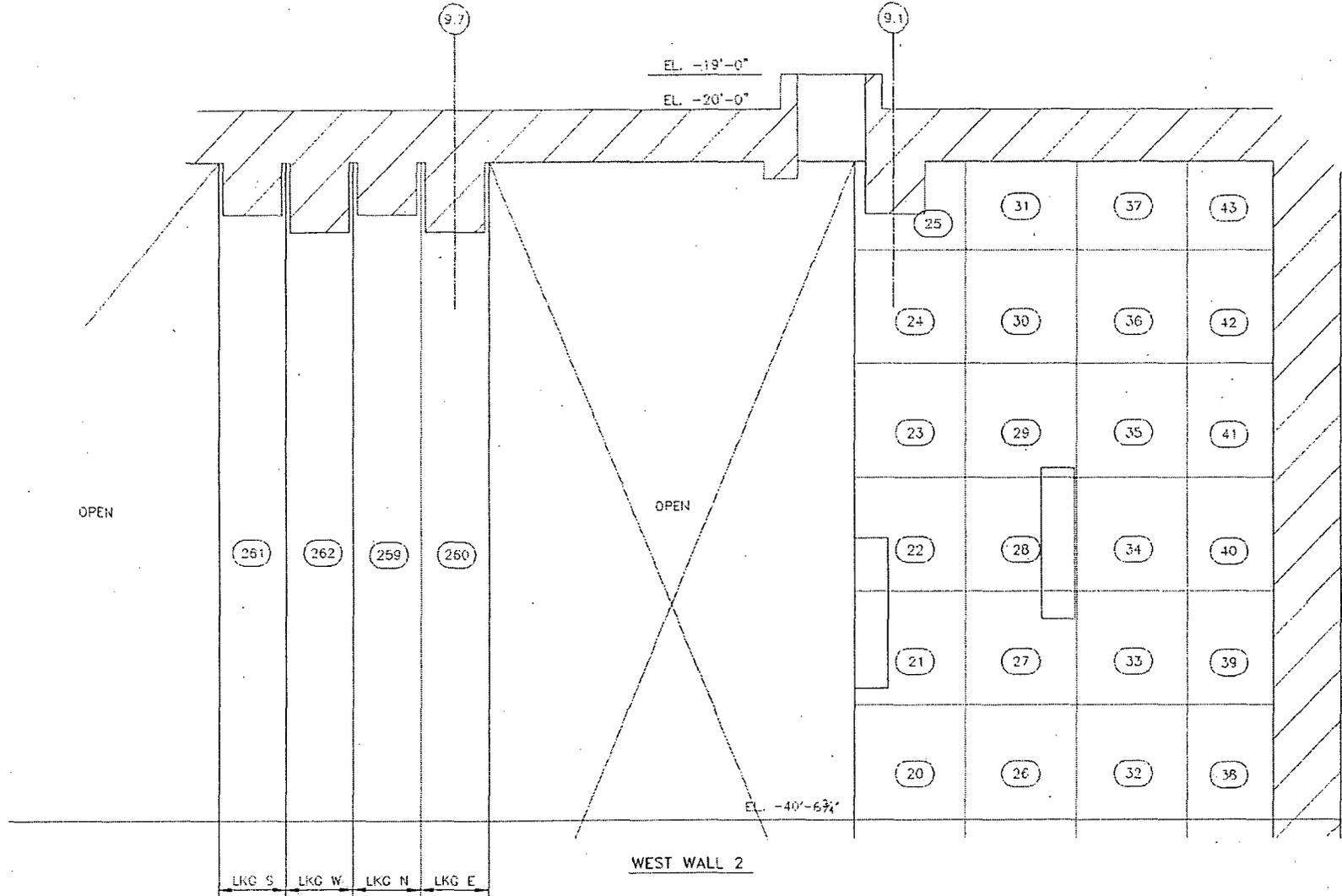
SURVEY LOCATION MAP
EAST DECAY HEAT REMOVAL PUMP ROOM
BETA SCANS
8130041-M3

