

**Rancho Seco**  
**Final Status Survey Summary Report**  
**March 24, 2008**  
**Intake Pump Structure**  
**Survey Unit F8230001**

Prepared By: Car L. Brown Date: 3/24/2008

**FSS Engineer**

Reviewed By: [Signature] Date: 3/24/08

**Lead FSS Engineer**

Approved By: [Signature] Date: 4-28-08

**Dismantlement Superintendent, Radiological**

## FINAL STATUS SURVEY SUMMARY REPORT

### Survey Unit:

F8230001, Intake Pump Structure

### Survey Unit Description:

Operating History: This structure, located south of the cooling towers, housed the pumps which delivered cooling water to the cooling towers. This area was not reported to have been used for the storage of radioactive material. Operating records and the HSA document no events with the potential for a release of radioactivity associated with this survey area.

Site Characterization: Direct measurements were made of the surfaces of the structure which confirmed the absence of plant-derived radionuclides. Direct measurements showed a mean gross activity level of 260 dpm/100 cm<sup>2</sup> and a maximum value of 1,375 dpm/100 cm<sup>2</sup>. 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: 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 randomly determined and 21 m<sup>2</sup> were scanned for approximately 5% 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**

<b>Survey Design Parameter</b>	<b>Value</b>	<b>Comment</b>
<b>Survey Area:</b>	F823	Intake Pump Structure
<b>Survey Unit:</b>	0001	Structure Surface
<b>Class:</b>	3	LTP Table 5-4
<b>SU Area (m<sup>2</sup>):</b>	402	
<b>Evaluator:</b>	Erin L. Brown	
<b>DCGL (dpm/100 cm<sup>2</sup>):</b>	43000	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>	21500	Default = 50% DCGL
<b>Design Sigma (dpm/100 cm<sup>2</sup>):</b>	667	
<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>	21	
<b>Scan Coverage (%):</b>	5%	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>	32.2	
<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 14 direct measurements were made in F8230001. 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 4013 to 6896 dpm/100 cm<sup>2</sup>, 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 <sup>2</sup> )
F8230001-C0001BD	2314
F8230001-C0002BD	2282
F8230001-C0003BD	2469
F8230001-C0004BD	2256
F8230001-C0005BD	2350
F8230001-C0006BD	2443
F8230001-C0007BD	1810
F8230001-C0008BD	1790
F8230001-C0009BD	2298
F8230001-C0010BD	2371
F8230001-C0011BD	2630
F8230001-C0012BD	1935
F8230001-C0013BD	2469
F8230001-C0014BD	2552
Mean:	2284
Median:	2332
Standard Deviation:	262
Range:	1790 - 2630

**Table 3. Removable Surface Activity Results**

<b>Measurement ID</b>	<b>Surface Beta Activity (dpm/100 cm<sup>2</sup>)</b>
F8230001C0001SM	-2.24
F8230001C0002SM	-2.24
F8230001C0003SM	-3.53
F8230001C0004SM	-3.53
F8230001C0005SM	-2.24
F8230001C0006SM	-0.95
F8230001C0007SM	1.64
F8230001C0008SM	-3.53
F8230001C0009SM	-4.82
F8230001C0010SM	-4.82
F8230001C0011SM	1.64
F8230001C0012SM	1.64
F8230001C0013SM	0.34
F8230001C0014SM	1.64
Mean:	-1.5
Median:	-2.24
Standard Deviation:	2.47
Range:	-4.82 to 1.64

**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**

<b>Survey Results Parameter</b>	<b>Value</b>	<b>Comment</b>	
<b>Material Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A	Average Ambient BKG = 0	
<b>Ambient Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A		
<b>Actual Direct Measurements (N):</b>	14		
<b>Median</b> (dpm/100 cm <sup>2</sup> ):	2332		
<b>Mean</b> (dpm/100 cm <sup>2</sup> ):	2284		
<b>Direct Measurement Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	262		
<b>Total Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	262		Based on samples and backgrounds.
<b>Maximum</b> (dpm/100 cm <sup>2</sup> ):	2630		Background Subtract Not Applied
<b>Material Type:</b>	N/A		
<b>Sign Test Final N Value:</b>	14		Class 3
<b>S+ Value:</b>	14		
<b>Critical Value:</b>	10		
<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		
<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 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. 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 cm<sup>2</sup> 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 F8230001 meets the release criteria of 10CFR20.1402.

