Rancho Seco

Final Status Survey Summary Report

July 14, 2008

Electrical Penetration Room 209, 20' Auxiliary Building, Upper Walls and Ceiling

Survey Unit F8131382

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FSS Engineer

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Lead FSS Engineer

Approved By: E. J. [illegible] **Date:** 7-28-08
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8131382, Electrical Penetration Room 209, 20' Auxiliary Building, Upper Walls and Ceiling

Survey Unit Description:

Operating History: The reinforced concrete structure 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. One report documented contamination of the auxiliary building roof. The roof was later replaced.

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 cm^2 and a maximum value of 5,720,000 dpm/100 cm^2. Direct measurements on the –29' elevation showed a mean gross activity level of 544,756 dpm/100 cm^2 and a maximum value of 11,370,000 dpm/100 cm^2. Direct measurements on the –20' elevation showed a mean gross activity level of 247,831 dpm/100 cm^2 and a maximum value of 10,080,000 dpm/100 cm^2. Direct measurements on the grade elevation showed a mean gross activity level of 373,758 dpm/100 cm^2 and a maximum value of 5,800,000 dpm/100 cm^2. Direct measurements on the +20' elevation showed a mean gross activity level of 85,408 dpm/100 cm^2 and a maximum value of 1,900,000 dpm/100 cm^2. Direct measurements on the +40' elevation showed a mean gross activity level of 3,288 dpm/100 cm^2 and a maximum value of 24,781 dpm/100 cm^2. Direct measurements on the building exterior, including the mezzanine roof, showed a mean gross activity level of 1,897 dpm/100 cm^2 and a maximum value of 2,990 dpm/100 cm^2. (The roof had been replaced prior to the classification survey.) Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the interior of the auxiliary building was determined to be a Class 1, 2 area and the exterior was a Class 2,3. The Electrical Penetration Room 209 upper walls and ceiling were determined to be a Class 1.

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 312 m^2 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	Electrical Penetration Room 209, 20' Auxiliary Building, Upper Walls and Ceiling
Survey Unit:	1382	Structure Surface
Class:	1	LTP Table 5-4
SU Area (m^2)**:**	312	
Evaluator:	Michael Stein	
DCGL (dpm/100 cm^2)**:**	43000	Gross Activity DCGL
Area Factor:	3.6	Class 1
Design DCGLemc (dpm/100 cm^2)**:**	154800	Class 1
LBGR (dpm/100 cm^2)**:**	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm^2)**:**	5461	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m^2)**:**	6.9	Class 1
Scan Area (m^2)**:**	312	
Scan Coverage (%):	100%	Class 1
$Z_{1-\alpha}$ **:**	1.645	
$Z_{1-\beta}$ **:**	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	3.9	
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:	45	Class 1
Grid Spacing L:	2.6	Class 1

Survey Results:

A total of 63 direct measurements were made in F8131382. 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 beta scan measurements indicated areas of elevated activity. Beta scan activity ranged from 1,563 to 45,196 dpm/100 cm², based on a surveyor efficiency of 0.5 and no background subtracted. None of the gamma scan measurements detected activity due to plant operations. Scan measurement locations for both beta and gamma emissions are identified in Attachment 1 of this report. 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 cm²)
F8131382-C0001BD	2225
F8131382-C0002BD	2168
F8131382-C0003BD	1961
F8131382-C0004BD	2075
F8131382-C0005BD	1956
F8131382-C0006BD	1852
F8131382-C0007BD	1753
F8131382-C0008BD	2028
F8131382-C0009BD	1899
F8131382-C0010BD	1888
F8131382-C0011BD	1826
F8131382-C0012BD	1530
F8131382-C0013BD	1478
F8131382-C0014BD	1525
F8131382-C0015BD	1587
F8131382-C0016BD	1406
F8131382-C0017BD	1478
F8131382-C0018BD	1323
F8131382-C0019BD	1473
F8131382-C0020BD	1395
F8131382-C0021BD	1432
F8131382-C0022BD	1665
F8131382-C0023BD	1442
F8131382-C0024BD	1452
F8131382-C0025BD	1790
F8131382-C0026BD	1592
F8131382-C0027BD	1551
F8131382-C0028BD	1136
F8131382-C0029BD	1359
F8131382-C0030BD	1426
F8131382-C0031BD	1385
F8131382-C0032BD	1452
F8131382-C0033BD	1504
F8131382-C0034BD	1484
F8131382-C0035BD	1354

F8131382-C0036BD	1421
F8131382-C0037BD	1665
F8131382-C0038BD	1437
F8131382-C0039BD	1551
F8131382-C0040BD	1629
F8131382-C0041BD	1416
F8131382-C0042BD	1546
F8131382-C0043BD	1509
F8131382-C0044BD	1541
F8131382-C0045BD	1613
F8131382-C0046BD	2448
F8131382-C0047BD	2495
F8131382-C0048BD	4710
F8131382-C0049BD	2122
F8131382-C0050BD	2303
F8131382-C0051BD	1442
F8131382-C0052BD	1442
F8131382-C0053BD	1292
F8131382-C0054BD	1323
F8131382-C0055BD	1406
F8131382-C0056BD	1229
F8131382-C0057BD	1369
F8131382-C0058BD	1338
F8131382-C0059BD	1712
F8131382-C0060BD	1509
F8131382-C0061BD	1618
F8131382-C0062BD	1556
F8131382-C0063BD	1447
Mean:	1666
Median:	1525
Standard Deviation:	489
Range:	1136 - 4710

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm^2)
F8131382C0001SM	-3.53
F8131382C0002SM	-3.53
F8131382C0003SM	-3.53
F8131382C0004SM	-3.53
F8131382C0005SM	-2.24
F8131382C0006SM	-0.95
F8131382C0007SM	-0.95
F8131382C0008SM	-3.53
F8131382C0009SM	0.34
F8131382C0010SM	-2.24
F8131382C0011SM	-3.53
F8131382C0012SM	-2.24
F8131382C0013SM	-2.24
F8131382C0014SM	-0.95
F8131382C0015SM	2.93
F8131382C0016SM	-0.95
F8131382C0017SM	-0.95
F8131382C0018SM	-0.95
F8131382C0019SM	0.34
F8131382C0020SM	1.64
F8131382C0021SM	-3.53
F8131382C0022SM	-6.11
F8131382C0023SM	-3.53
F8131382C0024SM	0.34
F8131382C0025SM	-2.24
F8131382C0026SM	-4.82
F8131382C0027SM	1.64
F8131382C0028SM	4.22
F8131382C0029SM	-2.24
F8131382C0030SM	-4.82
F8131382C0031SM	-2.24
F8131382C0032SM	5.51
F8131382C0033SM	-2.24
F8131382C0034SM	-0.95
F8131382C0035SM	-2.24
F8131382C0036SM	-0.95
F8131382C0037SM	-0.95
F8131382C0038SM	-2.24
F8131382C0039SM	-4.82
F8131382C0040SM	-3.53
F8131382C0041SM	-2.24
F8131382C0042SM	0.34
F8131382C0043SM	-2.24
F8131382C0044SM	-3.53
F8131382C0045SM	-0.95
F8131382C0046SM	19.72
F8131382C0047SM	11.97
F8131382C0048SM	36.5
F8131382C0049SM	-0.95
F8131382C0050SM	-0.95

F8131382C0051SM	-0.95
F8131382C0052SM	-4.82
F8131382C0053SM	0.34
F8131382C0054SM	-0.95
F8131382C0055SM	-2.24
F8131382C0056SM	-4.82
F8131382C0057SM	-3.53
F8131382C0058SM	4.22
F8131382C0059SM	-0.95
F8131382C0060SM	-2.24
F8131382C0061SM	-4.82
F8131382C0062SM	-3.53
F8131382C0063SM	-4.82
Mean:	-0.6
Median:	-2.24
Standard Deviation:	6.16
Range:	-6.11 to 36.5

Survey Unit Data Assessment:

The survey design required 45 direct measurements for the Sign Test. In actuality, 63 direct measurements were obtained. 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 cm²):	N/A	
Ambient Background Used (dpm/100 cm²):	N/A	Average Ambient BKG = 0
Actual Direct Measurements (N):	63	
Median (dpm/100 cm²):	1525	
Mean (dpm/100 cm²):	1666	
Direct Measurement Standard Deviation (dpm/100 cm²):	489	
Total Standard Deviation (dpm/100 cm²):	489	Based on samples and backgrounds.
Maximum (dpm/100 cm²):	4710	
Material Type:	N/A	Background Subtract Not Applied
Sign Test Final N Value:	63	
S+ Value:	63	
Critical Value:	38	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGLemc:	Yes	Class 1
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 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. No potential areas of elevated activity were detected.

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 cm^2 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.

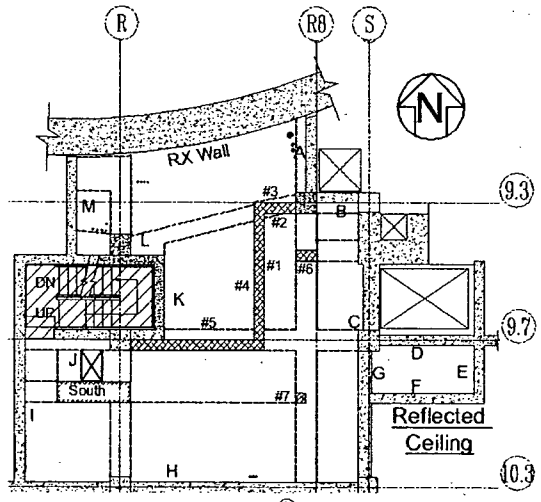
It is concluded that survey unit F8131382 meets the release criteria of 10CFR20.1402.

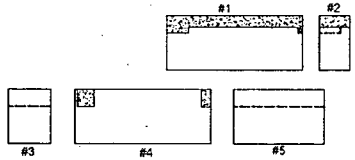
Attachment 1

Maps

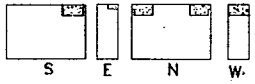
July 14, 2008

Survey Unit F8131382





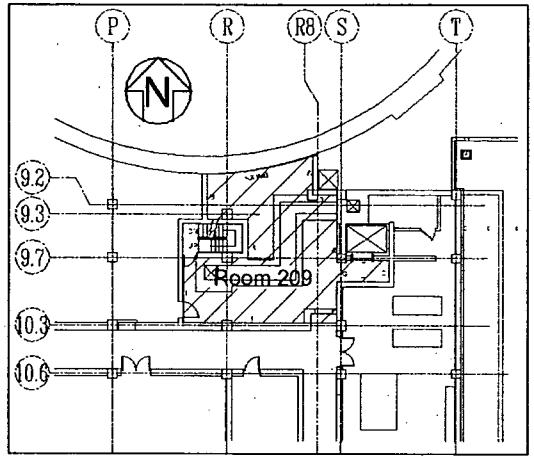
North Sample Line Chase
Vertical Surfaces



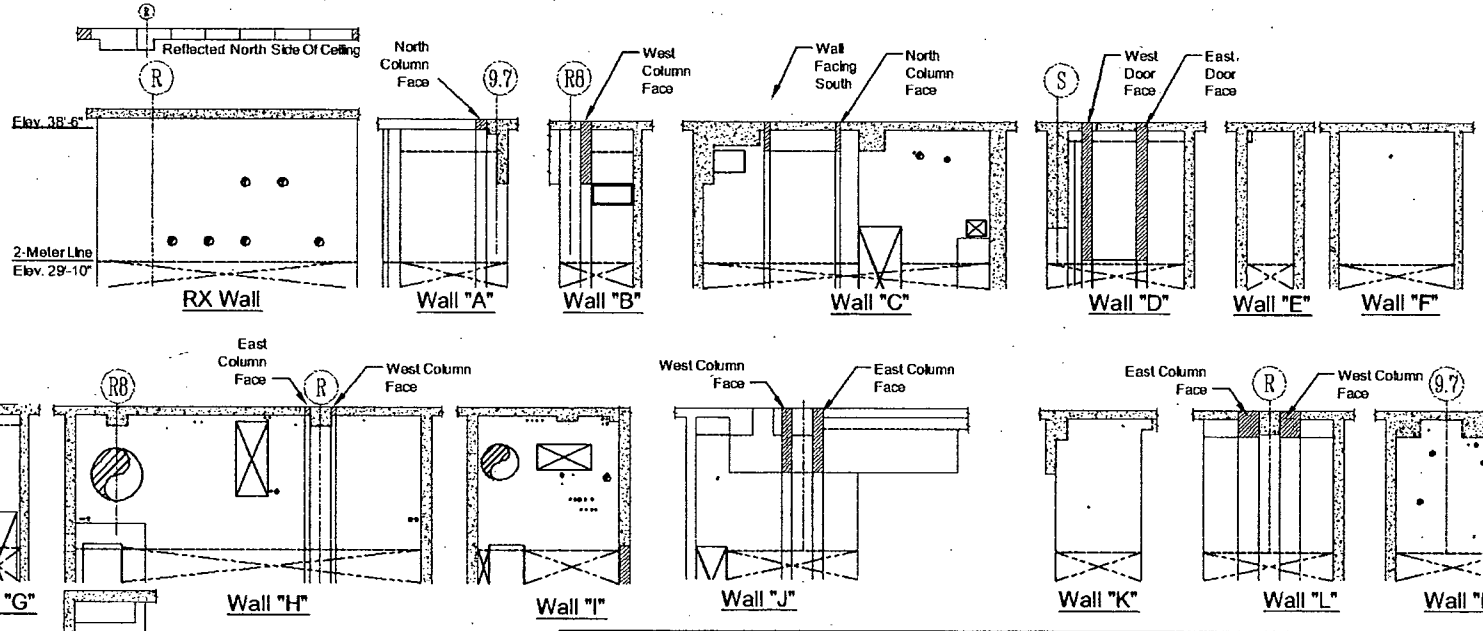
South Sample Line Chase
Vertical Surfaces

Sample Line Chase Support #6
Vertical Surfaces

Sample Line Chase Support #7
Vertical Surfaces



KEY PLAN



Estimated Surface Area

Upper Walls	204.5 m²
Ceiling	81.5 m²
Sample Line Chase	25.7 m²
Total	311.7 m²

Sample Line Chase

Scale Feet
1/16" = 1'-0"

