Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

CONTRACT NO. N68711-98-D-5713
CTO NO. 0072

FINAL

TASK-SPECIFIC PLAN FOR THE BUILDING 401 SCOPING SURVEY

June 5, 2008

DCN: ECSD-5713-0072-0010

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

CONTRACT NO. N68711-98-D-5713
CTO NO. 72

FINAL
TASK-SPECIFIC PLAN
FOR THE
BUILDING 401 SCOPING SURVEY
June 5, 2008
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

ECSD-5713-0072-0010

Prepared by:

TETRA TECH EC, INC.
1230 Columbia Street, Suite 750
San Diego, CA 92101

Brian Henderson
Technical Lead

Bill Dougherty
Project Manager

Daryl DeLong
Radiation Safety Officer

Laurie Lowman
Radiological Affairs Support Office

TETRA TECH EC, INC.

TRANSMITTAL/DELIVERABLE RECEIPT

Contract No. N68711-98-D-5713 (RAC III) Document Control No. ECSD-5713-0072-0010

File Code: 5.0

TO: Contracting Officer
Naval Facilities Engineering Command SW
Ms. Beatrice Appling, AQE.BA
Building 127, Room 108
1220 Pacific Highway
San Diego, CA 92132-5190

DATE: 06/09/08
CTO: 0072
LOCATION: Hunters Point Shipyard

FROM: A. N. Bolt

A. N. Bolt, Program Manager

DESCRIPTION: Final Task-Specific Plan for the Building 401 Scoping Survey, June 5, 2008

TYPE: ☐ Contract/Deliverable ☒ CTO Deliverable ☐ Notification ☐ Other

VERSION: Final (e.g. Draft, Draft Final, Final, etc.) REVISION #: N/A

ADMIN RECORD: (PM to Identify) Yes ☒ No ☐ Category ☐ Confidential ☐

SCHEDULED DELIVERY DATE: 06/05/08 ACTUAL DELIVERY DATE: 06/09/08

NUMBER OF COPIES SUBMITTED: O/10C/8E Copy of SAP to N. Ancog ☐

COPIES TO: (Include Name, Navy Mail Code, and Number of Copies)

NAVY:	TtEC:	OTHER: (Distributed by TtEC)
C. Mafara (06B2.CK) O/1C	R. Kanaya (6)	L. Lowman - RASO
*BPMOW	G. Joyce	
*D. Jensen 1C/1E	Library Copy	
*K. Forman BPMOW 1C/1E		
*M. Kito BPMOW 1C/1E		
D. Silva (EVR.DS) 3C/3E		Date/Time Received
P. Stroganoff - ROICC 1C/1E		
M. Mentink - CSO 1C/1E		
Basic Contract Files(AQE)1C		

TETRA TECH EC, INC.

June 5, 2008
ECSD-5713-0072-0010
5.0

Base Realignment and Closure
Program Management Office West
Attn: Dane Jensen
1455 Frazee Road, Suite 900
San Diego, California 92108

SUBJECT: FINAL TASK-SPECIFIC PLAN FOR THE BUILDING 401 SCOPING SURVEY, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Reference: Contract N68711-98-D-5713, Environmental Remedial Action Contract For Sites Southern California, Arizona, New Mexico, and Southern Nevada

Dear Dane:

Enclosed is the Final Task-Specific Plan for the Building 401 Scoping Survey, Hunters Point Shipyard, San Francisco, California, dated June 5, 2008. If you have any questions or require additional information, please contact me at (415) 216-2731.

Sincerely,

for Bill Dougherty
Project Manager

Enclosures: Final Task-Specific Plan for the Building 401 Scoping Survey, Hunters Point Shipyard, San Francisco, California

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

ABBREVIATIONS AND ACRONYMS

BHASP	Building-specific Health and Safety Plan
CFR	Code of Federal Regulations
cm	centimeter
cm^2	square centimeter
cm/s	centimeters per second
cpm	counts per minute
^{137}Cs	cesium-137
DCGL	derived concentration guideline level
$DCGL_W$	areawide DCGL
DFW	definable feature of work
DoD	Department of Defense
DON	Department of the Navy
dpm	disintegrations per minute
FSS	Final Status Survey
HPS	Hunters Point Shipyard
HRA	Historical Radiological Assessment
HSP	Health and Safety Plan
LBGR	lower boundary of the gray region
LLRW	low-level radioactive waste
m^2	square meter
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	minimum detectable concentration
MDCR	minimum detectable count rate
mrem/y	millirems per year
NaI	sodium iodide
NAVSEA	Naval Sea Systems Command
NSN	National Stock Number
^{226}Ra	radium-226
RASO	Radiological Affairs Support Office
ROC	radionuclide of concern
SFRA	San Francisco Redevelopment Agency
SOP	Standard Operating Procedure
^{90}Sr	strontium-90

ABBREVIATIONS AND ACRONYMS
(Continued)

TSP	Task-Specific Plan
TtEC	Tetra Tech EC, Inc.
TtFW	Tetra Tech FW, Inc.
WRS	Wilcoxon Rank Sum

TASK-SPECIFIC PLAN
FOR
BUILDING 401 SCOPING SURVEY

This Task-Specific Plan (TSP) provides task-specific details for the scoping survey of Building 401 at Hunters Point Shipyard (HPS). The survey will be conducted in accordance with the general approach and methodologies that are given in the *Base-wide Radiological Work Plan, Revision 1* (Base-wide Plan Revision 1) (Tetra Tech EC, Inc. [TtEC], 2007), and Standard Operating Procedures (SOPs). The survey activities will conform to the requirements of the Base-wide Health and Safety Plan (HSP) (Tetra Tech FW, Inc. [TtFW], 2004a) and the Building-specific Health and Safety Plan (BHASP) prepared for the site. No exceptions to the Base-wide Plan Revision 1, SOPs, or HSP are noted.

1.0 SITE DESCRIPTION AND HISTORICAL SUMMARY

Located in Parcel D near the intersections of Spear Avenue with both H Street and Hussey Street, Building 401 is a two-story building which measures approximately 100 feet by 250 feet. The references from the Historical Radiological Assessment (HRA), Volume II (Naval Sea Systems Command [NAVSEA], 2004), state that Building 401 was not radiologically impacted and was used for the following purposes:

- Supply storehouse
- Trades shop
- Public works maintenance shop & office
- General stores

However, in 2005, a civilian tenant of the Navy, provided several radium-226 (^{226}Ra) contaminated gauges from his shop at Building 401 to the Navy's radiological subcontractor. The subcontractor reported the device turn-in to the NAVSEA Detachment – Radiological Affairs Support Office (RASO), which provided for the proper management and disposal under the Navy's Low-Level Radioactive Waste (LLRW) program. The tenant obtained miscellaneous government surplus equipment through the Defense Reutilization and Marketing Office and had additional non-licensed general radioactive materials, such as check sources, electron tubes, and other radioluminescent devices.

In late 2007, the tenant vacated the premises prior to TtEC beginning sewer and storm drain removal near the building under a different project.

The RASO, in conjunction with the Base Realignment and Closure Program Management Office, has directed TtEC to prepare this TSP to perform a scoping survey to determine the radiological status of Building 401 due to the activities of the civilian tenant. Only the floor areas occupied by the civilian

tenant will be surveyed. The RASO has determined that the primary radionuclides of concern (ROCs) for Building 401 are cesium-137 (^{137}Cs), ^{226}Ra, and strontium-90 (^{90}Sr). The planned future use identified in the San Francisco Redevelopment Agency (SFRA) Reuse Plan (SFRA, 1997) is as a "mixed use" area, which includes residential areas.

2.0 SCOPING SURVEY PREPARATIONS

Prior to beginning the Final Status Survey (FSS), any miscellaneous items inside the civilian tenant's lease area of Building 401, debris, and other materials will need to be removed. All electron tubes which indicate a National Stock Number (NSN) beginning with 5960 are presumed to contain general radioactive materials, and will be managed as LLRW.

2.1 Equipment and Material Surveys and Removal

All residual equipment and other materials that are encountered inside of Building 401 will be surveyed for unrestricted release using SOPs HPO-Tt-006, *Radiation and Contamination Surveys* (TtFW, 2005a) and HPO-Tt-012, *Release of Materials and Equipment from Radiologically Controlled Areas* (TtFW, 2005b). A 100 percent scan for alpha and beta-gamma contamination will be performed over all accessible portions of the equipment or material. A minimum of 1 static (total activity and gross gamma count rate) and 1 smear (removable activity) will be taken over each unique piece of material, using the above referenced SOPs. The results of equipment and material surveys will be included with the final report.

Equipment and materials that indicate activity above the limits specified in Table 2-1, in addition to electron tubes that indicate an NSN beginning with 5960, will be managed as LLRW.

3.0 SCOPING SURVEY

The purpose of this section is to provide guidance for the Scoping Survey of Building 401. This TSP will be sufficient to recommend unrestricted release of the site if no residual contamination is detected.

3.1 Release Criteria

This survey is being performed to assess if residual radioactivity above the established release criteria, as defined in Table 2-1, is present in the area. The site will be modeled using radionuclide concentrations to evaluate total dose.

3.2 Reference Area

The reference (background) area for this survey is Building 400. This reference area was constructed in a similar era, and is of similar construction materials, as Building 401. This building is not listed as impacted in the HRA.

Additional or alternate reference areas may be selected by the Project Radiation Safety Officer if different materials are encountered.

3.3 Investigation Levels

The investigation level for gamma scan surveys will be three standard deviations (sigma) above the average gamma exposure rate, as measured in the reference area.