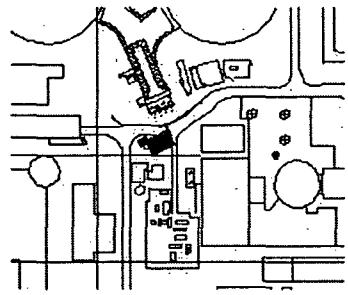
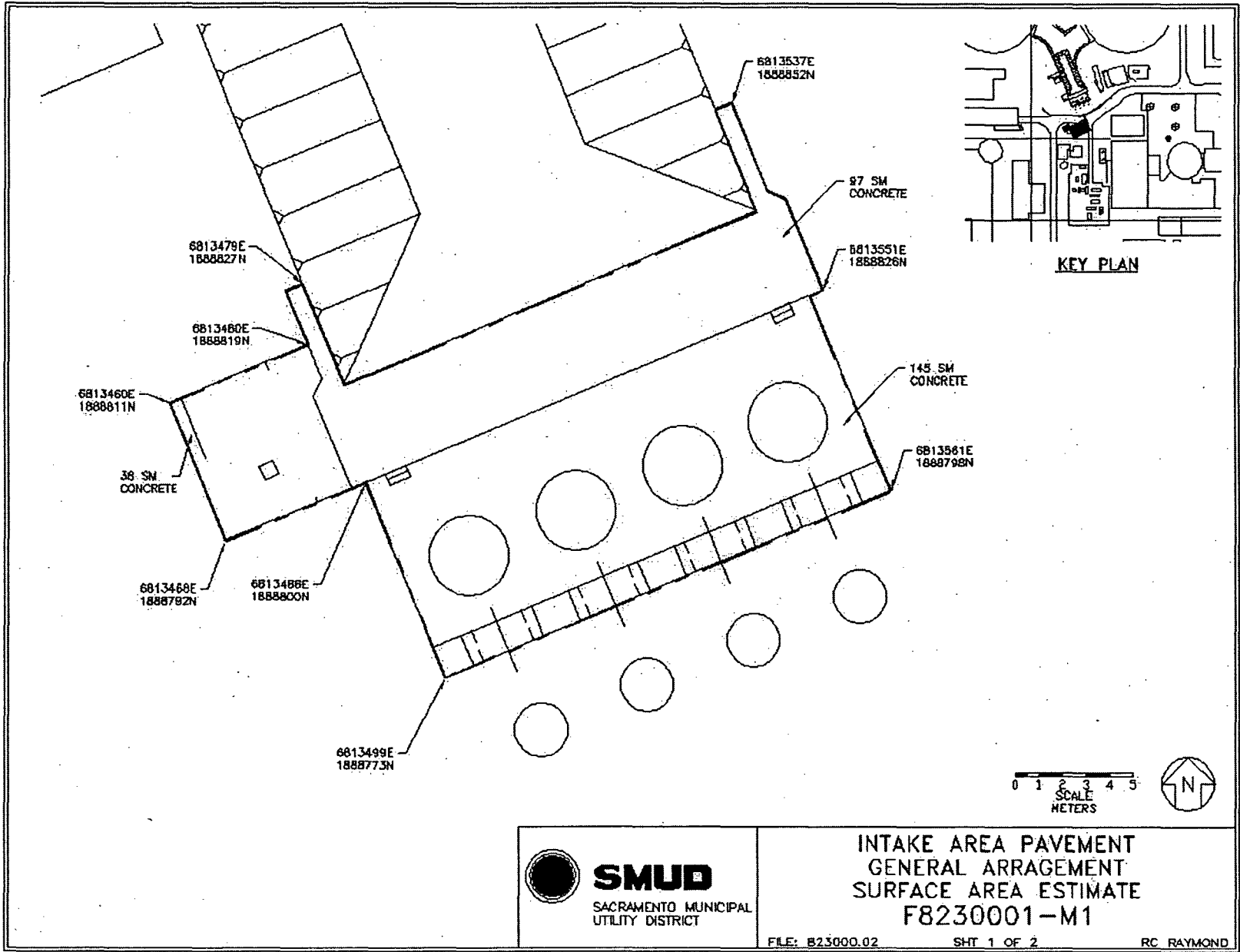