Scale Meters
0 1 2 3 4 5

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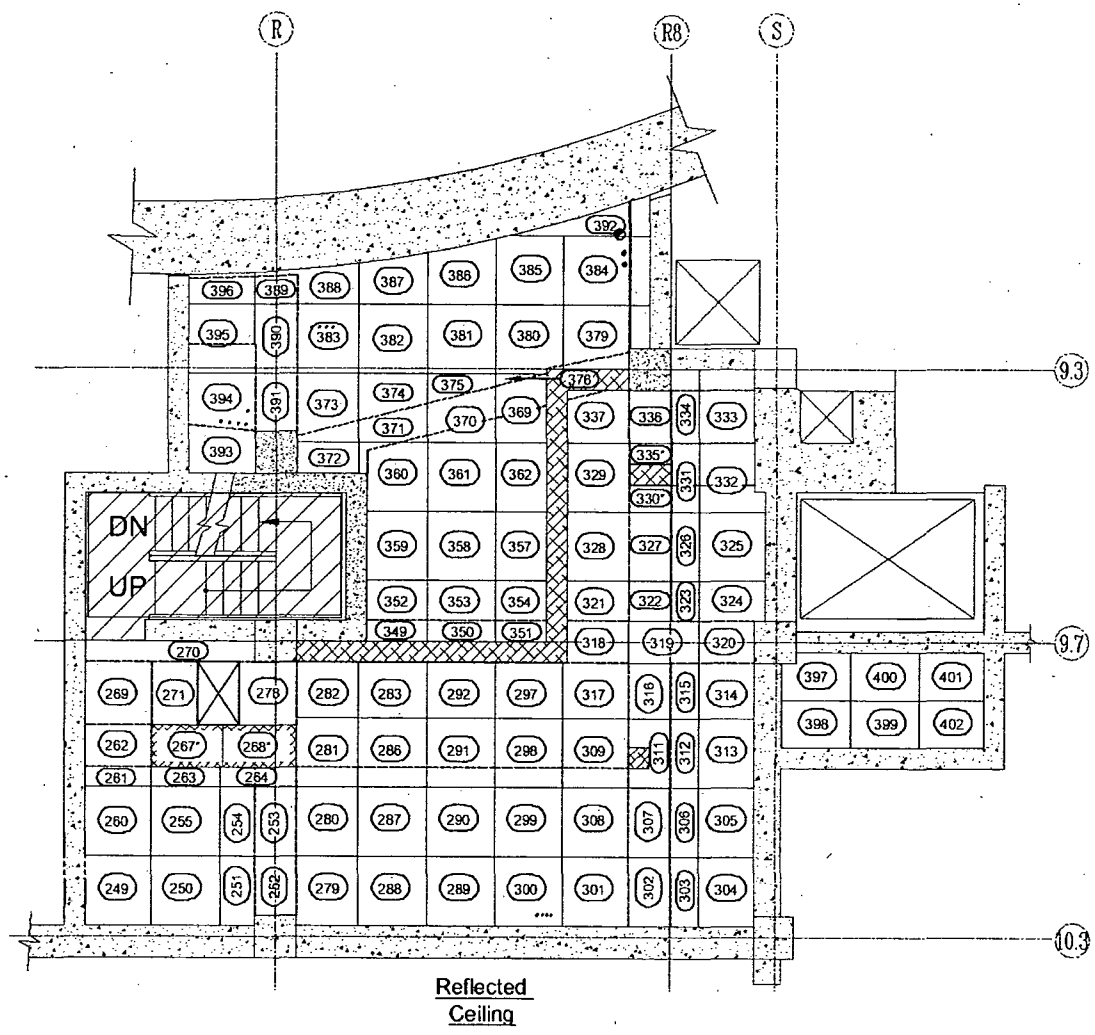
AUXILIARY BUILDING EL. 20' ROOM 209 GENERAL ARRANGEMENT - CEILING AND UPPER WALL SURFACE AREAS

F8131382-M1

FILE: 813000.04e SHEET 1 OF 6 T C HILL



* BETA SCAN CONTINUED ON AN ADJACENT SURFACE

Sample Line Chase

Scale Feet
1/8" = 1'-0"

Scale Meters
0 1 2 3

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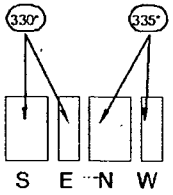
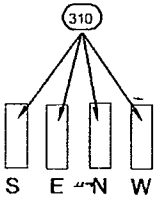
AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M1

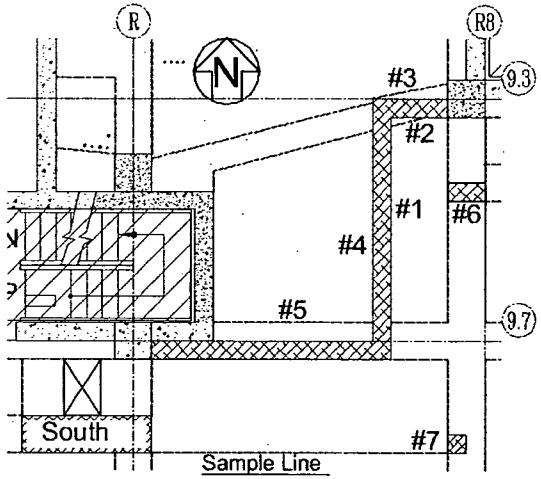
FILE: 813000.04e SHEET 2 of 6 T C HILL



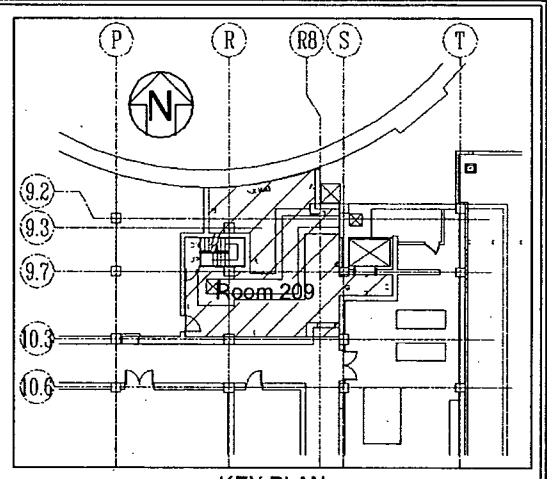
Sample Line Chase Support #6 Vertical Surfaces



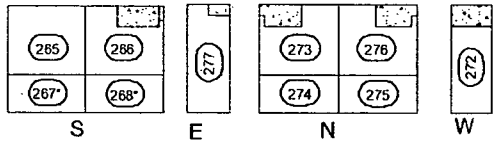
Sample Line Chase Support #7 Vertical Surfaces



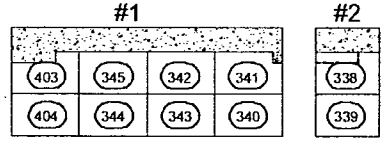
Sample Line Chase Key Plan

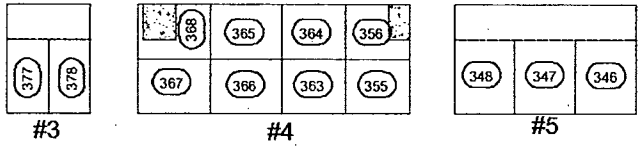


KEY PLAN

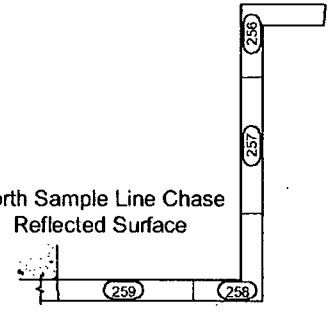


South Sample Line Chase Vertical Surfaces





North Sample Line Chase Vertical Surfaces



North Sample Line Chase Reflected Surface

* BETA SCAN CONTINUED ON AN ADJACENT SURFACE

Scale Feet
1/8" = 1'-0"

Sample Line Chase

Scale Meters
0 1 2 3

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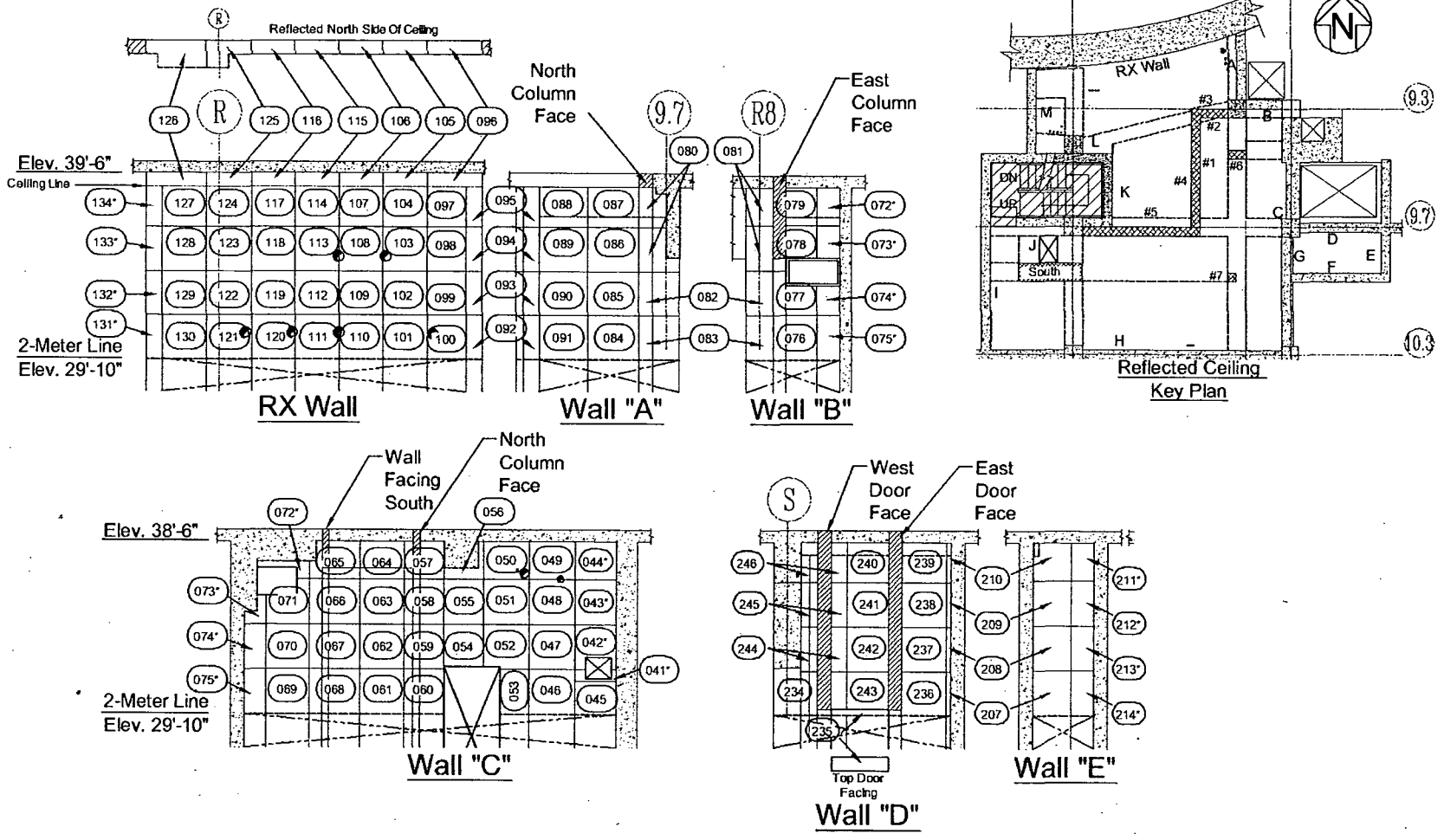
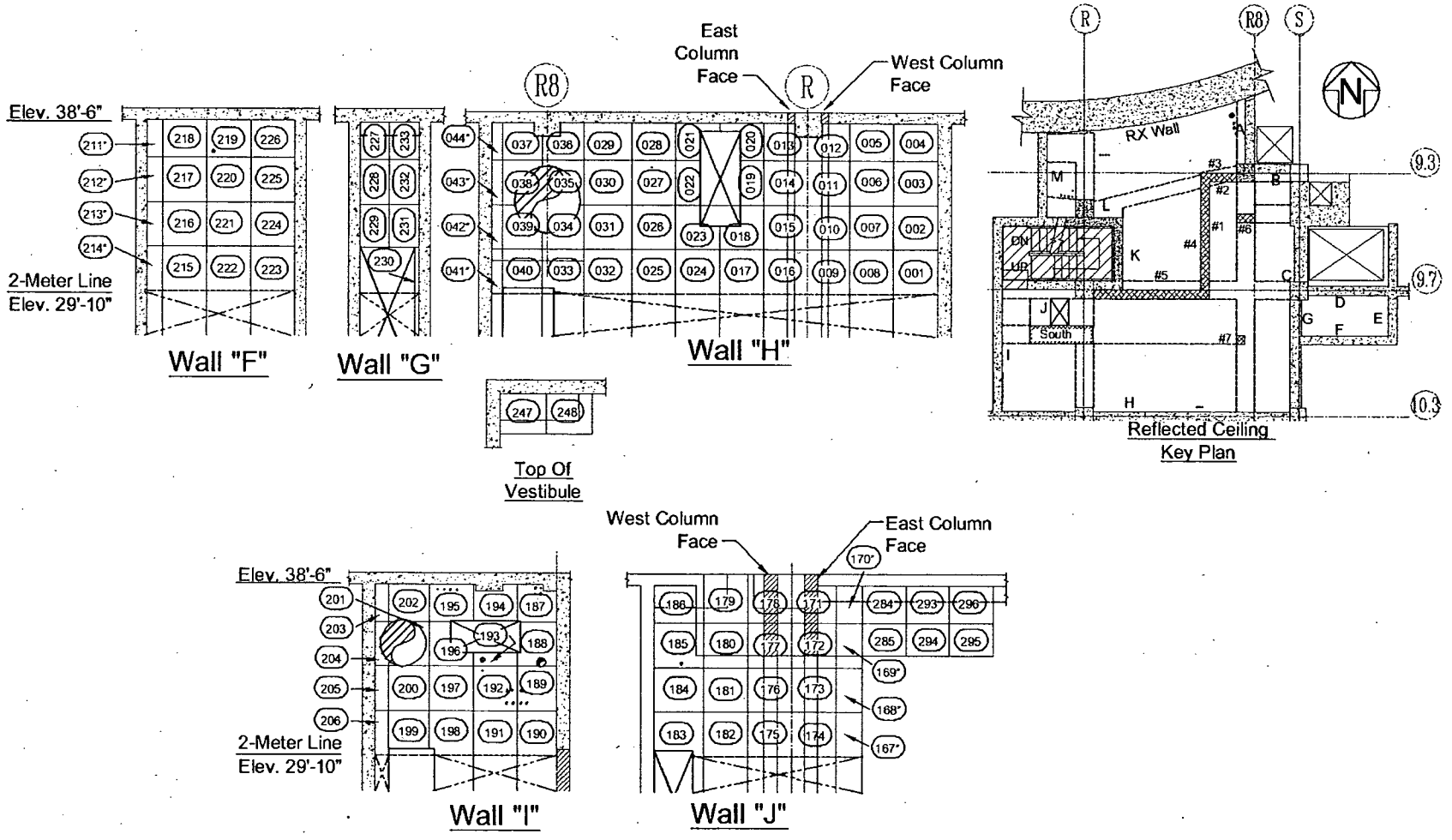
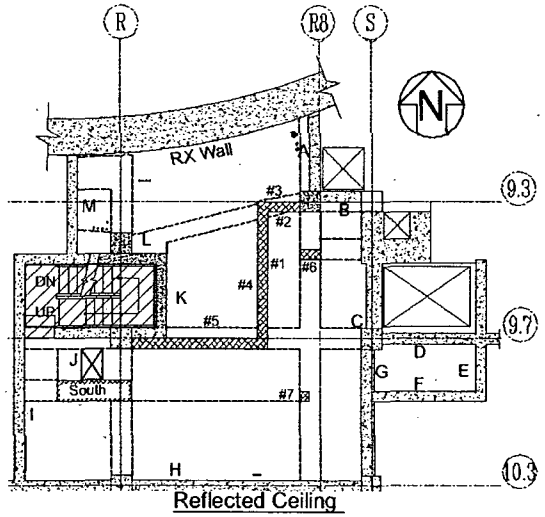
AUXILIARY BUILDING EL. 20' ROOM 209 CEILING AND UPPER WALL BETA SCAN MEASUREMENT LOCATIONS F8131382-M1