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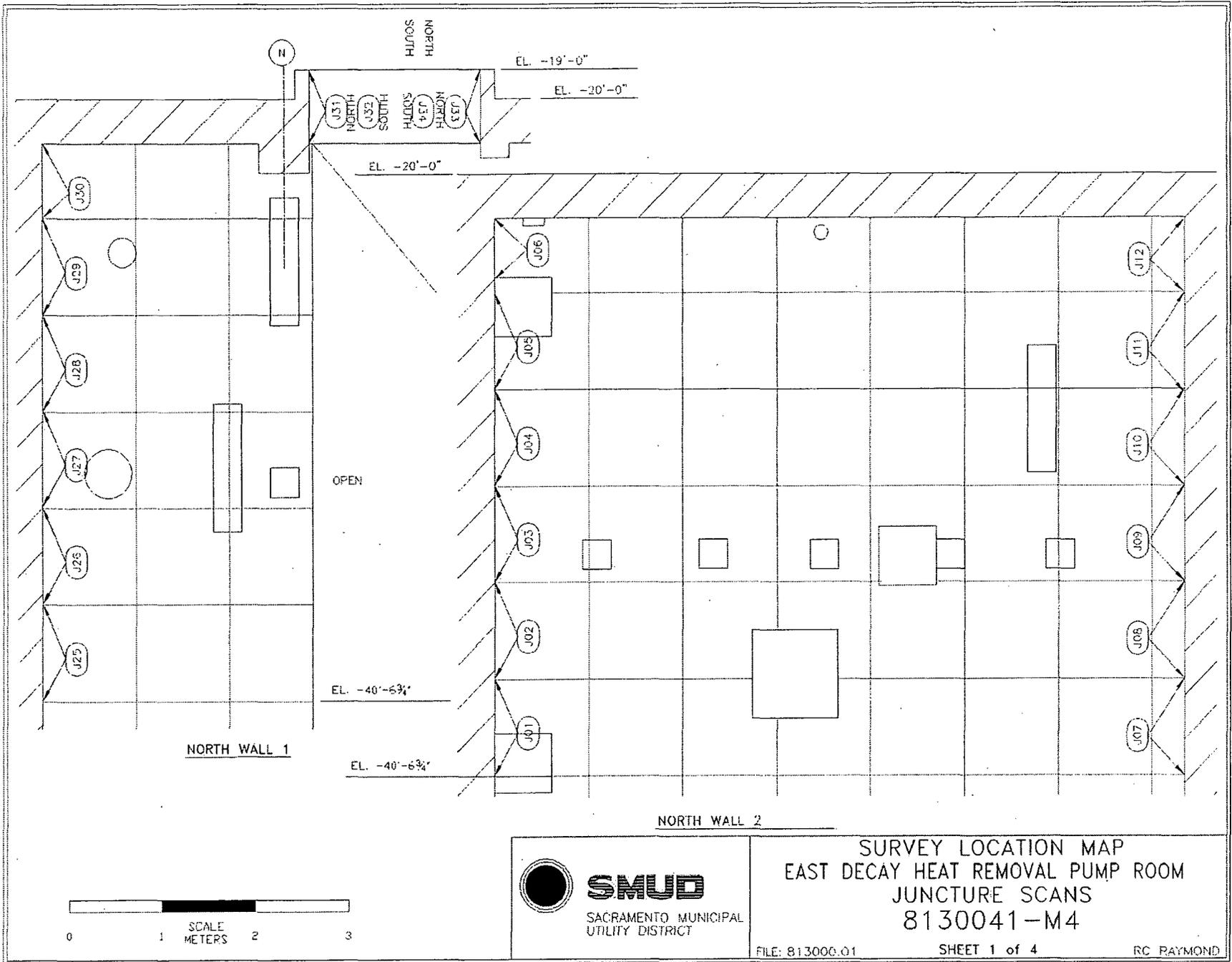
SHEET 4 of 5