**Attachment 1**

**Maps**

**March 24, 2008**

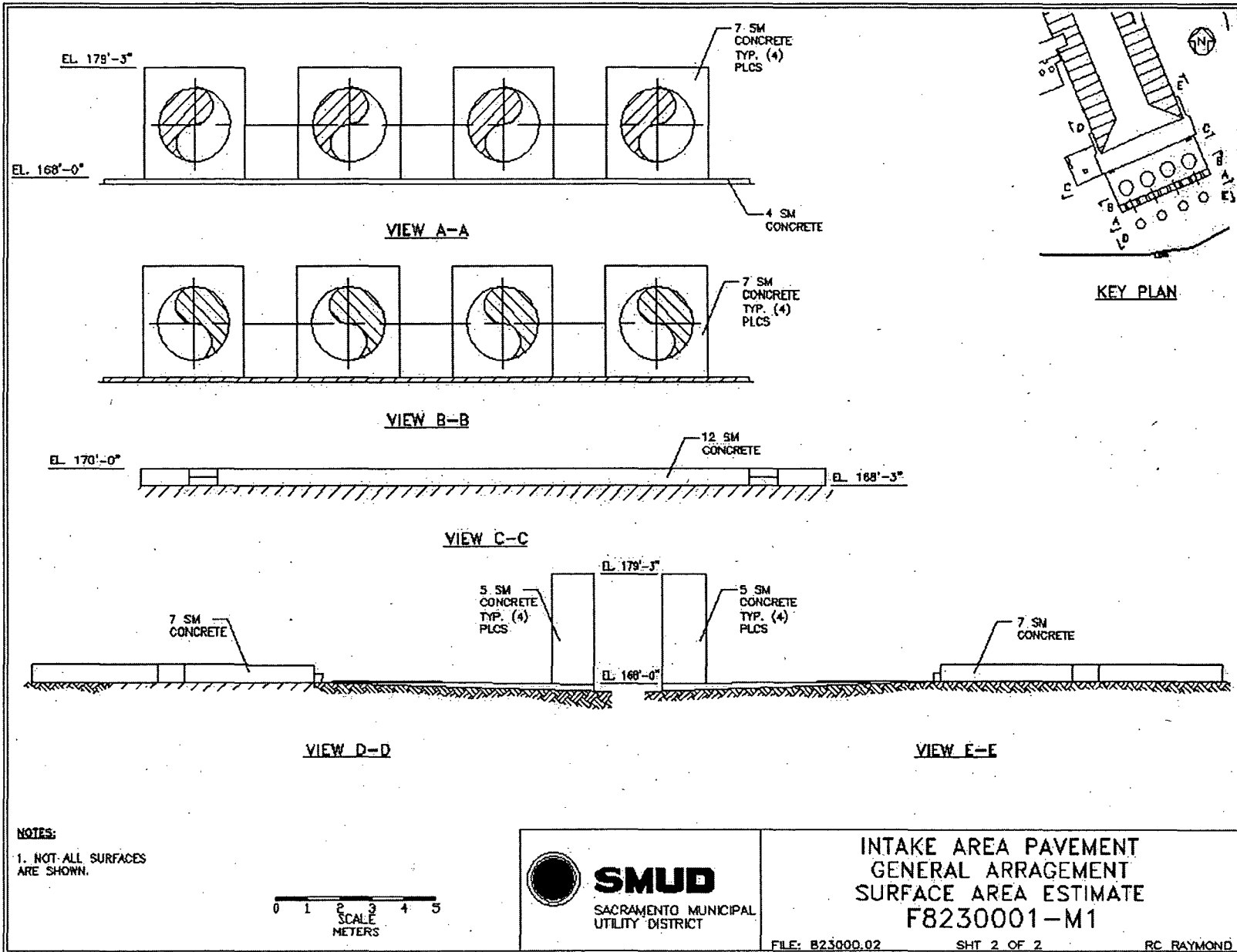
