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FINAL TASK SPECIFIC PLAN BUILDING 175 SCOPING SURVEY NAS WILLOW GROVE PA
10/01/2014
TETRA TECH INC

Final

Task Specific Plan
Building 175
Scoping Survey

Naval Air Station Joint Reserve Base
Willow Grove
Horsham, Pennsylvania

October 2014

Prepared for:
Department of the Navy
Base Realignment and Closure
Program Management Office East
Philadelphia, Pennsylvania

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Prepared under:
Naval Facilities Engineering Command
Contract Number: N62470-08-D-1001
Task Order: WE42

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FINAL

TASK SPECIFIC PLAN
BUILDING 175
SCOPING SURVEY

NAVAL AIR STATION JOINT RESERVE BASE
WILLOW GROVE
HORSHAM, PENNSYLVANIA

October 2014

Contract Task Order WE42

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REVIEW AND APPROVAL

Lawson Bailey
Project Manager

BRAC Environmental Coordinator

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α	Alpha
β	Beta
ε_i	Instrument efficiency
ε_s	Contaminated surface efficiency
B	Background count rate
b_i	Number of background counts in scan time interval
d'	Index of sensitivity
E	Detector efficiency
G	Source activity
i	Scan or observation interval
ρ or P	Probability
p	Surveyor efficiency factor
R_B	Background count rate
t	Time interval of detector over source
T_B	Background counting time
T_{S+B}	Sample counting time
W_A	Area of the detector window
$Z_{1-\alpha}$	Type I decision error level
$Z_{1-\beta}$	Type II decision error level
ASW	Anti-Submarine Warfare
cm	Centimeter
cm2	Square centimeter
cm/sec	Centimeter per second
cpm	Count per minute
dpm	Disintegration per minute
DFW	Definable features of work
DU	Depleted Uranium
ft^2	Square feet
HASP	Health and Safety Plan
HRA	Historical Radiological Assessment
inch/sec	Inch per second
JRB	Joint Reserve Base
LBGR	Lower bound of the gray region

MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum detectable concentration
MDCR	Minimum detectable count rate
min	Minute
N	Number of data points
NAS	Naval Air Station
NRC	Nuclear Regulatory Commission
Pa-234m	Protactinium 234 metastable
PSPC	Position sensitive proportional counter
RASO	Radiological Affairs Support Office
ROC	Radionuclides of concern
SCM	Surface contamination monitor
sec	Second
SIMS	Survey Information Management System
SOP	Standard operating procedure
Sr-90	Strontium 90
Th-234	Thorium 234
TSP	Task specific plan
U-238	Uranium 238
VP	Patrol Squadron

1.0 INTRODUCTION

This task specific plan (TSP) provides task-specific details for the scoping survey at Building 175 at the Willow Grove Naval Air Station (NAS) Joint Reserve Base (JRB) in Horsham, Pennsylvania. The survey will be conducted in accordance with the general approach and methodologies that are given in the Basewide Radiological Management Plan at Naval Air Station Joint Reserve Base, Willow Grove (TetraTech 2014a) and standard operating procedures (SOP). The surveys will conform to the requirements of the Health and Safety Plan (HASP) Naval Air Station Joint Reserve Base, Willow Grove (TetraTech 2014b) prepared for the survey program. No exceptions to the Management Plan, SOPs, and HASP are noted.

1.1 SITE DESCRIPTION AND HISTORICAL SUMMARY

Building 175 is a 323,300-square-foot hangar built in 1975 to house the VP/VR ASW Patrol Squadrons. As the largest hangar at NAS JRB Willow Grove, the steel-clad building is over 500 feet long with a suspended roof and a long concrete block section extending across the rear. The concrete block section served as administrative and shop areas for the squadrons that occupied the building. Drawings from 1975 and 1994 for this building show the operational portions of the building to be airframes, aviator equipment, electrical instrumentation, electronics, and armament work areas. A 2001 survey found no radon in this building, but a 1996 survey did find asbestos.

As stated in Section 6.1 of the HRA (TetraTech 2013), Building 175 originally housed ASW Patrol Squadrons (VP Squadrons). Work centers housed in this hangar included: Survival Equipment Shop; Avionics Shop; Ordnance Shop; and Flightline Shop. Many types of aircraft have components containing radioactive material as discussed in Chapter 6 of the HRA (TetraTech 2013). Aircraft that were potentially housed and repaired in this building between 1977 and 2011 and their associated radioisotopes are listed in Table 6-1 of the HRA (TetraTech 2013). Expected areas for the use of radioactive materials include the hangar bay and electronics maintenance areas, rooms 134, 135, 144 and 145. These areas are considered impacted. Examples of radioactive materials possibly used in this building are depleted uranium (DU) counterweights, ice detector probes, and engine ignition exciters. The specific radionuclides of concern (ROC) identified in the Historical Radiological Assessment (HRA) (TetraTech 2013) are strontium 90 (Sr-90) and uranium 238 (U-238). Figure 1 provides the location of Building 175 on the NAS JRB Willow Grove site.

2.0 SURVEY DESCRIPTION

This survey is being performed to assess if residual activity is above the established release criteria, as defined in Table 6-1 of the Management Plan (TetraTech 2014a). Surveys of the facility will be performed to determine the existence of radionuclides associated with the use or maintenance of DU counterweights and ice detector probes and engine exciters. Surveys will be performed for the presence of Sr-90 and DU, which consists of uranium 238 (U-238) and short lived progeny.

DU consists of U-238 and short lived progeny thorium 234 (Th-234) and protactinium 234m (Pa-234m). Although U-238 decays by alpha emission, both Th-234 and Pa-234m decay by beta emission. Since both Th-230 and Pa-234m are short lived, the three isotopes are in secular equilibrium. Therefore, measuring the beta emission from a surface can determine the U-238 contamination level. In fact, the preferred method of determining the presence of DU on surfaces is through the use of beta scans and direct measurements.

Pa-234m emits a high energy beta similar to the beta emitted during the decay of Sr-90. The Th-234 beta energy is low compared to the second beta emitted during the decay of Sr-90. The resultant efficiency of any gas flow proportional counter to counting betas emitted by the decay of DU will be slightly more than 50% of the efficiency from the decay of Sr-90. Since the ratio of the release criteria of U-238 to Sr-90 as identified in Section 2.2, is 5 to 1, a single beta survey to determine compliance with the Sr-90 release criteria will show compliance with the U-238 criteria as well. Areas that exceed the release criteria for Sr-90 will be investigated.

Swipe surveys will be obtained at predetermined locations. Swipes will be analyzed onsite for both alpha and beta emitting radionuclides.

Gamma walkover surveys will be performed in accordance with SUR-022, Gamma Walkover Surveys in each survey unit to provide additional assurance that no hidden sources of radioactivity exist in the survey unit area.

2.1 SURVEY PREPARATION ACTIVITIES

Areas within Building 175 that have flooring material that has been installed since the possible use of radioactive materials will have the flooring removed to expose the concrete surface to conduct the required scan and fixed measurement surveys. Materials containing asbestos will be removed by a certified asbestos abatement contractor. Materials (tile, carpet, cabinets, shelving) will be surveyed for release in accordance with SOP-012, *Release of Materials and Equipment.* Materials with radioactivity above the limits specified in Table 6-1 of the Management Plan will be packaged for storage and subsequent disposal. Materials that cannot be surveyed due to physical size or porosity will be randomly checked for radioactivity and maintained on site until completion of the building survey. If the Building 175 scoping survey and the random surveying of the material do not identify any radioactivity above background, the material will be disposed of as non-radioactive waste.

Interior walls in Building 175 will not be included in the areas to be surveyed. Building 175 will be surveyed as a Class 3 area. Class 3 areas are not expected to contain residual radioactivity. However, due to the nature of the materials containing radioactivity used, maintained or stored in the impacted areas, the higher probability of residual radioactivity is on the floor surfaces. If any radioactivity greater than the release criteria is detected, reclassification of the area will be evaluated and the wall surfaces will be considered.

Survey area preparation activities will be performed under radiological controls established in the SOPs. A listing of applicable SOPs for both preparation and survey activities is provided in Table 1. Surveys conducted in support of area preparation activities can provide input into final reports, but will not be used to demonstrate compliance with the release criteria or determination for additional survey requirements.

2.2 RELEASE CRITERIA

The building surface release criteria for U-238 is 5,000 disintegrations per minute (dpm) per 100 square centimeters (cm^2) total activity, and for Sr-90 it is 1,000 dpm/100 cm^2 (TetraTech 2014a). The removable contamination release criteria is one-fifth of the total activity limits (200 dpm/100 cm^2). (TetraTech 2014a). The limits for the specific radionuclides to be addressed in Building 175 are provided in Table 2. Beta surveys will be performed to meet the criteria for Sr-90. Meeting the release criteria for Sr-90 assures that the release criteria for U-238 is met.

2.3 REFERENCE AREA

The reference area will be selected with the concurrence of Navy Radiological Affairs Support Office (RASO). The reference areas for the Building 175 survey will consist of concrete floors and the reference materials will be identified in on-site buildings that have no history of containing radioactive material. The reference area survey data will be obtained prior to final recording of surveys within Building 175 and will be included in the Building 175 survey report.

2.4 INVESTIGATION LEVELS

Investigation levels for the beta surveys will be equal to the release criteria for Sr-90 defined in Section 2.2, the more restrictive isotope of concern in each area to be surveyed. Investigations of beta surveys may consist of resurveys with longer count times, determination of background adequacy or other means to determine if compliance with release criteria is achieved.

For gamma walkover surveys, areas exceeding 3 sigma (3σ) above the mean of the survey unit will be investigated. Gamma walkover survey investigations will consist of resurveys of the area in which the high reading was obtained to determine the source of the elevated reading or if the reading was a statistical anomaly since approximately 1 percent of all readings will exceed the 3σ value.

2.5 SURVEY UNITS AND CLASSIFICATION

Building 175 will be surveyed as Class 3, requiring a 25 percent survey of floor (TetraTech 2014a). The total floor area of the impacted area of the building is 87,030 square feet or 8,095.8 square meters. The building will be surveyed as 12 survey units. The hangar bay will be divided into 8 survey units, and each of the 4 impacted rooms (rooms 134, 135, 144, and 145) will be a survey unit. A layout drawing indicating building dimensions and survey unit locations is provided as Figure 2. Using a random start point, systematic data collection locations (N) will be

laid out in a triangular grid pattern for each of the survey units using the computer process provided by Visual Sample Plan (DOE 2014). In some cases, the number of data collection locations may exceed N based on the random location of the start point. Locations for data collection are provided in Figures 3 through 14. Additional biased surveys may be performed and samples may be collected at accessible points of ventilation systems and drain entrances within the building.

