

Rancho Seco  
Final Status Survey Summary Report  
March 24, 2008  
Service Water Piping System  
Survey Unit F8990471

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Dismantlement Superintendent, Radiological

## FINAL STATUS SURVEY SUMMARY REPORT

### Survey Unit:

F8990471, Service Water Piping System

### Survey Unit Description:

**Operating History:** This system filtered and conditioned untreated raw water from the makeup system and transported water to various non-safety coolers and utility stations throughout the site. This system was designed to be clean. Operating records and the HSA document no occurrences of radioactive contamination associated with this system piping.

**Site Characterization:** Direct measurements were made of the interior surfaces of the system piping which confirmed the absence of plant-derived radionuclides. Direct measurements of the interior showed a mean gross activity level of 187 dpm/100 cm<sup>2</sup> and a maximum value of 2,700 dpm/100 cm<sup>2</sup>. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the system was determined to be a Class 3 system.

HSA Events: None

### 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 spaced at 15cm intervals and 5.1 m<sup>2</sup> were scanned for approximately 2% coverage. 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**

<b>Survey Design Parameter</b>	<b>Value</b>	<b>Comment</b>
<b>Survey Area:</b>	F899	Service Water Piping System
<b>Survey Unit:</b>	0471	Structure Surface
<b>Class:</b>	3	LTP Table 5-4
<b>SU Area (m<sup>2</sup>):</b>	250.3	
<b>Evaluator:</b>	Erin L. Brown	
<b>DCGL (dpm/100 cm<sup>2</sup>):</b>	100000	Gross Activity DCGL
<b>Area Factor:</b>	N/A	Class 3
<b>Design DCGL<sub>emc</sub> (dpm/100 cm<sup>2</sup>):</b>	N/A	Class 3
<b>LBGR (dpm/100 cm<sup>2</sup>):</b>	50000	Default = 50% DCGL
<b>Design Sigma (dpm/100 cm<sup>2</sup>):</b>	1992	
<b>Type I Error:</b>	0.05	
<b>Type II Error:</b>	0.05	
<b>Predominant Nuclide:</b>	Cs-137	
<b>Sample Area (m<sup>2</sup>):</b>	N/A	Class 3
<b>Scan Area (m<sup>2</sup>):</b>	5.1	
<b>Scan Coverage (%):</b>	2%	Class 3
<b>Z<sub>1-α</sub>:</b>	1.645	
<b>Z<sub>1-β</sub>:</b>	1.645	
<b>Sign P:</b>	0.99865	
<b>Calculated Relative Shift:</b>	25.1	
<b>Relative Shift Used:</b>	3	Uses 3.0 if Relative Shift is >3
<b>N-Value:</b>	11	
<b>Design N-Value + 20%:</b>	14	NUREG-1575 Table 5-5
<b>Design Min Samples N:</b>	14	Class 3
<b>Grid Spacing L:</b>	N/A	Class 3

### Survey Results:

A total of 71 direct measurements were made in F8990471. 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 measurements indicated areas of elevated activity. Scan activity ranged from 1036 to 1580 dpm/100 cm<sup>2</sup>, based on the pipe detector efficiency.

**Table 2. Direct Measurement Results**

Measurement ID	Gross Activity (dpm/100 cm <sup>2</sup> )
F8990471-M0001GI	1502
F8990471-M0002GI	1499
F8990471-M0003GI	1477
F8990471-M0004GI	1388
F8990471-M0005GI	1362
F8990471-M0006GI	1391
F8990471-M0007GI	1494
F8990471-M0008GI	1431
F8990471-M0009GI	1470
F8990471-M0010GI	1497
F8990471-M0011GI	1525
F8990471-M0012GI	1422
F8990471-M0013GI	1452
F8990471-M0014GI	1493
F8990471-M0015GI	1445
F8990471-M0016GI	1523
F8990471-M0017GI	1481
F8990471-M0018GI	1492
F8990471-M0019GI	1496
F8990471-M0020GI	1571
F8990471-M0021GI	1547
F8990471-M0022GI	1535
F8990471-M0023GI	1488
F8990471-M0024GI	1511
F8990471-M0025GI	1502
F8990471-M0026GI	1543
F8990471-M0027GI	1580
F8990471-M0028GI	1577
F8990471-M0029GI	1547
F8990471-M0030GI	1515
F8990471-M0031GI	1496
F8990471-M0032GI	1530
F8990471-M0033GI	1474
F8990471-M0034GI	1488
F8990471-M0035GI	1496
F8990471-M0036GI	1435
F8990471-M0037GI	1475
F8990471-M0038GI	1404
F8990471-M0039GI	1425
F8990471-M0040GI	1453

