

Rancho Seco
Final Status Survey Summary Report
October 31, 2007
Machine Shop (exterior)
Survey Unit F8520002

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FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8520002, Machine Shop (exterior)

Survey Unit Description:

Operating History: This structure was used for the cutting, drilling, grinding and welding on maintenance materials. This area was reported to have been used for maintenance of components containing radioactive material. Operating records and the HSA document occurrences of radioactive material with the potential for a release of radioactivity associated with the interior of this structure, not with this survey area.

Site Characterization: Direct measurements were made of the interior and exterior surfaces of the structure, which confirmed the presence of plant-derived radionuclides. Direct measurements of the exterior showed a mean gross activity level of 2,087 dpm/100 cm² and a maximum value of 2,620 dpm/100 cm². Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the area was determined to be a Class 3 area.

HSA Events: HSA Report pg. 64.

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 134 m² were scanned for approximately 14% 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:	F852	Machine Shop (exterior)
Survey Unit:	0002	Structure Surface
Class:	3	LTP Table 5-4
SU Area (m ²):	952	
Evaluator:	DA Tallman	
DCGL (dpm/100 cm ²):	43000	Gross Activity DCGL
Area Factor:	N/A	Class 3
Design DCGL _{emc} (dpm/100 cm ²):	N/A	Class 3
LBGR (dpm/100 cm ²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm ²):	217	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m ²):	N/A	Class 3
Scan Area (m ²):	134	
Scan Coverage (%):	14%	Class 3
Z _{1-α} :	1.645	
Z _{1-β} :	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	99	
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 F8520002. 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 (range = 2,841 to 7,226 dpm/100 cm²). 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)
F8520002-G0001BD	1696
F8520002-G0002BD	1873
F8520002-G0003BD	1795
F8520002-G0004BD	1914
F8520002-G0005BD	1930
F8520002-G0006BD	1618
F8520002-Z0007BD	1764
F8520002-G0008BD	1852
F8520002-G0009BD	1893
F8520002-G0010BD	1852
F8520002-G0011BD	2345
F8520002-G0012BD	2251
F8520002-G0013BD	2246
F8520002-G0014BD	2588
Mean:	1973
Median:	1883
Standard Deviation:	277
Range:	1618 - 2588

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm²)
F8520002G0001SM	7.42
F8520002G0002SM	3.58
F8520002G0003SM	4.86
F8520002G0004SM	1.01
F8520002G0005SM	1.01
F8520002G0006SM	-0.27
F8520002G0007SM	3.58
F8520002G0008SM	3.58
F8520002G0009SM	16.39
F8520002G0010SM	11.27
F8520002G0011SM	-0.27
F8520002G0012SM	1.01
F8520002G0013SM	1.01
F8520002G0014SM	15.11
Mean:	4.95
Median:	3.58
Standard Deviation:	5.56
Range:	-0.27 to 16.39

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. While the sample standard deviation was not less than the design standard deviation, both values of sigma resulted in a relative shift of greater than three (3) 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):	1883		
Mean (dpm/100 cm ²):	1973		
Direct Measurement Standard Deviation (dpm/100 cm ²):	277		
Total Standard Deviation (dpm/100 cm ²):	277		Based on samples and backgrounds.
Maximum (dpm/100 cm ²):	2588		Background Subtract Not Applied
Material Type:	N/A		
Sign Test Final N Value:	14		Class 3 No additional samples required
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		
Total Standard Deviation <= Sigma:	Investigate		
Pass the Sign Test?	Yes		
Reject the Null Hypothesis?	Yes	The survey unit passes all conditions: no additional sample required	
Does the Survey Unit Pass All Criteria?	Investigate		

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 3 structure survey and the sample results are consistent with that classification. While the variability of the survey results was not less than the characterization data used for survey design, no additional samples were required. No potential areas of elevated activity were detected.

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.