RC RAYMOND

WEST WALL PENETRATIONS MANAGED IN DRWP-013



SURVEY LOCATION MAP
EAST DECAY HEAT REMOVAL PUMP ROOM
BETA SCANS
8130041-M3



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UTILITY DISTRICT

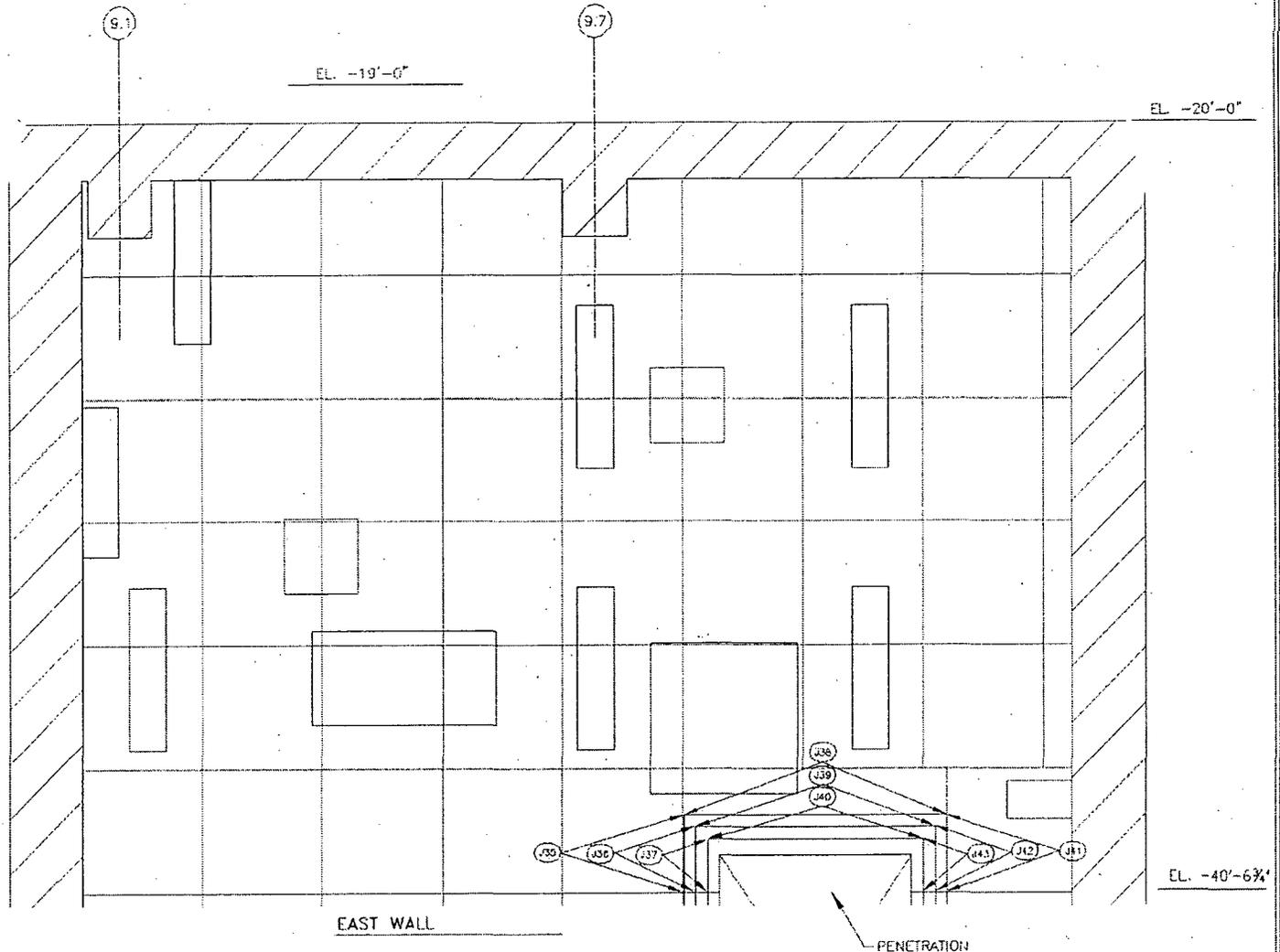
SURVEY LOCATION MAP
EAST DECAY HEAT REMOVAL PUMP ROOM