F8990471-M0041GI	1394
F8990471-M0042GI	1431
F8990471-M0043GI	1488
F8990471-M0044GI	1441
F8990471-M0045GI	1408
F8990471-M0046GI	1400
F8990471-M0047GI	1431
F8990471-M0048GI	1376
F8990471-M0049GI	1377
F8990471-M0050GI	1082
F8990471-M0051GI	1036
F8990471-M0052GI	1334
F8990471-M0053GI	1426
F8990471-M0054GI	1431
F8990471-M0055GI	1380
F8990471-M0056GI	1349
F8990471-M0057GI	1376
F8990471-M0058GI	1348
F8990471-M0059GI	1331
F8990471-M0060GI	1396
F8990471-M0061GI	1383
F8990471-M0062GI	1404
F8990471-M0063GI	1346
F8990471-M0063GI	1361
F8990471-M0065GI	1371
F8990471-M0066GI	1342
F8990471-M0067GI	1375
F8990471-M0068GI	1355
F8990471-M0069GI	1387
F8990471-M0070GI	1349
F8990471-M0071GI	1369
Mean:	1433
Median:	1431
Standard Deviation:	93
Range:	1036 - 1580

**Survey Unit Data Assessment:**

The survey design required 71 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>	71	
<b>Median</b> (dpm/100 cm <sup>2</sup> ):	1431	
<b>Mean</b> (dpm/100 cm <sup>2</sup> ):	1433	
<b>Direct Measurement Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	93	
<b>Total Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	93	Based on samples and backgrounds.
<b>Maximum</b> (dpm/100 cm <sup>2</sup> ):	1580	
<b>Material Type:</b>	N/A	Background Subtract Not Applied
<b>Sign Test Final N Value:</b>	71	
<b>S+ Value:</b>	71	
<b>Critical Value:</b>	42	
<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>	N/A	Class 3
<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 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. 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 for pipe surveys. No direct measurements exceeded the DCGL of 100000 dpm/100 cm<sup>2</sup> or the grout limit of 21000dpm/100cm<sup>2</sup>. 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 F8990471 meets the release criteria of 10CFR20.1402.