**Survey Unit F8230001**

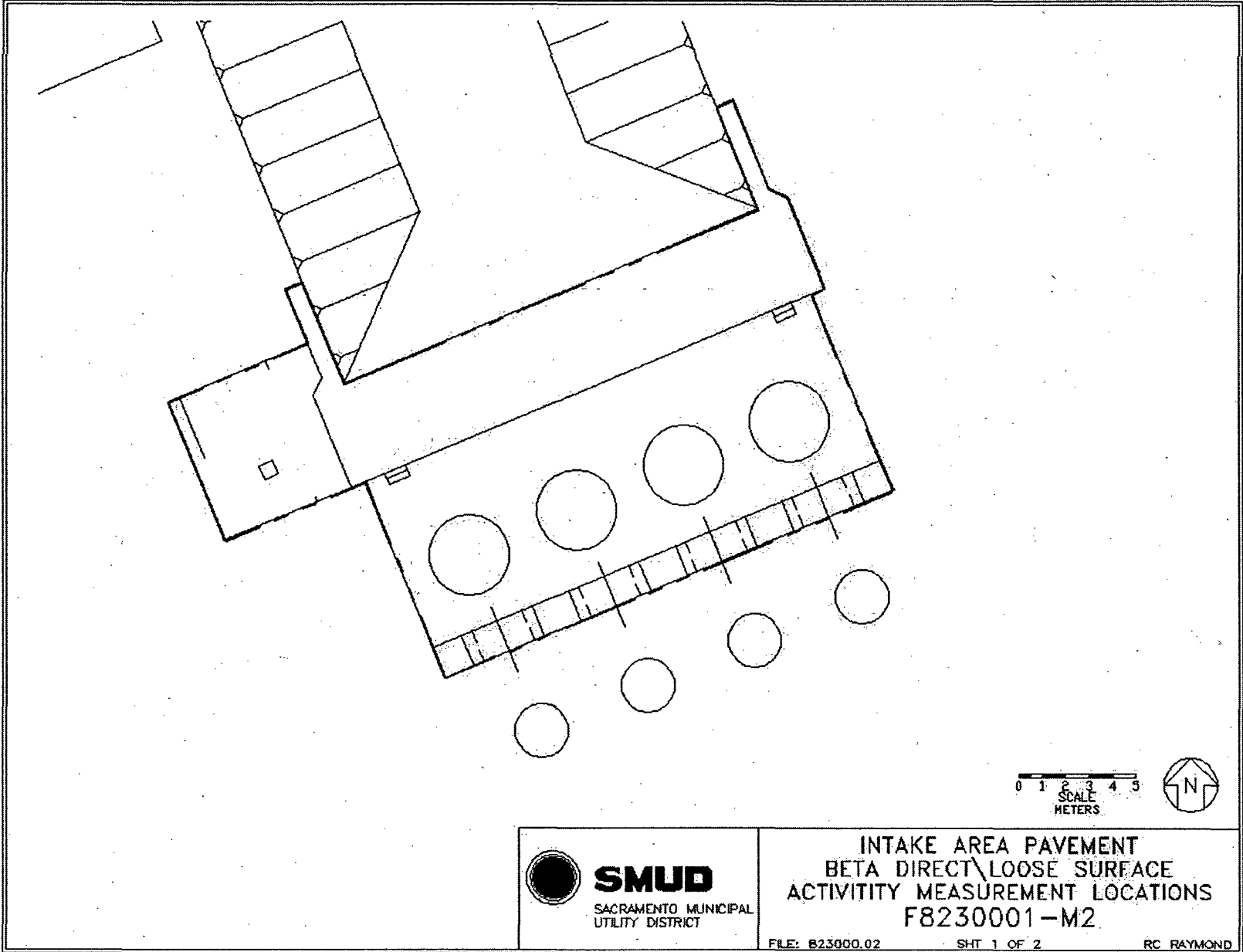


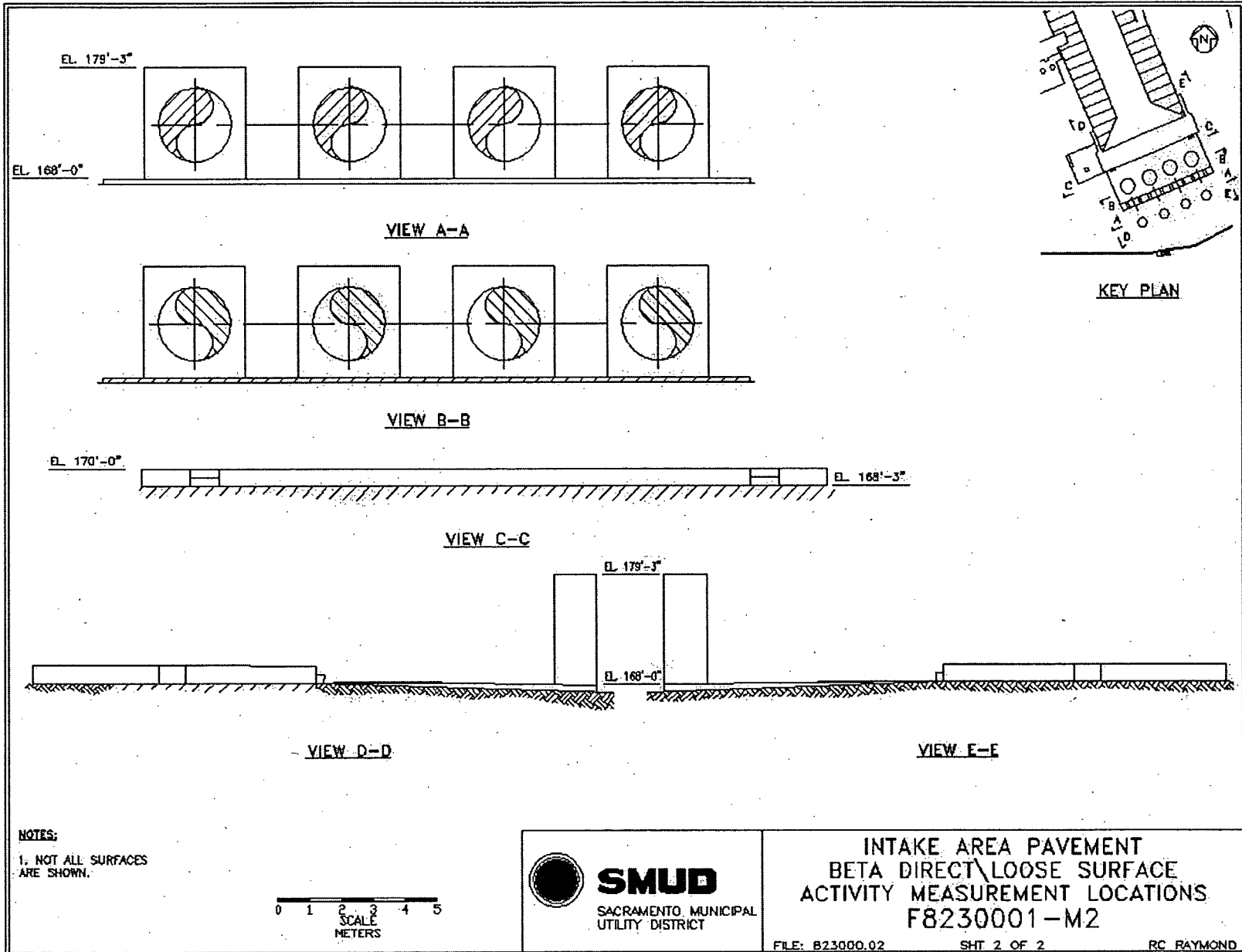