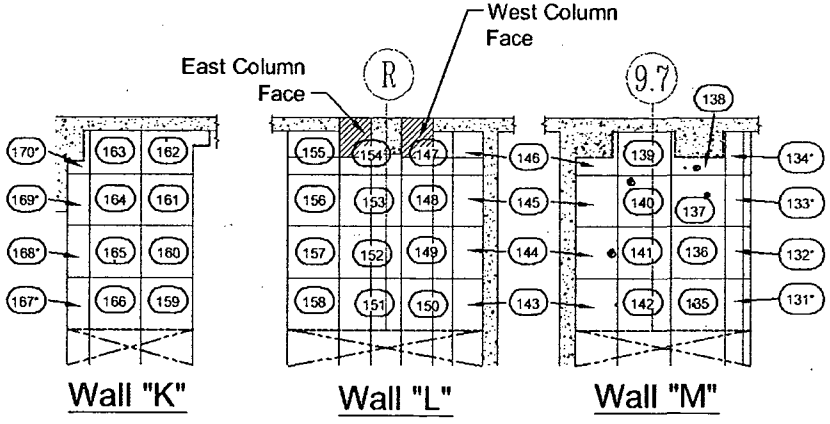
FILE: 813000.04e SHEET 3 of 6 T C HILL


Reflected North Side Of Ceiling
North Column Face
East Column Face
Elev. 39'-6"
Ceiling Line
2-Meter Line
Elev. 29'-10"
RX Wall
Wall "A"
Wall "B"
RX Wall
Reflected Ceiling
Key Plan
Wall Facing South
North Column Face
Elev. 38'-6"
2-Meter Line
Elev. 29'-10"
Wall "C"
West Door Face
East Door Face
Top Door Facing
Wall "D"
Wall "E"
* BETA SCAN CONTINUED ON AN ADJACENT SURFACE
Scale Feet
3/32" = 1'-0"
Scale Meters
0 1 2 3
Sample Line Chase
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M1
FILE: 813000.04e
SHEET 4 of 6
T C HILL


East Column Face
West Column Face
R8
R
Elev. 38'-6"
2-Meter Line
Elev. 29'-10"
Wall "F"
Wall "G"
Wall "H"
Top Of Vestibule
RX Wall
Reflected Ceiling Key Plan
West Column Face
East Column Face
Elev. 38'-6"
2-Meter Line
Elev. 29'-10"
Wall "I"
Wall "J"
* BETA SCAN CONTINUED ON AN ADJACENT SURFACE
Sample Line Chase
Scale Feet
3/32" = 1'-0"
Scale Meters
0 1 2 3
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M1
FILE: 813000.04e
SHEET 5 of 6
T C HILL



Reflected Ceiling
Key Plan



Wall "K" Wall "L" Wall "M"

* BETA SCAN CONTINUED ON AN ADJACENT SURFACE

Sample Line Chase

Scale Feet
$\frac{3}{32}$" = 1'–0"
Scale Meters
0 1 2 3

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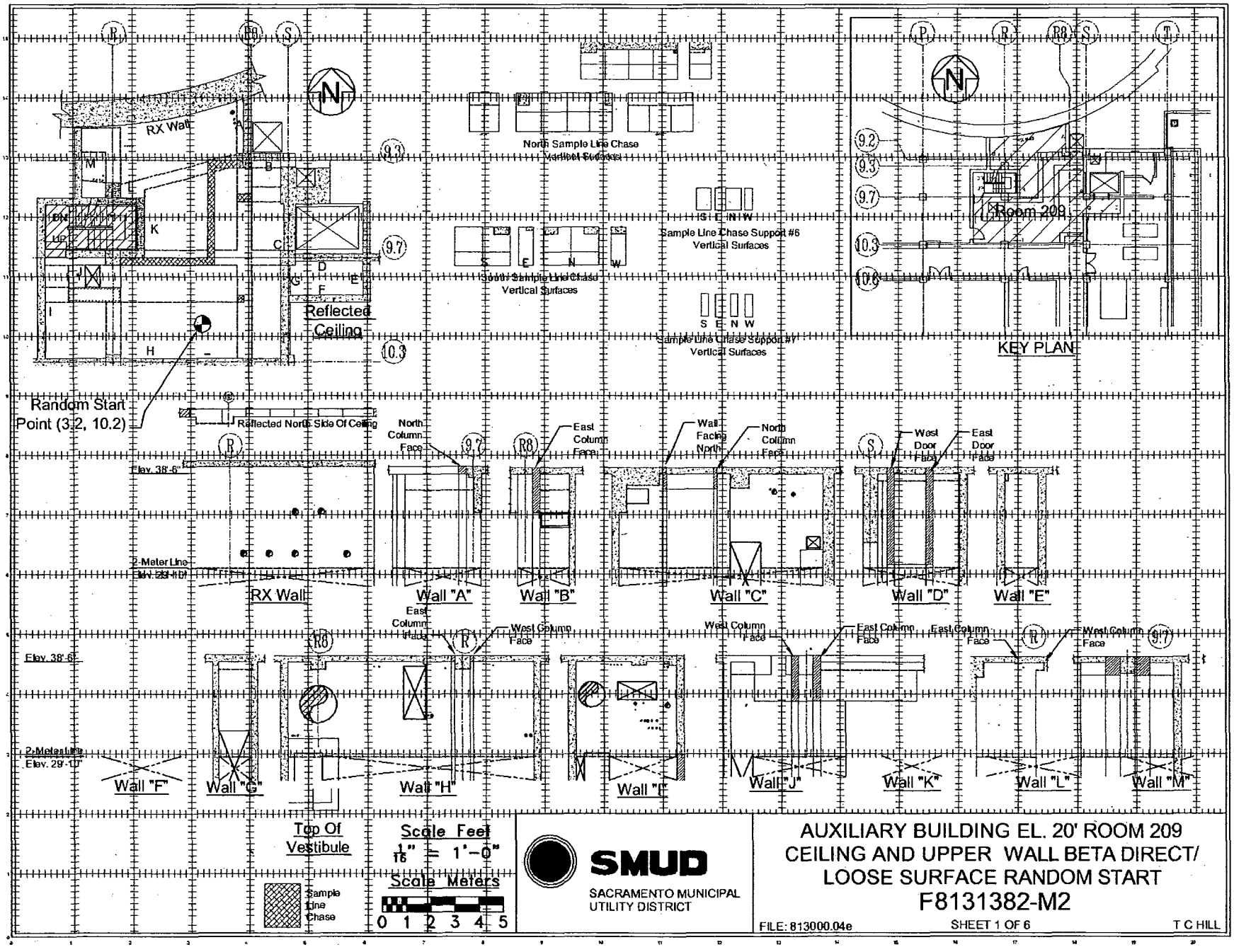
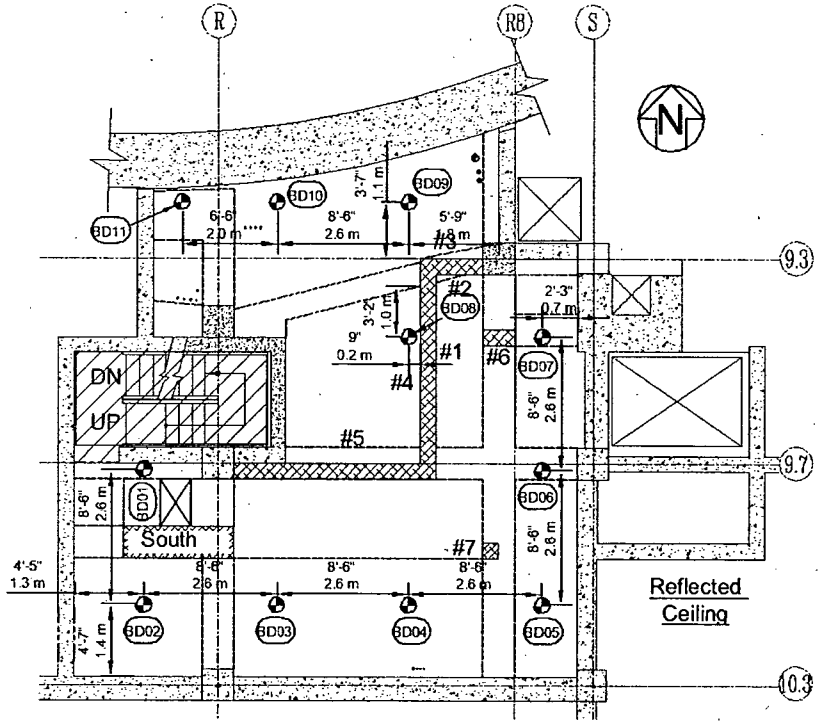
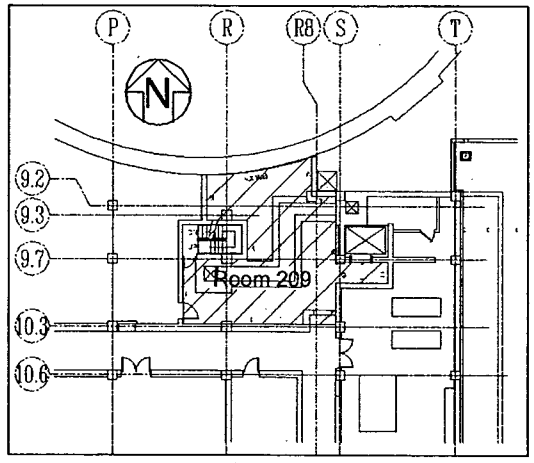
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M1

FILE: 813000.04e SHEET 6 of 6 T C HILL


RX Wall
North Sample Line Chase Vertical Surfaces
Sample Line Chase Support #6 Vertical Surfaces
South Sample Line Chase Vertical Surfaces
Sample Line Chase Support #7 Vertical Surfaces
Reflected Ceiling
Random Start Point (3.2, 10.2)
Reflected North Side Of Ceiling
KEY PLAN
Room 209
Elev. 38'-6"
2-Meter Line Elev. 29'-10"
RX Wall
Wall "A"
Wall "B"
Wall "C"
Wall "D"
Wall "E"
Wall "F"
Wall "G"
Wall "H"
Wall "I"
Wall "J"
Wall "K"
Wall "L"
Wall "M"
North Column Face
East Column Face
Wall Facing North
West Door Face
East Door Face
West Column Face
Top Of Vestibule
Sample Line Chase
Scale Feet
1/16" = 1'-0"
Scale Meters
0 1 2 3 4 5
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL BETA DIRECT/
LOOSE SURFACE RANDOM START
F8131382-M2
FILE: 813000.04e
SHEET 1 OF 6
T C HILL





KEY PLAN

Sample Line Chase

Scale Feet
$\frac{3}{32}$" = 1'-0"

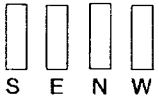
Scale Meters
0 1 2 3

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

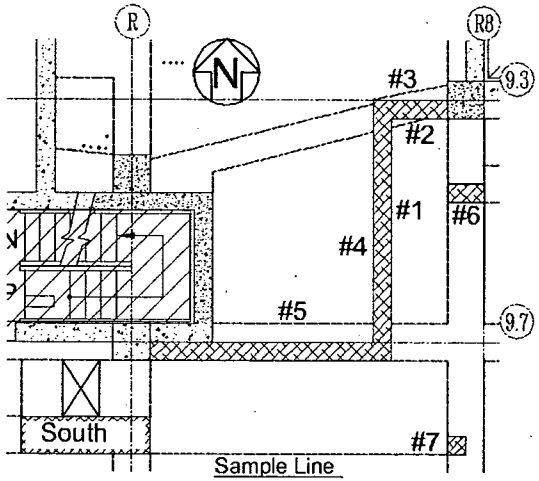
AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL BETA DIRECT/
LOOSE SURFACE MEASUREMENT POINTS
F8131382-M2