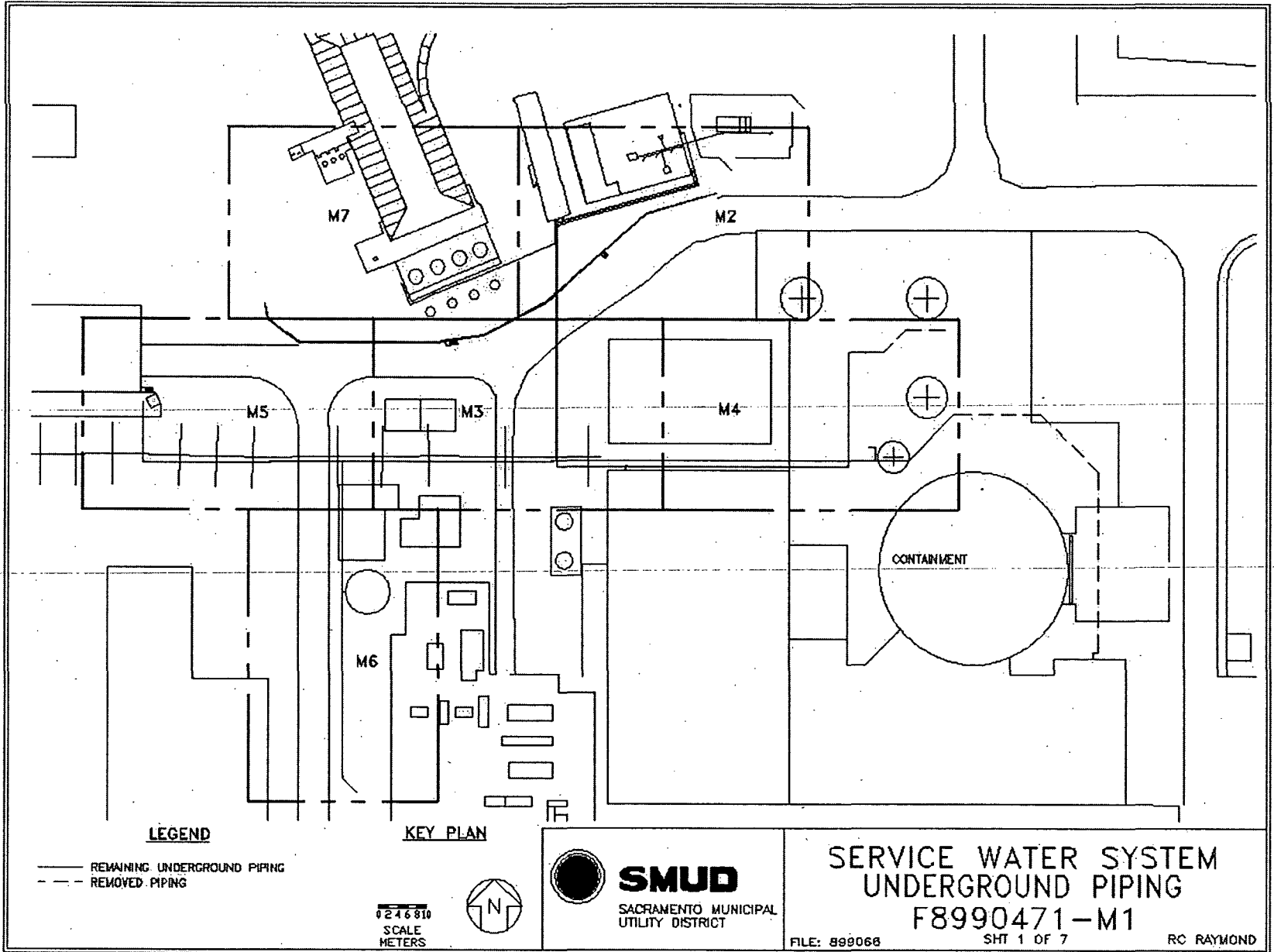


**Attachment 1**

**Maps**

**March 24, 2008**

**Survey Unit F8990471**



**LEGEND**

——— REMAINING UNDERGROUND PIPING  
 - - - REMOVED PIPING

**KEY PLAN**

0 2 4 6 8 10  
 SCALE  
 METERS



**SMUD**

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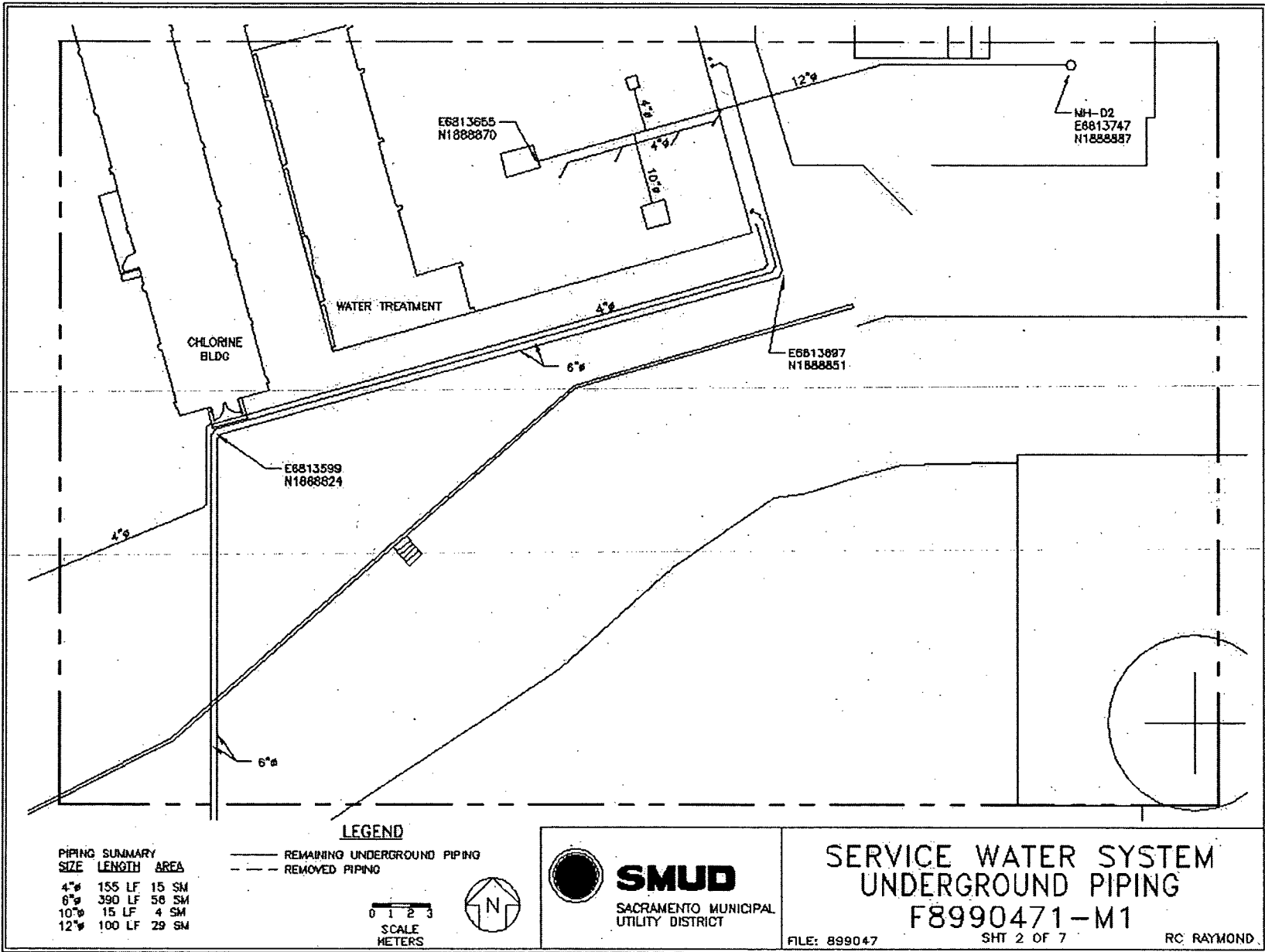
**SERVICE WATER SYSTEM  
 UNDERGROUND PIPING**