The investigation level for alpha and beta contamination surveys will be established at 100 disintegrations per minute (dpm)/100 square centimeters (cm^2) for alpha emitters and 1,000 dpm / 100 cm^2 for beta emitters.

3.4 Survey Units

The floor areas indicated in Appendix A (including the lower 2 meters of walls adjacent to Class 1 floor areas) will be treated as Class 1 survey units. Each Class 1 survey unit is limited to a maximum area of 100 square meters (m^2), and will be initially established in each room and in each area that contained similar flooring materials. Areas of the upper walls of the 1st floor, as indicated in Appendix A (greater than 2 meters from the floor), and ceilings will be handled as Class 2 survey units.

Additional Class 2 Survey Units may be established at the direction of the RASO after review of the preliminary survey results. The maximum size limit for Class 2 Survey Units is set at 1,000 m^2.

The area of all survey units, their classification, and general locations are provided in Table 3-1. Building 401 specific survey units and the approximate surveillance locations are detailed in Appendix A.

The results from this survey will be tested statistically using the Unity Rule presented in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (Department of Defense [DoD] et al., 2000) to ensure that the net residual activity in each survey unit is less than the 25 millirems per year (mrem/y) limit.

3.5 Wilcoxon Rank Sum Test

Regulatory guidance, as identified in MARSSIM (NUREG-1575; DoD et al., 2000), recommends use of the Wilcoxon Rank Sum (WRS) test to conservatively evaluate surveillance results that will be obtained from this survey. This test application will be used to evaluate, as applicable, measurement data for the applicable ROC. Positive findings will result in a change to this TSP to discuss remedial actions.

3.5.1 Number of Data Points

Since the ROCs are present in background, *N* is calculated in the manner specified for the WRS test (Equation 5-2 from the Base-wide Plan Revision 1).

Equation 5-2 from the Base-wide Plan Revision 1

$$N = \frac{\left(Z_{1-\alpha} + Z_{1-\beta}\right)^2}{3\left(P_r - 0.5\right)^2}(1.2)$$

Where:

$Z_{1-\alpha}$ = 1.645 Type I decision error level
$Z_{1-\beta}$ = 1.645 Type II decision level
P_r = random measurement probability (from Table 5.1 in MARSSIM [NUREG-1575])
(1.2) = 20% increase in number of samples over the minimum

3.5.2 Lower Boundary of the Gray Region Determination

The Lower Boundary of the Gray Region (LBGR) is the net median concentration of the contaminant in the survey unit. When this value is unknown, MARSSIM (NUREG-1575; DoD et al., 2000) suggests using a value for the LBGR of half the basewide derived concentration guideline level ($DCGL_w$) during planning purposes. Since Building 401 may show a highly variable amount of activity, the LBGR is unknown and difficult to predict. However, since the final activity will be at only a small fraction of the DCGL, the LBGR will be set at 0.3.

Normally, once the median concentration activity in the survey unit is established, this value will be used as a ratio to the lowest $DCGL_w$ for the decay method to determine the LBGR. Equation 6-7 from the Base-wide Plan Revision 1 gives the method used to determine the LBGR during the data quality assessment:

Equation 6-7 from the Base-wide Plan Revision 1

$$LBGR = \frac{C_1}{DCGL_1} + \frac{C_2}{DCGL_2} + \frac{C_2}{DCGL_2} + \ldots + \frac{C_i}{DCGL_i}$$

Where: C_i = *Concentration of Radionuclide "i"*
$DCGL_i$ = *DCGL of Radionuclide "i"*

3.5.3 Standard Deviation

Likewise, there is no estimate of the standard deviation of the contaminant in the survey unit, especially if no contaminant is initially expected. Therefore, sigma (σ) will be assigned the value of the standard deviation of the adjusted measurement values in the survey unit as shown in Equation 6-8 from the Base-wide Plan Revision 1:

Equation 6-8 from the Base-wide Plan Revision 1

$$\sigma = \sqrt{\left(\frac{\sigma_{C1}}{DCGL_1}\right)^2 + \left(\frac{\sigma_{C2}}{DCGL_2}\right)^2 + \ldots + \left(\frac{\sigma_{Ci}}{DCGL_i}\right)^2}$$

Where: σ_{Ci} = *Standard Deviation from Radionuclide "i"*
$DCGL_i$ = *DCGL of Radionuclide "i"*

For planning purposes, σ will be set at 0.5. During the FSS, this value will be revised using the actual radionuclide concentrations from the survey data.

3.5.4 Relative Shift

The relative shift is equal to Δ/σ, where Δ is equal to [$DCGL_W$-LBGR] and σ is an estimate of the standard deviation of the measured values in a survey unit. The relative shift can be calculated as shown in Equation 5-1 from the Base-wide Plan Revision 1:

Equation 5-1 from the Base-wide Plan Revision 1

$$\frac{\Delta}{\sigma} = \frac{DCGL_W - LBGR}{\sigma} = \frac{1-0.3}{0.5} = 1.4$$

Using this Δ/σ value of 1.4, P_r is determined to be 0.838864.

3.5.5 Unity Rule

As stated in Section 3.4 and Appendix I.11 of MARSSIM (NUREG-1575; DoD et al., 2000), the unity rule will be used since multiple radionuclides (with different decay methods) may be present. As stated in Appendix I.11.1, the DCGL is set at 1.0 (the total fraction of all radionuclides might exceed the 25 mrem/y as stated in the Action Memorandum).

Therefore *N* is calculated using Equation 5-2 from the Base-wide Plan Revision 1 as follows:

Where:

Type I decision error level: 1.645 (corresponds to a 5% error)
Type II decision error level: 1.645 (corresponds to a 5% error)
Random measurement probability: 0.838864

$$37.7 = \left\{\frac{(1.645+1.645)^2}{3(0.838864-0.5)^2}\right\}(1.2)$$

N for surveys is calculated as a minimum of 37.7 total data collection locations. Rounding this number up to an even number, this would equate to 19 from each survey unit and 19 from the reference area, for a

total of 38. However, to ensure that sufficient data are collected from the Survey Unit, 20 measurements will be collected.

To maintain the potential to use the data for the FSS, data will be continuously analyzed to determine the relationship between each survey unit and the reference area.

Approximate surveillance locations are detailed in Appendix A. The actual survey unit dimensions and surveillance locations may be adjusted based on actual field conditions without need for a change to this TSP. The final locations of survey units and surveillance locations will be provided in the final report.

3.6 Alpha and Beta Scan Measurements

Scan measurements are performed to identify elevated areas of radioactivity. Alpha and beta scans will be effective for identifying elevated concentrations of any ROC. One hundred percent of Class 1 and 50 percent of Class 2 survey units will be scanned with Ludlum Model 43-37 or 43-68 gas-flow proportional detectors coupled to Ludlum Model 2360 data loggers (or equivalent).

3.6.1 Alpha Scan Measurements

Preliminary survey data indicate that the alpha count rate on various surfaces within Building 401 averages less than 10 counts per minute (cpm) with a Model 43-37 (or equivalent) detector. Therefore, alpha scan speeds will be determined using Equation 7-4 from the Base-wide Plan Revision 1 (TtEC, 2007).

Equation 7-4 from the Base-wide Plan Revision 1

$$P(n \geq 2) = 1 - \left[1 + \frac{(GE + B)t}{60}\right]\left[e^{\frac{-(GE+B)t}{60}}\right]$$

Where:

$P(n \geq 2)$	=	probability of getting two or more counts during the time interval t(%)
t	=	time interval (s) = 11.7
G	=	contamination activity (dpm) = 100
E	=	detector efficiency (4π) = 0.2036
B	=	observed background count rate (cpm) = 5
$P(n \geq 2)$	=	95.77 % at a scan speed of 1.37 centimeters per second (cm/s)

The scan surveys will be performed using a Ludlum Model 43-37 (or equivalent) detector. The detector position will be adjusted so that the detector window is approximately 1/4 inch from the building surfaces. The surveyor will move the detector at a scan speed of 1.37 cm/s while maintaining audio and visual observation of the instrument response. If the surveyor observes two or more counts during a scan interval (approximately 12 seconds), the surveyor will pause the detector movement for 5 seconds to

obtain additional data. If during the 5-second observation no additional counts are observed, the surveyor can continue the scan survey. Conversely, if additional counts are observed during the 5-second observation, the surveyor should mark the area for further investigation and subsequent biased measurements using a 126-cm^2 or smaller detector to locate and properly quantify any areas of elevated activity.

Preliminary survey data indicate that the alpha count rate on various surfaces in Building 401 averages less than 2 cpm with a Model 43-68 detector. When using a 126 cm^2 or smaller detector, scanning for alpha emitters differs in that the expected background response of most alpha detectors is very close to zero. Since the amount of time a contaminated area is under the probe varies and the background count rate of some alpha instruments is less than 1 cpm, it is not reasonable to determine a fixed minimum detectable concentration (MDC) for scanning. Instead, it is more practical to determine the probability of detecting an area of contamination at a predetermined DCGL for given scan rates.

For alpha survey instrumentation with backgrounds ranging from less than 1 to 3 cpm, a single count provides a surveyor sufficient cause to stop and investigate further. Assuming this to be true, the probability of detecting given levels of alpha surface contamination can be calculated by use of Poisson summation statistics.