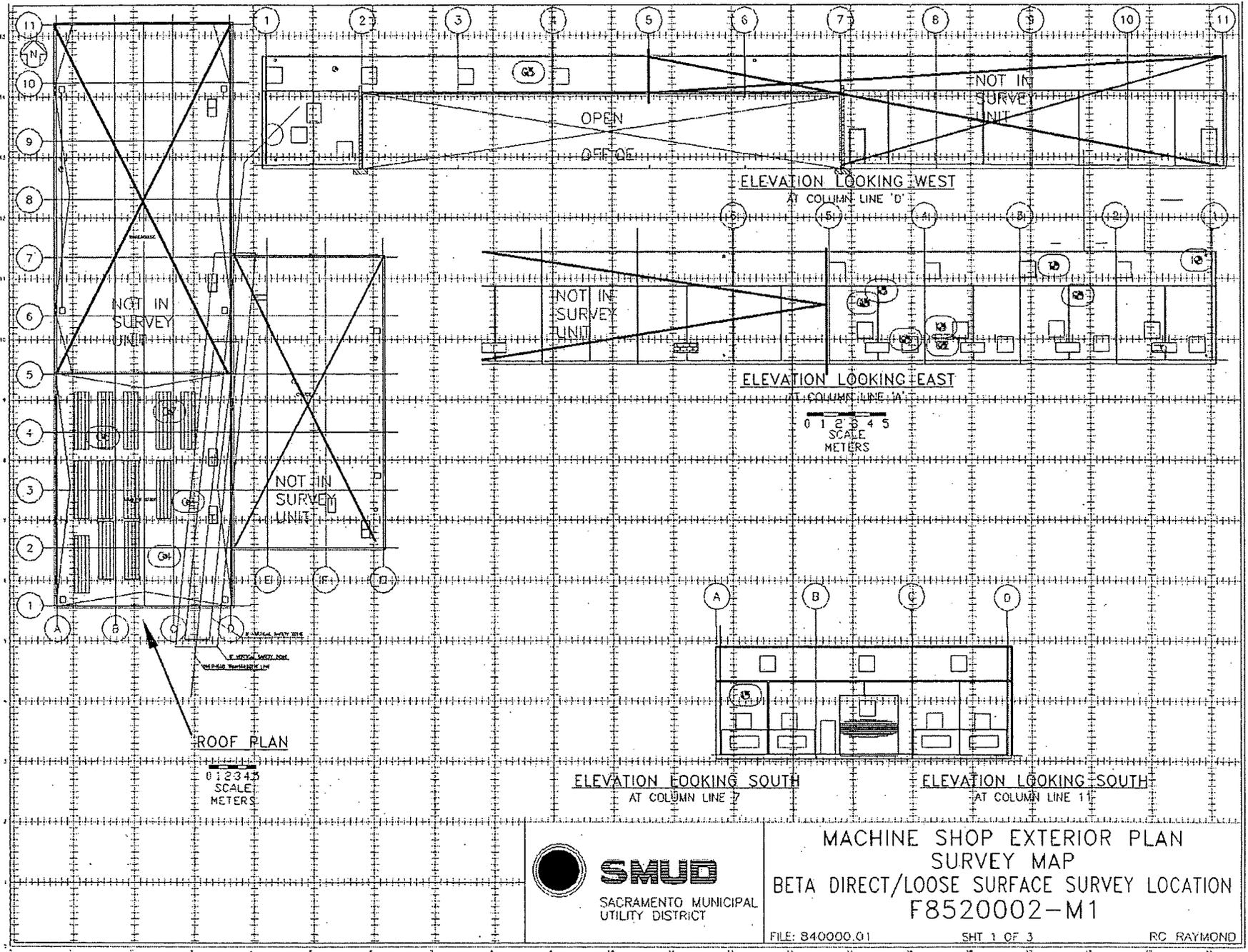
It is concluded that survey unit F8520002 meets the release criteria of 10CFR20.1402.