**F8990471-M1**

FILE: 899068

SHT 1 OF 7

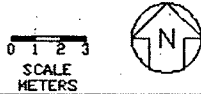
RC RAYMOND



**PIPING SUMMARY**

SIZE	LENGTH	AREA
4"	155 LF	15 SM
6"	390 LF	56 SM
10"	15 LF	4 SM
12"	100 LF	29 SM

- LEGEND**
- REMAINING UNDERGROUND PIPING
  - - - REMOVED PIPING

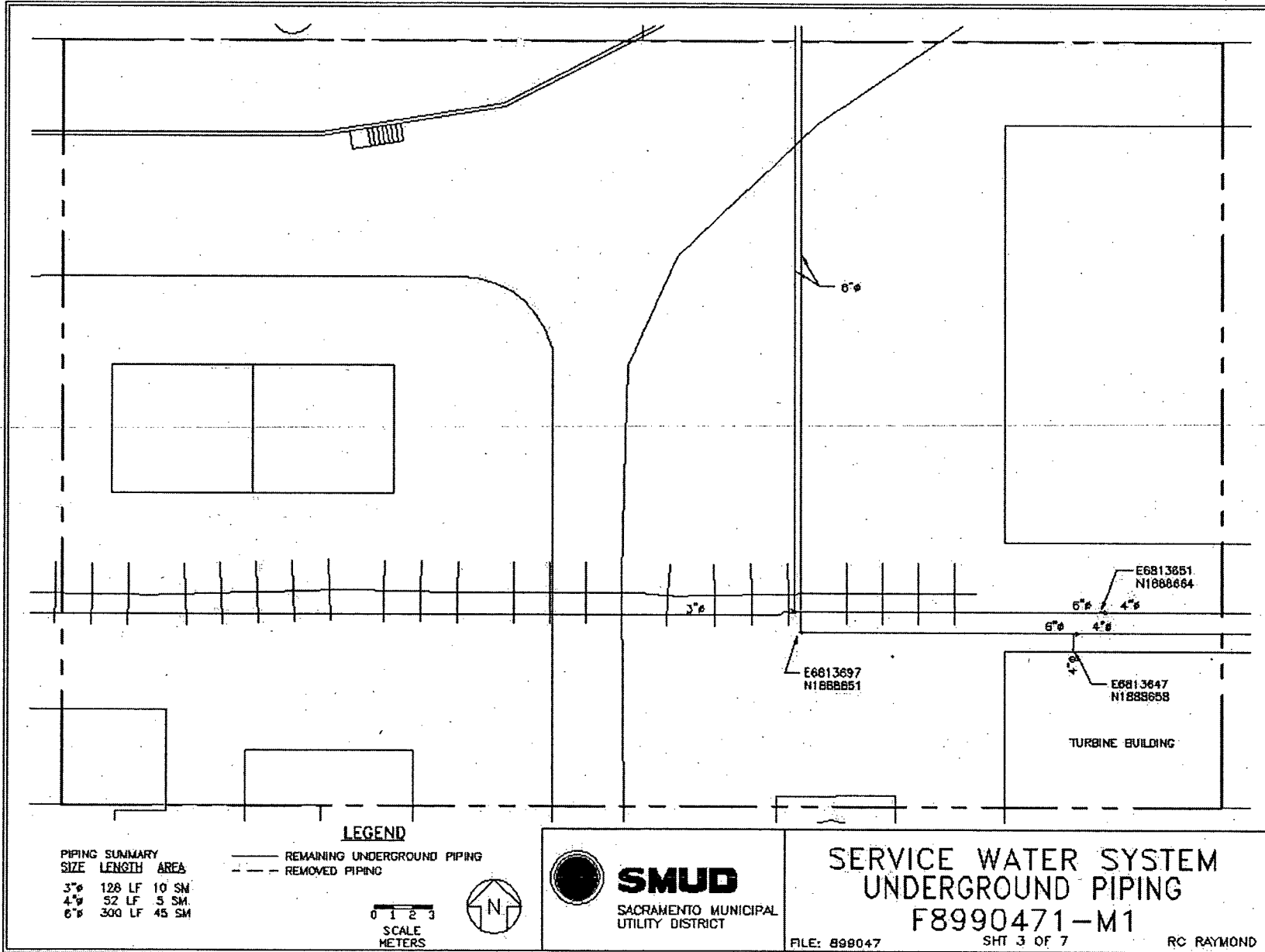


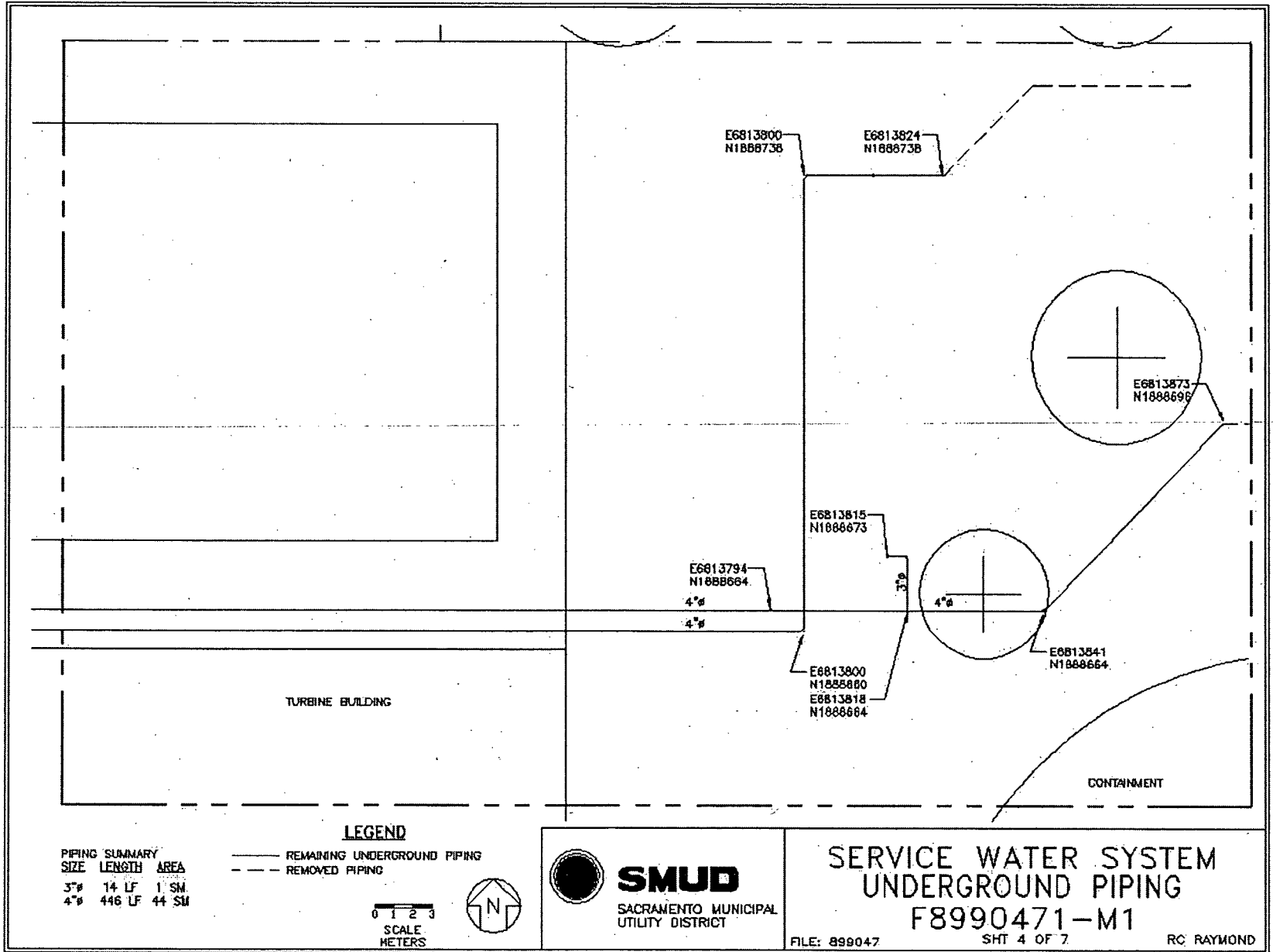
**SERVICE WATER SYSTEM  
UNDERGROUND PIPING  
F8990471-M1**