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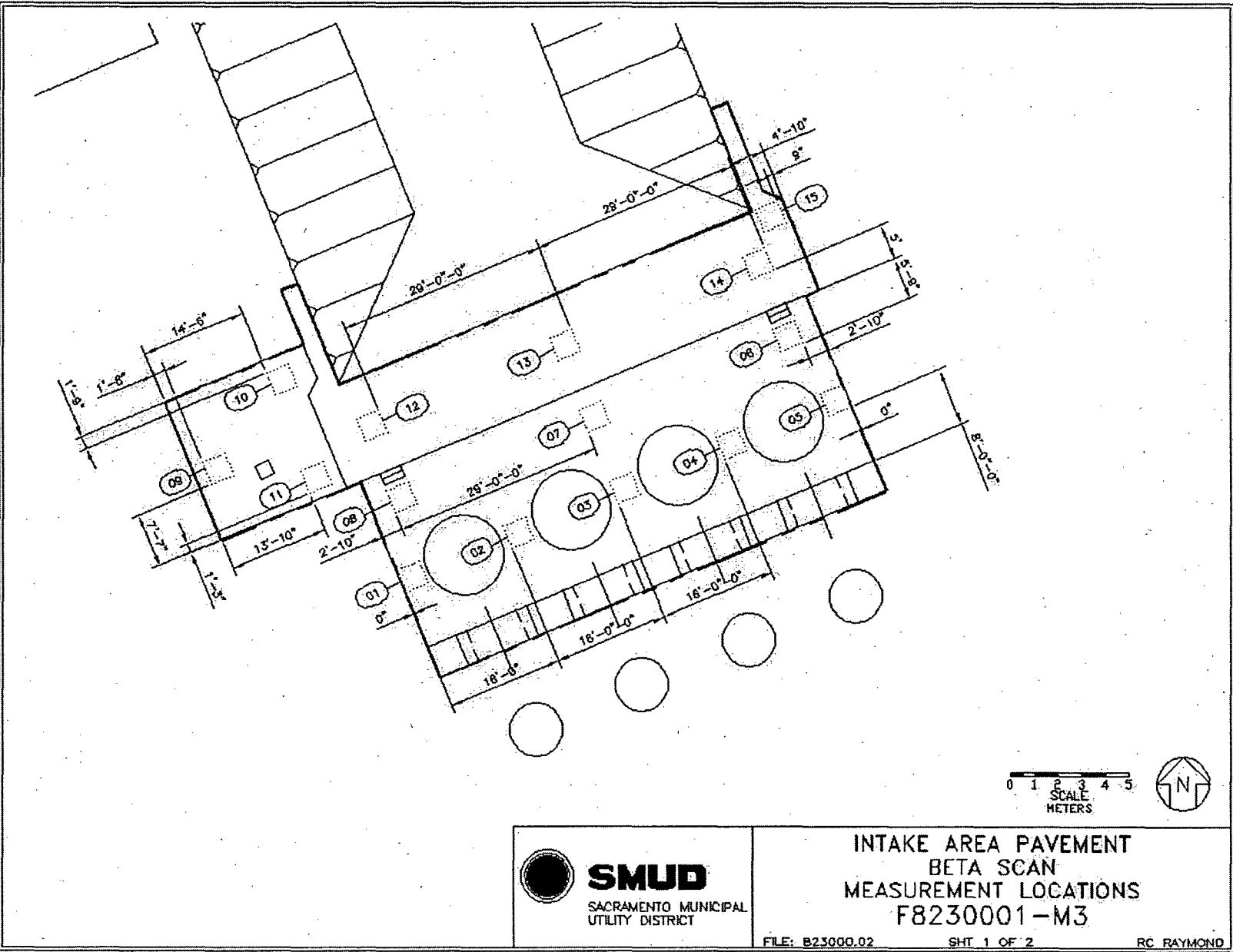