FILE: 813000.04e SHEET 2 of 6 T C HILL

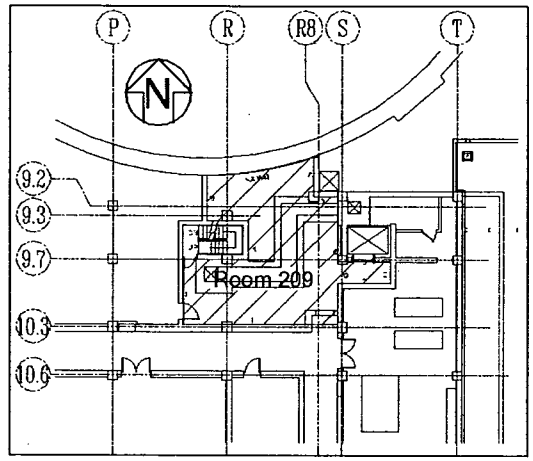
Sample Line Chase Support #6 Vertical Surfaces



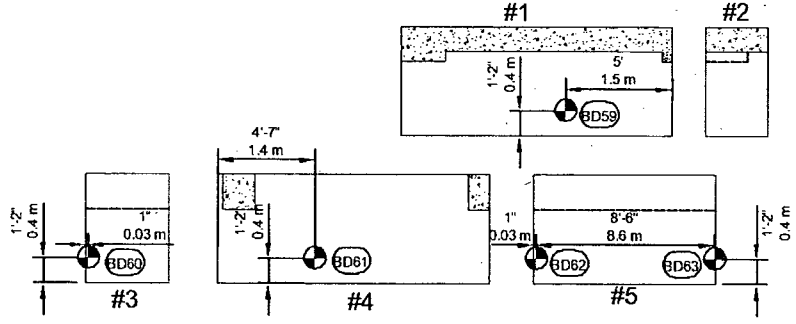
Sample Line Chase Support #7 Vertical Surfaces



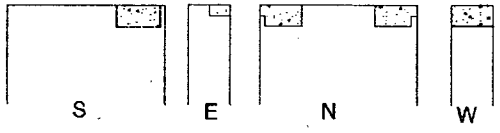
Sample Line Chase Key Plan



KEY PLAN



North Sample Line Chase Vertical Surfaces



South Sample Line Chase Vertical Surfaces

Scale Feet
1/8" = 1'-0"

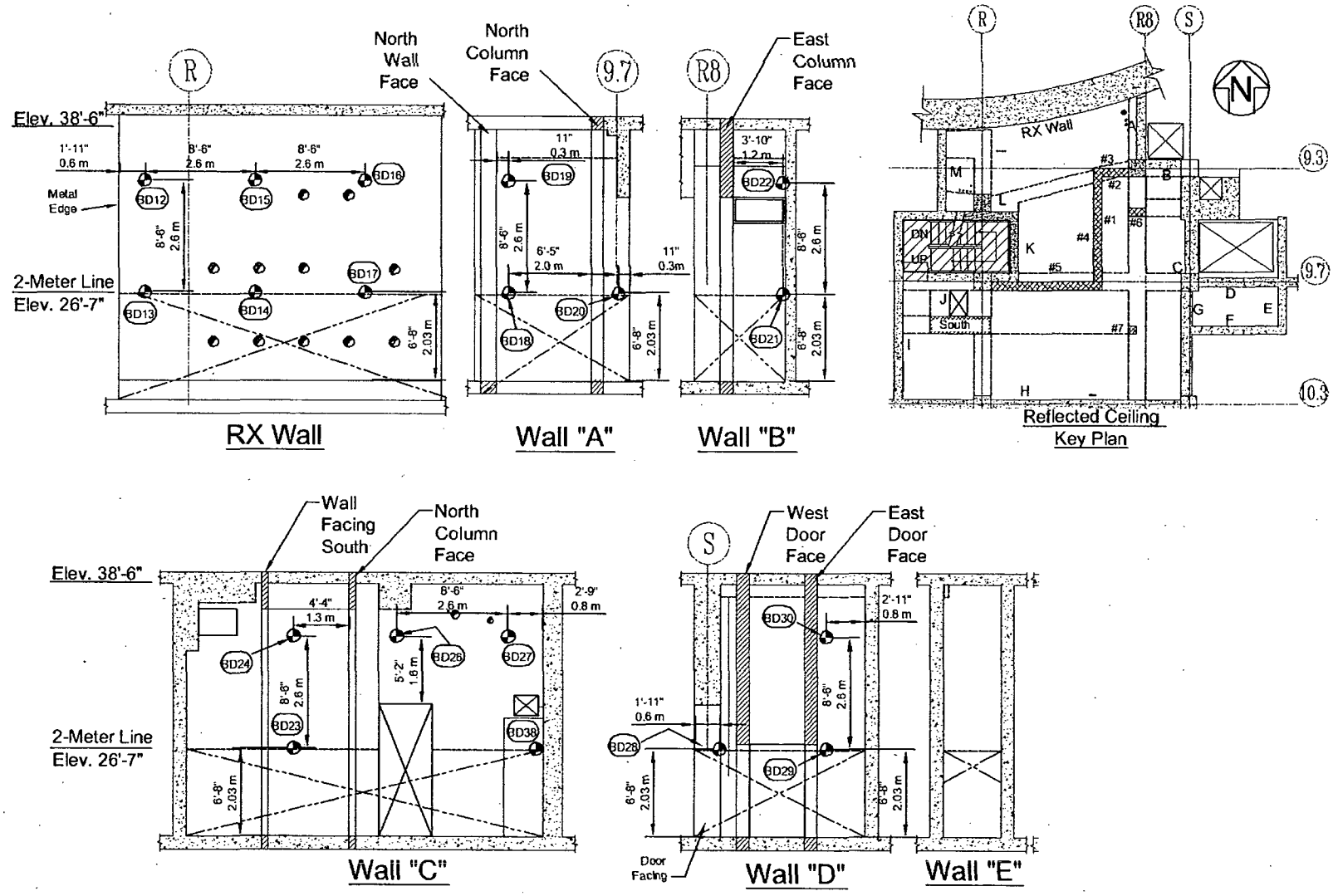
Sample Line Chase

Scale Meters
0 1 2 3

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209 CEILING AND UPPER WALL BETA DIRECT/ LOOSE SURFACE MEASUREMENT POINTS F8131382-M2

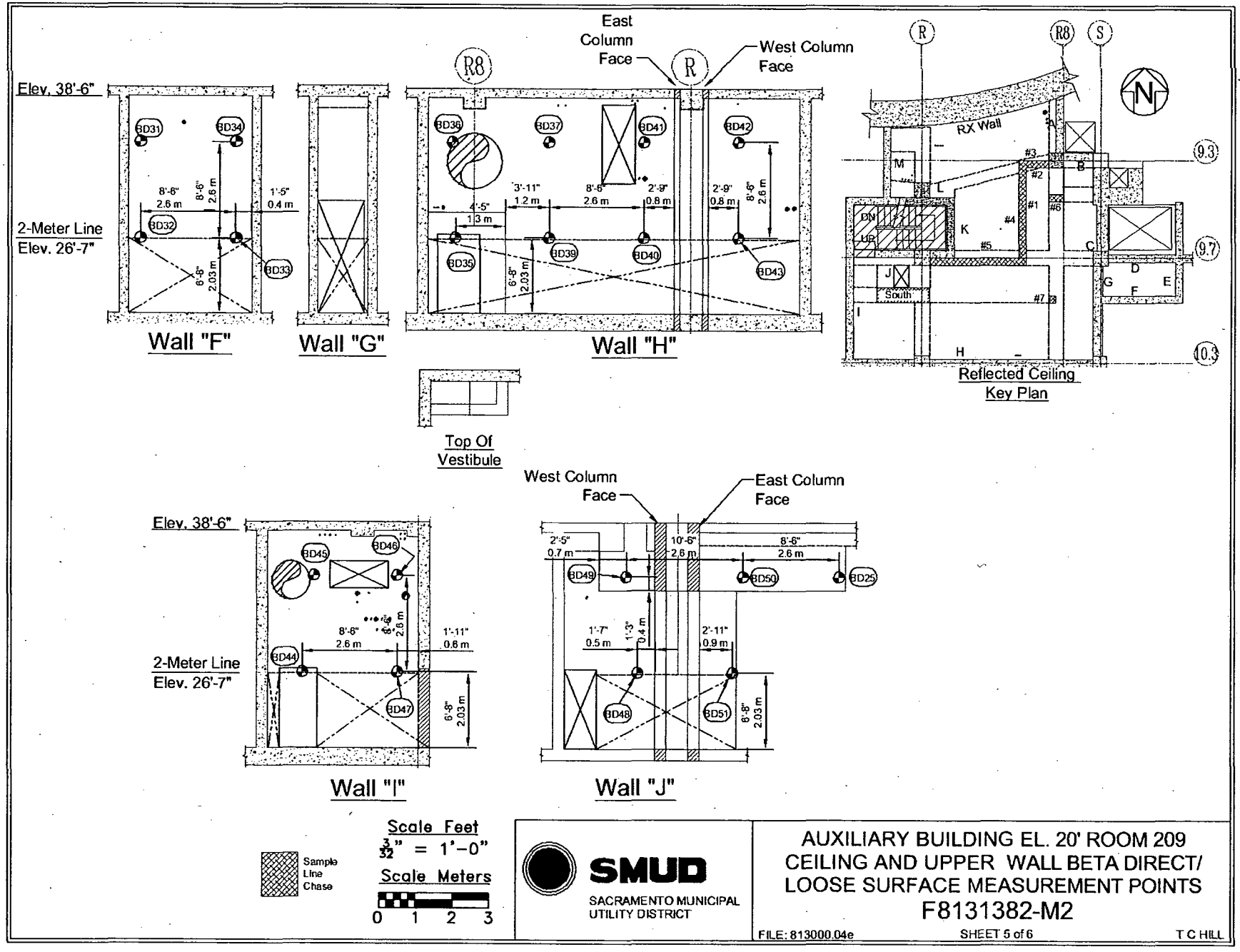
FILE: 813000.04e SHEET 3 of 6 T C HILL

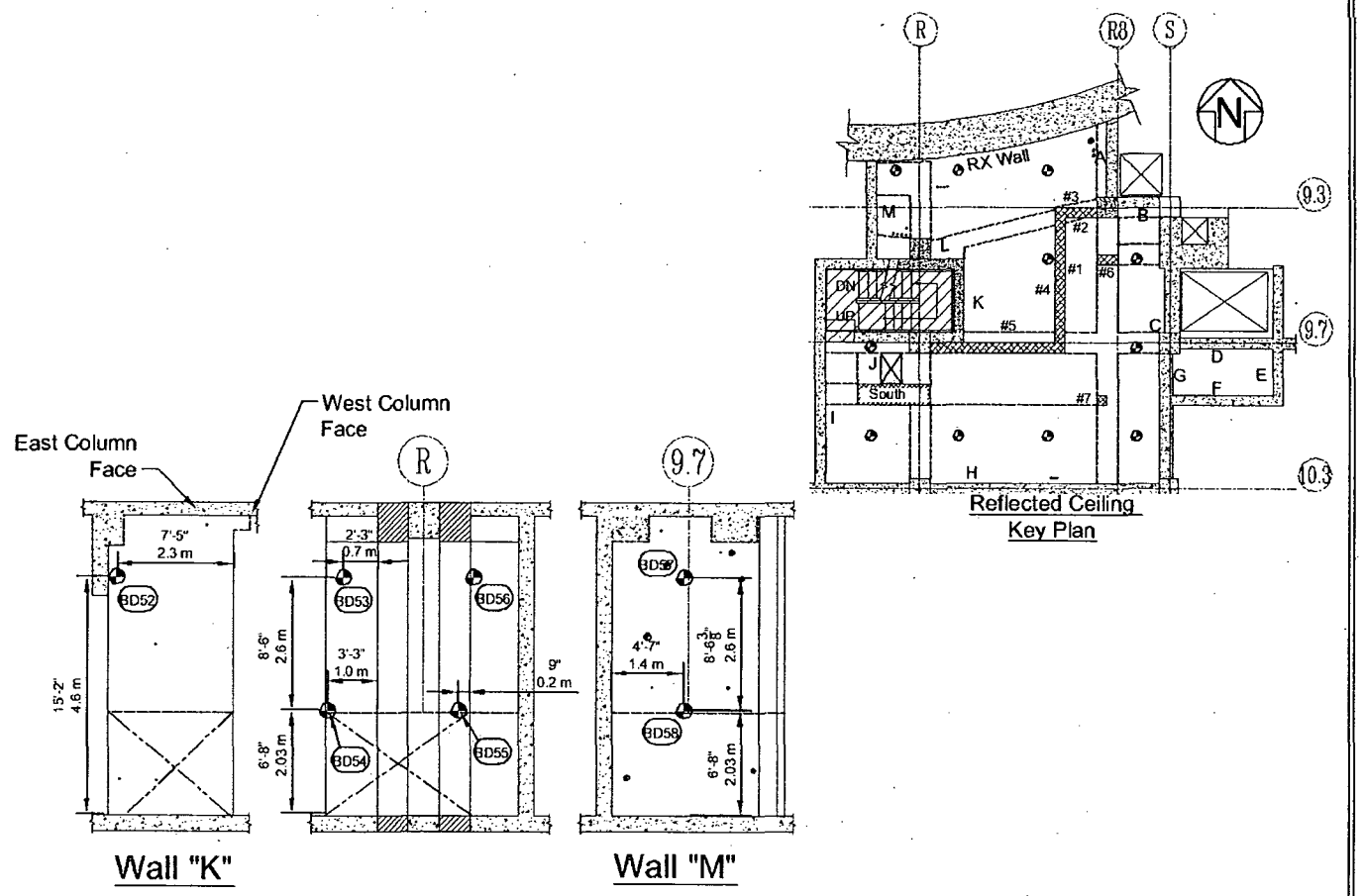


SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL BETA DIRECT/
LOOSE SURFACE MEASUREMENT POINTS
F8131382-M2

FILE: 813000.04e SHEET 4 of 6 T C HILL


Elev. 38'-6"
2-Meter Line
Elev. 26'-7"
BD31
BD34
BD32
BD33
8'-6" 2.6 m
8'-6" 2.6 m
1'-5" 0.4 m
6'-8" 2.03 m
Wall "F"
Wall "G"
East Column Face
West Column Face
R8
R
BD36
BD37
BD41
BD42
BD35
BD39
BD40
BD43
4'-5" 1.3 m
3'-11" 1.2 m
8'-6" 2.6 m
2'-9" 0.8 m
2'-9" 0.8 m
8'-6" 2.6 m
6'-8" 2.03 m
Wall "H"
Top Of Vestibule
RX Wall
N
M
L
K
J
I
H
DN
UP
South
#1
#2
#3
#4
#5
#6
#7
A
B
C
D
E
F
G
9.3
9.7
10.3
Reflected Ceiling Key Plan
West Column Face
East Column Face
Elev. 38'-6"
2-Meter Line
Elev. 26'-7"
BD45
BD46
BD44
BD47
8'-6" 2.6 m
2.6 m
1'-11" 0.6 m
6'-8" 2.03 m
Wall "I"
2'-5" 0.7 m
10'-6" 2.6 m
8'-6" 2.6 m
BD49
BD50
BD25
1'-7" 0.5 m
1'-3" 0.4 m
2'-11" 0.9 m
BD48
BD51
8'-8" 2.03 m
Wall "J"
Sample Line Chase
Scale Feet
3/32" = 1'-0"
Scale Meters
0 1 2 3
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL BETA DIRECT/
LOOSE SURFACE MEASUREMENT POINTS
F8131382-M2
FILE: 813000.04e
SHEET 5 of 6
T C HILL