JUNCTURE SCANS
8130041-M4

FILE: 813000.01

SHEET 1 of 4

RC RAYMOND

EAST WALL PENETRATIONS MANAGED IN 8130061



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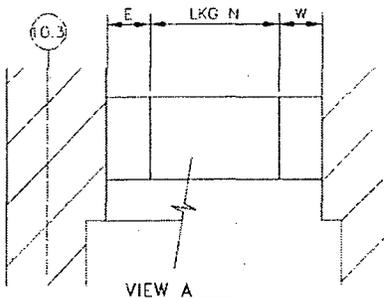
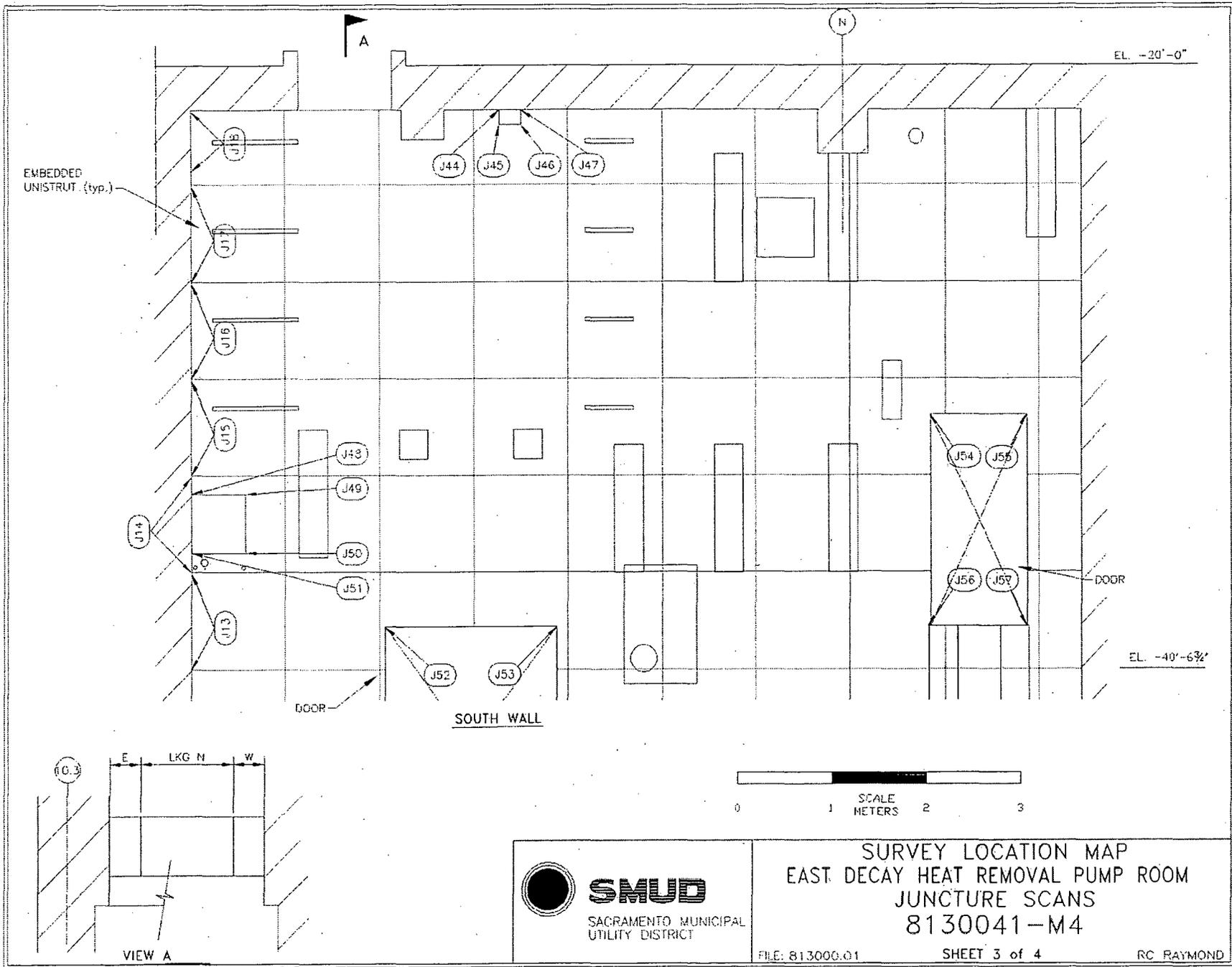
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