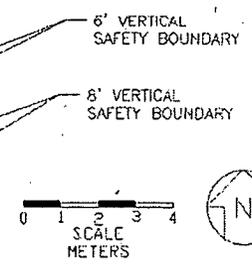
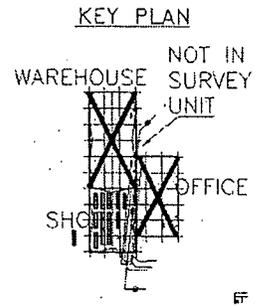
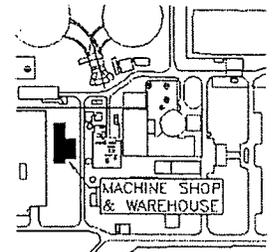
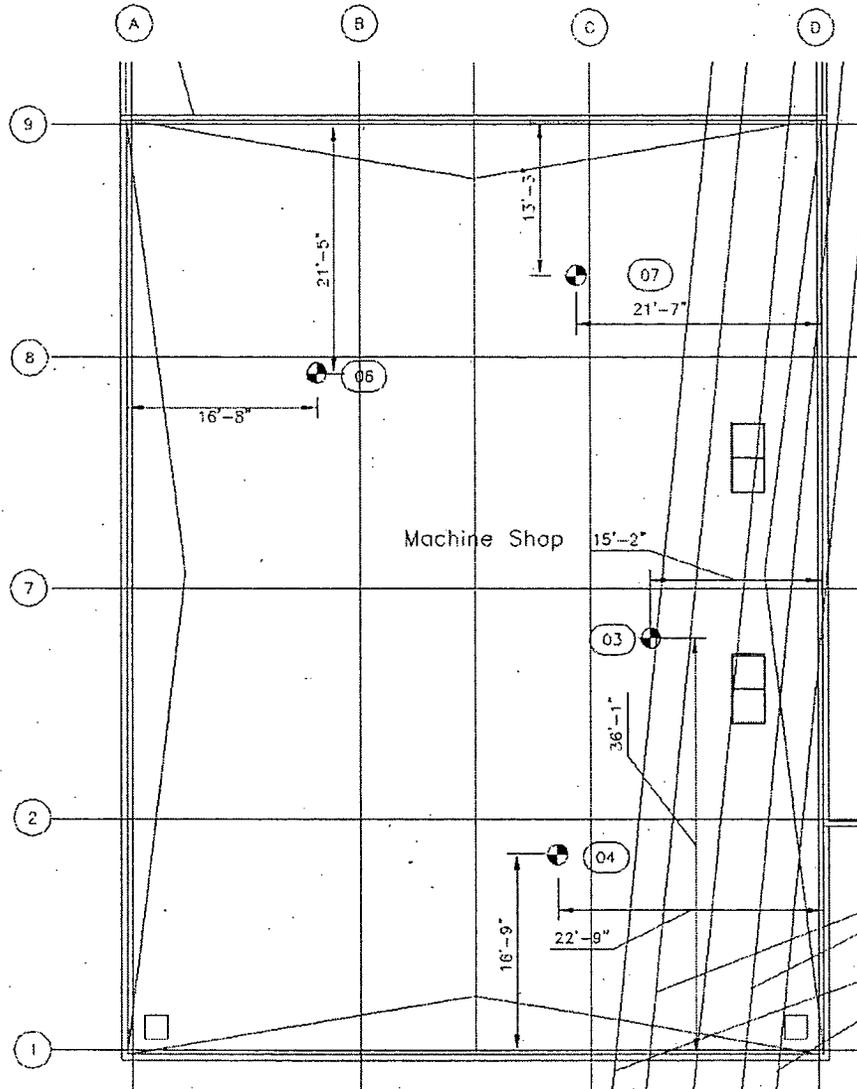
Attachment 1