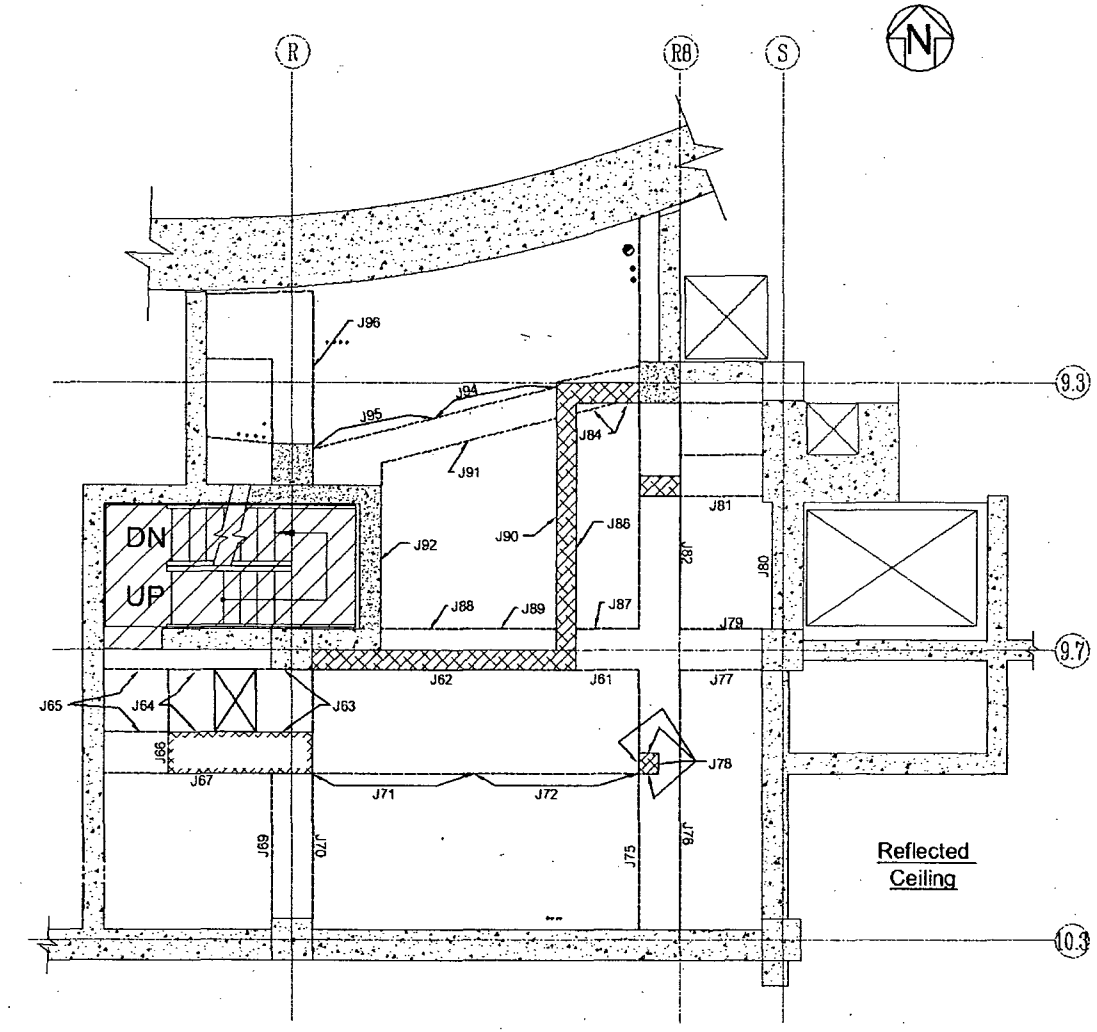
Sample Line Chase

Scale Feet
$\frac{3}{32}$" = 1'–0"
Scale Meters
0 1 2 3

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL BETA DIRECT/
LOOSE SURFACE MEASUREMENT POINTS
F8131382-M2

FILE: 813000.04e SHEET 6 of 6 T C HILL



Sample Line Chase

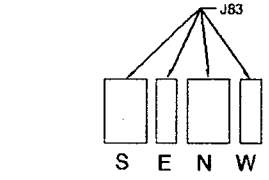
Scale Feet
1/8" = 1'-0"

Scale Meters
0 1 2 3

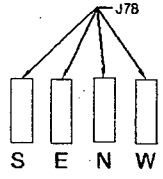
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL JUNCTURE
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M3

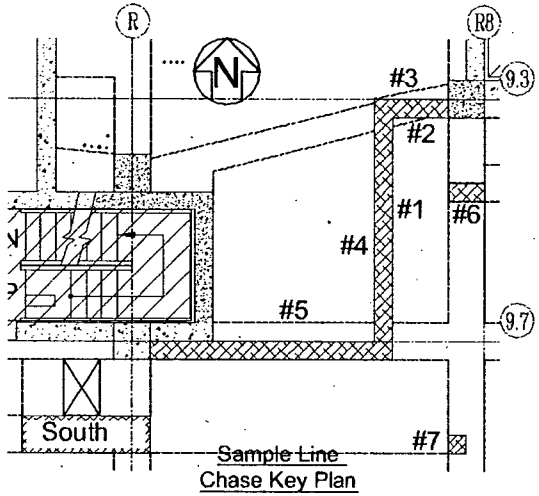
FILE: 813000.04e SHEET 1 OF 5 T C HILL



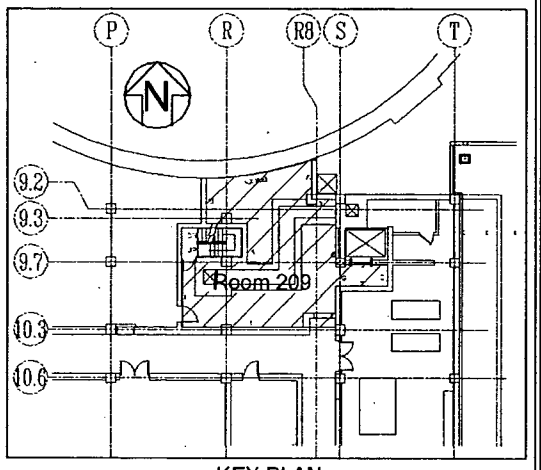
Sample Line Chase Support #6 Vertical Surfaces



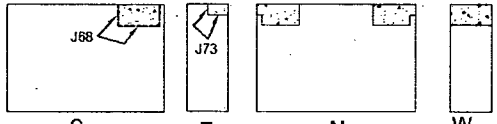
Sample Line Chase Support #7 Vertical Surfaces



Sample Line Chase Key Plan

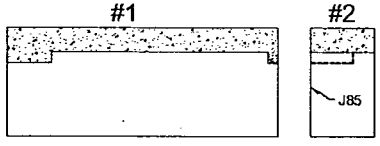


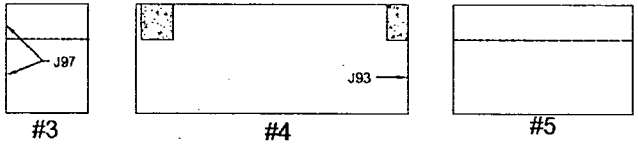
KEY PLAN



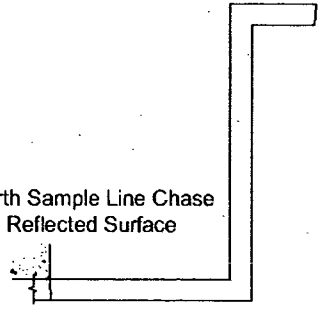
South Sample Line Chase Vertical Surfaces

South Sample Line Chase Reflected Surface





North Sample Line Chase Vertical Surfaces



North Sample Line Chase Reflected Surface

Sample Line Chase

Scale Feet

1/8" = 1'-0"