SURVEY LOCATION MAP
EAST DECAY HEAT REMOVAL PUMP ROOM
JUNCTURE SCANS
8130041-M4

FILE: 813000.01

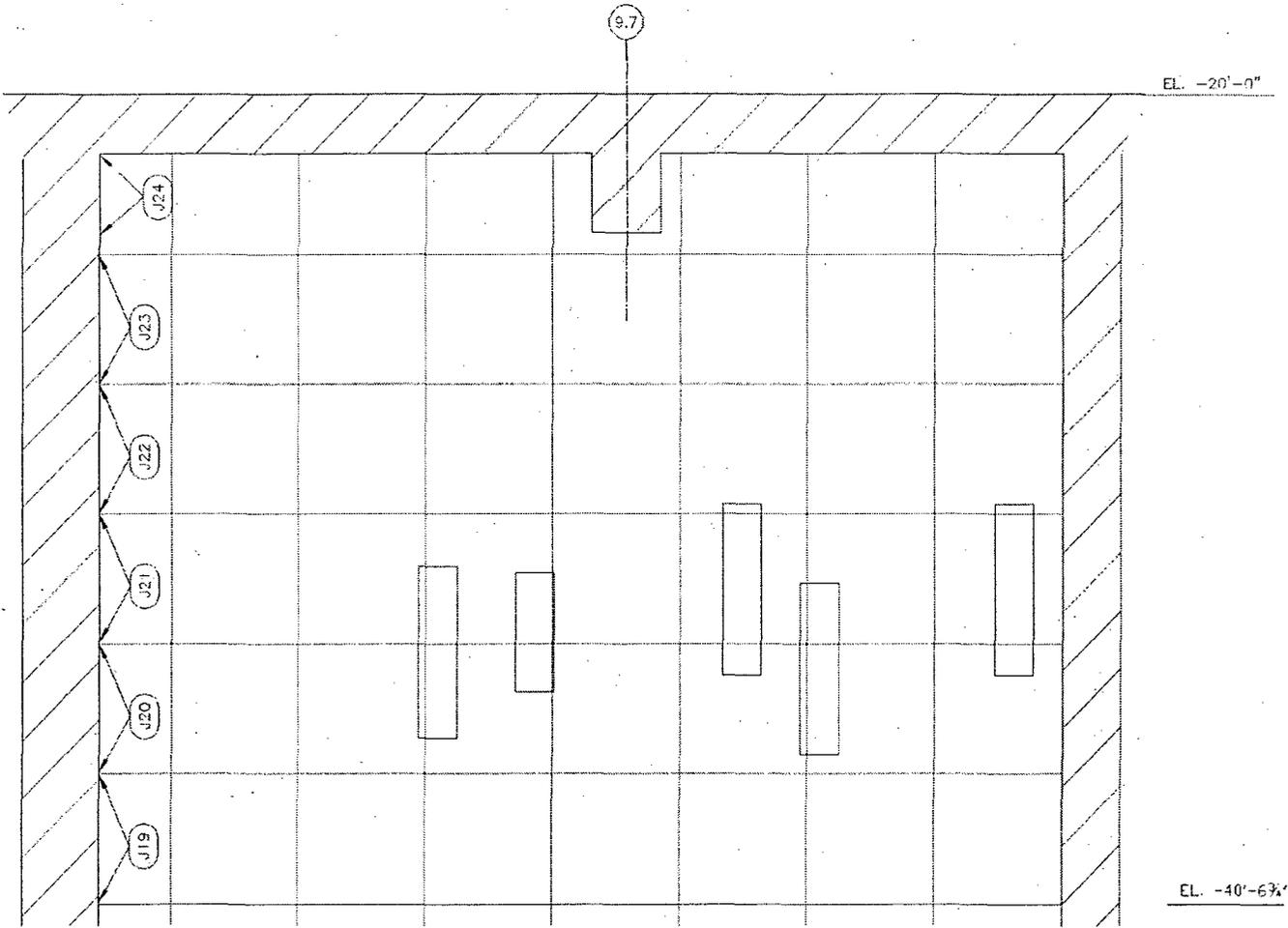
SHEET 2 of 4

RC RAYMOND

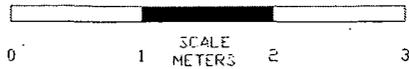


 <p>SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT</p>	<p>SURVEY LOCATION MAP EAST DECAY HEAT REMOVAL PUMP ROOM JUNCTURE SCANS 8130041-M4</p>	
	<p>FILE: 813000.01</p>	<p>SHEET 3 of 4</p>