Given a known scan rate and a surface contamination release limit, the probability of detecting a single count while passing over the contaminated area is given by Equation 7-2 of the Base-wide Plan Revision 1 (TtEC, 2007):

Equation 7-2 from the Base-wide Plan Revision 1

$$P(n \geq 1) = 1 - e^{\frac{-GEd}{60v}}$$

Where:

$P(n \geq 1)$	=	probability of observing a single count = 97.18%
G	=	contamination activity dpm = 100
E	=	detector efficiency (4π) = 0.2036
d	=	width of detector in direction of scan (centimeters [cm]) = 14.4
v	=	scan speed (cm/s) = 1.37

Once a count is recorded and the guideline level of contamination is present, the surveyor should stop and wait until the probability of getting another count is at least 90 percent. This time interval can be calculated by Equation 7-3 of the Base-wide Plan Revision 1 (TtEC, 2007):

Equation 7-3 from the Base-wide Plan Revision 1

$$t = \frac{13,800}{CAE}$$

Where:

t = time period for static count(s) = 5.38
C = contamination guideline (dpm/100 cm^2) = 100
A = physical probe area (cm^2) = 126
E = detector efficiency (4π) = 0.2036

Using the above equations found in the Base-wide Plan Revision 1 and Chapter 6 of MARSSIM (NUREG-1575; DoD et al., 2000), the probability of detecting 100 dpm/100 cm^2 alpha is 97.18 percent.

Scan speeds may be adjusted based on the specific parameters for instruments in use, provided that the probability does not fall below 90 percent.

3.6.2 Beta Scan Measurements

The minimum number of net source counts in the scan interval can be arrived at by multiplying the square root of the number of background counts (in the scan interval) by the detectability value associated with the desired performance (as reflected in *d'*) as shown in Equation 7-5 from the Base-wide Plan Revision 1 (TtEC, 2007) as follows:

Equation 7-5 from the Base-wide Plan Revision 1

$$MDCR = d'\sqrt{b_i}\left(\frac{60}{i}\right)$$

Where:

d' = index of sensitivity (α and β errors [performance criteria])
b_i = number of background counts in scan time interval (count)
i = scan or observation interval (s)

For beta scans:

d' = 3.28
b_i = 97.5 counts (based on a background of 500 cpm)
i = 16 cm / 1.37 cm/s = 11.7 seconds
Beta scan minimum detectable count rate (MDCR) = 166.09 cpm at a scan speed of 1.37 cm/s.

The scan MDC is determined from the MDCR by applying conversion factors that account for detector and surface characteristics and surveyor efficiency. As discussed below, the MDCR accounts for the background level, performance criteria (d'), and observation interval. The observation interval during scanning is the actual time that the detector can respond to the contamination source. This interval depends on the scan speed, detector size in the direction of the scan, and area of elevated activity. The

scan MDC for structure surfaces is calculated using Equation 7-6 from the Base-wide Plan Revision 1 (TtEC, 2007) as follows:

Equation 7-6 from the Base-wide Plan

$$Scan\ MDC = \frac{MDCR}{\sqrt{p}\,\varepsilon_i \varepsilon_s \frac{W_A}{100\ cm^2}}$$

Where:

$MDCR$ is discussed above
p = surveyor efficiency factor
ε_i = instrument efficiency (count per particle)
ε_s = contaminated surface efficiency (particle per disintegration)
W_A = area of the detector window (cm^2)

For beta scans:

$MDCR$ = 166.09
p = 0.50
ε_i = 0.4084
ε_s = 0.25
W_A = 582
Beta scan MDC = 395.28 dpm/100 cm^2 at a scan speed of 1.37 cm/s.

3.6.3 Gamma Scans

One-hundred percent of the Class 1 survey units will be scanned with Ludlum Model 44-10 sodium iodide (NaI) scintillation detectors coupled to Ludlum Model 2350-1 scaler/rate meters. The gamma scans will be performed in accordance with SOP HPO-Tt-006, *Radiation and Contamination Surveys* (TtFW, 2005a). A single detector will be used to perform gamma scans. Scans will be performed at a rate of approximately 0.5 meter per second (1-second scan observation) with the detector held approximately 10 cm (4 inches) above the ground, and it will be moved back and forth across the travel path while scanning, producing a serpentine scan pattern.

3.6.3.1 Minimum Detectable Count Rate for Gamma Surveys (2-inch by 2-inch NaI Probe)

MDCR is the minimum detectable number of net source counts in the scan interval, for an ideal observer, that can be arrived at by multiplying the square root of the number of background counts (in the scan interval) by the detectability value associated with the desired performance (as reflected in *d'*), as shown in Equation 7-5 from the Base-wide Plan Revision 1 (TtEC, 2007):

Equation 7-5 from the Base-wide Plan Revision 1

$$MDCR = d'\sqrt{b_i}\left(\frac{60}{i}\right)$$

Where, for ^{226}Ra and ^{137}Cs:

$MDCR$	=	Minimum Detectable Count Rate
d'	=	index of sensitivity (α and β errors) = 3.28
b_i	=	number of background counts in scan time interval = 96.76 cpm
i	=	Scan or observation interval = 1 second

For this calculation, the observed background count rate of 5,806 cpm for ^{226}Ra and ^{137}Cs are used. It should be noted that a typical source will remain under the NaI probe for 1 second during the scan; therefore, the average number of background counts in the observation interval is 96.76 [b_i = 5,806 × (1/60)]. The required rate of true positives is 95 percent, and the rate of false positives is 5 percent. From Table 6.5 of MARSSIM (NUREG-1575; DoD et al., 2000), the value of d', representing this performance goal, is 3.28. Using these inputs, the MDCR for Building 401 is 1,936 cpm for ^{226}Ra and ^{137}Cs.

3.6.3.2 MDCR and Use of Surveyor Efficiency, Gamma (2-inch by 2-inch NaI Probe)

The $MDCR_{Surveyor}$ can be calculated assuming a surveyor efficiency (P) of 0.5 and the observed background count rate of 5,806 cpm for ^{226}Ra and ^{137}Cs using Equation 7-9 from the Base-wide Plan Revision 1 (TtEC, 2007) as follows:

Equation 7-9 from the Base-wide Plan Revision 1

$$MDCR_{SURVEYOR} = \frac{MDCR}{\sqrt{P}} = \frac{1{,}936}{\sqrt{0.5}} = 2{,}737.91\,cpm$$

3.7 Alpha and Beta Static Measurements

Alpha and beta static measurements will be obtained from the locations identified in Appendix A. Two-minute alpha and beta static measurements will be performed at biased locations on materials to achieve the MDC limits necessary for the isotopes of concern. Additional measurements may be collected if elevated radiation readings are identified while performing the scan surveys. Ludlum Model 43-68 gas-flow proportional detectors coupled to Ludlum Model 2360 data loggers will be used to perform alpha and beta static measurements.

The MDC for alpha measurements is calculated from preliminary Building 401 survey data using Equation 7-7 from the Base-wide Plan Revision 1 (TtEC, 2007) as follows:

Equation 7-7 from the Base-wide Plan Revision 1

$$MDC = \frac{3 + 4.65\sqrt{R_B T_B}}{\varepsilon_s \varepsilon_i \frac{W_A}{100} T_B}$$

Where:

3+4.65	=	constant factor provided in MARSSIM
R_B	=	Background Count Rate = 1 cpm
T_B	=	Background Count Time = 2 minutes
ε_i	=	Instrument Efficiency = 0.3555
ε_s	=	Surface Efficiency Factor = 0.25
W_A	=	Probe Area Size = 126 cm^2

The calculated MDC (based on preliminary measurements) for alpha contamination is 42.76 dpm/100 cm^2, using a 2-minute static counting time. Counting time may be increased as necessary to provide a sufficient static MDC for any ROC below the release criteria.

The MDC for beta measurements is calculated using Equation 7-7 from the Base-wide Plan Revision 1 (TtEC, 2007) as follows:

Where:

3+4.65	=	constant factor provided in MARSSIM
R_B	=	Background Count Rate = 130 cpm
T_B	=	Background Count Time = 2 minutes
ε_i	=	Instrument Efficiency = 0.3913
ε_s	=	Surface Efficiency Factor = 0.25
W_A	=	Probe Area Size = 126 cm^2

The calculated MDC (based on preliminary measurements) for beta contamination is 316.32 dpm/100 cm^2, using a 2-minute static counting time. Counting time may be increased as necessary to maintain MDC below the Table 2-1 limits.

3.8 Static Gamma Measurements

Static gamma measurements will be collected at the specified systematic locations in horizontal and vertical survey units. Additional biased measurements may be collected if elevated gamma scan survey results identify measurements above the investigation level. The gamma and exposure rate measurements will be performed in accordance with SOP HPO-Tt-006, *Radiation and Contamination Surveys* (TtFW, 2005a).

For gamma surveys, MDC is calculated in cpm. Equation 7-12 from the Base-wide Plan Revision 1 (TtEC, 2007) is used to calculate the MDC.

Equation 7-12 from the Base-wide Plan Revision 1

$$MDC = \frac{3 + 4.65\sqrt{R_B T_B}}{T_B}$$

Where:

3+4.65	=	constant factor provided in MARSSIM
R_B	=	background count rate (cpm) = 5,806
T_B	=	background counting time (minute) = 1

~~Using the inputs observed in the reference area (listed above) in Equation 7-12, the calculated MDC for~~ the Ludlum Model 2350-1 is 357.32 cpm for ^{226}Ra and ^{137}Cs.

3.9 Exposure Rate Measurements

Exposure rate measurements will be collected from the specified systematic locations in each of the survey units. Additional measurements will be collected if elevated measurements are identified while performing the gamma scan surveys. Ludlum Model 19 scintillation detectors will be used to perform the measurements.