Maps

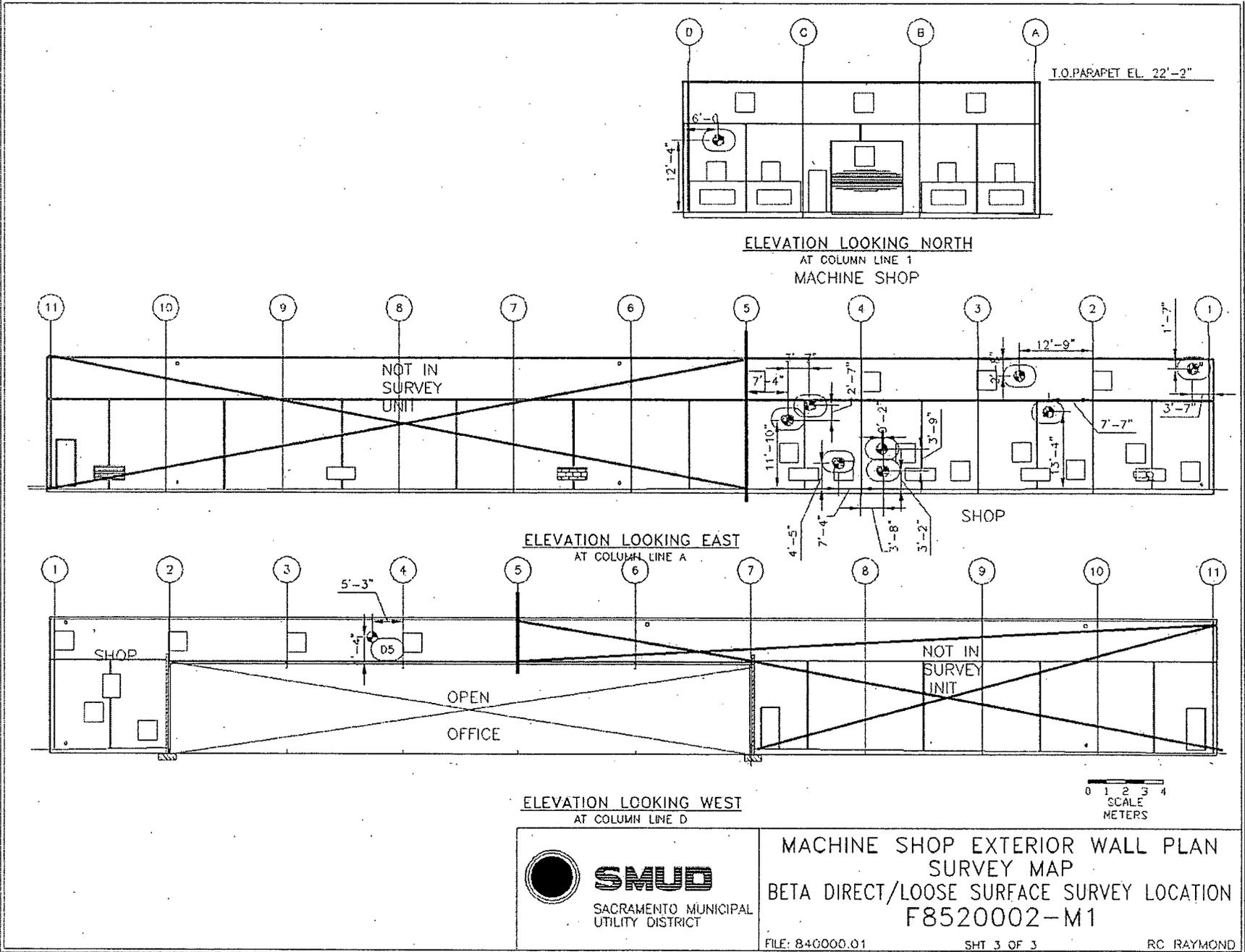
October 31, 2007

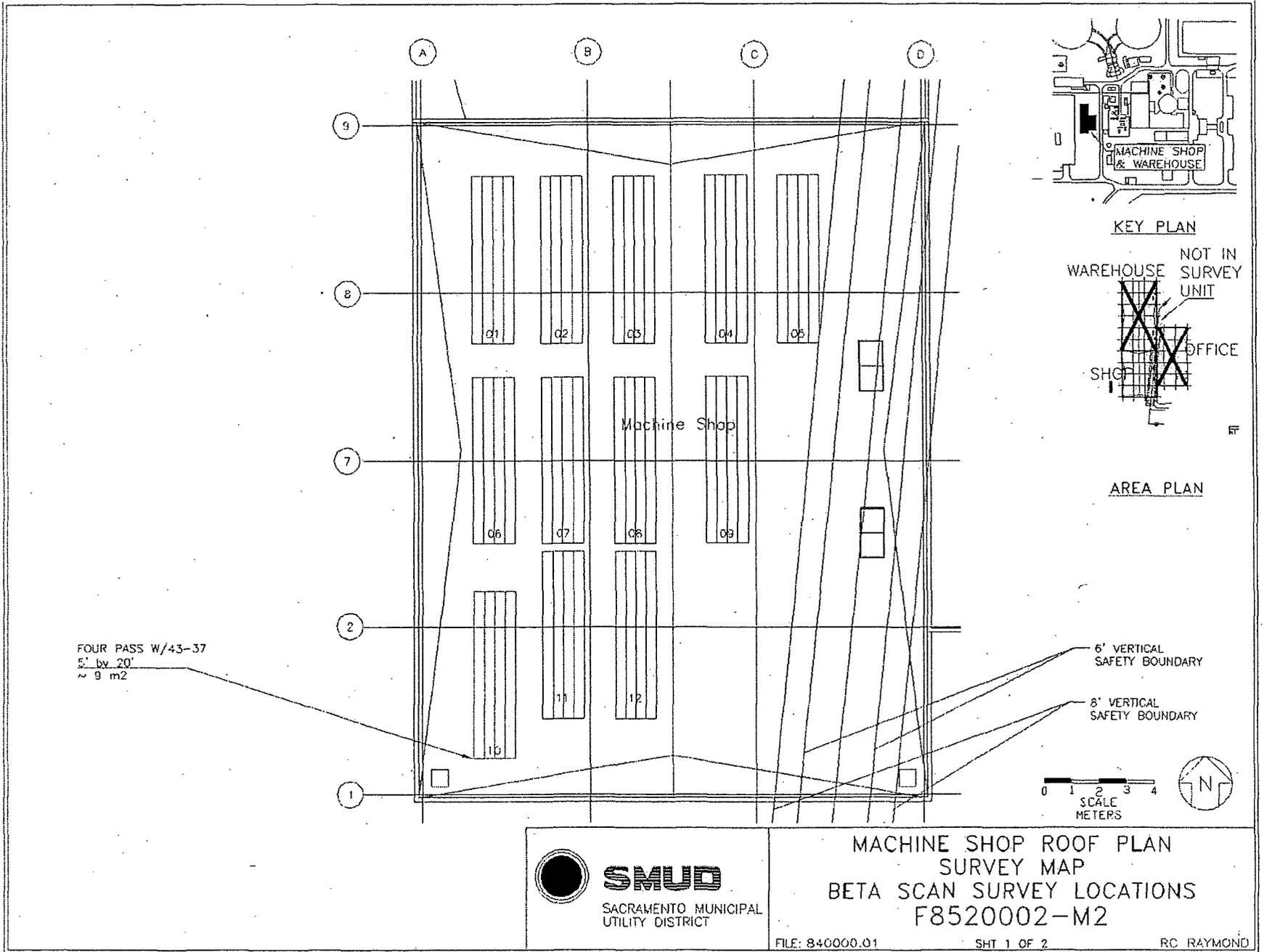