2.6 ESTABLISHING THE NUMBER OF MEASUREMENTS

To determine the number of measurements, N, to be taken per survey unit when the contaminant is not present in background, Equation 5-3 of the Management Plan (TetraTech 2014a) is used:

$$N = \left(\frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(Sign\rho - 0.5)^2} \right)(1.2)$$

Where:

N = Number of data points

$Z_{1-\alpha}$ = Type I decision error level, 1.645

$Z_{1-\beta}$ = Type II decision error level, 1.645

Sign ρ = random measurement probability, 0.945201

1.2 = 20 percent increase in number of samples over the minimum

The values used in the calculation are from Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance (Nuclear Regulatory Commission [NRC] 2000) and are based on a recommended value for the relative shift (Δ/σ) of 1.6 as discussed in Section 5.5.2.2 of MARSSIM (NRC 2000). Type I and Type II decision errors are based on 0.05 false negative and 0.05 false positive rates. The associated Z values are obtained from MARSSIM Table 5.2 (NRC 2000). The random measurement probability, Sign ρ, is from MARSSIM Table 5.4 (NRC 2000).

Using the defined values, the equation becomes:

$$N = \left(\frac{(1.645 + 1.645)^2}{4(0.945201 - 0.5)^2} \right)(1.2)$$

The calculation results in a value of N = 16.38328. Therefore, a minimum of 17 measurements will be obtained in each survey unit.

2.7 BETA SCAN MEASUREMENTS

Scan measurements are performed to identify elevated areas of radioactivity within the survey unit. Based on the identified ROCs, the survey units within Building 175 will be surveyed for beta activity. All scan surveys will be performed using the SCM. SCM scan surveys will be conducted in the dynamic, or "rolling" mode. Beta scan measurements are discussed in Section 2.7.1. If adequate area is not available to the SCM in the dynamic mode, surveys may be supplemented by the SCM in the static mode discussed in Section 2.8.1. The SCM utilizes a gas flow position sensitive proportional counter (PSPC). The PSPC functions as any gas flow proportional counter, using P-10 as the counting gas. As in any proportional counter, voltage plateaus are established for the detection of alpha or alpha plus beta particles. High voltage appropriate for the type of particles to be detected is applied to the single anode wire which runs the length of the detector. The SCM computer compares the pulse heights of pulses sensed at each end of the anode wire and establishes the location on the anode wire where the pulsed was sensed. Although the available resolution is greater than 2,000 locations on the anode wire, the SCM computer will "bin" the data in 5 centimeters (cm) wide increments along the length of the wire.

The SCM can be operated in both a dynamic or "rolling" mode or a static or "corner" mode. In the dynamic mode, the system uses a direct current powered drive motor affixed to a cart which contains all electronics and computer hardware, and a detector (or two) is mounted to the front of the cart. The SCM's design focuses on the elimination of human errors associated with performing surveys of large areas. The system is designed such that surveys are performed at constant speed, the detector held at a set distance from the surface being surveyed, and survey data recorded automatically. In the dynamic mode, a precision wheel encoder is mounted to the cart axle to determine distance traveled by the cart. The encoder can measure to a small fraction of a centimeter and is used to trigger the computer to capture data for every 5 cm of travel of the SCM cart. The result is count data (counts) for every 5 cm "bin" for every 5 cm of travel, or a matrix of 25 cm^2 "pixels" of data. In the static mode, a preset time is applied to the collection of data from a stationary detector. Data is binned in a manner similar to the dynamic mode.

Data is transferred from the SCM to a processing station containing the Survey Information Management Systems (SIMS) software via removable media. SIMS software is used to "stitch" the individual strips of data to create a single survey of a survey unit or portion of a survey unit area. The data collected in 25 cm^2 "pixels" is summed with adjacent "pixels" in a manner that will result in the evaluation of every possible 100 cm^2 area. When determining activity, each 25 cm^2 "pixel" is 25 percent of four overlapping 100 cm^2 areas. This process ensures that small areas of activity above limits are not missed through grid registration errors.

2.7.1 Beta Scan Measurements

Beta scan surveys will be performed in Building 175. For these beta surveys, the SCM will be the primary instrument. As stated in Section 2.0, the limiting ROC in the Class 3 area is Sr-90. In the Class 3 area, the SCM will be operated on the alpha plus beta plateau at a target speed of 2 inch/sec (5 cm/sec) with the detector positioned approximately 0.5 inches above the surface being

surveyed. For SCM scans for Sr-90 in Class 3 areas, the MDCR from Equation 7-5 of the Management Plan (TetraTech 2014a) is:

$$MDCR = d'\sqrt{b_i}(\frac{60}{t})$$

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

Therefore:

$$MDCR = 3.28\sqrt{16.67}\left(\frac{60}{2}\right) = 402\ cpm$$

Where: d' = 3.28
b_i = 16.67 counts (based on 500 cpm background and a 2 sec count interval)
i = 2 sec (based on a scan speed of 5 cm/sec and a detector width of 10 cm.)

and the scan MDC from Equation 7-6 of the Management Plan (TetraTech 2014a) is:

$$Scan\ MDC = \frac{MDCR}{\sqrt{\rho} * \varepsilon_i * \varepsilon_s * \frac{W}{100\ cm^2}}$$

Where: MDCR = as discussed above
P = surveyor efficiency factor
ε_i = instrument efficiency
ε_s = surface efficiency
W = Area of the detector window (cm^2) [Defaults to 100 cm^2 for probes greater than 100 cm^2]

Therefore:

$$Scan\ MDC = \frac{402}{\sqrt{1} * 1.04 * .5 * \left(\frac{100}{100}\right)} = 773\ dpm$$

Where: p = 1
ε_i = 1.04
ε_s = 0.5
W_A = 100 cm^2

2.8 STATIC MEASUREMENTS

Beta static measurements will be obtained with both the SCM and the Ludlum 43-68 detector coupled to the Ludlum 2221or 2241 scaler/ratemeter. The SCM static measurements will supplement the surveys performed in the dynamic or rolling mode when the rolling mode cannot get into areas such as on floors against the wall, or on walls where interferences make rolling surveys impractical. The Ludlum 43-68 detector will be used to obtain fixed measurements at the number of locations identified in Section 2.5.

2.8.1 Beta Static Measurements

The MDC for beta static measurements from equation 7-8 of the Basewide Radiological Management Plan (TetraTech 2013) is:

$$MDC = \frac{3 + 3.29\sqrt{R_B T_{S+B}(1 + \frac{T_{S+B}}{T_B})}}{\varepsilon_i \varepsilon_s \frac{W_A}{100\ cm^2} T_{S+B}}$$

Where: R_B = Background count rate (cpm)

T_B = Background counting time (min)

T_{S+B} = Sample counting time (min)

ε_i = Instrument efficiency

ε_s = Surface efficiency

W_A = Active area of the probe window (Defaults to 100 cm^2 for probes greater than 100 cm^2)

Static measurement count times for the beta from the limiting ROC, Sr-90, will be 8 seconds for the SCM and 30 seconds for the Ludlum 43-68 with the 2221 or 2241 scaler/ratemeter. For the SCM surveying for Sr-90, the MDC, equation 7-8 from the Basewide Radiological Management Plan (TetraTech 2014a) becomes:

$$MDC = \frac{3 + 3.29\sqrt{500 * .133 * (1 + \frac{.133}{.133})}}{1.04 * 0.5 * \left(\frac{100}{100}\right) * .133} = 592\ dpm$$

Where: R_b = 500 cpm
T_{s+b} = 8 sec. or .133 min
T_b = 8 sec. or .133 min
ε_i = 1.04
ε_s = 0.5
W_A = 100 cm^2

For the Ludlum 43-68 surveying for Sr-90, the equation becomes:

$$MDC = \frac{3 + 3.29\sqrt{200 * .5 * (1 + \frac{.5}{.5})}}{.52 * .5 * \left(\frac{100}{100}\right) * .5} = 366\ dpm$$

Where: R_b = 200 cpm
T_{s+b} = 30 sec. or 0.5 min
T_b = 30 sec. or 0.5 min
ε_i = 0.52
ε_s = 0.5
W_A = 100 cm^2

2.9 GAMMA WALKOVER SURVEYS

Gamma walkover surveys will be conducted in each survey unit with a "2" by "2" sodium iodide detector and a Ludlum 2241 scaler/ratemeter. Gamma readings will be obtained in accordance with Section 8.2.2 of the Basewide Radiological Management Plan (TetraTech 2014a). Surveys will be conducted in accordance with procedure SUR-022, *Gamma Walkover Surveys.*

2.10 REMOVABLE CONTAMINATION SURVEYS

Prior to the conduct of scanning surveys, removable contamination will be assessed by wiping the survey unit with a Masslin cloth on a suspect area and monitoring the wiped cloth with a Ludlum 43-68 detector coupled to a Ludlum 2221 scaler/ratemeter. Since beta emitting nuclides are of concern, the Masslin cloth will be surveyed by detectors operating on the alpha plus beta plateau. Areas in which the first wipe of the Masslin cloth indicates any increase in activity will be re-wiped with the Masslin cloth to determine the specific area that contains removable contamination. Swipe surveys using disc swipes will be conducted at any area indicating activity above background.

Swipe surveys using disc swipes will also be conducted in at least one location within each 1,000 ft^2 in a Class 3 survey unit, at each floor and sink drain and at each of the systematic data collection locations. All swipe surveys will be counted onsite using a Ludlum 2929 detector

which records both alpha and beta activity simultaneously. Swipe surveys will be performed and documented in accordance with SOP-006, *Radiation and Contamination Surveys*.

2.11 MEDIA SAMPLES

Samples will be collected if sediment is found in sumps, floor drains, and sink drains to support evaluation of compliance with release criteria and to determine specific nuclides as necessary. Sampling may also be performed as an integral part of investigations to determine the cause of elevated measurements. Samples will be collected in accordance with SOP-009, *Sampling Procedures for Radiological Surveys* and submitted to an off-site laboratory for radiological analysis. One sediment sample per drain will be collected if sufficient sediment is present. Analysis of results will be evaluated against soil criteria identified in Table 2.

Media samples will also be obtained at any accessible building outfall locations that would contain liquid runoff from Building 175.

3.0 SITE RESTORATION

Site restoration work is not required at the conclusion of surveying in Building 175.