3.10 Media Sampling

Smear samples will be collected at all static surveillance points, once static measurements have been obtained. Smear samples will also be collected from drainage systems encountered within the survey units. Additional solid samples may be collected if elevated alpha, beta, and/or gamma survey results identify areas above the investigation level. Samples will be collected using SOP HPO-Tt-009, *Sampling Procedures for Radiological Surveys* (TtFW, 2004b). Samples will be analyzed at the on-site laboratory using approved SOPs for the appropriate analysis.

Solid samples will be collected in drain lines where sufficient accumulation of material has occurred. Solid samples will be analyzed by gamma spectroscopy, and 20 percent of these samples will be analyzed for ^{90}Sr at the on-site laboratory. Ten percent of solid samples analyzed at the on-site laboratory, by analysis, will be sent to an off-site laboratory for analysis. Acceptable quality control parameters are listed in Table B.7-3 of Appendix B of the Base-wide Plan Revision 1.

4.0 SITE RESTORATION

Upon conclusion of work in Building 401, no site restoration work will be necessary because the building is not scheduled for Navy demolition.

5.0 BUILDING 401 REPORT

Results of the survey that demonstrate that the net residual dose at Building 401 is less than 25 mrem/y, with no single measurement indicating activity, will be presented in an FSS Report. Any conclusion, other than a recommendation for unrestricted release, will be presented in a Characterization Report.

6.0 QUALITY CONTROL

The Data Quality Objectives for the survey are provided in Table 6-1.

Definable features of work (DFWs) establish the measures required to verify both the quality of work performed and compliance with project requirements. The DFWs for this task are radiological surveys and associated sample results.

A description of the DFWs and the associated phases of quality control are presented in Table 6-2.

7.0 ENVIRONMENTAL PROTECTION

No environmental protection-driven requirements not already addressed in the Base-wide Plan apply.

8.0 REFERENCES

The following additional references not already in the Base-wide Plan are cited in this TSP:

Department of Defense (DoD), Department of Energy, Nuclear Regulatory Commission, and US Environmental Protection Agency. 2000. *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575, Revision 1.* August.

Naval Sea Systems Command (NAVSEA). 2004. *Historical Radiological Assessment, Hunters Point Annex, Volume II, History of the Uses of General Radioactive Material 1939-2003.* August.

San Francisco Redevelopment Agency (SFRA). 1997. *Hunters Point Shipyard Redevelopment Plan.* July.

Tetra Tech EC, Inc. (TtEC). 2007. *Base-wide Radiological Work Plan Revision 1, Hunters Point Shipyard, San Francisco, California.* October.

Tetra Tech FW, Inc (TtFW). 2004a. *Final Base-wide Health and Safety Plan.* Hunters Point Shipyard, San Francisco, California.

_____. 2004b. *Final, Hunters Point Shipyard Project, Standard Operating Procedure, Sampling Procedures for Radiological Survey, HPO-Tt-009.*

_____. 2005a. *Final, Hunters Point Shipyard Project, Standard Operating Procedure, Radiation and Contamination Surveys, HPO-Tt-006.*

_____. 2005b. *Final, Hunters Point Shipyard Project, Release of Materials and Equipment from Radiologically Controlled Areas, HPO-Tt-012.*

TABLES

TABLE 2-1

BUILDING 401 SITE
PRIMARY RADIATION PROPERTIES AND RELEASE CRITERIA
FOR RADIONUCLIDES OF CONCERN

Radionuclide	Primary Radiation Properties		Release Criteria		
	Half-life	Type	Materials, Equipment, and Wastes		Release Criteria for Residential Reuse Solid Samples[b] (pCi/g)
			Total Surface Activity[a]	Removable Activity[a]	
^{137}Cesium	30.17 y	Beta Gamma	5,000	1,000	0.113
^{226}Radium	1,600 y	Alpha Gamma	100	20	1.0 [c]
^{90}Strontium	28.6 y	Beta	1,000	200	0.331

Notes:

[a] Units are dpm per 100 cm^2.

[b] EPA PRGs for soil (ventilation and drain line solid samples), except as noted.

[c] Per agreement with EPA.

Abbreviations and Acronyms:

cm^2 – square centimeter
dpm – disintegrations per minute
EPA – U.S. Environmental Protection Agency
pCi/g – picocurie per gram
PRG – Preliminary Remediation Goal
y – year

TABLE 3-1

SURVEY UNIT DESIGNATIONS AND AREAS

Class 1 Survey Unit	Floor	Area (m^2)	Class 1 Survey Unit	Floor	Area (m^2)	Class 2 Survey Unit	Location	Area (m^2)
SU-001	1st Floor	84	SU-016	1st Floor	71	SU-030	1st Floor	604
SU-002	1st Floor	73	SU-017	1st Floor	72	SU-031	1st Floor	621
SU-003	1st Floor	63	SU-018	1st Floor	16			
SU-004	1st Floor	95	SU-019	1st Floor	19			
SU-005	1st Floor	14	SU-020	1st Floor	17			
SU-006	1st Floor	3	SU-021	1st Floor	25			
SU-007	1st Floor	13	SU-022	1st Floor	19			
SU-008	1st Floor	20	SU-023	1st Floor	9			
SU-009	1st Floor	13	SU-024	2nd Floor	74			
SU-010	1st Floor	54	SU-025	2nd Floor	74			
SU-011	1st Floor	99	SU-026	2nd Floor	74			
SU-012	1st Floor	100	SU-027	2nd Floor	10			
SU-013	1st Floor	100	SU-028	2nd Floor	55			
SU-014	1st Floor	15	SU-029	2nd Floor	6			
SU-015	1st Floor	33						

Abbreviations and Acronyms:

m^2 – square meters
SU – Survey Unit

TABLE 6-1

SUMMARY OF DATA QUALITY OBJECTIVES

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
Statement of Problem	**Decisions**	**Inputs to the Decisions**	**Boundaries of the Study**	**Decision Rules**	**Limits on Decision Errors**	**Optimize the Sampling Design**
Building 401 is listed as an area impacted by radiological activities. Isotopes of concern for Building 401 are ^{137}Cs, ^{226}Ra, and ^{90}Sr. It must be determined if the site-specific release criteria for these isotopes have been met or if remediation is warranted.	The primary use of the data expected to result from completion of this TSP is to support the Final Status Survey of Building 401. Therefore, the decision to be made can be stated as, "Do the results of the survey meet the release criteria?"	Radiological surveys required to support the Final Status Survey of Building 401 will include: • 100 percent alpha, beta, and gamma scan surveys of Class 1 survey units. • 50 percent alpha, beta, and gamma scan surveys of Class 2 survey units. • A minimum of 20 systematic gamma, exposure rate, alpha and beta total contamination, and alpha and beta removable contamination measurements will be collected in each Class 1 and Class 2 survey unit. • Additional biased measurements and samples will be collected if investigation levels are exceeded or at locations identified during review of the associated scan data.	The boundaries of the Building 401 are shown in Appendix A. The spatial boundaries are consistent to recommend unrestricted release of the Building if no contamination is found above the release criteria stated for this TSP.	If the results of the survey meet the release criteria, then the data will be used to support a Final Status Survey. Otherwise, the data with be used for characterization. *Note*: if areas of elevated activity are observed, a modification to this TSP will be prepared for the performance of characterization surveys and possible remedial action.	Limits on decision errors are set at 5 percent, unless double sampling is determined to be necessary, when the alpha error is reduced to 2.5 percent, as specified in the Base-wide Plan Revision 1.	Operational details for the radiological survey process have been developed. The theoretical assumptions are based on guidelines contained in MARSSIM. Specific assumptions regarding types of radiation measurements, instrument detection capabilities, quantities and locations of data to be collected, and investigation levels are contained in this TSP and the Base-wide Plan Revision 1.

Abbreviations and Acronyms:

^{137}Cs – cesium-137
^{226}Ra – radium-226
^{90}Sr – strontium-90
MARSSIM – Multi-Agency Radiation Survey and Site Investigation Manual
TSP – Task-specific Plan

TABLE 6-2

DEFINABLE FEATURES OF WORK FOR RADIOLOGICAL SURVEYS

ACTIVITY	PREPARATORY (Prior to initiating survey activity)	DONE	INITIAL (At outset of survey activity)	DONE	FOLLOW-UP (Ongoing during survey activity)	DONE
Radiological surveys	• Verify that an approved TSP is in place. • Verify that the remedial Project Manager, the Radiological Site Manager, and Caretaker Site Office are notified about mobilization. • Verify that an approved RWP is available and has been read and signed by assigned personnel. • Verify that Base-wide Plan, BHASP, TSP, and AHAs have been reviewed. • Verify that assigned personnel are trained and qualified. • Verify that personnel have been given an emergency notification procedure. • Verify that workers assigned dosimetry have completed NRC Form 4. • Verify that the relevant SOPs and/or manufacturers' instructions are available and have been reviewed for equipment to be used for radiological surveys. • Verify that equipment is on site and is in working order (initial daily check).		• Verify that radiological instruments are as specified in the Base-wide Plan and TSP. • Inspect training records. • Verify that a qualified RCT and SHSS are present at active work areas. • Verify that site activities are being photographed. • Verify that the reference area measurements have been obtained using the procedure described in the Base-wide Plan, which states that the same survey methodology and instruments used to collect the background data will be used to perform measurements within survey units. • Verify that daily checks were performed on all portable survey instruments. • Verify that radiological instrument calibrations and setup are current. • Verify that required dosimetry is being worn. • Verify that field logbooks, proper forms, and chain-of-custody documents are in use. • Verify that samples and measurements are being collected in accordance with the TSP, the Base-wide Plan, and relevant SOPs. • Verify that sample handling and analyses are in accordance with the Base-wide Plan and applicable SOPs.		• Verify that site is properly posted and secured, if necessary. • Conduct ongoing inspection of material and equipment. • Verify that a qualified RCT and SHSS are present at active work areas. • Verify that daily instrument checks and background measurements were obtained and documented. • Verify that survey and sample analysis results are documented. • Verify that personnel have read and signed revised RWP, if revision is required. • Inspect sample chain-of-custody and survey log for completeness. • Verify that survey and analytical activities conform to the TSP. • Verify that survey instruments are recalibrated after repairs or modifications. • Verify that site activities are being photographed. • Verify that survey documentation is reviewed by the RTS.	