INTAKE AREA PAVEMENT  
 GENERAL ARRAGEMENT  
 SURFACE AREA ESTIMATE  
 F8230001-M1

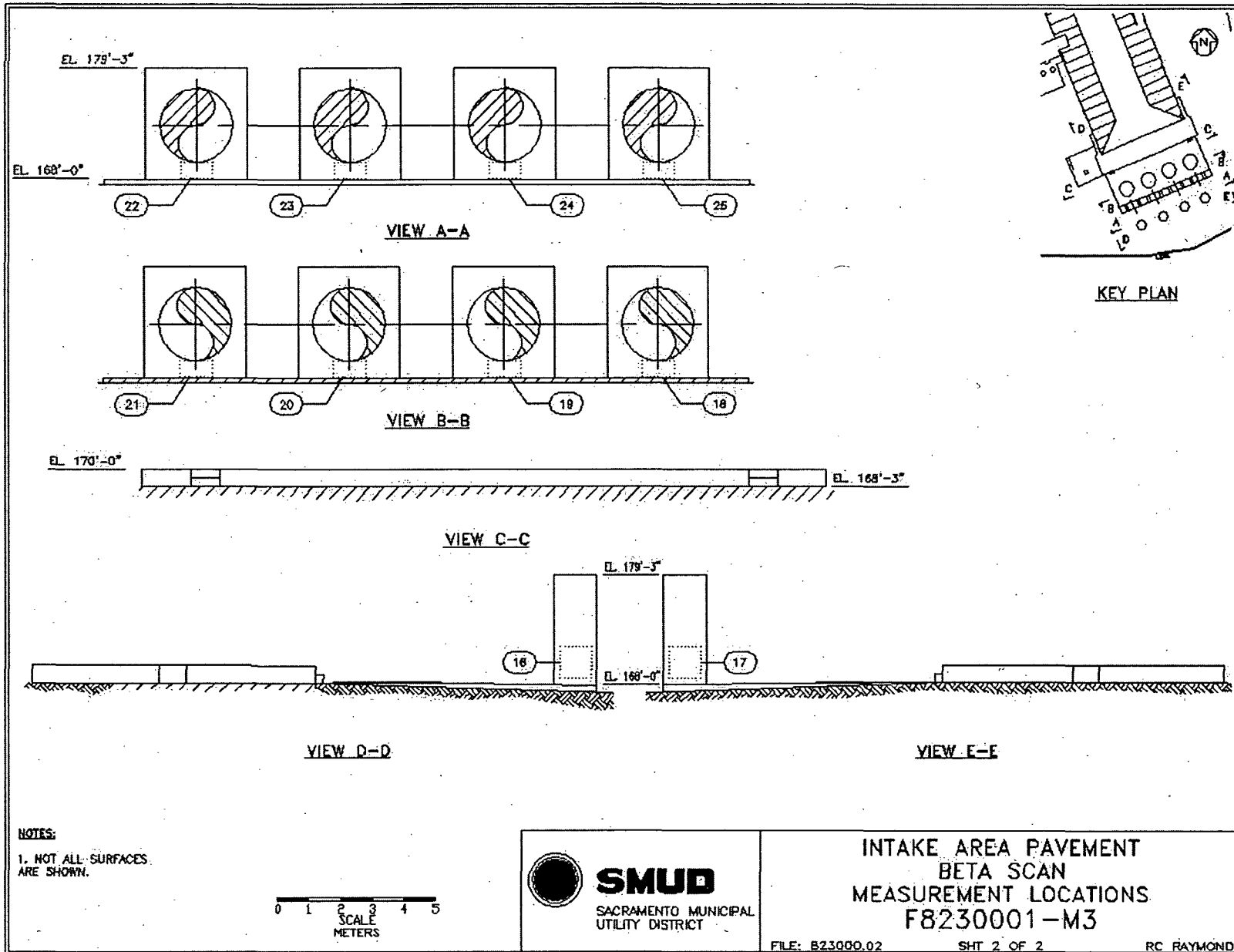


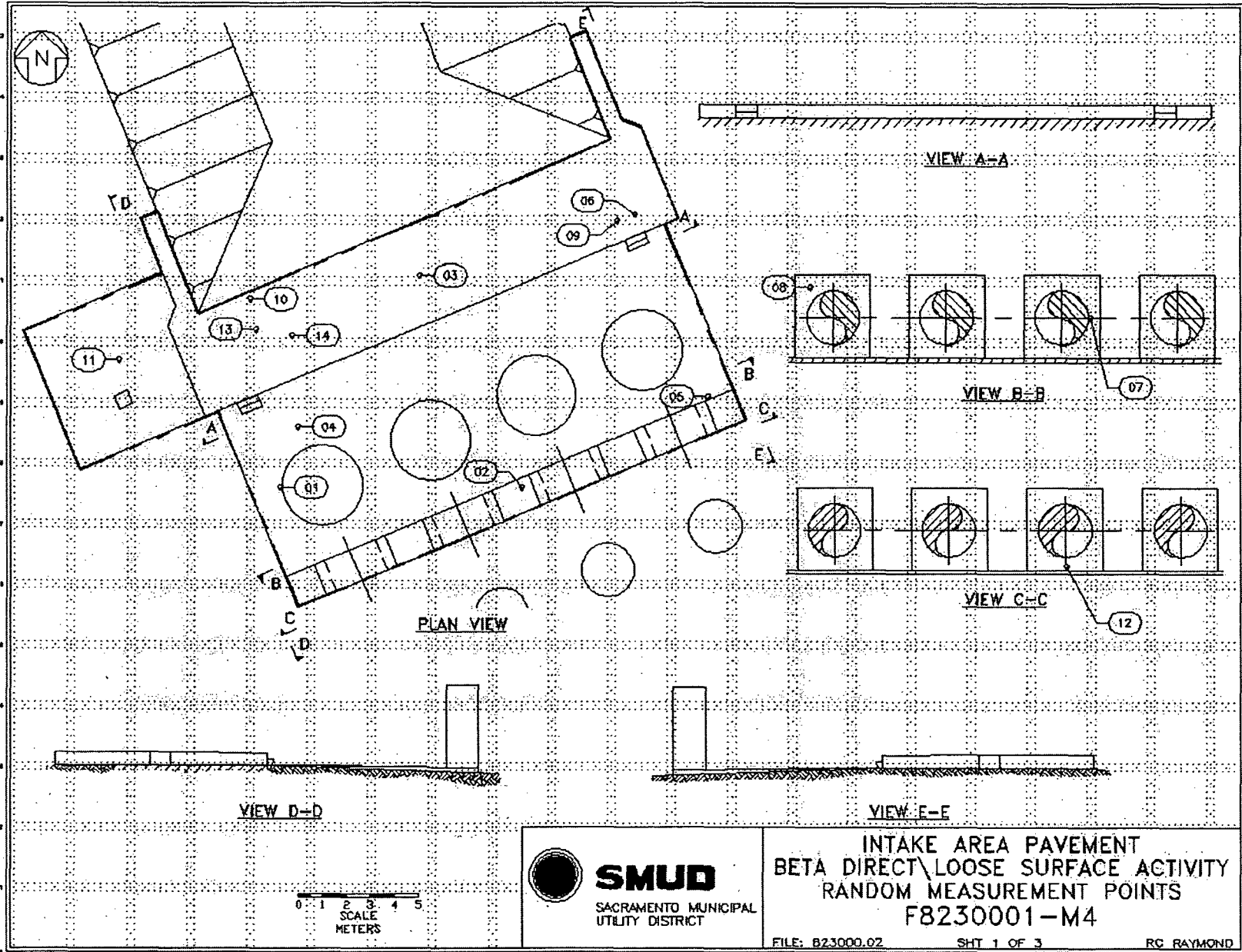




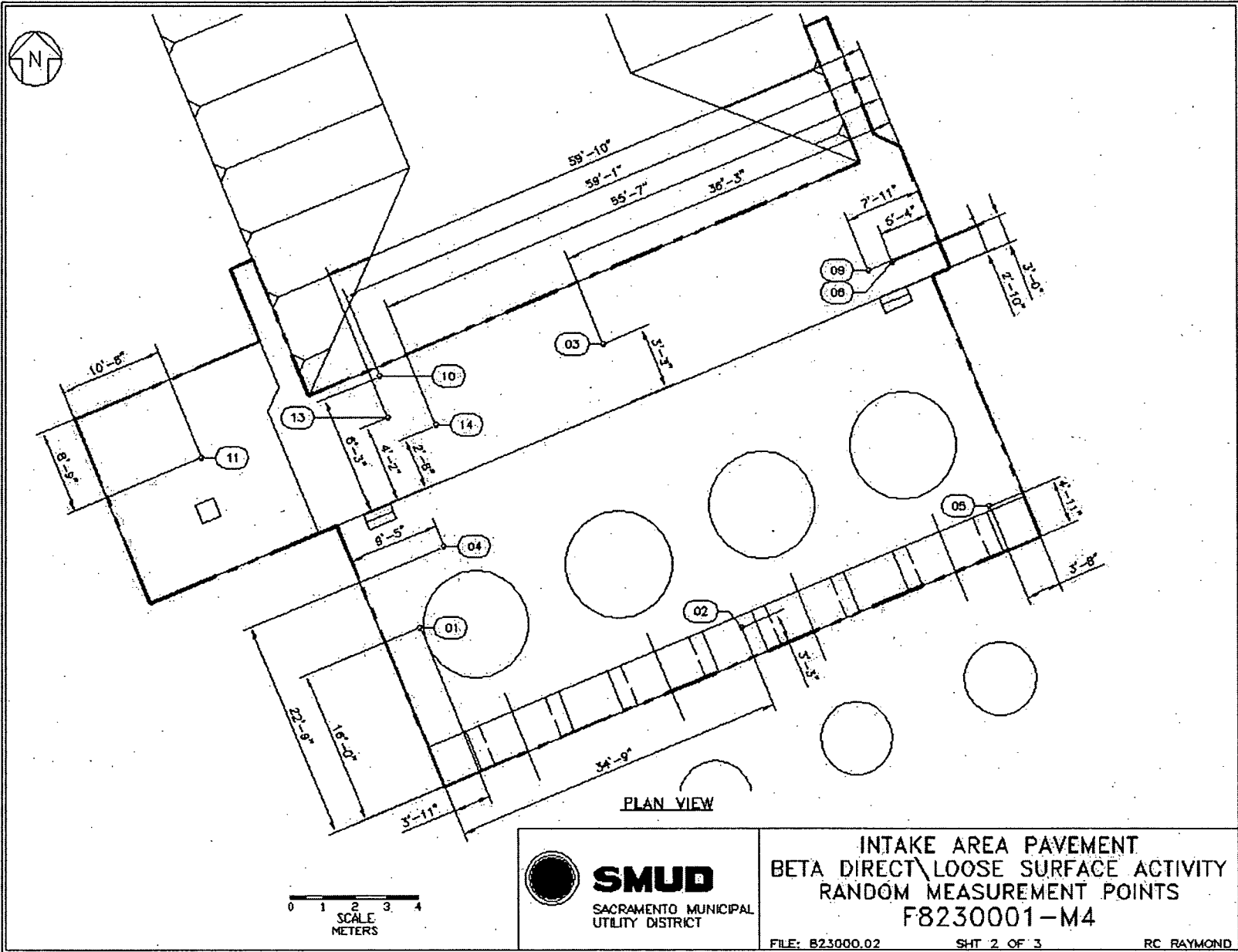


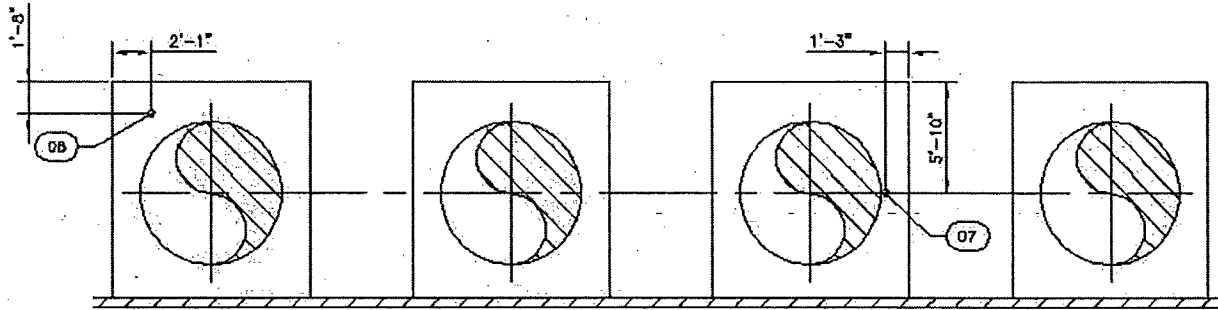
 <p><b>SMUD</b> SACRAMENTO MUNICIPAL UTILITY DISTRICT</p>	<p>INTAKE AREA PAVEMENT BETA SCAN MEASUREMENT LOCATIONS F8230001-M3</p> <p>FILE: B23000.02      SHT 1 OF 2      RC RAYMOND</p>