4.0 BUILDING 175 REPORT

Results of the survey that demonstrate that no single measurement indicating activity greater than the release criteria, and the resultant risk based dose as calculated, will be presented in a survey report. Any conclusion other than a recommendation for unrestricted release will be presented in a Characterization Report.

5.0 QUALITY CONTROL

The data quality objectives for the survey are provided in Table 3.

Definable features of work (DFW) establish the measures required to verify both the quality of work performed and compliance with project requirements. The DFW for this task is radiological surveys. Description of this DFW and the associated phases of quality control are presented in Table 4.

6.0 ENVIRONMENTAL PROTECTION

Environmental protection requirements are addressed in the Management Plan (TetraTech 2014a).

7.0 REFERENCES

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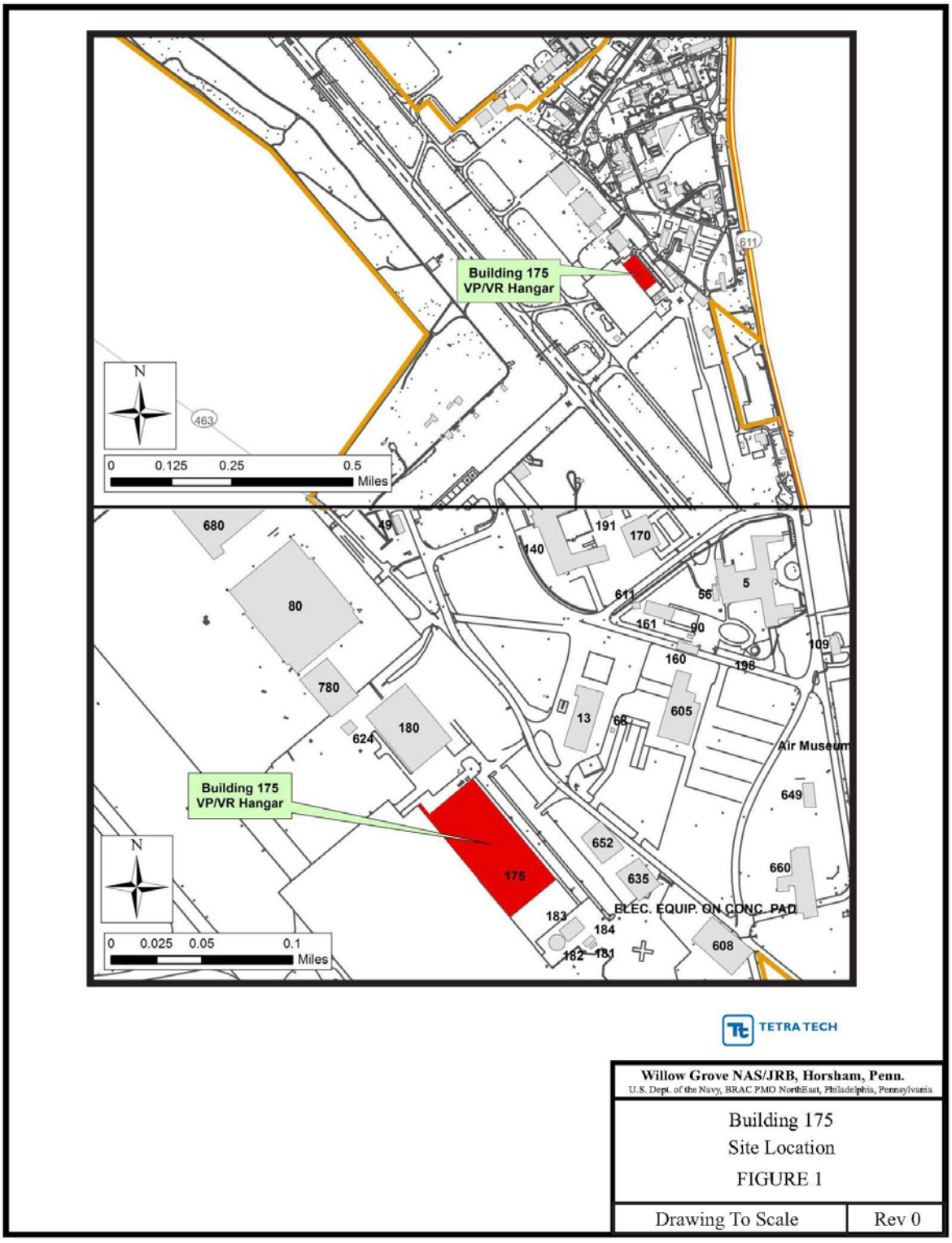
FIGURES