TABLE 6-2

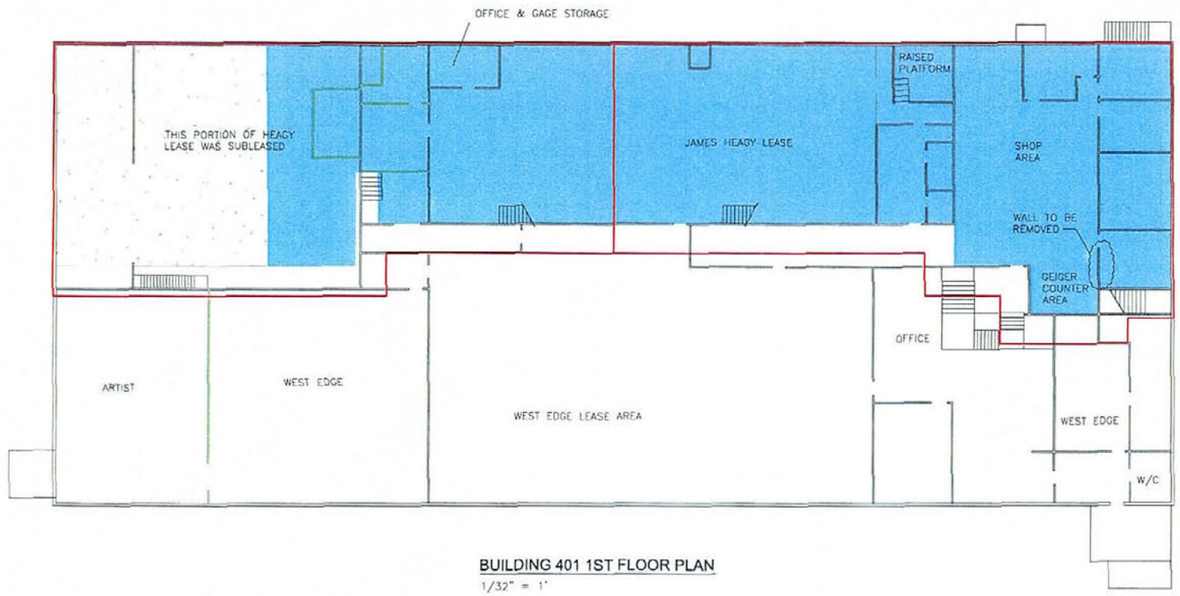
DEFINABLE FEATURES OF WORK FOR RADIOLOGICAL SURVEYS

Abbreviations and Acronyms:

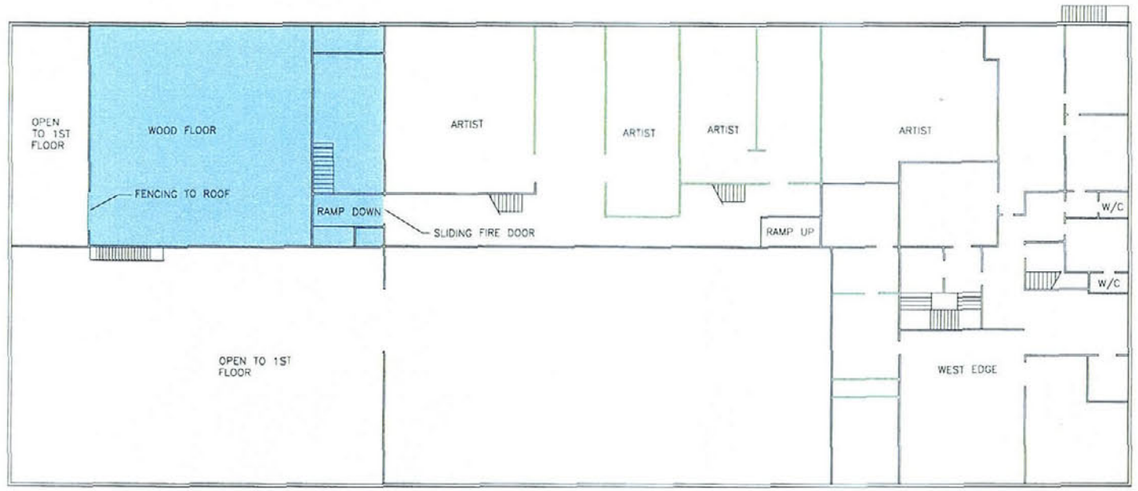
AHA – Activity Hazard Analysis
BHASP – Building-specific Health and Safety Plan
NRC – Nuclear Regulatory Commission
RCT – Radiological Control Technician
RTS – Radiological Task Supervisor
RWP – Radiation Work Permit
SHSS – Site Health and Safety Specialist
SOP – Standard Operating Procedure
TSP – Task-specific Plan

APPENDIX A

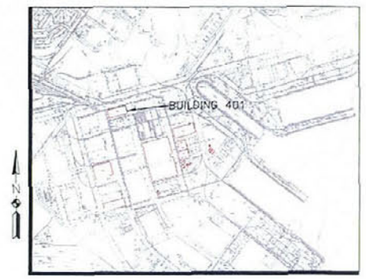
FIGURES FOR BUILDING 401 SURVEYS



BUILDING 401 1ST FLOOR PLAN
1/32" = 1'



BUILDING 401 2ND FLOOR PLAN
1/32" = 1'



KEY PLAN

LEGEND

- CONCRETE FLOOR
- TILE FLOOR
- WOOD FLOOR
- CLASS 2 BOUNDARY — — —

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CA
P.O. BOX 884836, SAN FRANCISCO, CA 94188

TETRA TECH EC, INC
1230 COLUMBIA STREET, SUITE 750
SAN DIEGO, CA 92101
TEL: (619) 234-8890 FAX: (619) 234-8591

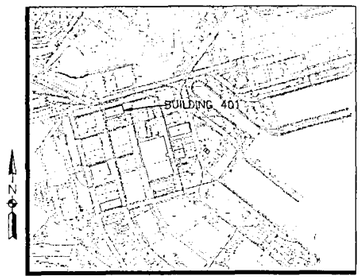
HUNTERS POINT SHIPYARD
PARCEL D
BUILDING 401
PLAN VIEWS

DRAWING NO.
BUILDING 401

SHEET: 1 or 1

REVISION:

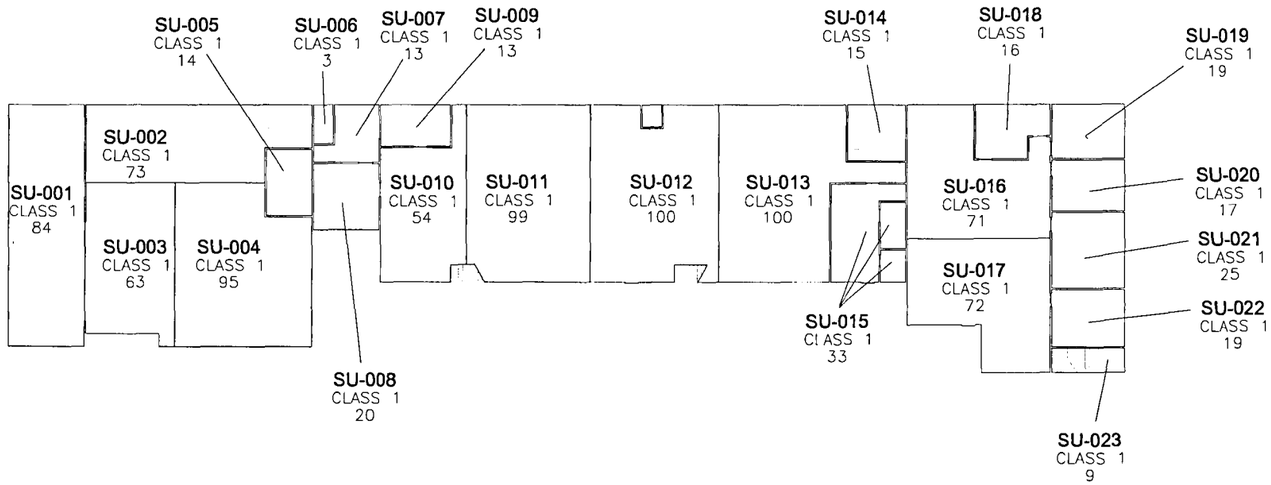
05-07-08



KEY PLAN

LEGEND

SU-002 — SURVEY UNIT NUMBER
CLASS 1 — SURVEY CLASSIFICATION
84 — AREA IN m^2



1ST FLOOR CLASS 1 SURVEY
1/8" = 1'

05-07-08

\\EGISFOFILE1\PROJECTS\CTO-72X CAD FILES\BUILDING 401\DWG FILES\BUILDING 401.DWG
PLOT/UPDATE: MAY 07 2008 10:35:37

RESPONSIBLE ENGINEER:
DRAWN BY: A. PAWLOWSKI
CHECKED BY:
PROJECT ENGINEER:
DCN:
DESIGN FILE NO:
BUILDING #/DWG:
SCALE: AS SHOWN
SHEET SIZE: A1