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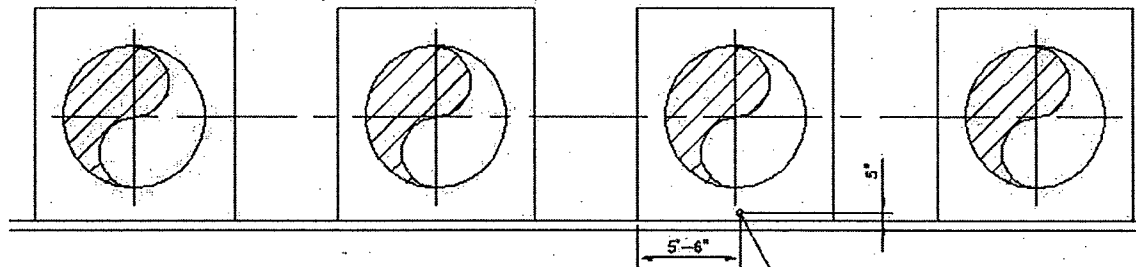




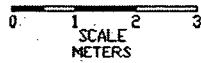




VIEW B-B



VIEW C-C



**SMUD**

SACRAMENTO MUNICIPAL  
UTILITY DISTRICT

INTAKE AREA PAVEMENT  
BETA DIRECT / LOOSE SURFACE ACTIVITY  
RANDOM MEASUREMENT POINTS  
F8230001-M4

FILE: B23000.02

SHT 3 OF 3

RC RAYMOND

**Attachment 2**

**Instrumentation**

**March 24, 2008**

**Survey Unit F8230001**

**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; 193715	43-68B; 160703	433	1033
Tennelec; 0401171	N/A	5.9 dpm $\alpha$ , 11.7 dpm $\beta$	N/A

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

<b>Parameter</b>	<b>Value (dpm/100 cm<sup>2</sup>)</b>
Investigation Criteria - Direct	21500
Investigation Criteria - Scan	43000
DCGL <sub>w</sub>	43000
DCGL <sub>EMC</sub>	N/A

**Attachment 3**

**Investigation**

**March 24, 2008**

**Survey Unit F8230001**

**(none required)**

**Attachment 4**

**Data Assessment**

**March 24, 2008**

**Survey Unit F8230001**