Building 175
VP/VR Hangar
N
463
0 0.125 0.25 0.5
Miles
680
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191
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140
80
611
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5
161
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109
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180
624
Air Museum
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660
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ELEC. EQUIP. ON CONC. PAD
0 0.025 0.05 0.1
Miles
TETRA TECH
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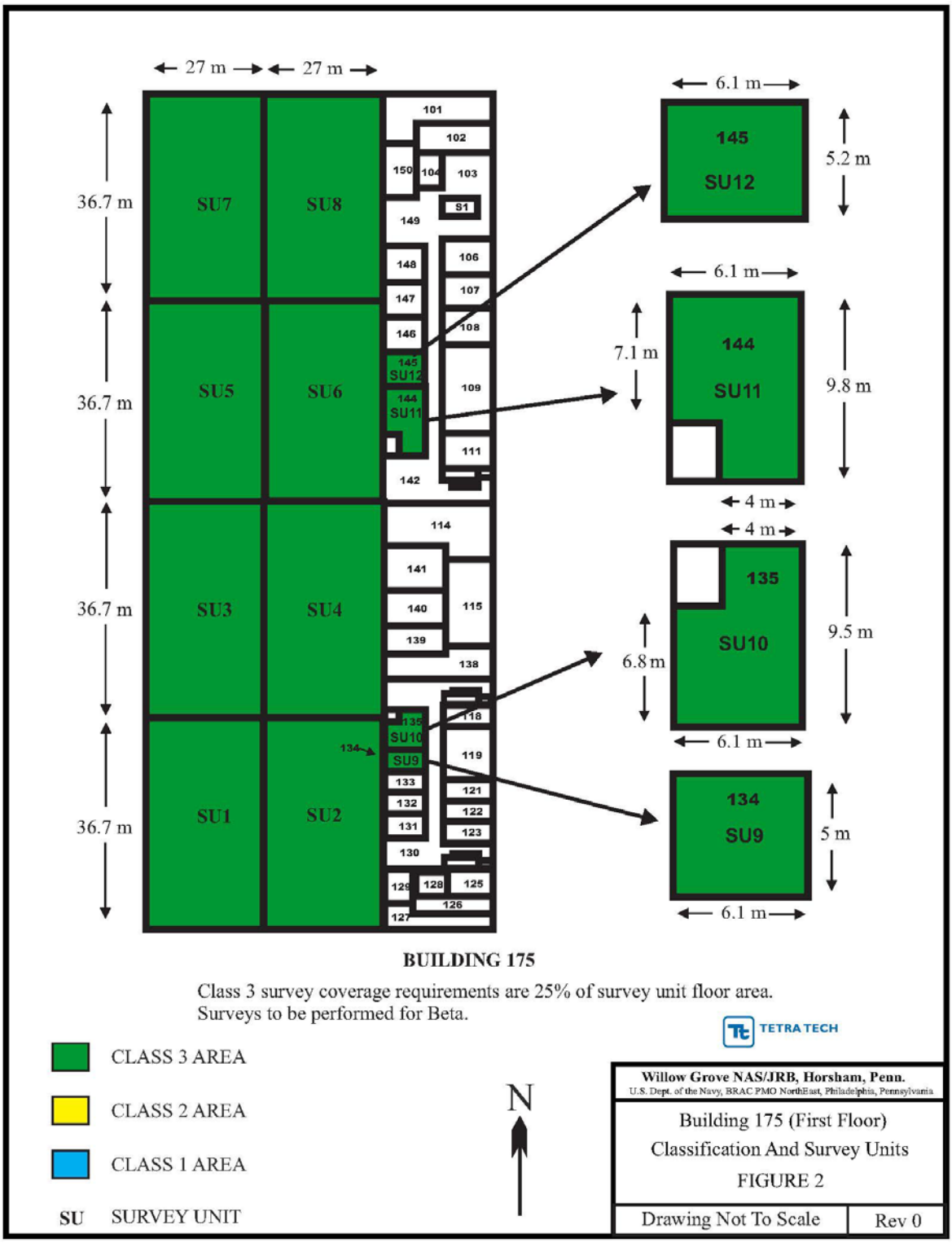
U.S. Dept. of the Navy, BRAC PMO NorthEast, Philadelphia, Pennsylvania
Building 175
Site Location
FIGURE 1
Drawing To Scale
Rev 0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6.1 m
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SU9
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6.1 m
BUILDING 175
Class 3 survey coverage requirements are 25% of survey unit floor area.
Surveys to be performed for Beta.
TETRA TECH
CLASS 3 AREA
CLASS 2 AREA
CLASS 1 AREA
SU SURVEY UNIT
N
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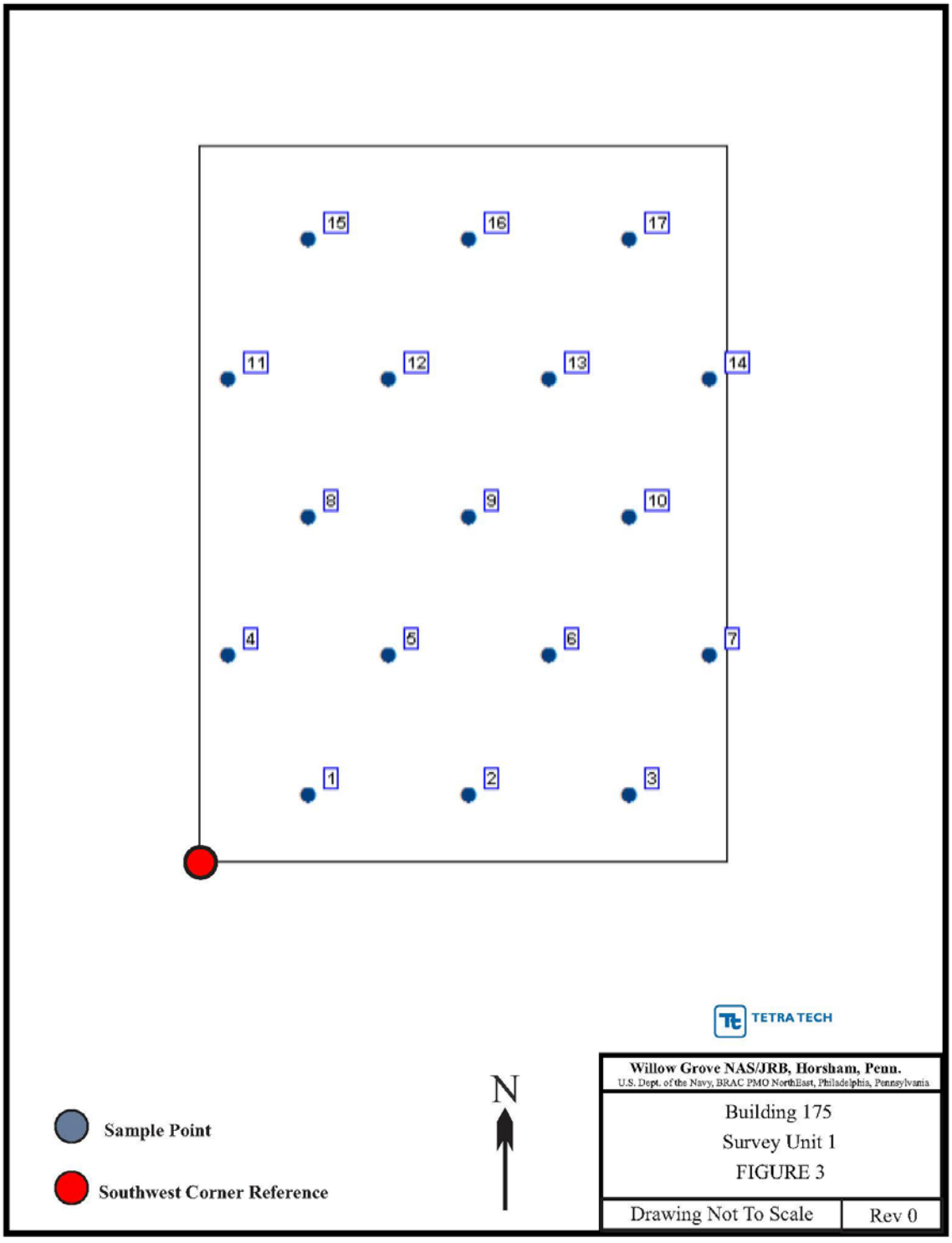