Survey Unit F8520002

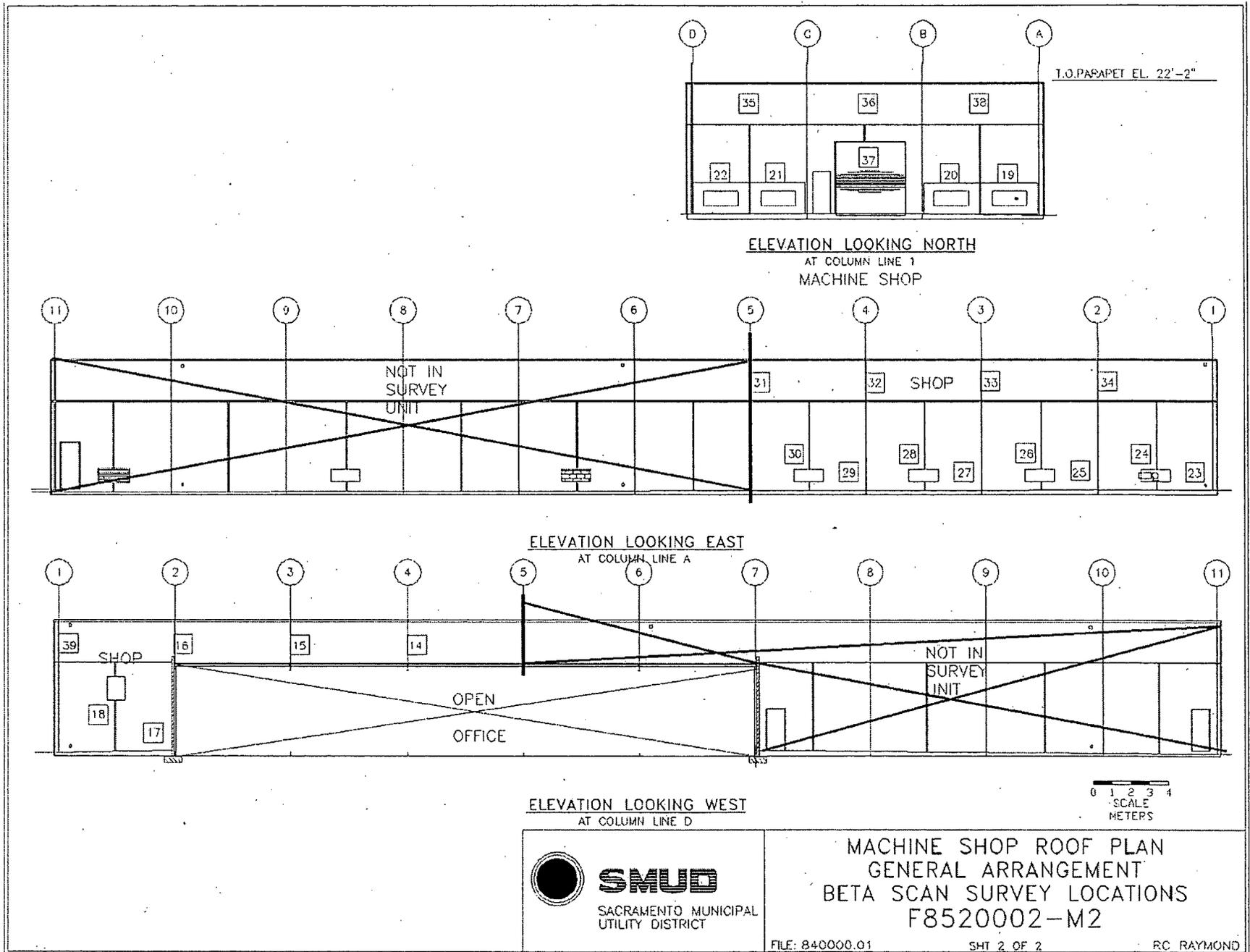


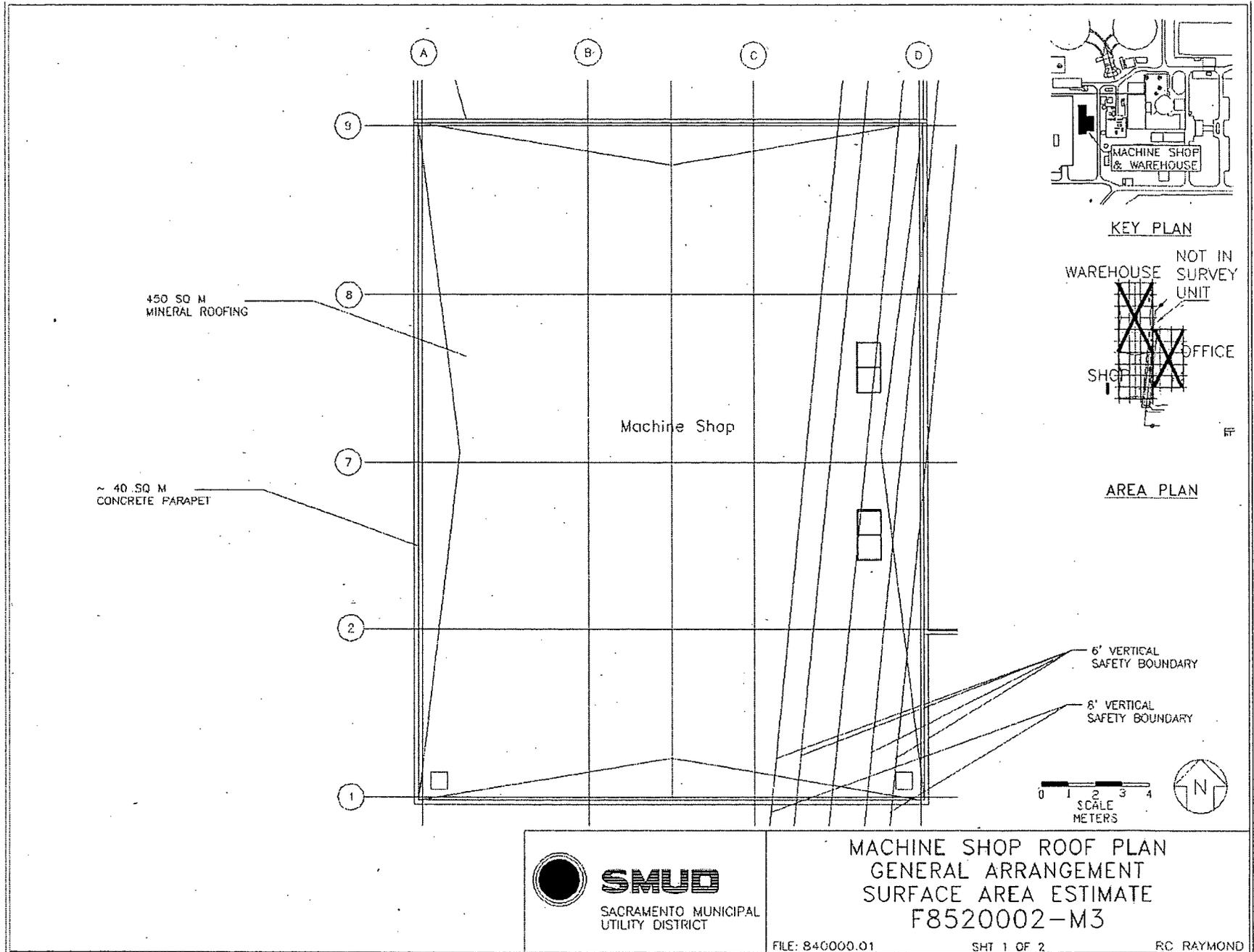


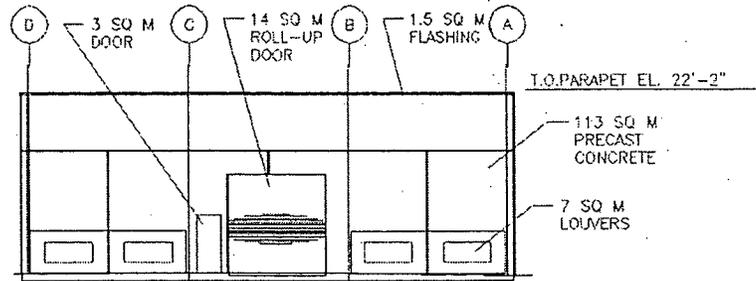
MACHINE SHOP ROOF PLAN
SURVEY MAP
BETA DIRECT/LOOSE SURFACE SURVEY LOCATION
F8520002-M1