REV NO	DESCRIPTION	DATE	APPRV

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CA
P.O. BOX 884836, SAN FRANCISCO, CA 94188

TETRA TECH EC, INC
1230 COLUMBIA STREET, SUITE 750
SAN DIEGO, CA 92101
TEL: (619) 234-8690 FAX: (619) 234-8591

HUNTERS POINT SHIPYARD
PARCEL D
BUILDING 401
FIRST FLOOR SURVEY UNIT KEY PLAN

DRAWING NO.
BUILDING 401

SHEET: 1 OF 4
REVISION:

LEGEND

WALL OF SURVEY UNIT

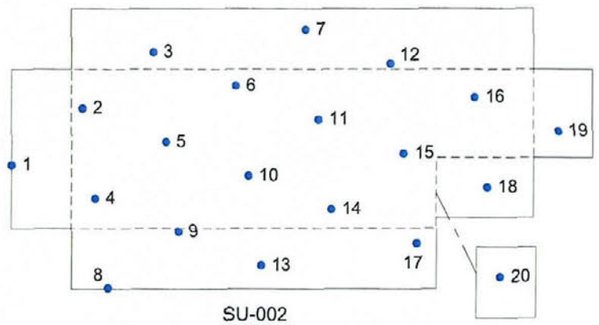
18 SURVEY POINT LOCATION/NUMBER

BOTTOM OF SURVEY UNIT

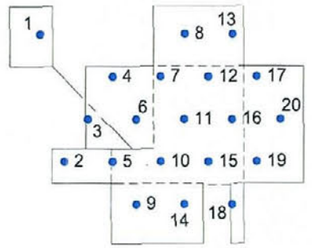
SU-002 SURVEY UNIT NUMBER

CLASS 1 SURVEY CLASSIFICATION

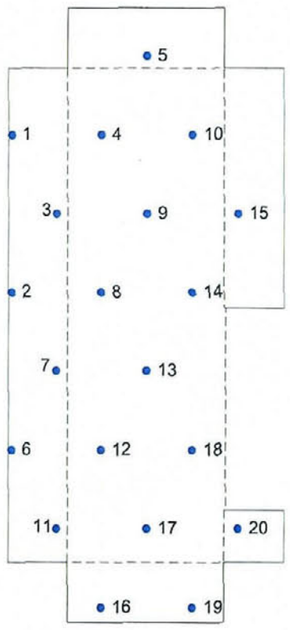
84 AREA IN m^2



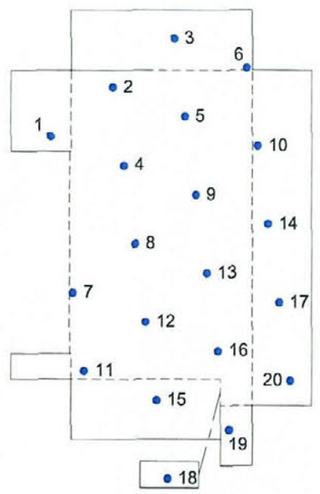
SU-002
CLASS 1
73



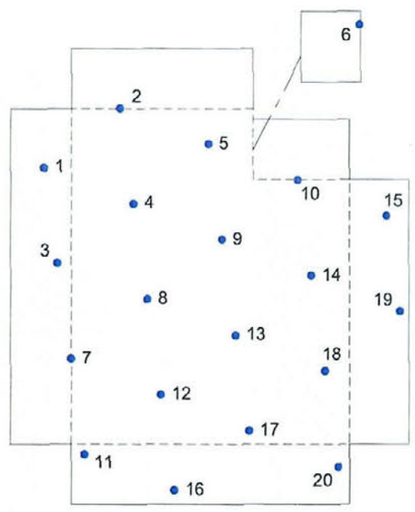
SU-007
CLASS 1
13



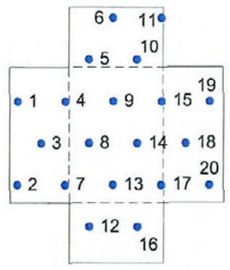
SU-001
CLASS 1
84



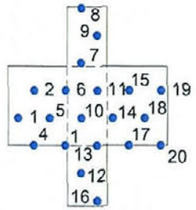
SU-003
CLASS 1
63



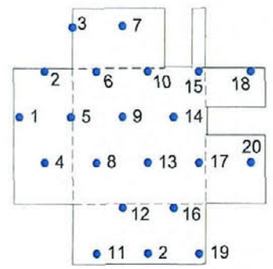
SU-004
CLASS 1
95



SU-005
CLASS 1
14



SU-006
CLASS 1
3



SU-008
CLASS 1
20

1ST FLOOR CLASS 1 SURVEY
1/8" = 1'

05-07-08

\\EDISFILE1\PROJECTS\CTO-72X CAD FILES\BUILDING 401\DWG FILES\BUILDING 401.DWG
PLOT/UPDATE: MAY 07 2008 10:35:37

HUNTERS POINT SHIPYARD
PARCEL D
BUILDING 401
FIRST FLOOR CLASS 1 SURVEY UNITS

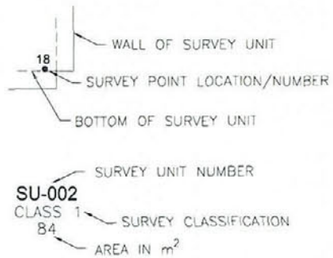
RESPONSIBLE ENGINEER
DRAWN BY
K. CAMBRE
CHECKED BY
PROJECT ENGINEER
DCM
DESIGN FILE NO.
Building 401.DWG
SCALE: AS SHOWN
Sheet SIZE: A1
REV NO
DESCRIPTION
DATE
APPV

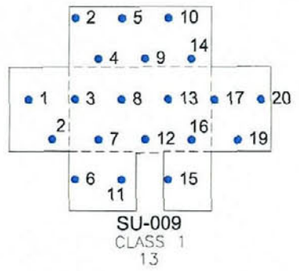
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CA
P.O. BOX 884536, SAN FRANCISCO, CA 94188

TETRA TECH EC, INC
1230 COLUMBIA STREET SUITE 750
SAN DIEGO, CA 92101
TEL: (619) 234-8590 FAX: (619) 234-8591

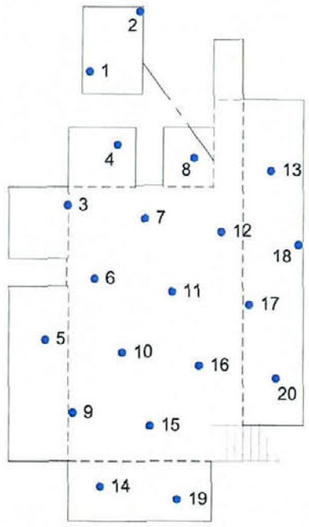
DRAWING NO.
BUILDING 401

SHEET: 2 of 4
REVISION:

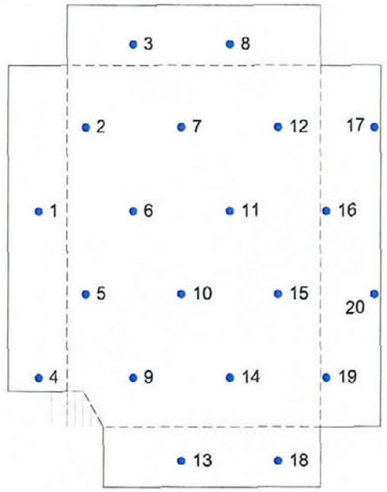




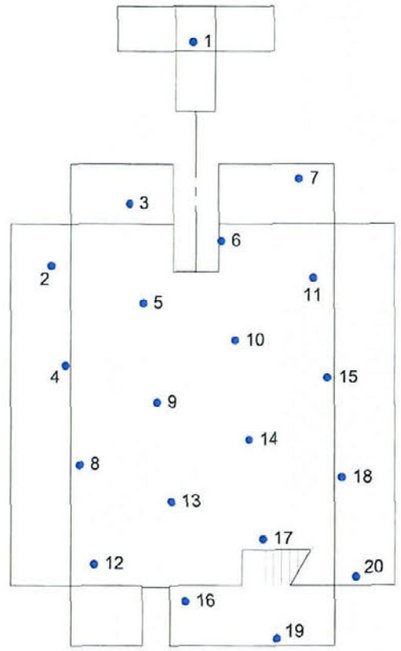
SU-009
CLASS 1
13



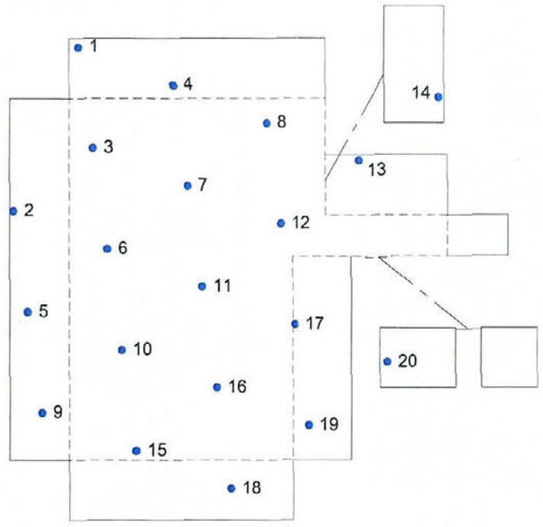
SU-010
CLASS 1
54



SU-011
CLASS 1
99



SU-012
CLASS 1
100



SU-013
CLASS 1
100

1ST FLOOR CLASS 1 SURVEY
1/8" = 1'