Scale Meters

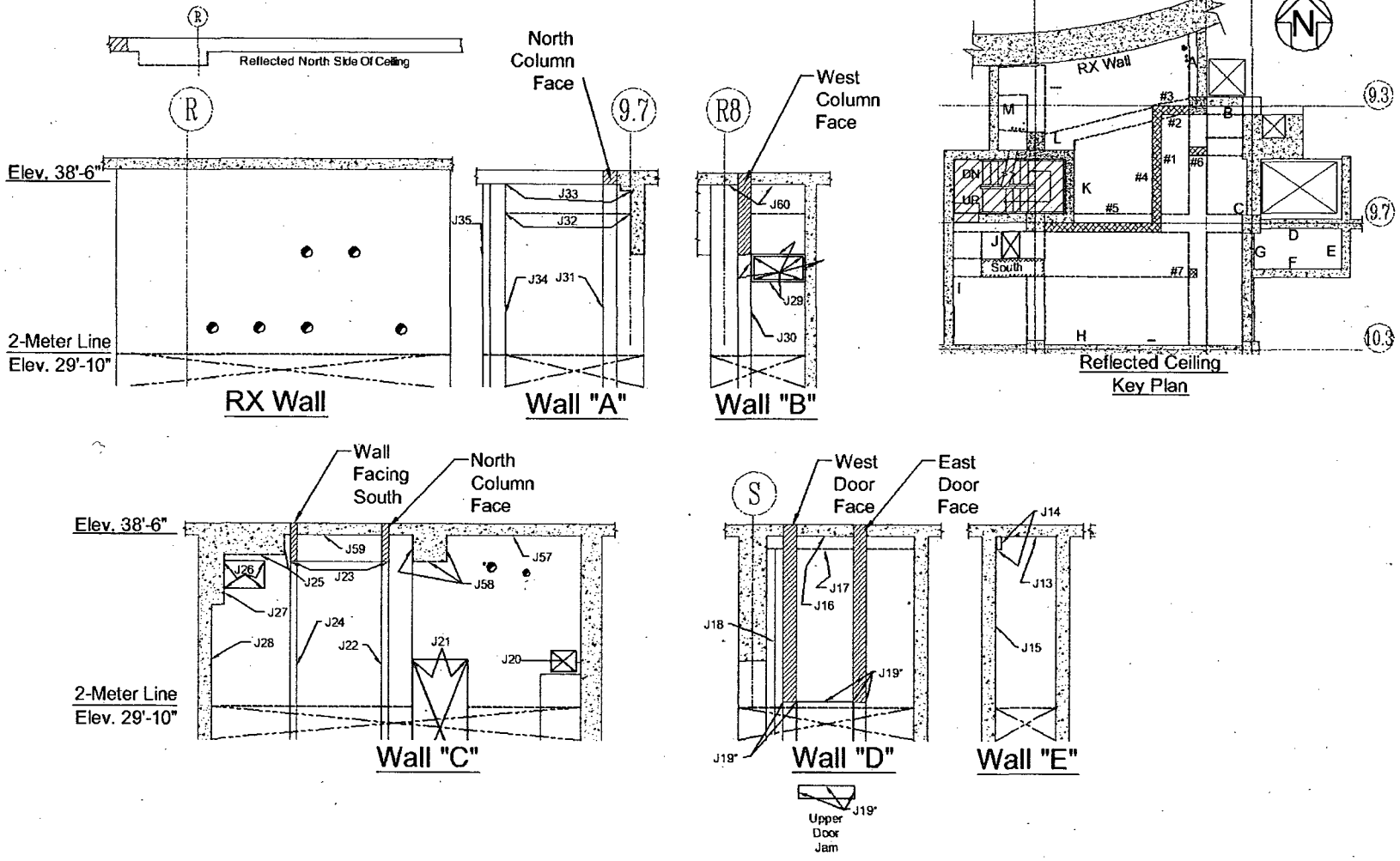
0 1 2 3

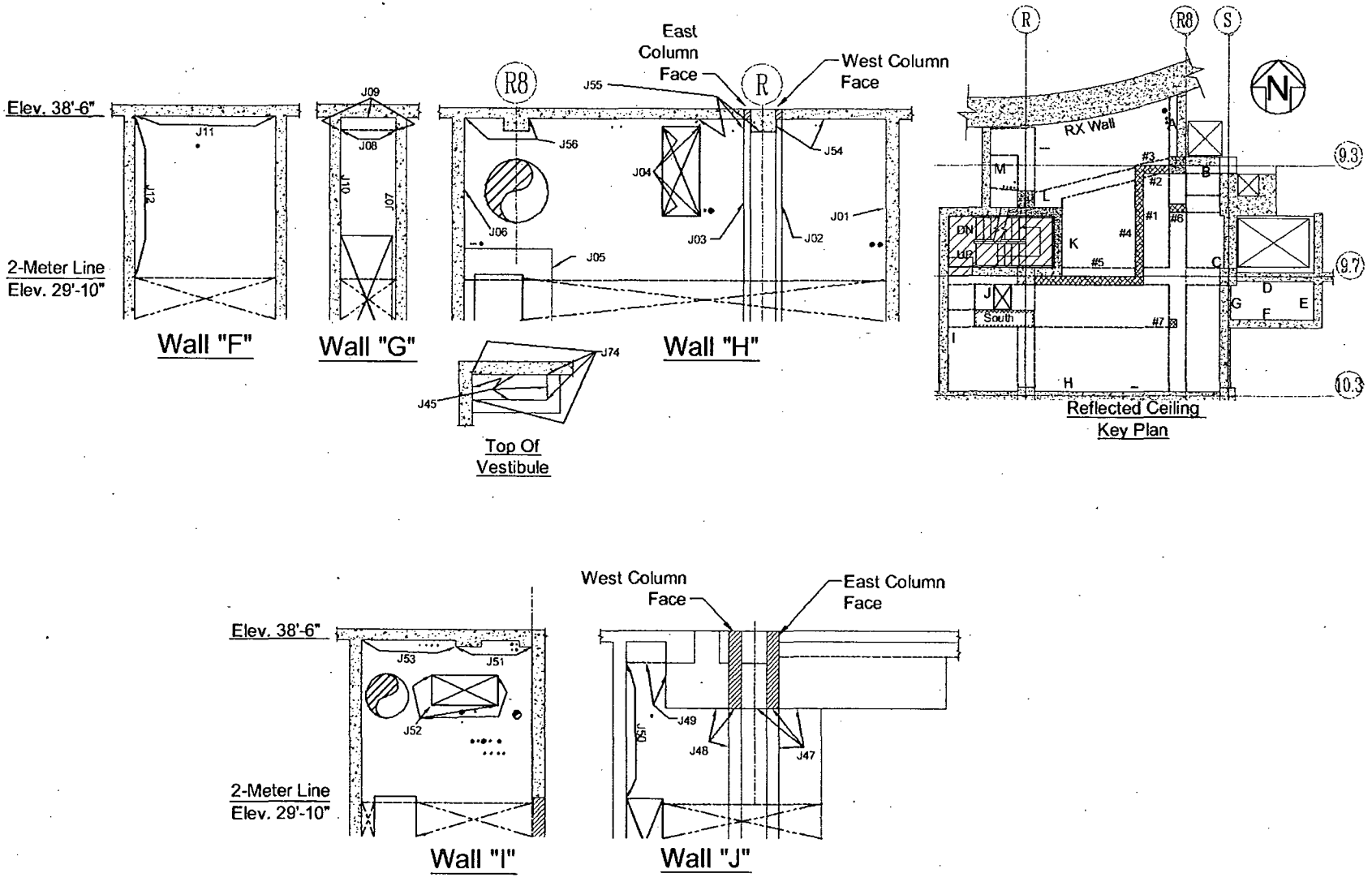
SMUD

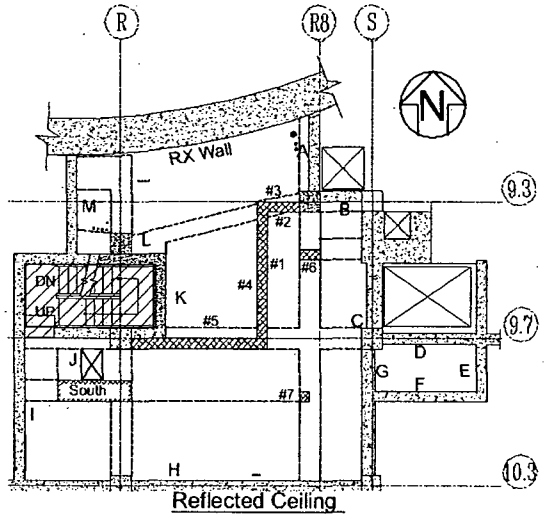
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209 CEILING AND UPPER WALL JUNCTURE BETA SCAN MEASUREMENT LOCATIONS F8131382-M3

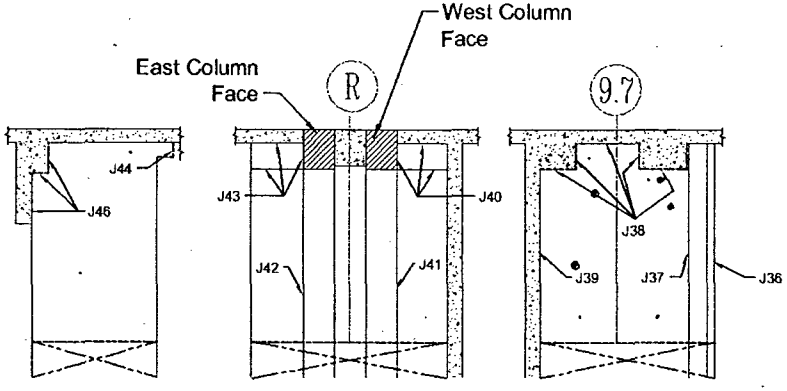
FILE: 813000.04e SHEET 2 of 5 T C HILL


Reflected North Side Of Ceiling
R
Elev. 38'-6"
2-Meter Line
Elev. 29'-10"
RX Wall
North
Column
Face
9.7
J33
J32
J35
J34
J31
Wall "A"
R8
West
Column
Face
J60
J29
J30
Wall "B"
RX Wall
#1
#2
#3
#4
#5
#6
#7
K
M
L
DN
UP
J
South
I
H
A
B
C
D
E
F
G
9.3
9.7
10.3
Reflected Ceiling
Key Plan
Wall
Facing
South
North
Column
Face
J59
J57
J26
J25
J23
J58
J27
J24
J28
J22
J21
J20
Wall "C"
S
West
Door
Face
East
Door
Face
J14
J17
J16
J13
J18
J15
J19*
J19*
Wall "D"
Wall "E"
J19*
Upper
Door
Jamb
Note: * Continued on adjacent Surface
Sample
Line
Chase
Scale Feet
3/32" = 1'-0"
Scale Meters
0 1 2 3
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL JUNCTURE
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M3
FILE: 813000.04e
SHEET 3 of 5
T C HILL


Elev. 38'-6"
2-Meter Line
Elev. 29'-10"
J11
J12
J09
J08
J10
J07
R8
R
East Column Face
West Column Face
J55
J56
J54
J04
J01
J03
J02
J06
J05
J74
J45
Wall "F"
Wall "G"
Wall "H"
Top Of Vestibule
RX Wall
N
9.3
9.7
10.3
Reflected Ceiling Key Plan
Elev. 38'-6"
2-Meter Line
Elev. 29'-10"
J53
J51
J52
West Column Face
East Column Face
J49
J48
J47
J50
Wall "I"
Wall "J"
Sample Line Chase
Scale Feet
3/32" = 1'-0"
Scale Meters
0 1 2 3
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL JUNCTURE
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M3
FILE: 813000.04e
SHEET 4 of 5
T C HILL



Reflected Ceiling
Key Plan



Wall "K" Wall "L" Wall "M"

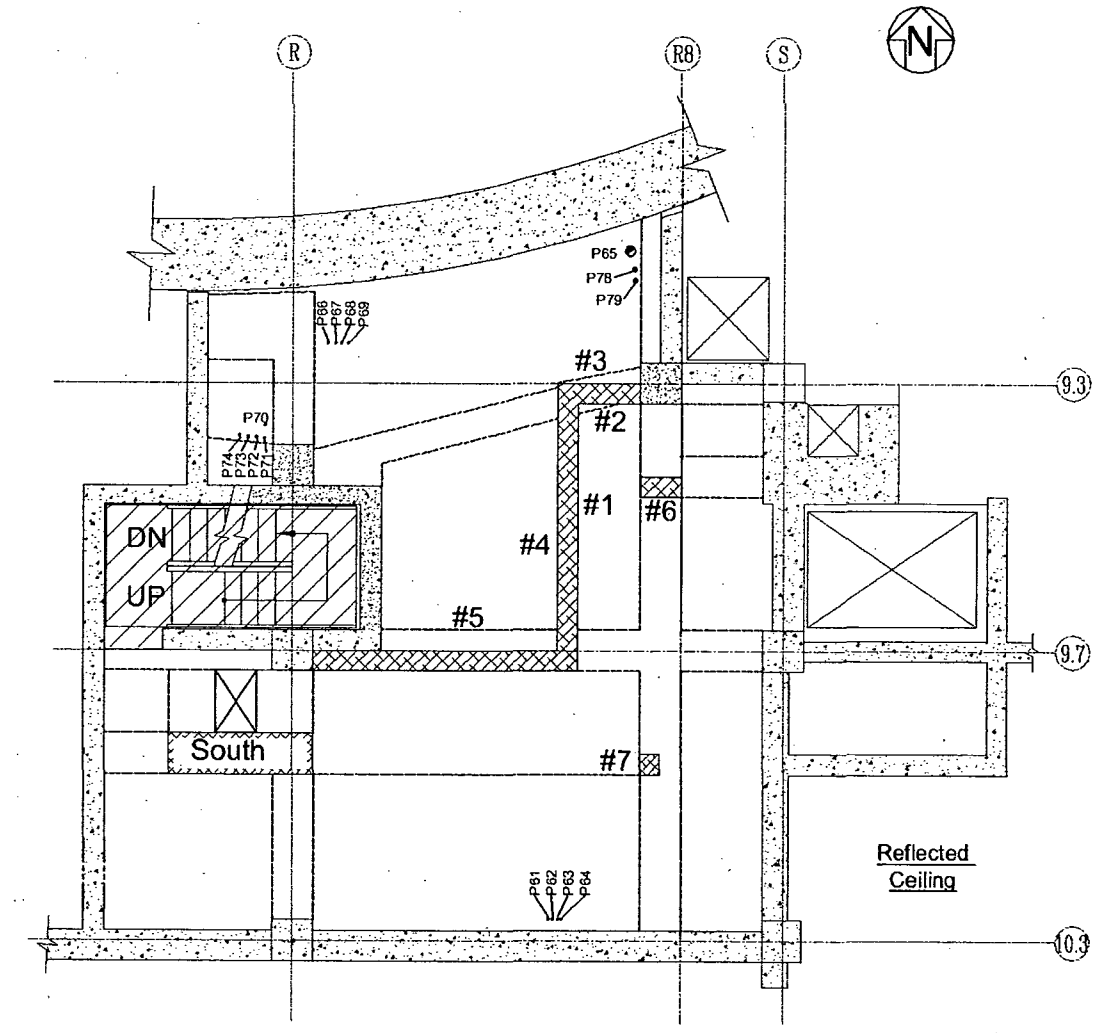
Sample Line Chase

Scale Feet
$\frac{3}{32}$" = 1'–0"
Scale Meters
0 1 2 3

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL JUNCTURE
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M3

FILE: 813000.04e SHEET 5 of 5 T C HILL



Scale Feet
1/8" = 1'-0"

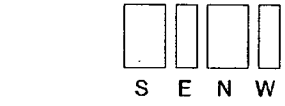
Scale Meters
0 1 2 3

Sample
Line
Chase

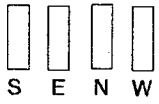
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL PENETRATION
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M4

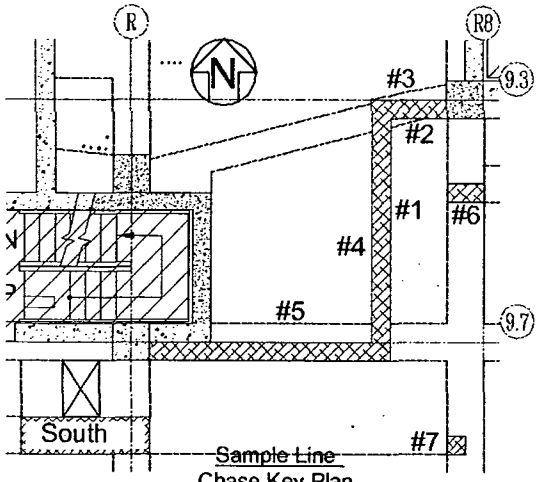
FILE: 813000.04e SHEET 1 OF 5 T C HILL



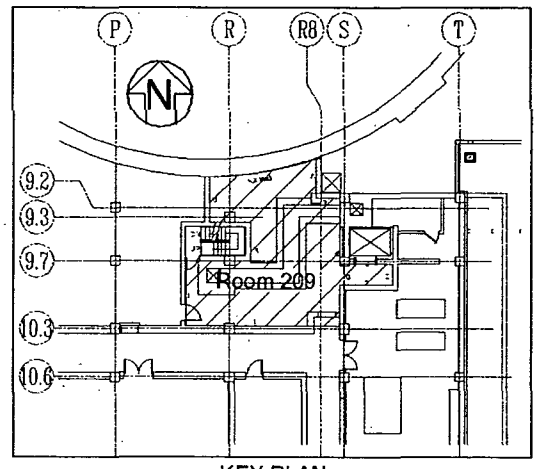
Sample Line Chase Support #6 Vertical Surfaces



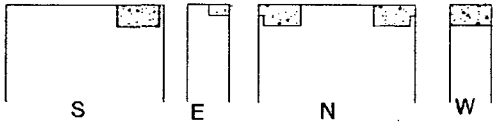
Sample Line Chase Support #7 Vertical Surfaces



Sample Line Chase Key Plan

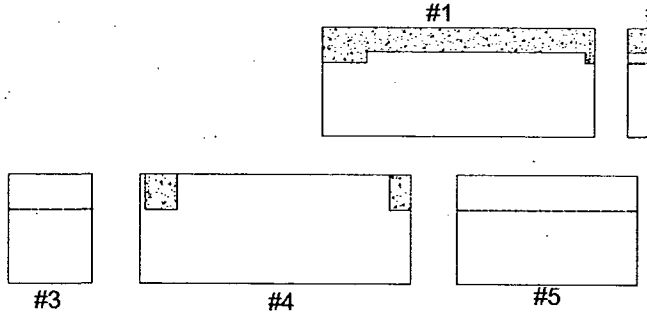


KEY PLAN

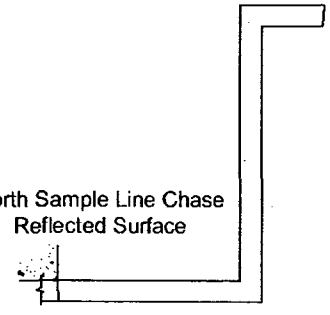


South Sample Line Chase Vertical Surfaces

South Sample Line Chase Reflected Surface



North Sample Line Chase Vertical Surfaces



North Sample Line Chase Reflected Surface

Scale Feet
1/8" = 1'-0"