FILE: 899047

SHT 2 OF 7

RC RAYMOND





**PIPING SUMMARY**

SIZE	LENGTH	AREA
3"	14 LF	1 SM
4"	446 LF	44 SM

**LEGEND**

——— REMAINING UNDERGROUND PIPING  
 - - - - - REMOVED PIPING

0 1 2 3  
 SCALE  
 METERS



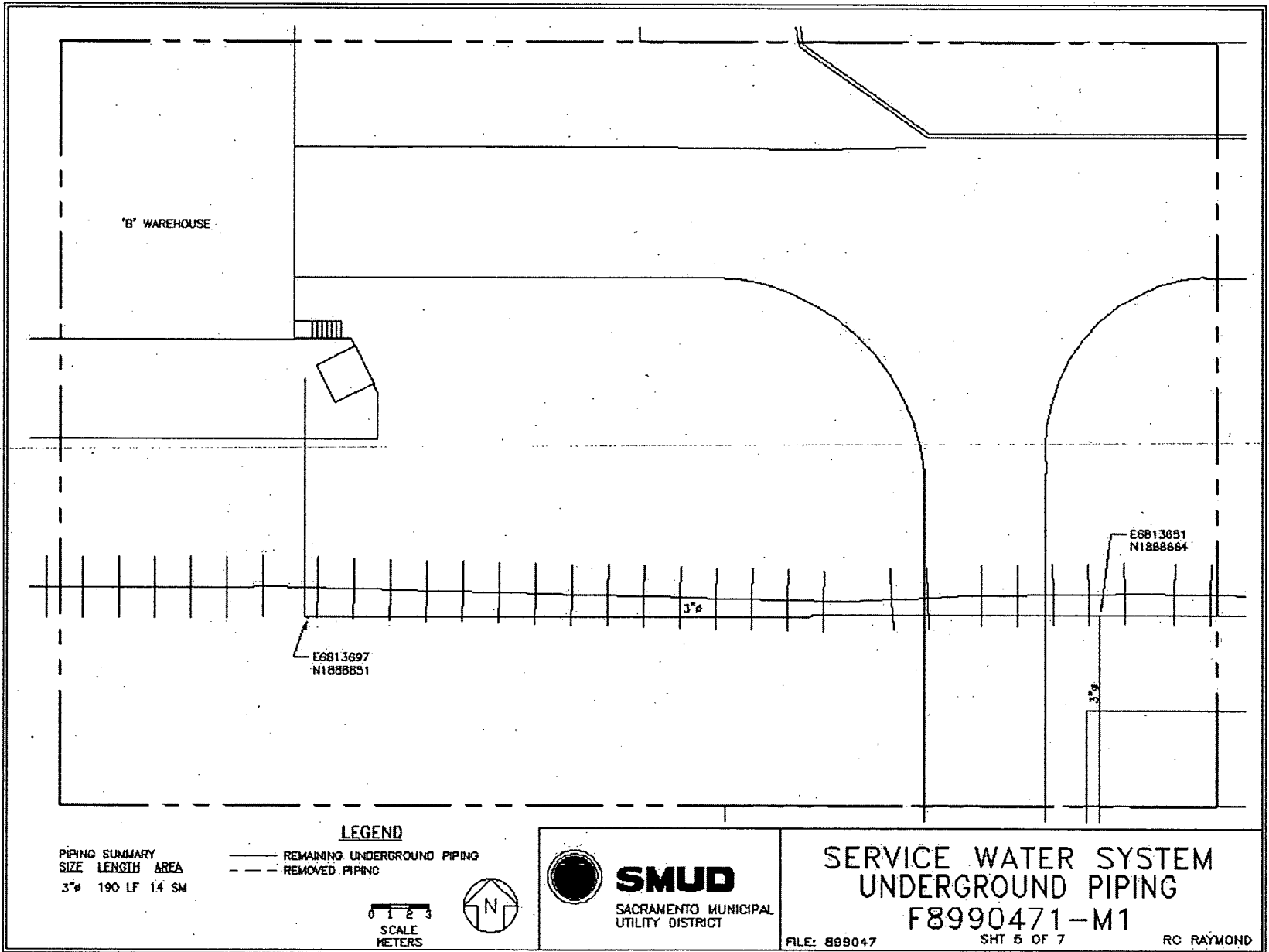
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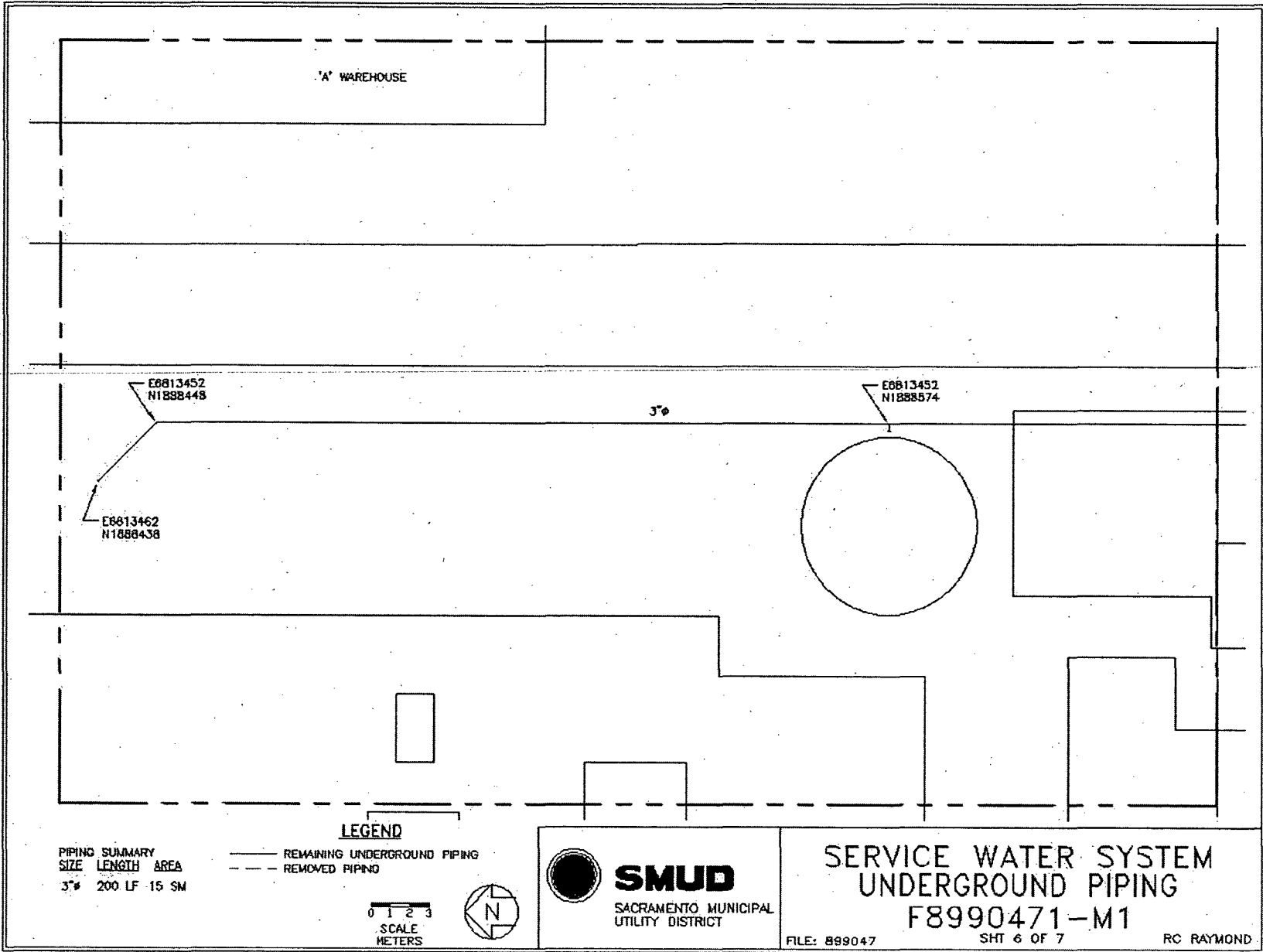
**SERVICE WATER SYSTEM  
 UNDERGROUND PIPING  
 F8990471-M1**