WEST WALL PENETRATIONS MANAGED IN DRWP-013



WEST WALL 1



SMUD

SACRAMENTO MUNICIPAL
UTILITY DISTRICT

SURVEY LOCATION MAP
EAST DECAY HEAT REMOVAL PUMP ROOM
JUNCTURE SCANS
8130041-M4

FILE: 813000.01

SHEET 4 of 4

RC RAYMOND

Attachment 2

Instrumentation

November 6, 2008

Survey Unit F8130041

Table 2-1. Survey Unit Instrumentation

Instrument Model; Serial No.	Detector Model; Serial No.	MDC Static (dpm/100 cm ²)	MDC Scan (dpm/100 cm ²)
M2350; 180733	43-98B; 148638	590 ^A 930 ^B 1400 ^C	1070 ^A 1680 ^B 2520 ^C
M2350; 180733	43-94; 148620	350 ^D	610 ^D
M2350; 149794	43-68/5B; 149103	433 ^E	1033 ^E
M2350; 142509	43-51B; 190667	1324 ^F 990 ^G	4494 ^F 2313 ^G
M2350; 180738	43-51B; 190666		
M2350; 149794	43-116-1B; 256005	796 ^H 491 ^I	3258 ^H 739 ^I
M2350; 203486	43-116-1B; 190173	796 ^J	3258 ^J
Tennelec; 0401171	N/A	6 dpm α, 12 dpm β	N/A

^A 43-98B; – penetration – concrete – 2”	^F 43-51B; – surface scan – concrete
^B 43-98B; – penetration – concrete – 3”	^G 43-51B; – juncture scan – concrete
^C 43-98B; – penetration – concrete – 4”	^H 43-116B; – surface scan – concrete
^D 43-94B; – penetration – concrete – 1”	^I 43-116B; – juncture scan – concrete
^E 43-68B; – surface scan – concrete	^J 43-116B; – penetration – concrete – 4”-14”

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm ²)
Investigation Criteria - Direct	43,000 *
Investigation Criteria – Scan	43,000 *
DCGL _w	43000
DCGL _{EMC}	154507

* Investigation levels set conservatively at the DCGL_w
See table below for instrument/media specific cpm values.

¹ 43-98B; penetration 2”– concrete, scan -3180	⁷ 43-51B; surface scan – concrete scan -9900,
² 43-98B; penetration 3”– concrete, scan -2020	⁸ 43-51B; juncture scan – concrete, scan -15200
³ 43-98B; penetration 4”– concrete scan -1350	⁹ 43-116B; surface scan – concrete, scan -1990
⁴ 43-94B; penetration 1”– concrete, scan -3250	¹⁰ 43-116B;juncture scan – concrete, scan - 4260
⁵ 43-68B; surface scan – concrete, scan -5840	¹¹ 43-116B; penetration – concrete – 4”-14” scan - 1990
⁶ 43-68B; surface – concrete, direct - 8260	

Attachment 3

Investigation

November 6, 2008

Survey Unit F8130041

Table 3-1 Survey Unit Investigation

<i>Grid</i>	<i>Investigation Level (cpm)</i>	<i>Initial Value (cpm)</i>	<i>Investigation Result (cpm)</i>	<i>Elevated Area (m²)</i>	<i>Area Factor</i>	<i>DCGL_{emc}</i>	<i>Investigation Result (dpm/100cm²)</i>	<i>DCGL_{emc} Unity Fraction</i>
DHLIPAREA	9900	22668	620 ¹	NA	NA	NA	< DCGLw	NA
<p>DHLIPAREA – Decay Heat Lip Area – during survey of grid 0053, difficulty was experienced due to the magnitude of the surface irregularities resulting from the substantial remediation effort. One area of particular note was the area in the lower quadrant of the Decay Heat line which protruded from the remediated penetration pedestal. This lip area was investigated as a unique structural feature with the survey unit.</p> <p>¹Post remediation value.</p>								
Survey Unit Remainder						DCGL = 43,000	SU Mean =	NA
EMC Unity Sum								NA

Attachment 4
Data Assessment
November 6, 2008
Survey Unit F8130041