U.S. Dept. of the Navy, BRAC PMO NorthEast, Philadelphia, Pennsylvania
Building 175 (First Floor)
Classification And Survey Units
FIGURE 2
Drawing Not To Scale
Rev 0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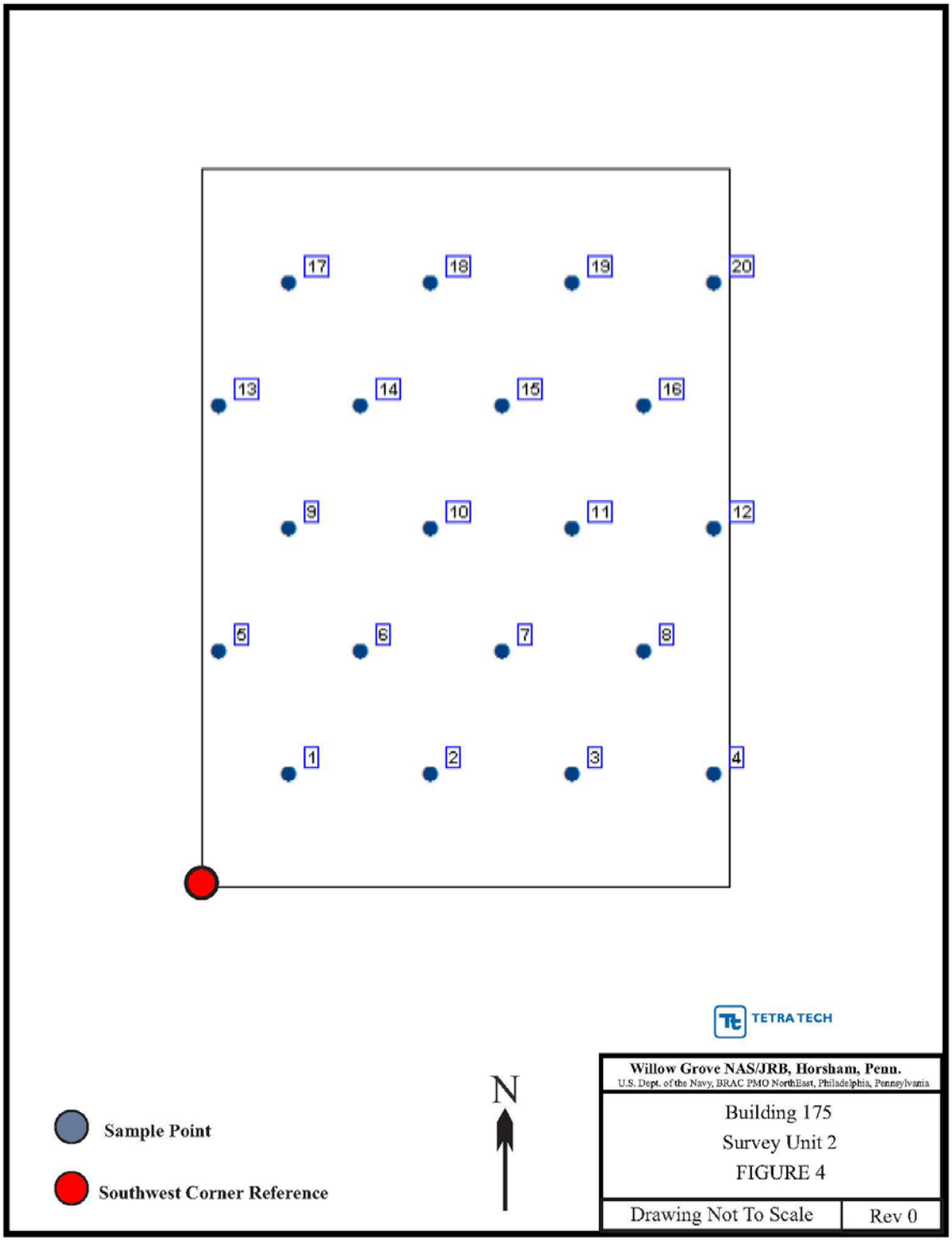
TETRA TECH
Willow Grove NAS/JRB, Horsham, Penn.
U.S. Dept. of the Navy, BRAC PMO NorthEast, Philadelphia, Pennsylvania
Building 175
Survey Unit 1
FIGURE 3
Drawing Not To Scale
Rev 0
N
Sample Point
Southwest Corner Reference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TETRA TECH
Willow Grove NAS/JRB, Horsham, Penn.
U.S. Dept. of the Navy, BRAC PMO NorthEast, Philadelphia, Pennsylvania
Building 175
Survey Unit 2
FIGURE 4
Drawing Not To Scale
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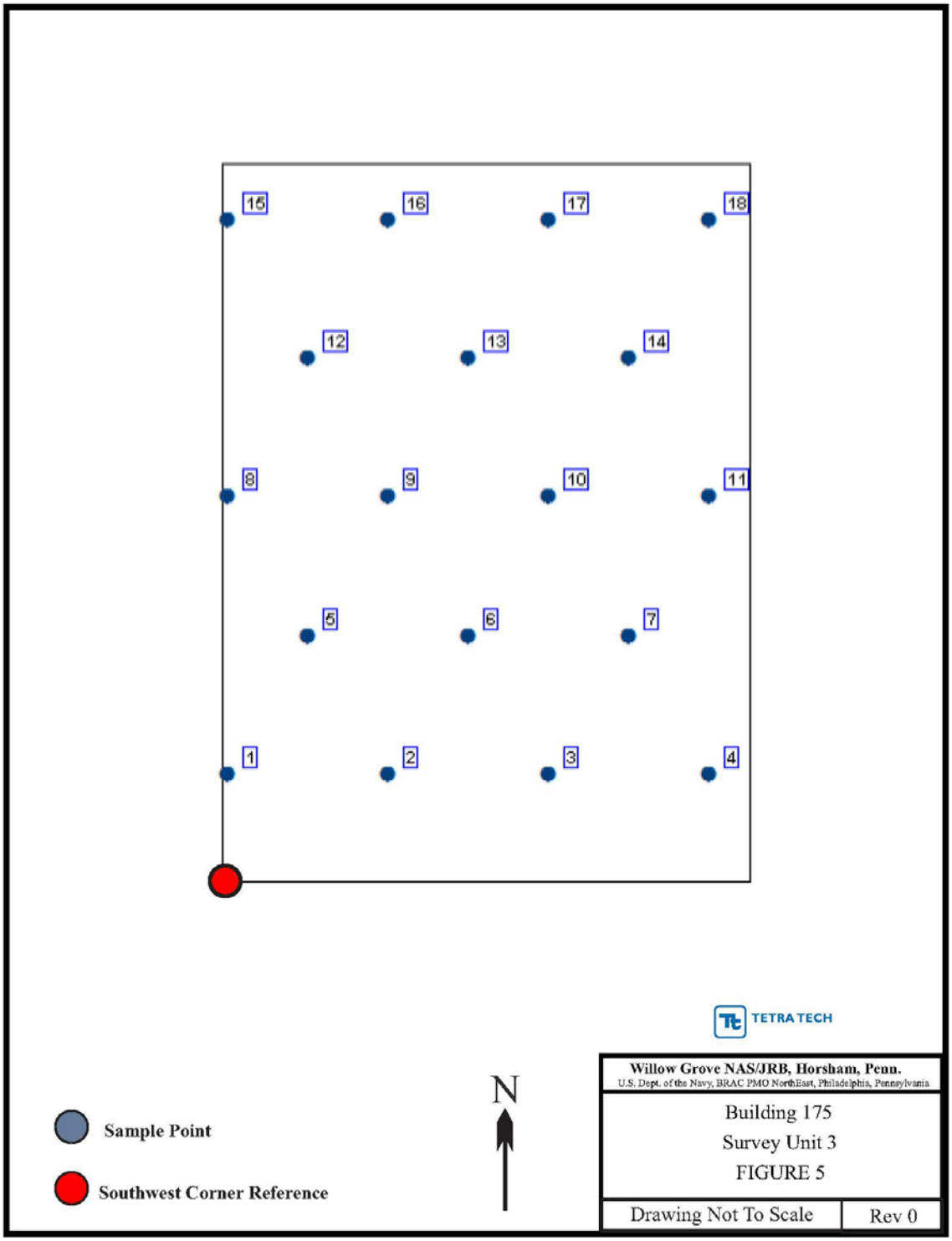
Sample Point
Southwest Corner Reference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TETRA TECH
Willow Grove NAS/JRB, Horsham, Penn.
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Building 175
Survey Unit 3
FIGURE 5
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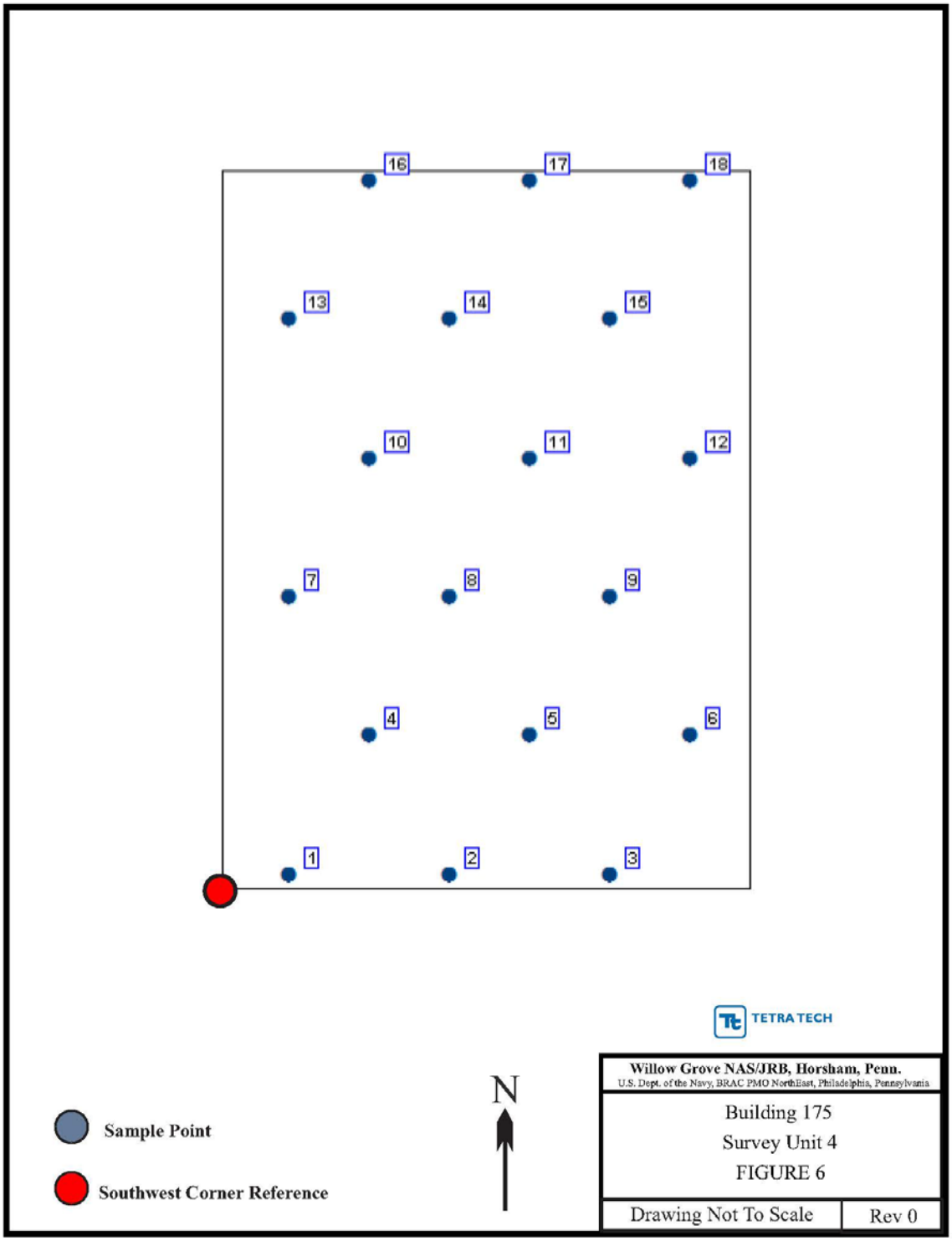
Sample Point