FILE: 899047

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RC RAYMOND





PIPING SUMMARY

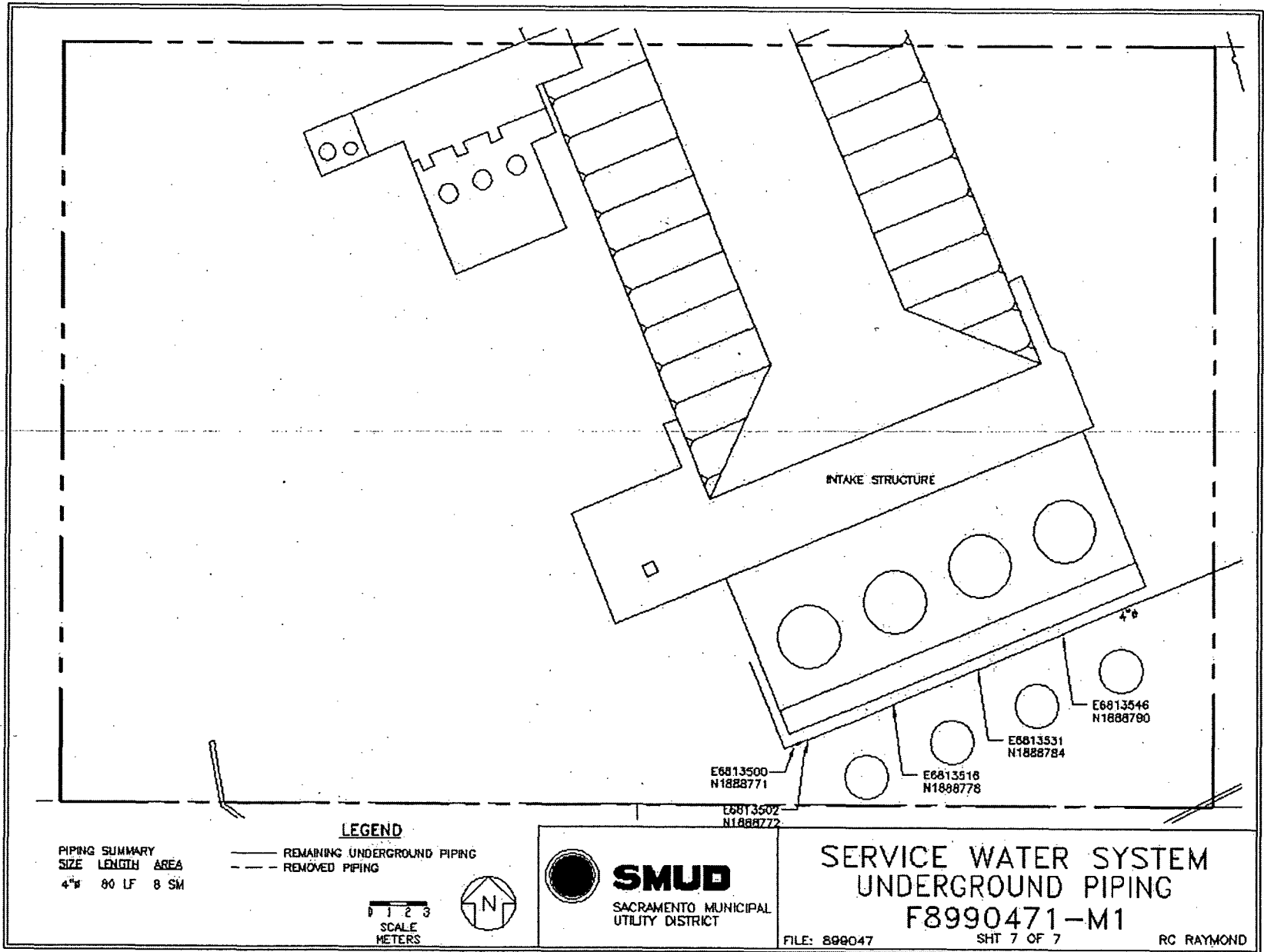
SIZE	LENGTH	AREA
3"	200 LF	15 SM

- LEGEND**
- REMAINING UNDERGROUND PIPING
  - - - REMOVED PIPING



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**SERVICE WATER SYSTEM  
UNDERGROUND PIPING**  
F8990471-M1



PIPING SUMMARY

SIZE	LENGTH	AREA
4"	80 LF	8 SM

**LEGEND**

- REMAINING UNDERGROUND PIPING
- - - REMOVED PIPING



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**SERVICE WATER SYSTEM  
UNDERGROUND PIPING  
F8990471-M1**

FILE: 899047

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RC RAYMOND



**Attachment 2**

**Instrumentation**

**March 24, 2008**

**Survey Unit F8990471**

**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; 203484	44-157; 215854	1680	N/A

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

<b>Parameter</b>	<b>Value (dpm/100 cm<sup>2</sup>)</b>
Investigation Criteria - Direct	50000
Investigation Criteria – Scan	N/A
DCGL <sub>w</sub>	100000
DCGL <sub>EMC</sub>	N/A

**Attachment 3**

**Investigation**

**March 24, 2008**

**Survey Unit F8990471**

**(none required)**

**Attachment 4**

**Data Assessment**

**March 24, 2008**

**Survey Unit F8990471**