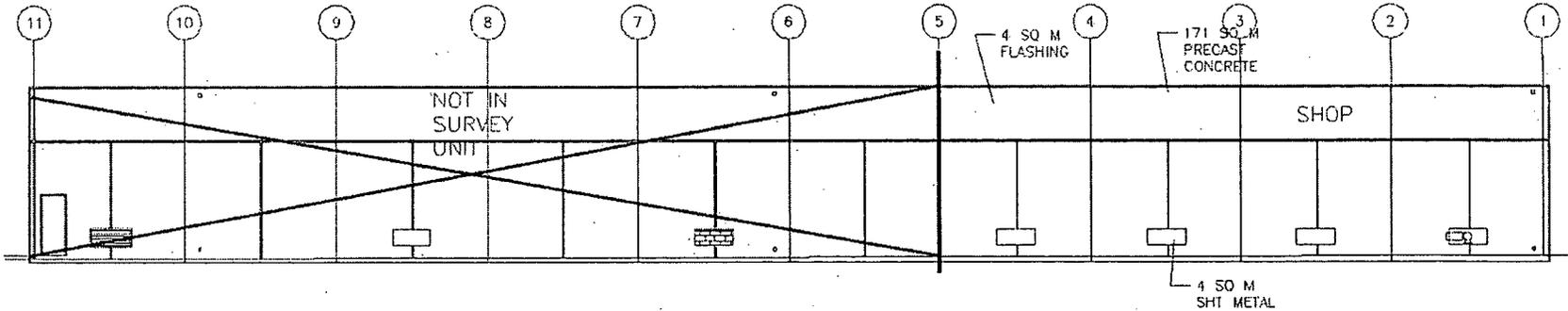




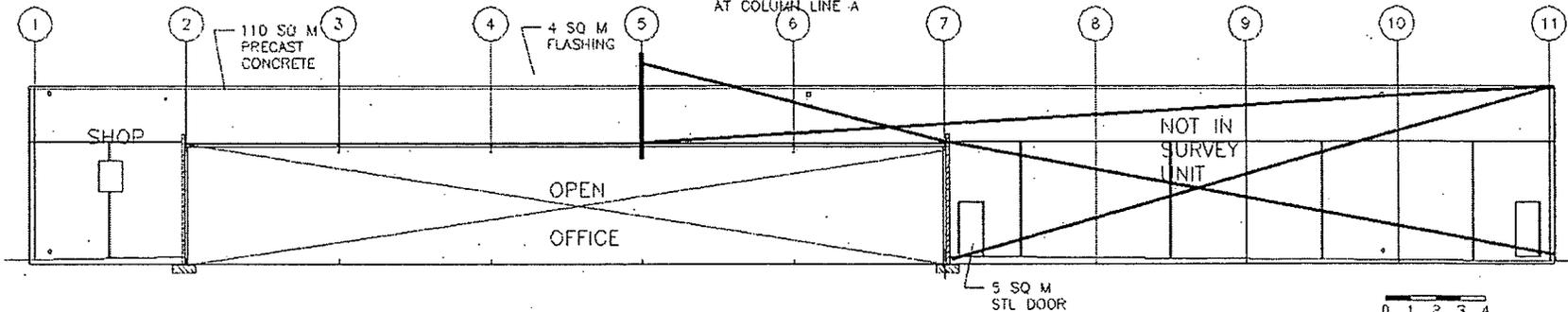




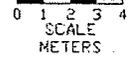
ELEVATION LOOKING NORTH
AT COLUMN LINE 1
MACHINE SHOP



ELEVATION LOOKING EAST
AT COLUMN LINE A



ELEVATION LOOKING WEST
AT COLUMN LINE D



SMUD

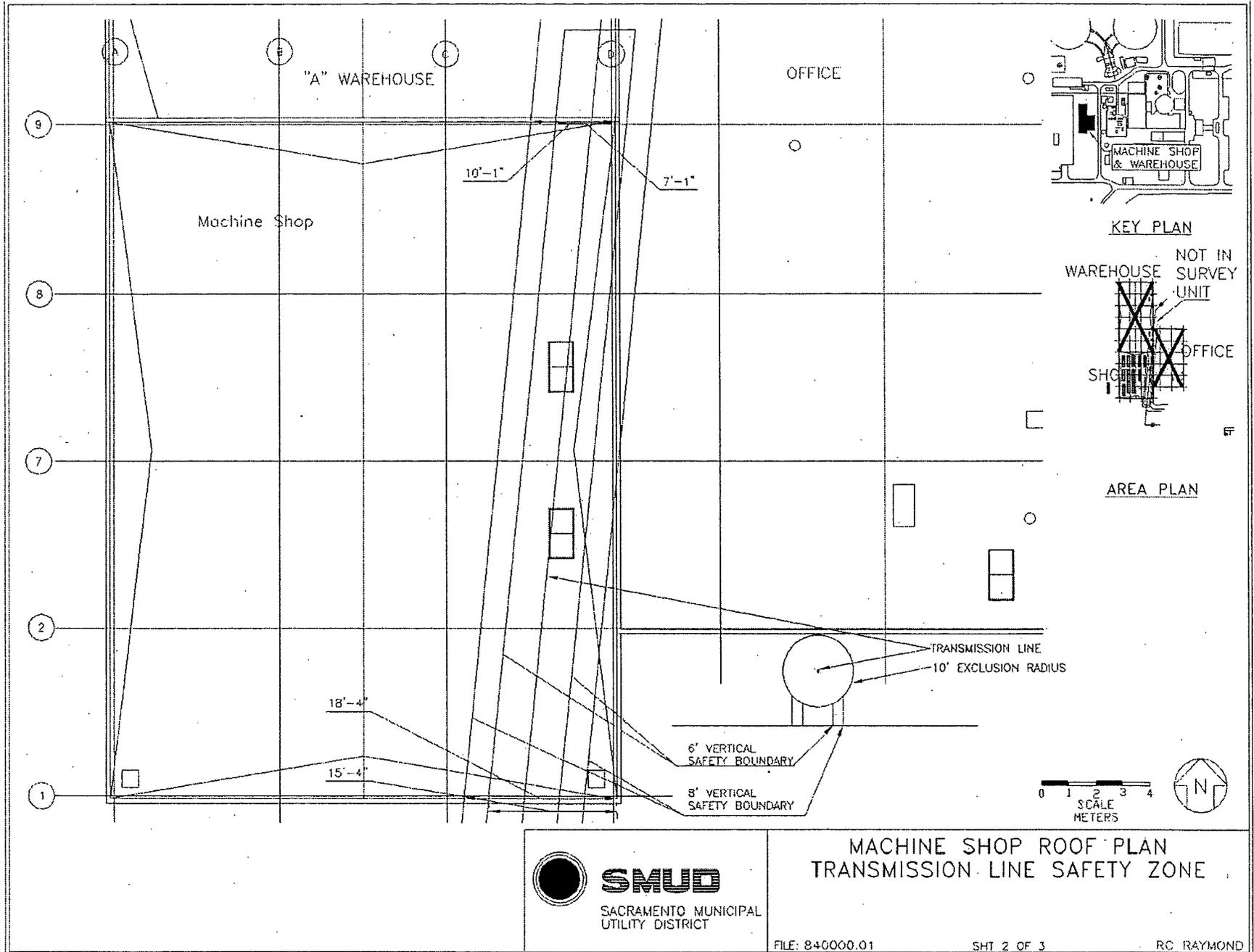
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

MACHINE SHOP ROOF PLAN
GENERAL ARRANGEMENT
SURFACE AREA ESTIMATE
F8520002-M3

FILE: 840000.01

SHT 2 OF 2

RC RAYMOND



Attachment 2
Instrumentation
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Survey Unit F8520002

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; 149802	43-68B; 148453	433	1033
M2350; 149802	43-68B; 148453	256 ¹	611 ¹
M2350; 142499	43-37; 148502	198	616
Tennelec; 0401171	N/A	5 dpm α , 11 dpm β	N/A

¹Metals

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
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(none required)

Attachment 4
Data Assessment
October 31, 2007
Survey Unit F8520002