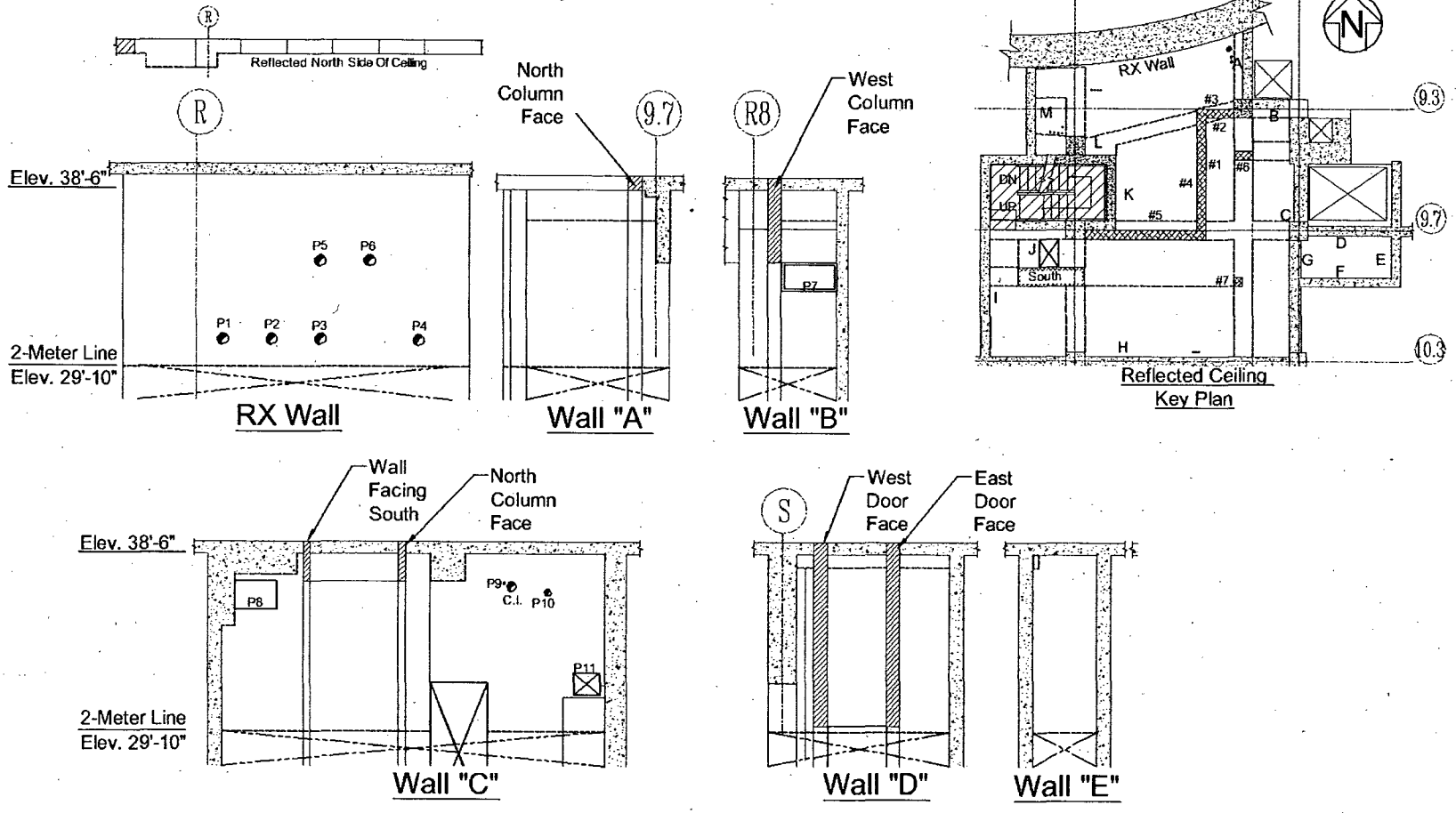
Sample Line Chase

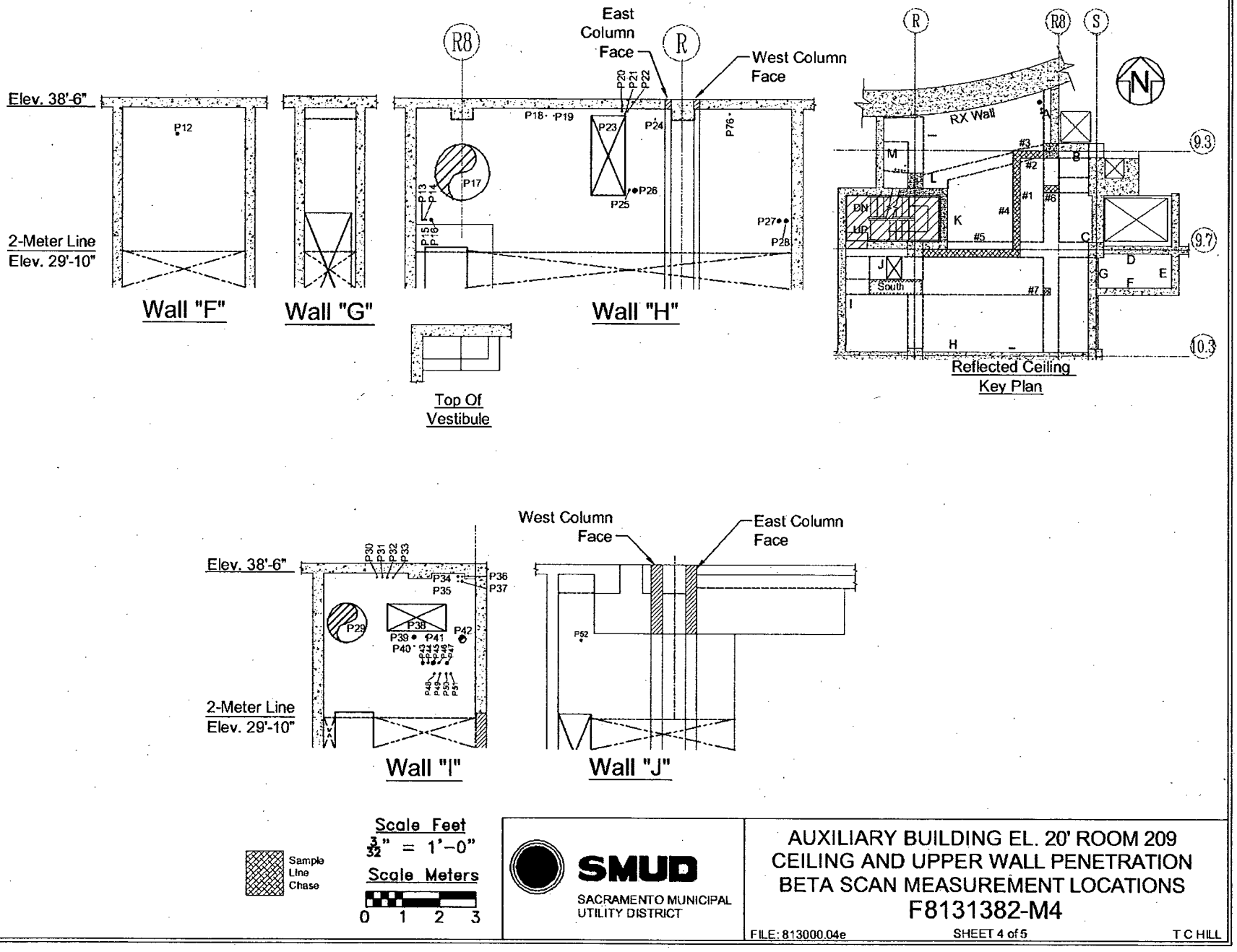
Scale Meters
0 1 2 3

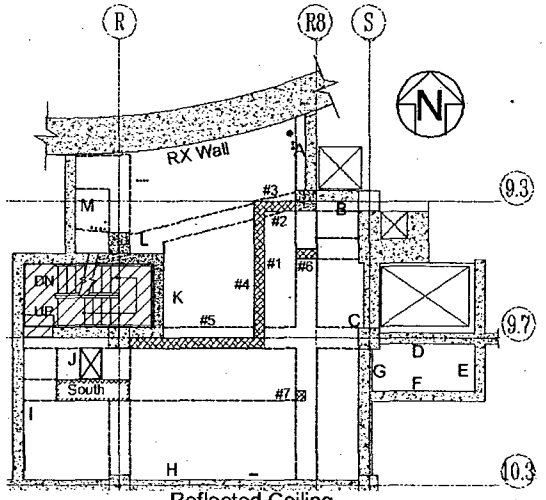
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL PENETRATION
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M4

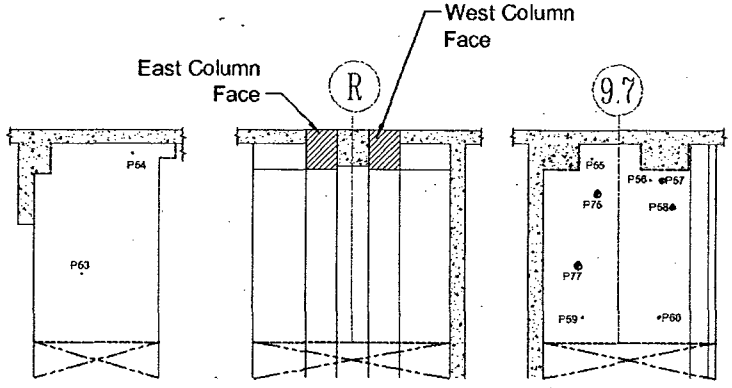
FILE: 813000.04e SHEET 2 of 5 T C HILL


Reflected North Side Of Ceiling
R
Elev. 38'-6"
2-Meter Line
Elev. 29'-10"
P1
P2
P3
P4
P5
P6
RX Wall
North
Column
Face
9.7
Wall "A"
R8
West
Column
Face
P7
Wall "B"
R
R8
S
N
RX Wall
9.3
9.7
10.3
#1
#2
#3
#4
#5
#6
#7
B
C
D
E
F
G
H
I
J
K
L
M
DN
UP
South
Reflected Ceiling
Key Plan
Wall
Facing
South
North
Column
Face
Elev. 38'-6"
P8
P9
C.L.
P10
P11
2-Meter Line
Elev. 29'-10"
Wall "C"
S
West
Door
Face
East
Door
Face
Wall "D"
Wall "E"
Scale Feet
3/32" = 1'-0"
Scale Meters
0 1 2 3
Sample
Line
Chase
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL PENETRATION
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M4
FILE: 813000.04e
SHEET 3 of 5
T C HILL


Elev. 38'-6"
2-Meter Line
Elev. 29'-10"
Wall "F"
Wall "G"
Wall "H"
East Column Face
West Column Face
R8
R
P12
P13
P14
P15
P16
P17
P18
P19
P20
P21
P22
P23
P24
P25
P26
P27
P28
P76
Top Of Vestibule
RX Wall
Reflected Ceiling Key Plan
Elev. 38'-6"
2-Meter Line
Elev. 29'-10"
Wall "I"
Wall "J"
West Column Face
East Column Face
P29
P30
P31
P32
P33
P34
P35
P36
P37
P38
P39
P40
P41
P42
P52
Sample Line Chase
Scale Feet
3/32" = 1'-0"
Scale Meters
0 1 2 3
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL PENETRATION
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M4
FILE: 813000.04e
SHEET 4 of 5
T C HILL



Reflected Ceiling
Key Plan



Wall "K" Wall "L" Wall "M"

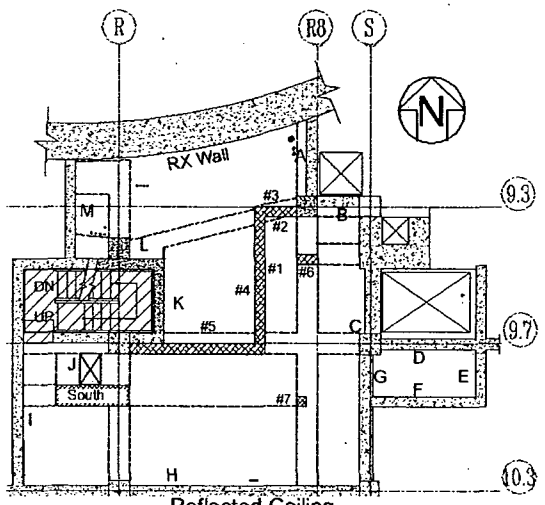
Sample
Line
Chase

Scale Feet
$\frac{3}{32}$" = 1'–0"
Scale Meters
0 1 2 3

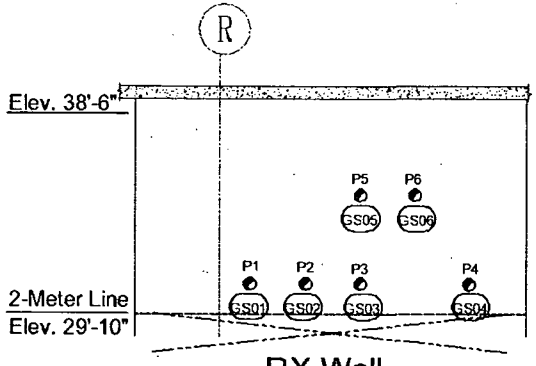
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL PENETRATION
BETA SCAN MEASUREMENT LOCATIONS
F8131382-M4

FILE: 813000.04e SHEET 5 of 5 T C HILL



Reflected Ceiling
Key Plan



RX Wall

Sample Line Chase

Scale Feet
$\frac{3}{32}$" = 1'–0"
Scale Meters
0 1 2 3

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUXILIARY BUILDING EL. 20' ROOM 209
CEILING AND UPPER WALL PENETRATION
GAMMA SCAN MEASUREMENT LOCATIONS
F8131382-M5

FILE: 813000.04e SHEET 1 of 1 T C HILL

Attachment 2

Instrumentation

July 14, 2008

Survey Unit F8131382

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; 142514	43-98B; 148639	930	1680
M2350; 180733	43-98B; 148638	930	1680
M2350; 180733	43-94B; 148620	350	610
M2350; 175834	43-68B; 190482	433	1033
M2350; 193700	43-68B; 190294	433	1033
M2350; 142509	43-68B; 160699	433	1033
M2350; 175834	43-68B; 148634	433	1033
M2350; 149789	43-68B; 148633	433	1033
M2350; 149789	43-116-1B; 256006	796	3258
M2350; 175834	43-116-1B; 190642	796	3258
M2350; 180733	43-111B; 148641	2290	4160
Tennelec; 0401171	N/A	5.9 dpm α, 11.7 dpm β	N/A
InSpector 1000	03069793	N/A	4830 Cs-137 5350 Co-60

The scan and static MDC's provided represent the most conservative MDC values for the survey conducted.