Southwest Corner Reference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Building 175
Survey Unit 4
FIGURE 6
Drawing Not To Scale
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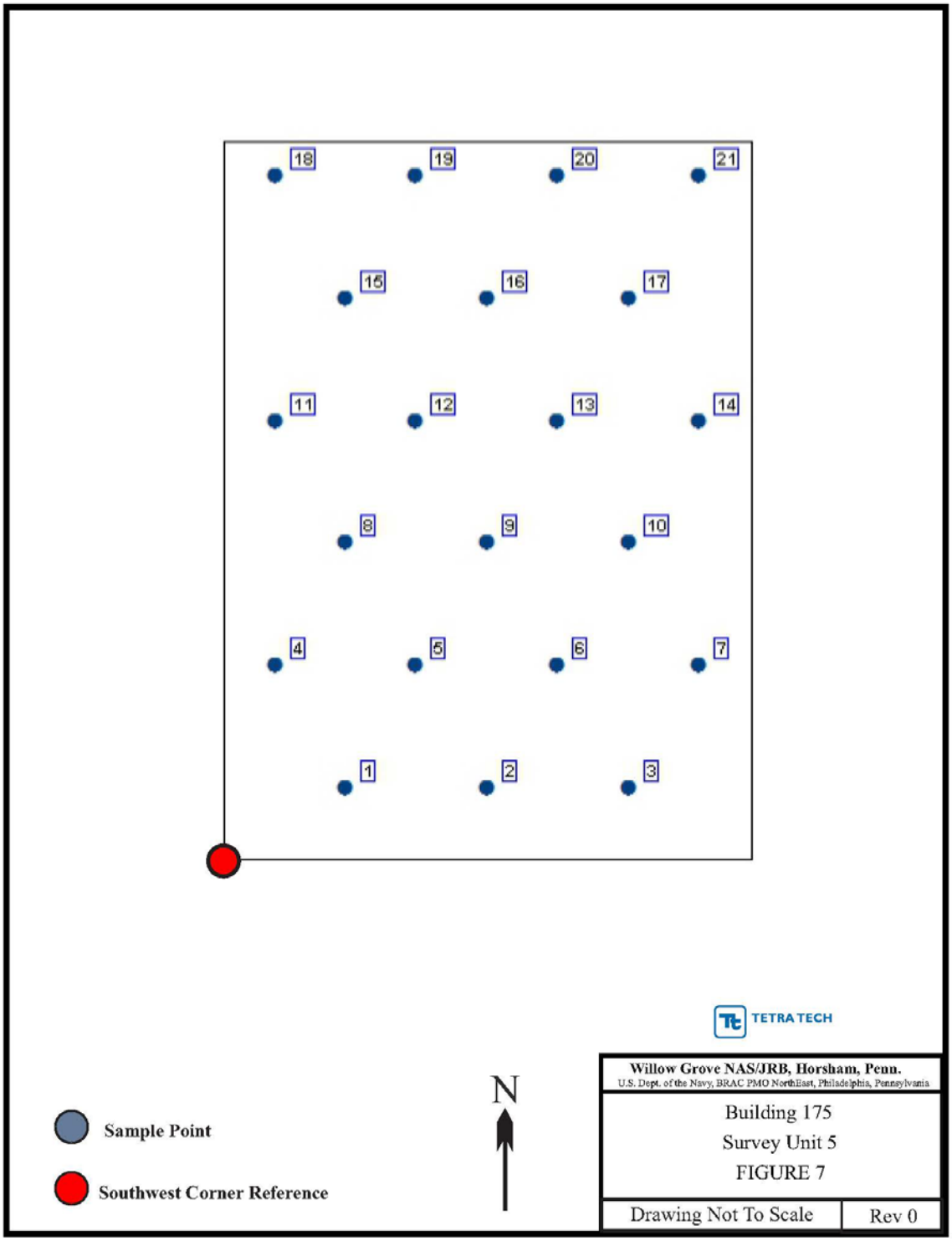
Sample Point
Southwest Corner Reference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Building 175
Survey Unit 5
FIGURE 7
Drawing Not To Scale
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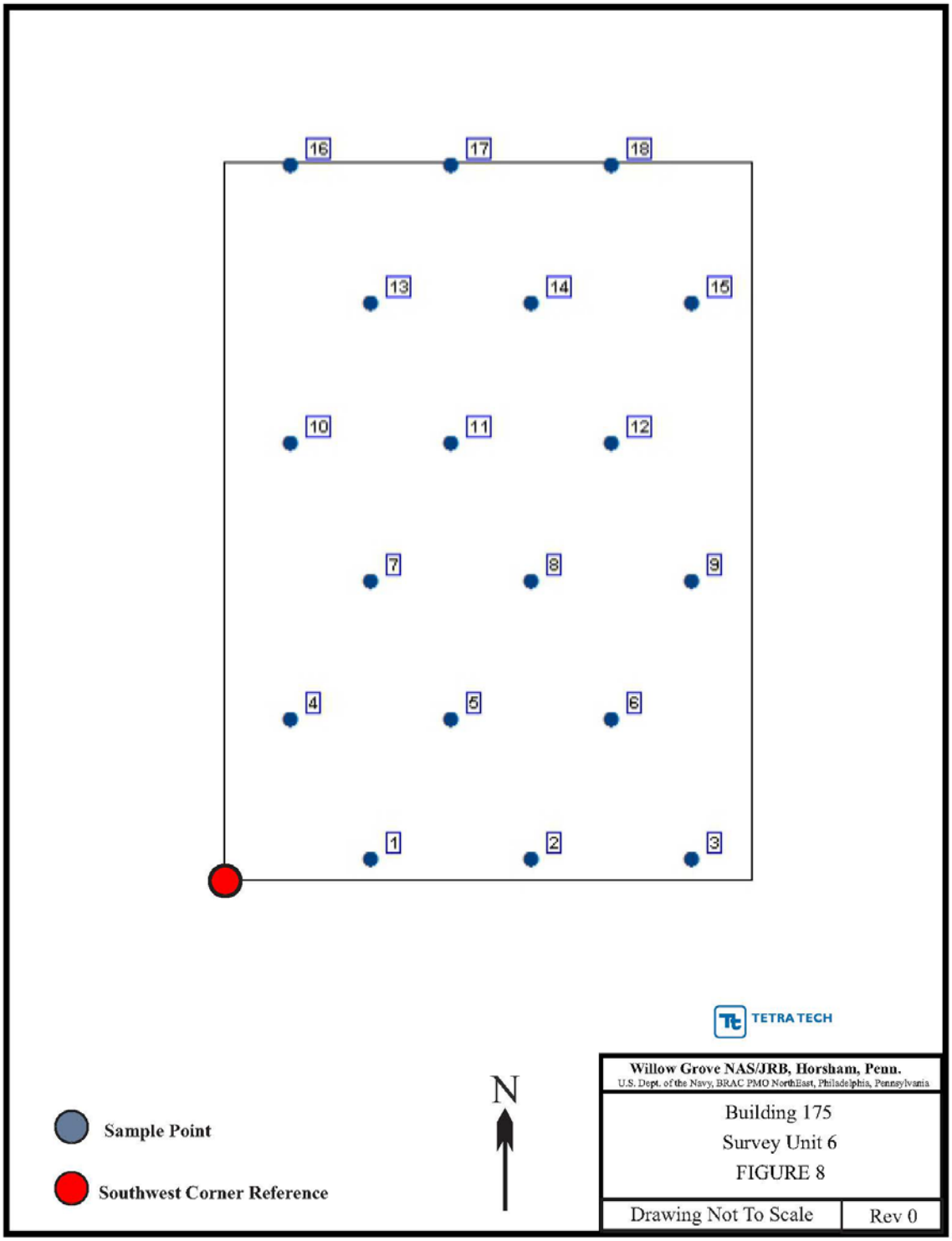
Sample Point
Southwest Corner Reference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U.S. Dept. of the Navy, BRAC PMO NorthEast, Philadelphia, Pennsylvania
Building 175
Survey Unit 6
FIGURE 8
Drawing Not To Scale
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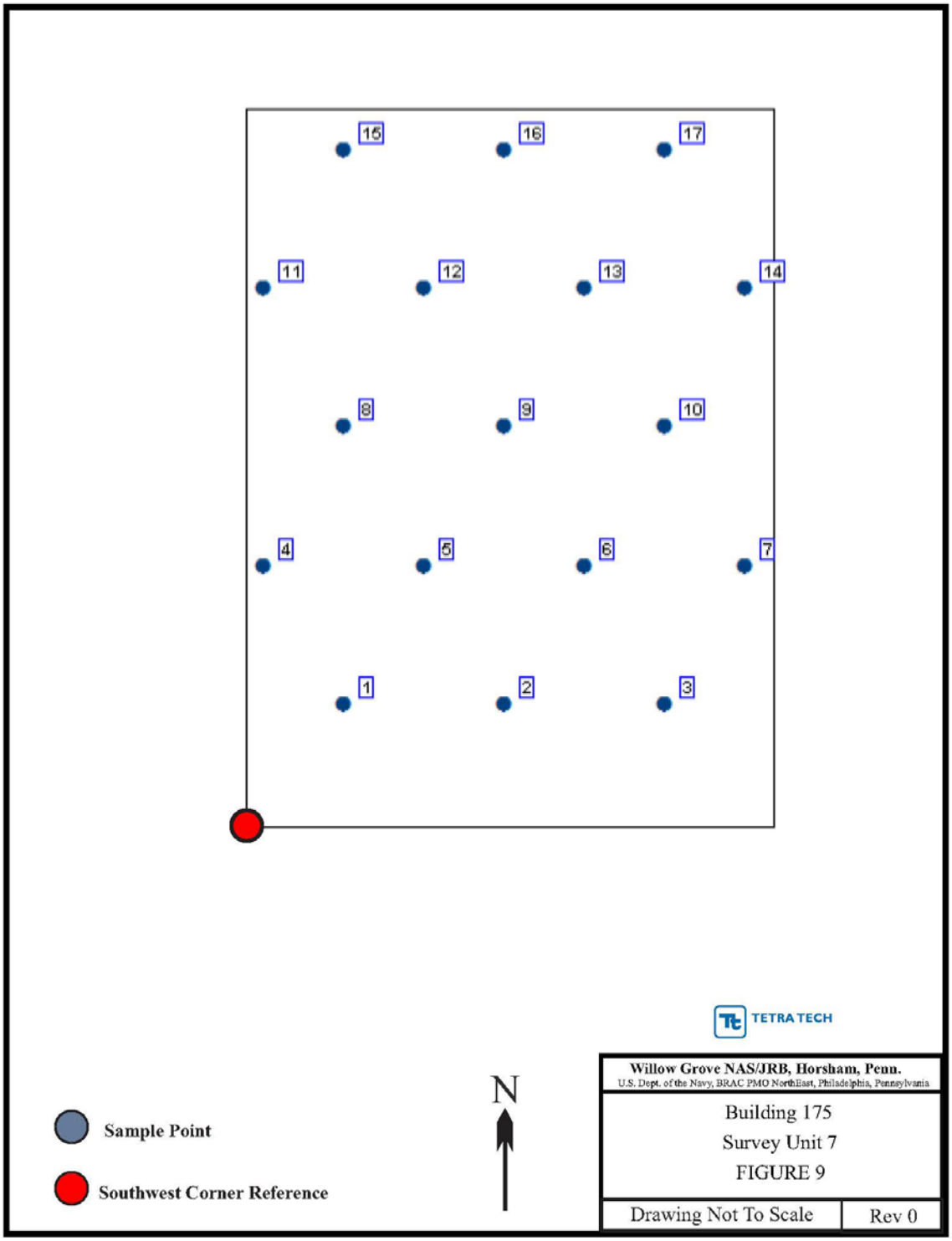
Sample Point
Southwest Corner Reference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U.S. Dept. of the Navy, BRAC PMO NorthEast, Philadelphia, Pennsylvania
Building 175
Survey Unit 7
FIGURE 9
Drawing Not To Scale
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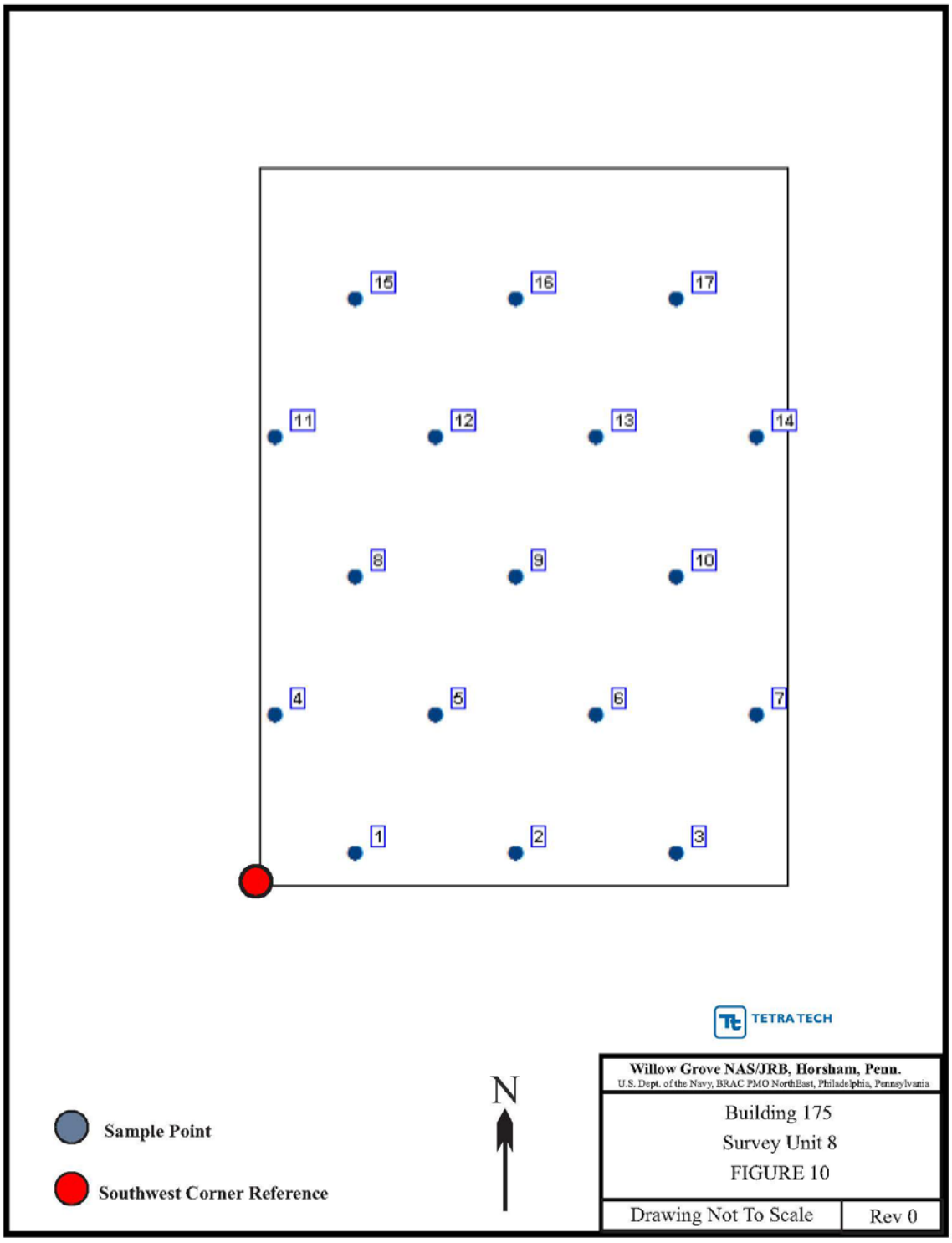
Sample Point
Southwest Corner Reference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Building 175
Survey Unit 8
FIGURE 10
Drawing Not To Scale