05-07-08

\\EOSFOFILE1\PROJECTS\CTG-72X CAD FILES\BUILDING 401\DWG FILES\BUILDING 401.DWG
PLOT/UPDATE: MAY 07 2008 10:35:37

RESPONSIBLE ENGINEER
DRAWN BY
A. CRESPEE
CHECKED BY
PROJECT ENGINEER
DCN:
DESIGN FILE NO.
BUILDING 401.DWG
SCALE AS SHOWN
SHEET SIZE A1

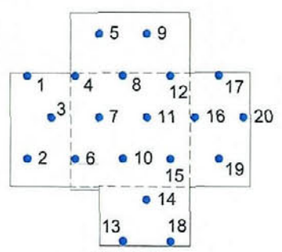
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CA
P.O. BOX 884836, SAN FRANCISCO, CA 94188

TETRA TECH EC, INC
1230 COLUMBIA STREET, SUITE 750
SAN DIEGO, CA 92101
TEL: (619) 234-8890 FAX: (619) 234-8591

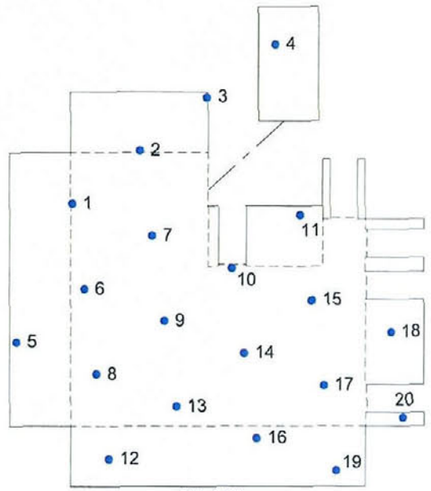
HUNTERS POINT SHIPYARD
PARCEL D
BUILDING 401
FIRST FLOOR CLASS 1 SURVEY UNITS

DRAWING NO.
BUILDING 401

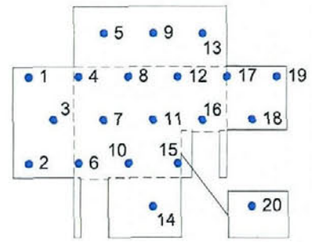
SHEET: 3 of 4
REVISION:



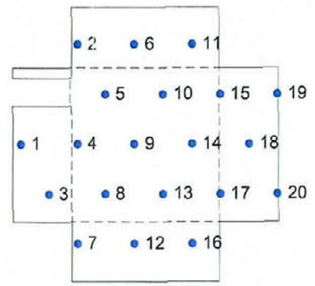
SU-014
CLASS 1
15



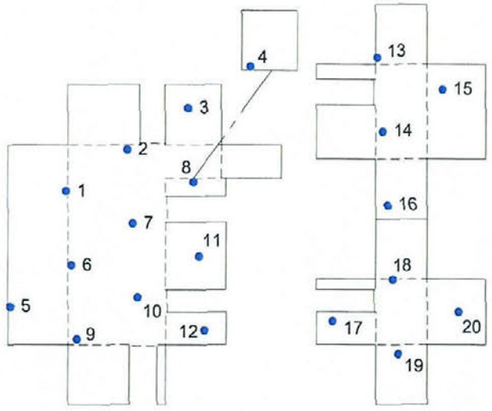
SU-016
CLASS 1
71



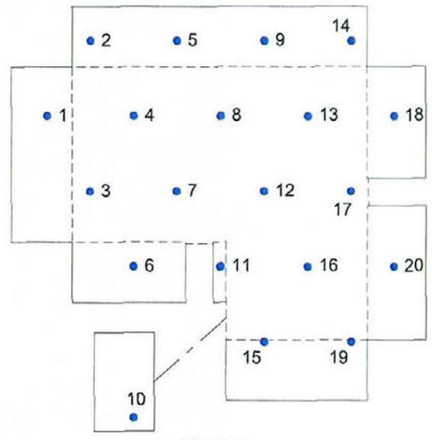
SU-018
CLASS 1
16



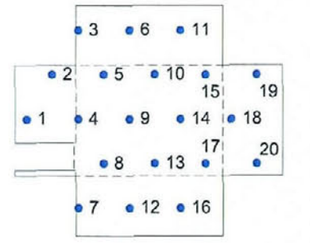
SU-021
CLASS 1
25



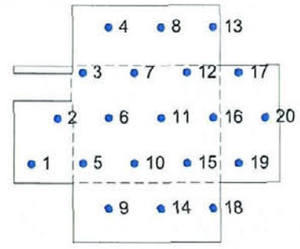
SU-015
CLASS 1
33



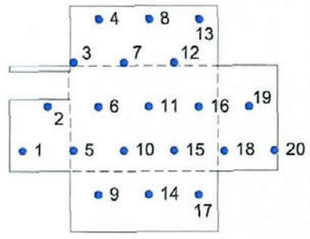
SU-017
CLASS 1
72



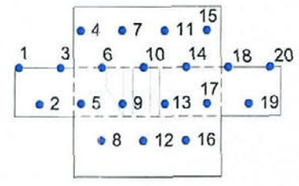
SU-019
CLASS 1
19



SU-022
CLASS 1
19



SU-020
CLASS 1
17



SU-023
CLASS 1
9

1ST FLOOR CLASS 1 SURVEY
1/8" = 1'

LEGEND

18 — SURVEY POINT LOCATION/NUMBER
WALL OF SURVEY UNIT
BOTTOM OF SURVEY UNIT

SU-002 — SURVEY UNIT NUMBER
CLASS 1 — SURVEY CLASSIFICATION
84 — AREA IN m^2

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CA
P.O. BOX 884836, SAN FRANCISCO, CA 94188

TETRA TECH EC, INC
1230 COLUMBIA STREET, SUITE 750
SAN DIEGO, CA 92101
TEL: (619) 234-8890 FAX: (619) 234-8591

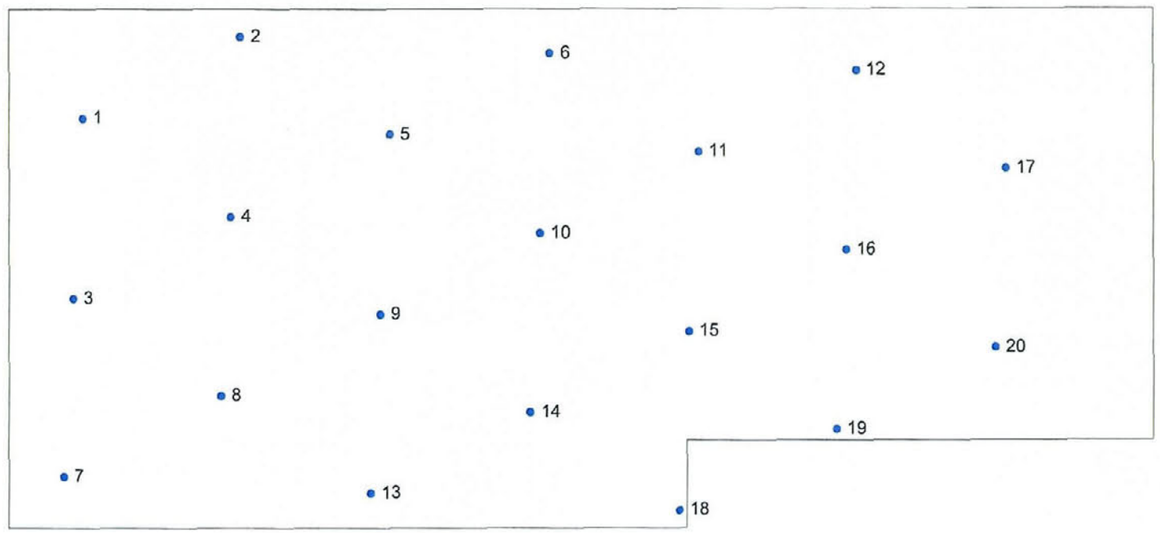
HUNTERS POINT SHIPYARD
PARCEL D
BUILDING 401
FIRST FLOOR CLASS 1 SURVEY UNITS

DRAWING NO.
BUILDING 401

SHEET: 4 of 4
REVISION:

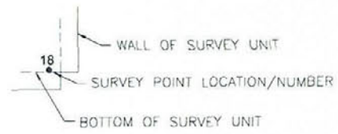
05-07-08

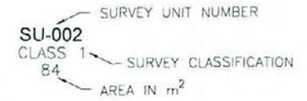
\\EGISFORLEY\PROJECTS\C10-72X CAD FILES\BUILDING 401\DWG FILES\BUILDING 401.DWG
PLOT/UPDATE: MAY 07 2008 10:35:37