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	154800
Investigation Criteria – Scan	154800
$DCGL_W$	43000
$DCGL_{EMC}$	154800

Attachment 3

Investigation

July 14, 2008

Survey Unit F8131382

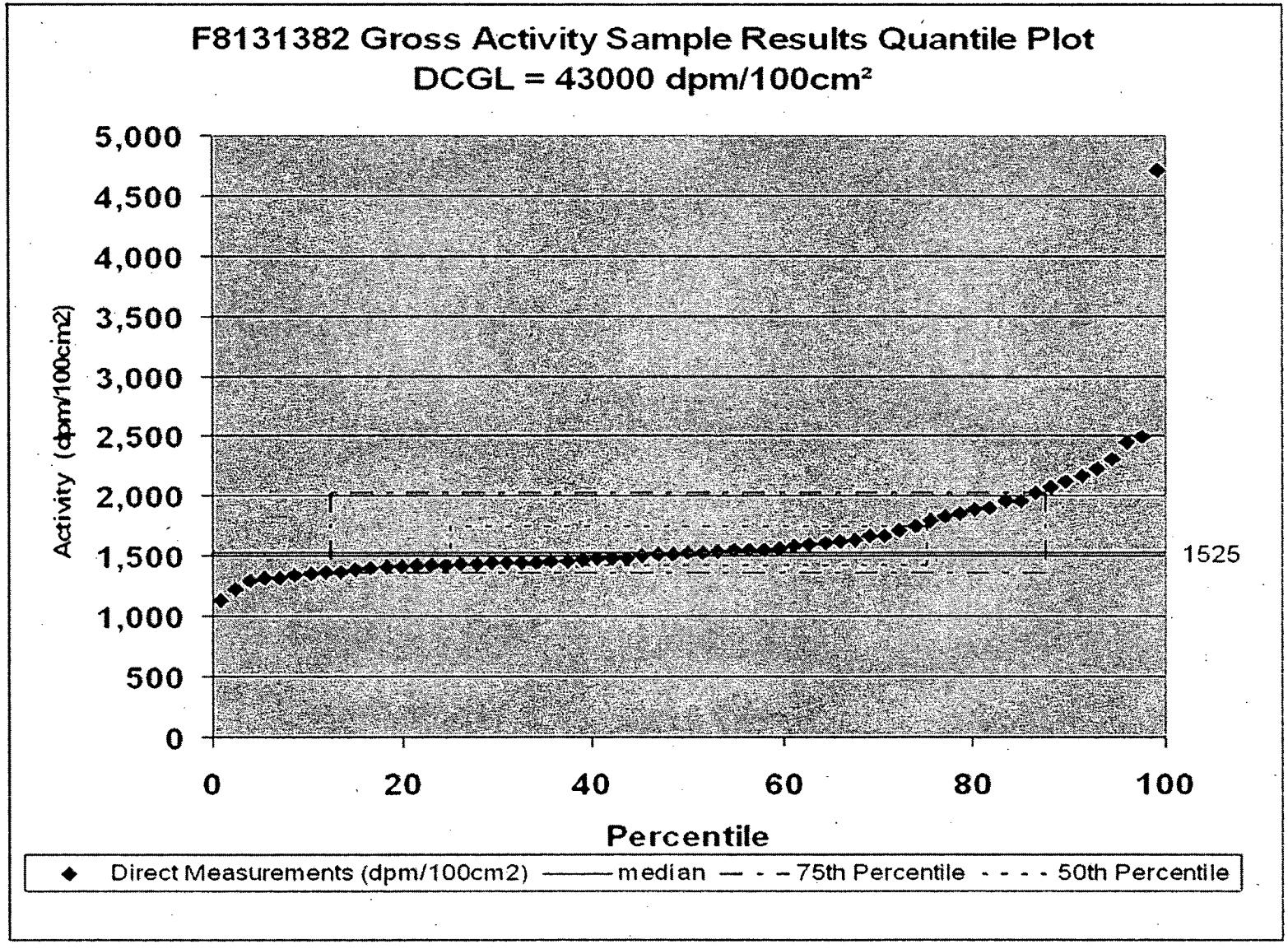
(none required)

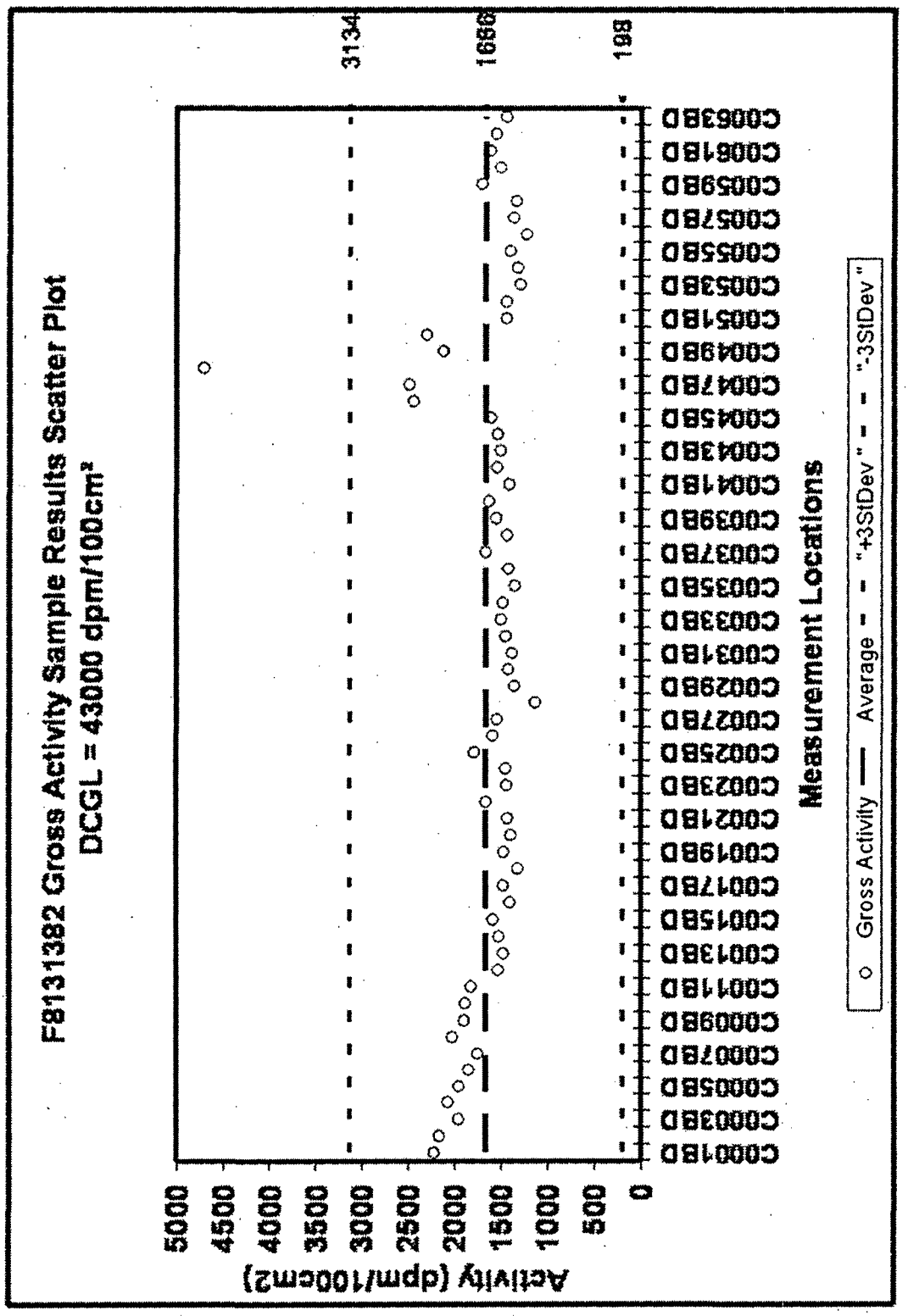
Attachment 4

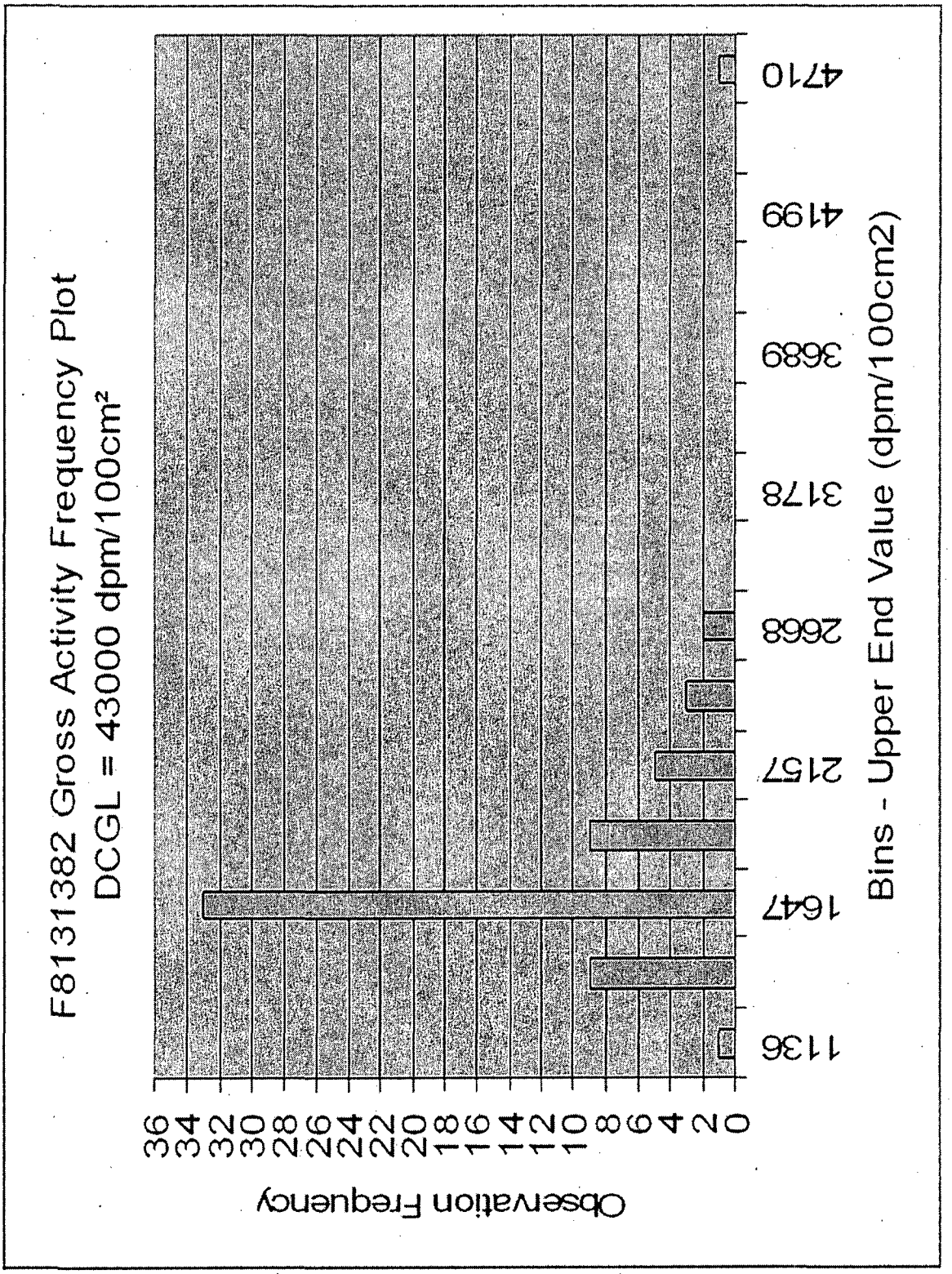
Data Assessment

July 14, 2008

Survey Unit F8131382


F8131382 Gross Activity Sample Results Quantile Plot
DCGL = 43000 dpm/100cm²
Activity (dpm/100cm2)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0
20
40
60
80
100
Percentile
1525
Direct Measurements (dpm/100cm2)
median
75th Percentile
50th Percentile


F8131382 Gross Activity Sample Results Scatter Plot
DCGL = 43000 dpm/100cm²
3134
1686
198
Activity (dpm/100cm2)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
C00018BD
C00038BD
C00058BD
C00078BD
C00098BD
C00118BD
C00138BD
C00158BD
C00178BD
C00198BD
C00218BD
C00238BD
C00258BD
C00278BD
C00298BD
C00318BD
C00338BD
C00358BD
C00378BD
C00398BD
C00418BD
C00438BD
C00458BD
C00478BD
C00498BD
C00518BD
C00538BD
C00558BD
C00578BD
C00598BD
C00618BD
C00638BD
Measurement Locations
Gross Activity
Average
"+3StDev"
"-3StDev"


F8131382 Gross Activity Frequency Plot
DCGL = 43000 dpm/100cm²
Observation Frequency
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
1136
1647
2157
2668
3178
3689
4199
4710
Bins - Upper End Value (dpm/100cm2)