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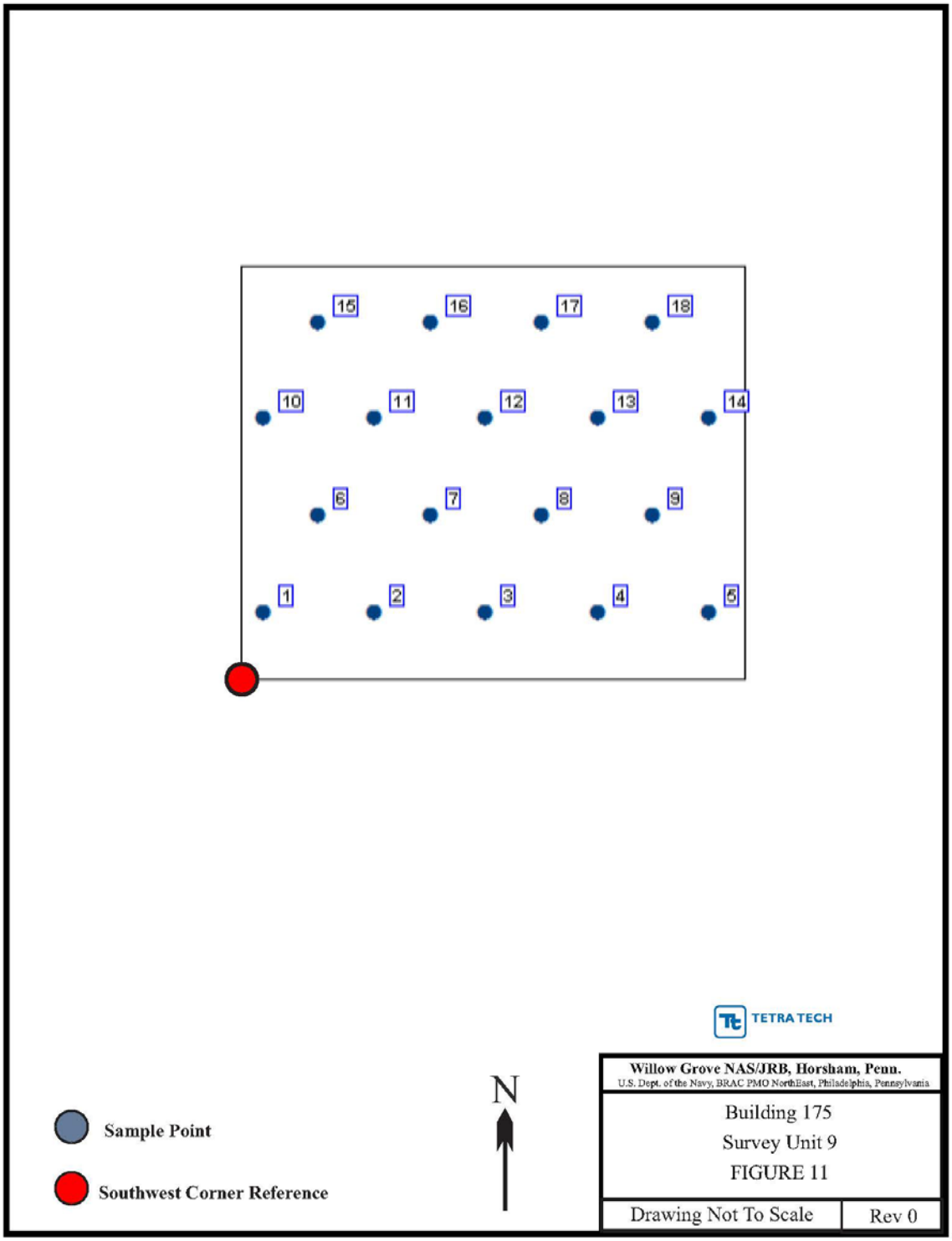
Southwest Corner Reference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Building 175
Survey Unit 9
FIGURE 11
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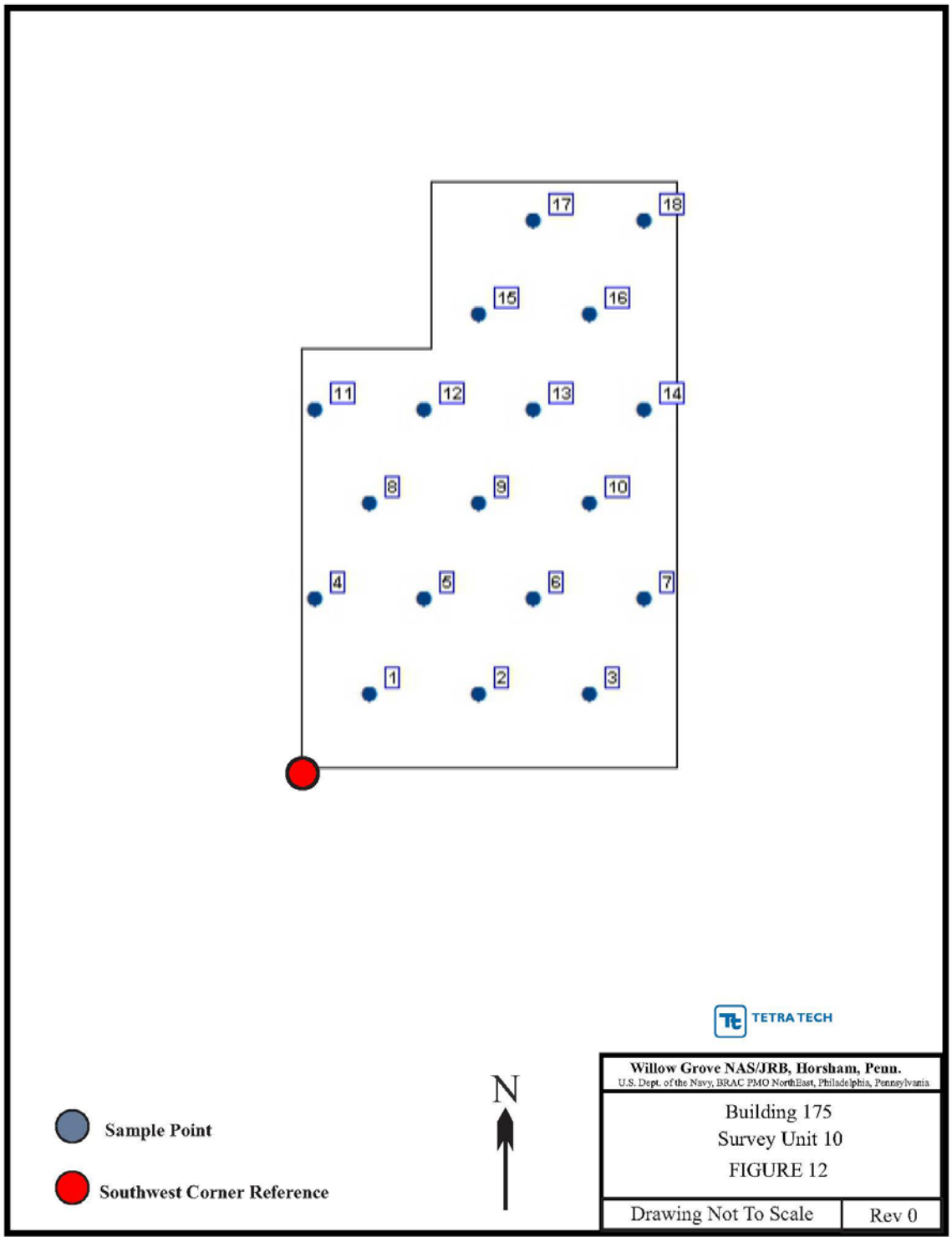
Sample Point
Southwest Corner Reference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U.S. Dept. of the Navy, BRAC PMO NorthEast, Philadelphia, Pennsylvania
Building 175
Survey Unit 10
FIGURE 12
Drawing Not To Scale
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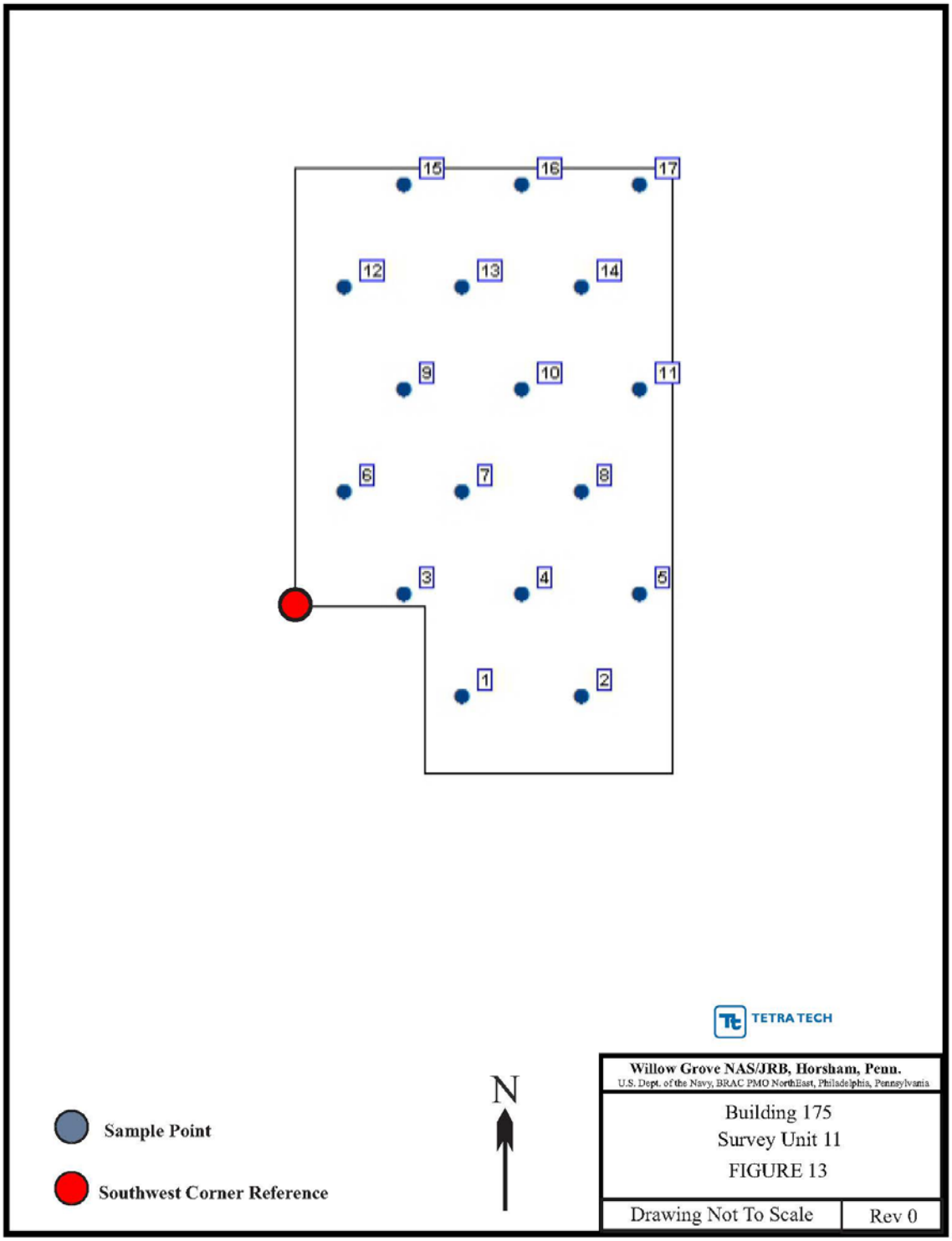
Sample Point
Southwest Corner Reference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U.S. Dept. of the Navy, BRAC PMO NorthEast, Philadelphia, Pennsylvania
Building 175
Survey Unit 11
FIGURE 13
Drawing Not To Scale
Rev 0
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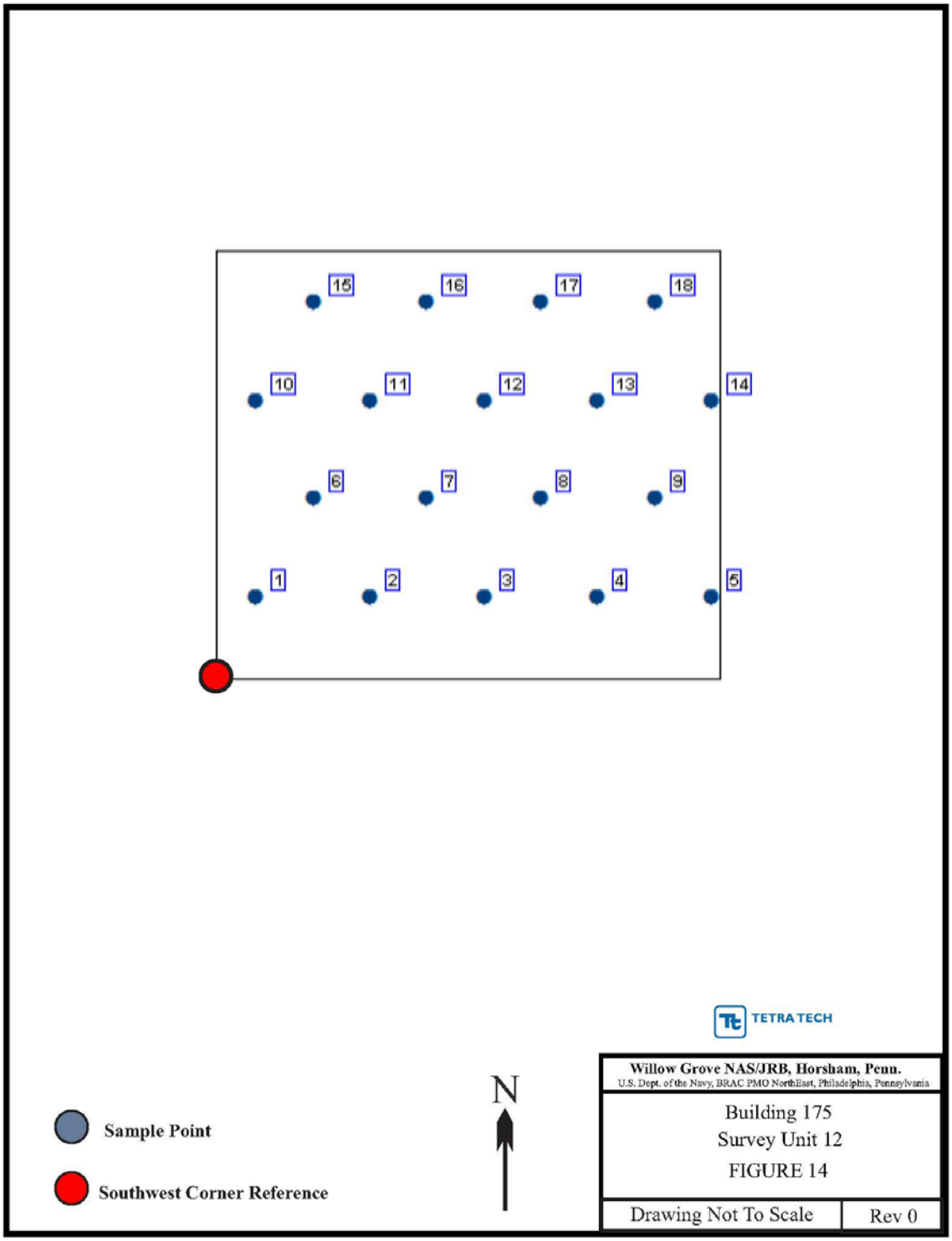
Sample Point
Southwest Corner Reference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Building 175
Survey Unit 12
FIGURE 14
Drawing Not To Scale
Rev 0
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Sample Point
Southwest Corner Reference

TABLES

TABLE 1 BUILDING 175 APPLICABLE STANDARD OPERATING PROCEDURES

Procedure	Title	Rev
SOP 002	Radiation Work Permits	0
SOP 004	Project Dosimetry	0
SOP 006	Radiation and Contamination Surveys	0
SOP 007	Preparation of Portable Radiation and Contamination Survey Meters for Field Use	0
SOP 008	Air Sampling and Sample Analysis	0
SOP 009	Sampling Procedures for Radiological Surveys	0
SOP 010	RCA Posting and Access Control	0
SOP 011	Control of Radioactive Materials	0
SOP 012	Release of Materials and Equipment	0
SOP 016	Decontamination of Equipment and Tools	0
SOP 022	Radiological Clothing Selection, Monitoring and Decontamination	0
SOP 023	Source Control	0
SOP 024	Occurrence Reporting	0
SUR 022	Gamma Walkover Surveys	0
RP-OP-017	Operation of the Ludlum Model 2929 Dual Scaler	0
RP-OP-025	Operation of the Ludlum Model 2221	0
RP-OP-026	Operation of the Ludlum Model 19	0
SCM-OPS-01	Position Sensitive Proportional Counters Purging	0
SCM-OPS-02	Position Sensitive Proportional Counters Plateau Determination	0
SCM-OPS-03	Position Sensitive Proportional Counters Position Calibration	1
SCM-OPS-04	Encoder Calibration	0
SCM-OPS-05	Position Sensitive Proportional Counters Efficiency Calibration	0
SCM-OPS-06	Position Sensitive Proportional Counters Quality Assurance	1
SCM-SETUP-01	Position Sensitive Proportional Counters Repair	0
SCM-SETUP-02	Hardware Setup	0
SCM-SETUP-03	Quality Assurance Testing of SCM	0

TABLE 2 BUILDING 175 PRIMARY RADIATION PROPERTIES AND RELEASE CRITERIA FOR RADIONUCLIDES OF CONCERN

Radionuclide	Primary Radiation Properties		Release Criteria[a]				
			Materials & Equipment		Building Surfaces		Soil[b]
	Half-Life	Type	Total Surface Activity	Removable Activity	Total Surface Activity	Removable Activity	Activity (pCi/g)
Sr-90	3.01E01 Years	Beta	1,000	200	1,000	200	1.02
U-238	4.51E09 years	Alpha & Beta	5000	1000	5000	1000	8.4

Notes:

a Units are disintegrations per minute per 100 square centimeters, unless otherwise specified.
b Criteria is above background for those radionuclides found in background soils.

U-238 Uranium 238
Sr-90 Strontium 90

Source: TetraTech 2014a. Basewide Radiological Management Plan, Naval Air Station Joint Reserve Base Willow Grove, Willow Grove, Pennsylvania.

TABLE 3 SUMMARY OF DATA QUALITY OBJECTIVES

STEP 1 Statement of Problem	STEP 2 Decisions	STEP 3 Inputs to the Decisions	STEP 4 Boundaries of Study	STEP 5 Decision Rules	STEP 6 Limits on Decision Errors	STEP 7 Optimizing the Sampling Design
Building 175 is listed in the HRA as an area impacted by radiological activities. The isotopes of concern are Sr-90 and U-238. It must be determined if the site-specific release criteria for these isotopes have been met or if remediation or further survey is warranted.	The primary use of the data expected to result from completion of this TSP is to support the Scoping Survey of Building 175. Therefore the decision to be made can be stated as "Do the results of the survey indicate activity above background or meet the release criteria?"	Radiological surveys required to support the Final Status Survey of Building 175 will include: • 25 percent scan surveys of the Class 3 area • A minimum of 17 systematic static measurements will be performed in the Class 3 area • One swipe per 1,000 square feet in Class 3 survey units • One sediment sample will be collected from each drain if available. • One swipe at each systematic sample location	The lateral and vertical spatial boundaries for this survey effort are confined to the interior portions the hangar and rooms 134, 135, 144, and 145 of Building 175.	If the concentration of radioactivity on building surfaces, paved areas, or in sediment samples is less than the release criteria, then no further measurements are required. If the results of the survey exceed the release criteria, then the building will be investigated further.	Limits on decision errors are set at 5 percent as specified in the Management Plan (TetraTech 2014a).	Operational details for the radiological survey process have been developed. The theoretical assumptions are based on guidelines contained in MARSSIM (NRC 2000). 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 Management Plan (TetraTech 2014a)

Notes:

HRA	Historical Radiological Assessment	Sr-90	Strontium 90
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual	TSP	Task Specific Plan
NRC	Nuclear Regulatory Commission	U-238	Uranium 238

TABLE 4 DEFINABLE FEATURES OF WORK FOR RADIOLOGICAL SURVEYS

ACTIVITY	PREPARATORY (Prior to initiating survey activity)	DONE	INITIAL (At onset of survey activities)	DONE	FOLLOW-UP (Ongoing during survey activities)	DONE
Radiological Surveys	• Verify that an approved TSP is in place. • Verify that the Remedial Project Manager and the Caretaker Site Office are notified about mobilization. • Verify that an approved Radiation Work Permit, if required, is available and has been read and signed by assigned personnel. • Verify that the Management Plan, HASP and TSP, have been reviewed. • Verify that personnel assigned are trained and qualified. • Verify that personnel have been given an emergency notification procedure. • Verify that workers assigned dosimeter have completed NRC Form 4. • Verify that relevant SOPs are available and have been reviewed for equipment to be used. • Verify that equipment is on site and in working order (initial daily check).		• Verify that radiological instruments are as specified in the Management Plan (TetraTech 2014a) and TSP. • Inspect Training Records. • Verify that reference area measurements have been obtained in accordance with the Management Plan (TetraTech 2014a). • Verify that daily checks were performed on all survey instruments. • Verify that instrument calibration and setup are current. • Verify that required dosimeter is being worn. • Verify that field logbooks and proper forms are in use. • Verify that samples and measurements are being collected in accordance with the TSP, Management Plan and applicable SOPs. • Verify the sample handling is in accordance with the Management Plan (TetraTech 2014a) and applicable SOPs.		• Verify that the site is properly posted and secured. • Conduct ongoing inspections of material and equipment. • Verify that daily instrument checks were obtained and documented. • Verify that survey results were documented. • Inspect chain-of-custody and survey logs for completeness. • Verify that survey activities conform to the TSP. • Verify that survey instruments are recalibrated after repairs or modifications.	

Notes

HASP Health and Safety Plan
NRC Nuclear Regulatory Commission
SOP Standard Operating Procedure
TSP Task Specific Plant