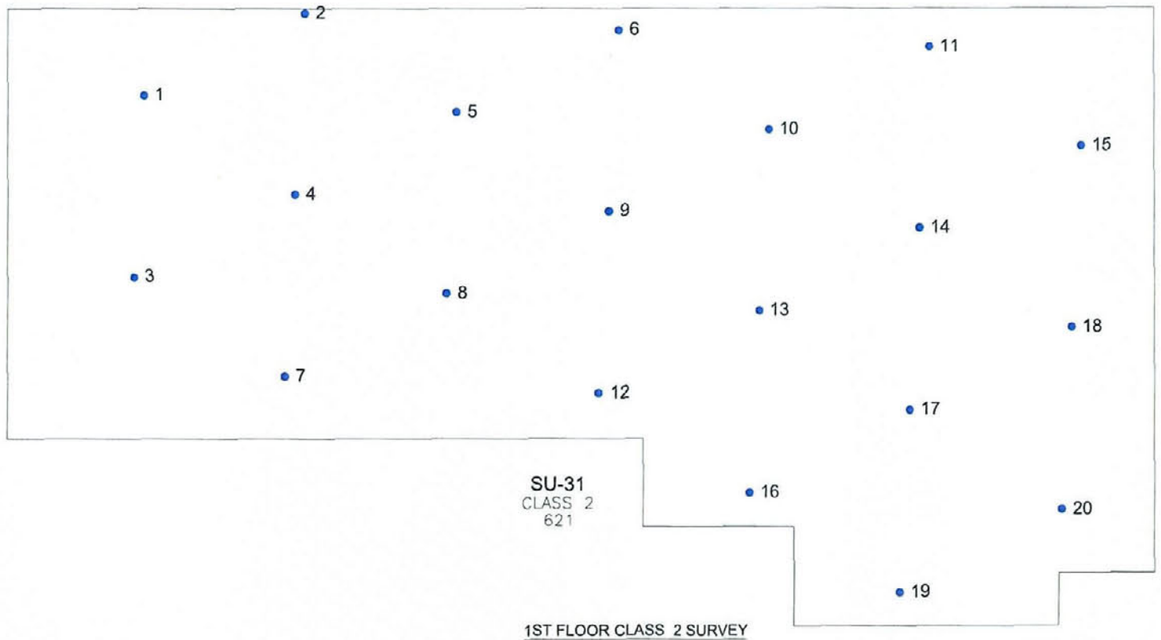


SU-30
CLASS 2
604

LEGEND







SU-31
CLASS 2
621

1ST FLOOR CLASS 2 SURVEY
1/8" = 1'

05-07-08

\\EDSOFILE\PROJECTS\C10-72X CAD FILES\BUILDING 401\DWG FILES\BUILDING 401.DWG
PLOT/UPDATE: MAY 07 2008 10:35:37

RESPONSIBLE ENGINEER
DRAWN BY
A. CRABTREE
CHECKED BY
PROJECT ENGINEER
DCN
DESIGN FILE NO.
BUILDING 401.DWG
SCALE: AS SHOWN
SHEET SIZE: A1

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CA
P.O. BOX 884536, SAN FRANCISCO, CA 94188

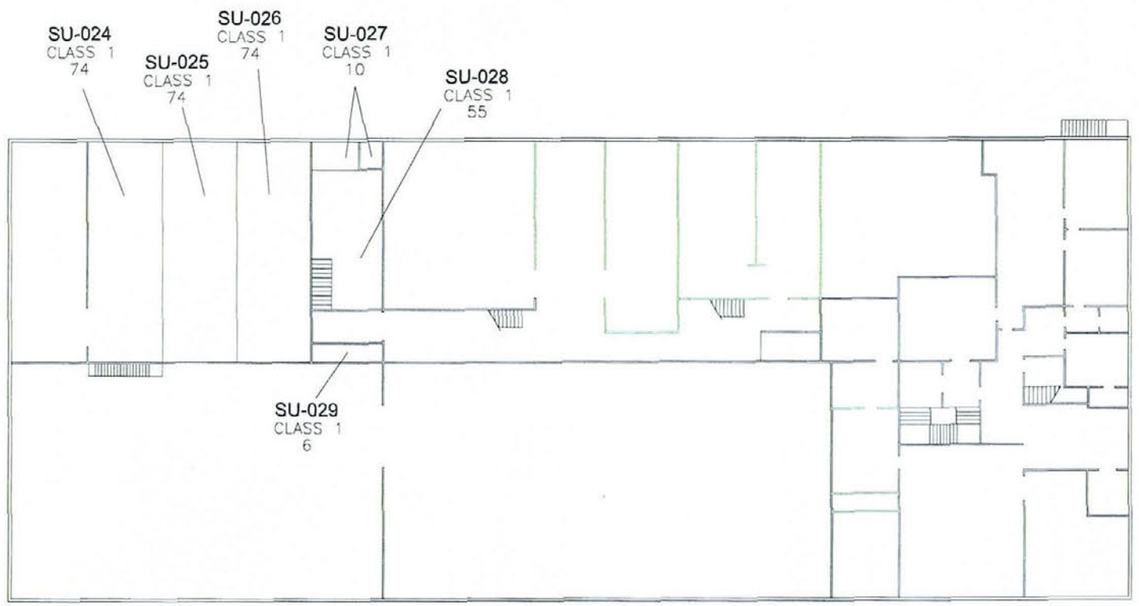
TETRA TECH EC, INC
1230 COLUMBIA STREET, SUITE 750
SAN DIEGO, CA 92101
TEL: (619) 234-8890 FAX: (619) 234-8591

BY | DATE | DESCRIPTION | NO.

HUNTERS POINT SHIPYARD
PARCEL D
BUILDING 401
FIRST FLOOR CLASS 2 SURVEY UNITS

DRAWING NO.
BUILDING 401

SHEET: 1 OF 1
REVISION:



2ND FLOOR CLASS 1 SURVEY
1/32" = 1'

05-07-08

\\CDSOFILE1\PROJECTS\CTO-72X CAD FILES\BUILDING 401\DWG FILES\BUILDING 401.DWG
PLOT/UPDATE: MAY 07 2008 10:35:37

RESPONSIBLE ENGINEER
DRAWN BY
A. CRABTREE
CHECKED BY
PROJECT ENGINEER
BCK

NO	DESCRIPTION	DATE	APPR
BY			

DESIGN FILE NO.
BUILDING 401.DWG
SCALE AS SHOWN
SHEET SIZE A1

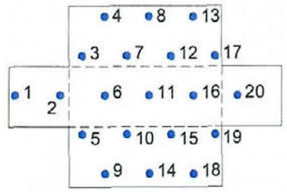
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CA
P.O. BOX 884836, SAN FRANCISCO, CA 94188

TETRA TECH EC, INC
1230 COLUMBIA STREET, SUITE 750
SAN DIEGO, CA 92101
TEL: (619) 234-8890 FAX: (619) 234-8591

HUNTERS POINT SHIPYARD
PARCEL D
BUILDING 401
SECOND FLOOR CLASS 1 SURVEY UNITS

DRAWING NO.
BUILDING 401

SHEET: 1 of 2
REVISION:

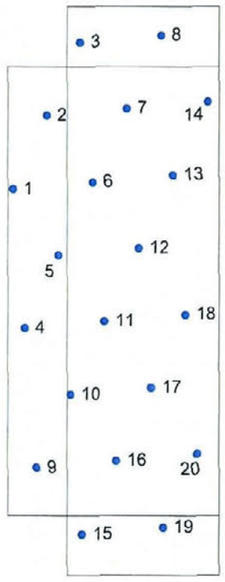


SU-027
CLASS 1
10

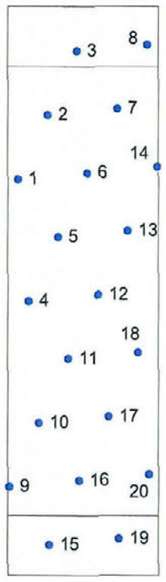
LEGEND

SU-002
CLASS 1
84

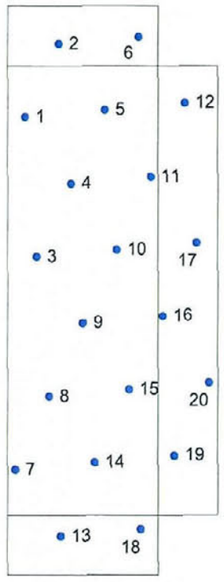
SURVEY UNIT NUMBER
SURVEY CLASSIFICATION
AREA IN m^2



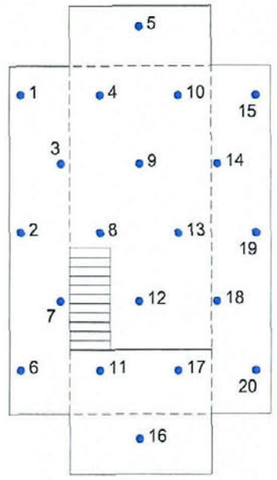
SU-024
CLASS 1
74



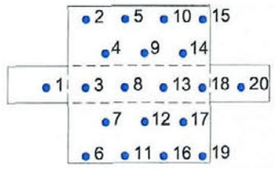
SU-025
CLASS 1
74



SU-026
CLASS 1
74



SU-028
CLASS 1
55



SU-029
CLASS 1
6

2ND FLOOR CLASS 1 SURVEY
1/8" = 1'

\\EGIS\PROFILES\PROJECTS\C10-72X CAD FILES\BUILDING 401\DWG FILES\BUILDING 401.DWG
PLOT/UPDATE: MAY 07 2008 10:35:37

05-01-08

REV NO	DESCRIPTION	DATE	APPV

RESPONSIBLE ENGINEER
DRAWN BY
A. CRUCIBLE
CHECKED BY
PROJECT ENGINEER
REV:
DESIGN F.F. NO:
BUILDING 401.DWG
SCALE: AS SHOWN
SHEET SIZE: A1

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CA
P.O. BOX 884836, SAN FRANCISCO, CA 94188

TETRA TECH EC, INC
1230 COLUMBIA STREET, SUITE 750
SAN DIEGO, CA 92101
TEL: (619) 234-8890 FAX: (619) 234-8591

HUNTERS POINT SHIPYARD
PARCEL D
BUILDING 401
SECOND FLOOR CLASS 1 SURVEY UNITS

DRAWING NO.
BUILDING 401

SHEET: 2 of 2
REVISION: