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FINAL TASK SPECIFIC PLAN FOR THE BUILDING 584 FINAL STATUS SURVEY NAS BRUNSWICK ME
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TETRA TECH EC INC

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FINAL
TASK-SPECIFIC PLAN FOR THE BUILDING 584 FINAL STATUS SURVEY
FORMER NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

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Prepared for

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ACRONYMS AND ABBREVIATIONS

APP	Accident Prevention Plan
cm^2	square centimeter
cm/s	centimeters per second
Co-60	Cobalt-60
cpm	counts per minute
Cs-137	Cesium-137
CTO	Contract Task Order
DAC	Derived Air Concentration
DFW	Definable Features of Work
DoD	Department of Defense
dpm	disintegrations per minute
DQO	Data Quality Objectives
DRMO	Defense Reutilization and Marketing Office
FSS	Final Status Survey
H-3	Tritium
HRA	Historical Radiological Assessment
LBGR	Lower Boundary of the Gray Region
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
MDCR	Minimum Detectable Count Rate
NASB	Naval Air Station Brunswick
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
Ra-226	Radium-226
RASO	Radiological Affairs Support Office
SOP	Standard Operating Procedure
Sr-90	Strontium-90
SSHP	Site Safety and Health Plan
SU	Survey Unit
Th-232	Thorium-232
TtEC	Tetra Tech EC, Inc.
TSP	Task-Specific Plan
U-238	Uranium-238

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1.0 INTRODUCTION

Tetra Tech EC, Inc. (TtEC) has prepared this Task-Specific Plan (TSP) for the Final Status Survey (FSS) of Building 584 at the former Naval Air Station Brunswick (NASB), Brunswick, Maine for the United States Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC), Atlantic under a Removal Action Contract, N62470-13-D-8007, Contract Task Order (CTO) WE09. The survey will be conducted in accordance with the general approach and methodologies provided in the Basewide Radiological Management Plan (TtEC, 2014a) and Standard Operating Procedures (SOPs) provided in Attachment 3 to the Basewide Radiological Management Plan. The surveys will conform to the requirements of the Accident Prevention Plan (APP)/Site Safety and Health Plan (SSHP) (TtEC, 2014b) and the Radiation Protection Plan, Attachment 2 to the Basewide Radiological Management Plan, prepared for the survey program. No exceptions to the Basewide Radiological Management Plan, SOPs, or APP/SSHP are noted.

This survey is being performed to determine whether residual radioactivity is present in Building 584. The survey of this area has been designed as a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) NUREG-1575 survey (DoD et.al, 2000). This methodology will allow the use of survey data to support an FSS if no residual radioactivity exceeds the release criteria.

1.1 Site Description and Historical Summary

Building 584 is a one story metal structure covering 7,200 square feet (180 feet long by 40 feet wide). The building was used as the Defense Reutilization and Marketing Office (DRMO) where the sale or disposal of the Navy's hazardous waste and surplus material was coordinated. The location of Building 584 within NASB is shown on Figure A-1.

Per review of the Public Works drawings provided in Appendix B, the building, when constructed in 1965 was 3,200 square feet in size (80 feet long by 40 feet wide). The original building had one office with a restroom located at the southwestern end of the building with the furnace directly across from the office along the north wall. Per the revised as-built dated September 10, 1982, an additional 100 feet was added to the eastern portion of the building. As part of the remodel process in 1981/1982, a new partition and doorway was installed down the center of the original building and the furnace was relocated to a new room constructed just east of the partition within the warehouse. The security cage located between the original furnace and the western wall was also removed. The interior walls of the office were replaced with new gypsum wall board and a new access door was installed in the center of the western wall and new resilient flooring was placed up to the new partition. The restroom located within the office was removed and new restrooms were installed east of the office and a lunch area established between the restroom and the new partition. A new office and conference room were established along the northern side of the building between the former location of the furnace and the new partition. The remodel of Building 584 is shown on Figure A-1.

Building 584 is part of the DRMO Area, which consists of this building and the adjacent DRMO Yard. The Yard is south of Building 584 and is currently an approximate 84,000 square foot asphalt paved surface. Building 584 has no current radiological use; however, as the DRMO Area has been in use since 1965 for storage of equipment to be surplused by the Navy and because commodities that contained radioactive materials may have been turned into DRMO, the DRMO Area is considered a potential for radiological impact (NAVSEA, 2013). Per the Historical Radiological Assessment (HRA), the radionuclides of concern (ROCs) for the DRMO Area are Cobalt-60 (Co-60), Cesium-137 (Cs-137), Radium-226 (Ra-226), Strontium-90 (Sr-90), Thorium-232 (Th-232), Tritium (H-3), and Uranium-238 (U-238) (NAVSEA, 2012). This TSP covers Building 584. A separate TSP has been developed for the DRMO Yard.

2.0 PREPARATION AND SURVEY DESCRPTION

Any miscellaneous equipment, trash, and debris present inside Building 584 that will impede performance of the survey activities described herein will be removed and surveyed as materials and equipment in accordance with SOP 003, Release of Materials and Equipment from Radiologically Controlled Areas, before the survey activities are begun. Vinyl tiles and flooring still present in the building may require removal to facilitate survey of the original concrete surface. Any vinyl tiles and flooring that are removed will be surveyed as materials and equipment. Materials identified as having contamination present above the levels specified in Table 2-1 will be packaged for subsequent decontamination or storage and disposal.

In accordance with the MARSSIM (DoD et al., 2000), a Class 3 survey of the floor surface will be performed within Building 584. The Class 3 survey of the floor will focus on areas where potential radioactive material would have been stored (i.e., the warehouse between Columns 3 and 10).

3.0 FINAL STATUS SURVEY DESCRIPTION

The FSS is being performed to assess whether residual activity is above the established release criteria defined in Table 2-1. The FSS will be sufficient to recommend unrestricted radiological release of the building if no residual contamination is detected in the survey units.

3.1 Release Criteria

The release criterion for building surfaces is 5,000 disintegrations per minute (dpm)/100 square centimeters (cm^2) for Co-60, Cs-137, and U-238; 100 dpm/100 cm^2 for Ra-226; and 1,000 dpm/100 cm^2 for Sr-90 and Th-232. The release criteria for H-3 is 5,000 dpm/100 cm^2 total surface activity; however, due to the low energy beta emitted by H-3, detection with surface monitoring is not practical and these samples will be sent off-site for analysis for H-3. The removable contamination release criterion is one-fifth of the total activity criteria. The limits for the specific ROCs to be addressed in Building 584 are provided in Table 2-1.

3.2 Reference Area

Prior to performing the survey activities, material-specific background reference areas will be established for the building survey activities. Non-radiologically impacted building background reference areas with similar physical, chemical, geological, radiological, and biological characteristics as the building materials will be selected. Building 53 will initially be used as the reference area for this survey. If similar material types are not available within Building 53, radiologically non-impacted portions of Buildings 200 and 250 may also be used as reference areas, with the selected areas being reviewed and approved by RASO. These buildings appear to have similar building materials as in Building 584. Location of Buildings 53, 200, and 250 are shown on Figure A-2 in Appendix A. Additional reference areas may be chosen by the Radiation Safety Officer Representative (RSOR), in consultation with the Radiological Affairs Support Office (RASO).

3.3 Investigation Level

The investigation level for alpha surveys will be areas identified by two or more alpha counts over the predetermined scan interval followed by two or more alpha counts after pausing over the same area when using a large area detector. Note that in cases where several contiguous areas are identified with two or more alpha counts, single static measurement investigations for each contiguous area may be conducted with RASO concurrence. Additionally, in cases where elevated alpha counts are identified in many areas as result of elevated background conditions, such as those due to radon progeny, the investigation level may be adjusted with RASO concurrence. However, all areas exceeding two or more alpha counts during the pause will be identified.

When using a handheld detector that has a background count rate of one or fewer counts per minute for alpha surveys, the investigation level will be one or more alpha counts over the predetermined scan interval followed by one or more alpha counts after pausing over the same area. The investigation level for beta surveys will be 4,500 dpm/100 cm^2 beta (at 90 percent of the release criteria). The investigation levels for removable contamination are 20 dpm/100 cm^2 alpha and 200 dpm/100 cm^2 beta. These levels are consistent with the release criteria presented in Table 2-1. For gamma surveys, the investigation level will be established at the survey unit mean plus 3-sigma (σ), where σ is the standard deviation of the gamma readings in the reference area.

3.4 Survey Units

Survey Unit SU 1 is considered to be a Class 3 area. MARSSIM guidance (DoD et al. 2000) Table 2 indicates that scan surveys and systematic sampling points should be based on professional judgment. As such, in the interest of conservatism, a 25 percent scan survey of the floor where radioactive material containing items may have been stored will be conducted. Additionally, systematic sample measurements will be collected across the surface where DRMO items were historically stored. The location of SU 1 within Building 584 is provided on Figure A-3.

The survey unit will contain systematic data collection locations. At each systematic sample location, a direct surface measurement and swipe survey samples will be obtained. Swipe surveys will be analyzed in accordance with the SOPs. The number of systematic locations has been determined in Section 3.5 to be a minimum of 16. Using a random start point, the systematic data collection locations have been laid out in a triangular grid pattern for each survey unit using the computer process provided by Visual Sample Plan (Matzke et al., 2010). Locations for the systematic data collection are shown on Figure A-3 in Appendix A.

One hundred percent of the swipe samples will be analyzed for removable alpha and beta contamination using a Ludlum 2929 swipe counter or equivalent. Ten percent of the samples will be analyzed for H-3 by liquid scintillation counting.

3.5 Establishing the Number of Measurements

Since the contaminants may be present in the background, *N* is calculated in the manner specified for the Wilcoxon Rank-Sum test (Equation 5-2 from the Basewide Radiological Management Plan):

Equation 5-2 from the Basewide Radiological Management Plan (TtEC, 2014a)

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

Where:

$Z_{1-\alpha}$ = Type I decision error level as determined from MARSSIM (1.645)

$Z_{1-\beta}$ = Type II decision error level as determined from MARSSIM (1.645)

P_r = random measurement probability, which is based on relative shift discussed in Section 5.5.2.2 from MARSSIM

1.2 = factor for over-sampling to account for missing or unusable data

The second term in the equation increases the number of data points by 20 percent. The value of 20 percent was selected to account for a reasonable amount of uncertainty in the parameters used to calculate *N* and still allow flexibility to account for some lost or unusable data. While this 20 percent factor assists in meeting all data quality objectives (DQOs) as stated in Table 3-1, it is not required during the data quality assessment to demonstrate compliance with the stated objectives of the statistical tests. The actual number of measurements required for each survey unit will be calculated for the final report.

P_r in Equation 5-2 from the Basewide Radiological Management Plan is based on the relative shift. The relative shift is equal to Δ/σ, where Δ is equal to [derived concentration guideline level (DCGL) – lower boundary of the gray region (LBGR)], and σ is an estimate of the standard deviation of the measured values in a survey unit. In cases where the unity rule is used, the DCGL is set at 1.

3.5.1 LBGR Determination

The LBGR is the net median concentration of the contaminant in the survey unit. Since this value is unknown, MARSSIM (DoD et al. 2000) suggests using a value for the LBGR of ½ DCGL during planning purposes. However, once the median concentration activity in the survey unit is established (as expressed in a gross alpha and gross beta measurement), this value will be used as a ratio to the lowest DCGL for the decay method to determine the LBGR. Equation 6-7 from the Basewide Radiological Management Plan gives the method used to determine the LBGR:

Equation 6-7 from the Basewide Radiological Management Plan (TtEC, 2014a)

$$LBGR = \frac{C_1}{DCGL_1} + \frac{C_2}{DCGL_2} + \frac{C_3}{DCGL_3} + \ldots + \frac{C_i}{DCGL_i} \leq 1$$

Where:

C_i = concentration of radionuclide "i"
$DCGL_i$ = DCGL of radionuclide "i"

For planning purposes, the LBGR will administratively be set to ½ the DCGL, or at a value of 0.5.

3.5.2 Standard Deviation

There is also no estimate of the standard deviation of the contaminant in the survey unit, especially if no contaminant is initially expected. Therefore, 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 Basewide Radiological Management Plan:

Equation 6-8 from the Basewide Radiological Management Plan (TtEC, 2014a)

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

Where:

σ_{Ci} = standard deviation from radionuclide "i"
$DCGL_i$ = DCGL of radionuclide "i"

For planning purposes, as σ is unknown, per MARSSIM recommendations, it will be estimated as 0.3.

3.5.3 Relative Shift

The relative shift is equal to Δ/σ, where Δ is equal to [wide-area DCGL ($DCGL_W$) − LBGR] and σ is an estimate of the standard deviation of the measured values in a survey unit (or for planning purposes from the background area). As stated previously, in cases where the unity rule is used, the DCGL is set to 1. The relative shift can be calculated as shown in Equation 5-1 from the Basewide Radiological Management Plan:

Equation 5-1 from the Basewide Radiological Management Plan (TtEC, 2014a)

$$\frac{\Delta}{\sigma} = \frac{DCGL_W - LBGR}{\sigma} = \frac{1 - 0.5}{0.3} = 1.67$$

Using this Δ/σ value of 1.67, from Table 5.1 of MARSSIM, P_r was determined to be 0.871014.

3.5.4 Unity Rule

As stated in Section 4.3.3 and Appendix I.11 of MARSSIM, the unity rule was used since multiple radionuclides (with different decay methods, with unknown ratios, and with unrelated radionuclide concentrations) were present. As stated in Appendix I.11.1, the DCGL is set at 1.0. Therefore, *N* is calculated using Equation 5-2 from the Basewide Radiological Management Plan as follows:

Where:

Type I decision error level (MARSSIM Table 5.2): 1.645
Type II decision error level (MARSSIM Table 5.2): 1.645
Random measurement probability (MARSSIM Table 5.1): 0.871014

$$31.45 = \left\{ \frac{(1.645 + 1.645)^2}{3(0.871014 - 0.5)^2} \right\} (1.2)$$

N for surveys is calculated as a minimum of 31.45 total data collection locations. Rounding this number up to an even number would equate to 16 from each survey unit and 16 from the reference area, for a total of 32. Figure A-3 indicates the approximate systematic measurement locations.

The survey is not initially designated as an FSS, but was designed so that if no radioactive contamination was found above the established release criteria, this survey could be used as an FSS, in accordance with MARSSIM (DoD et al., 2000). To maintain the potential for an FSS, data will be continuously analyzed to determine the relationship between each survey unit and the reference area.

3.6 Alpha and Beta Scan Measurements

Scan measurements are performed to identify areas of radioactivity that exceed an action level within the survey unit. Alpha (α) scans will be effective for identifying elevated concentrations of Ra-226 and Th-232. Beta (β) scans will be effective in identifying elevated concentrations of Co-60, Cs-137, Sr-90 and U-238. One hundred percent of accessible surface areas in the Class 1 survey units and fifty percent of accessible surface areas in the Class 2 survey unit will be scanned with the Ludlum Model 43-37, 43-37-1, or 43-68 gas flow proportional detectors or 43-89 scintillation detector coupled to a Ludlum 2360 or 2221 survey meter.

3.6.1 Alpha Scan Measurements

3.6.1.1 Large Area Detectors (Model 43-37, 43-37-1, or equivalent)

The alpha count rate on various surfaces within Building 584 typically averages less than 10 counts per minute (cpm) with a Model 43-37 or 43-37-1 (or equivalent) detector. Therefore, alpha scan speeds will be determined using Equation 7-4 from the Basewide Radiological Management Plan (TtEC, 2014a).

Equation 7-4 from the Basewide Radiological Management Plan (TtEC, 2014a)

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

Where:

P(n≥ 2)	=	probability of getting two or more counts during the time interval *t*(%)
t	=	time interval (seconds) = 4
G	=	DCGLw x area factor (dpm) = 300
E	=	detector efficiency (4π) = 0.10
B	=	observed background count rate (cpm) = 10
P(n≥ 2)	=	74.52 percent at a scan speed of 4 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 one-quarter inch from the building surfaces. The surveyor will move the detector at a scan speed of 4 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 4 seconds), the surveyor will pause the detector movement for 4 seconds to obtain additional data. If no additional counts are noticed during the 4-second observation, the surveyor can continue the scan survey. Conversely, if additional counts are noticed during the 4-second observation, the surveyor will 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.

3.6.1.2 Small Area Detectors (Model 43-68 or equivalent)

The alpha count rate on various surfaces in Building 584 typically 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 derived concentration guideline level 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 getting a second count from a 300 dpm source is calculated using Equation 7-2 from the Basewide Radiological Management Plan (TtEC, 2014a):

Equation 7-2 from the Basewide Radiological Management Plan (TtEC, 2014a)

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

Where:

$P(n \geq 1)$	=	probability of observing a single count = 83.5 percent
G	=	contamination activity dpm = 300
E	=	detector efficiency (4π) = 0.10
d	=	width of detector in direction of scan (centimeters) = 14.4
v	=	scan speed (cm/s) = 4

Once a count is recorded and the guideline level of contamination is present, the surveyor will stop and wait until the probability of getting another count is at least 90 percent. This time interval can be calculated using Equation 7-3 from the Basewide Radiological Management Plan (TtEC, 2014a):

Equation 7-3 from the Basewide Radiological Work Plan (TtEC, 2014a)

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

Where:

t	=	time period for static count(s) = 3.65
C	=	contamination guideline (dpm/100 cm^2) = 300
A	=	physical probe area (cm^2) = 126
E	=	detector efficiency (4π) = 0.10

Using the above equations from the Basewide Radiological Management Plan and Chapter 6 of MARSSIM (DoD et al. 2000), the probability of detecting 300 dpm/100 cm^2 alpha at a scan speed of 4 cm/s with a time period of 4 seconds for a static count is 83.5 percent.

Scan speeds may be adjusted based on the specific parameters for instruments in use, provided that the probability does not fall below 68 percent.

3.6.2 Beta Scan Measurements

3.6.2.1 Large Area Detectors (Model 43-37, 43-37-1, or equivalent)

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 Basewide Radiological Management Plan (TtEC, 2014a):

Equation 7-5 from the Basewide Radiological Management Plan (TtEC, 2014a)

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

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 (seconds)

For beta scans:

d'	=	3.28
b_i	=	33.3 counts (based on a background of 500 cpm)
i	=	15.90 cm / 4 cm/s = 4 seconds

Beta scan minimum detectable count rate (MDCR) = 283.91 cpm at a scan speed of 4 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 Basewide Radiological Management Plan (TtEC, 2014a):

Equation 7-6 from the Basewide Radiological Management Plan (TtEC, 2014a)

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

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:

$MDCR$ = 283.91
p = 0.50
ε_i = 0.4084
ε_s = 0.25
W_A = 821

Beta scan MDC = 478.77 dpm/100 cm^2 at a scan speed of 4 cm/s.

3.7 Alpha and Beta Static Measurements

Alpha and beta static measurements will be obtained from the locations identified in Appendix A. Additional measurements may be collected if radiation readings exceeding the investigation level are identified while performing the scan surveys. Ludlum Model 43-68 gas-flow proportional detectors or Ludlum Model 43-89 scintillation detectors coupled to Ludlum Model 2221 or 2360 data loggers will be used to perform alpha and beta static measurements. Note that all alpha and beta static measurements exceeding investigation levels should have corresponding notes on the survey sheets annotating the investigative action taken (sample taken, surveyed with different instrument type, etc.).

3.7.1 Alpha Static Measurements

The MDC for alpha measurements is calculated using Equation 7-7 from the Basewide Radiological Management Plan (TtEC, 2014a):

Equation 7-7 from the Basewide Radiological Management Plan (TtEC, 2014a)

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

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 = 0.4
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 37.99 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 (Table 2-1).

The specified count times are based on the MDC formula, Equation 7-7 from the Basewide Radiological Management Plan (TtEC, 2014a). The count times are useful in determining an instrument's ability to meet the required MDC. However, empirically derived values will provide a more accurate assessment of the MDC for a specified count time as recommended by MARSSIM (DoD et al., 2000). Empirical values will be determined at NASB in conjunction with reference area measurements. With concurrence of the Navy RASO, count times determined based on empirical data will be used for static survey measurements.

3.7.2 Beta Static Measurements

For the Ludlum 43-68, the MDC equation becomes:

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

3 + 4.65	=	constant factor provided in MARSSIM
R_B	=	background count rate = 500 cpm
T_B	=	background count time = 2 minutes
ε_i	=	instrument efficiency = 0.4
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 595.4 dpm/100 cm^2, using a 2-minute static counting time. Counting time may be increased as necessary to maintain the MDC below the Table 2-1 limits.

Alpha and beta measurements are recorded at the same time with a Ludlum 2360 data logger. Therefore, the count time for all beta emitting radionuclides of concern with the Ludlum 43-68 or 43-89 detector in the static mode will be 2 min.

The specified count times are based on the MDC formula, Equation 7-7 from the Basewide Radiological Management Plan (TtEC, 2014a). The count times are useful in determining an instrument's ability to meet the required MDC. However, empirically derived values will provide a more accurate assessment of the MDC for a specified count time as recommended by MARSSIM (DoD et al., 2000). Empirical values will be determined at NASB in conjunction with reference area measurements. With concurrence of the RASO, count times determined based on empirical data will be used for static survey measurements.

3.8 Gamma Scans

Twenty five percent of the Class 3 survey unit will be scanned with Ludlum Model 44-10 NaI scintillation detectors coupled to Ludlum Model 2350-1 scaler/rate meters. The gamma scans will be performed in accordance with SOP 001, Radiation and Contamination Surveys. A single detector will be used to perform gamma scans. Scans will be performed at a rate of approximately 0.5 meters 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. Backgrounds used for gamma scan measurement will be commensurate with the materials encountered throughout each survey unit, and will be used for comparison purposes during static gamma measurements.

3.8.1 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 Basewide Radiological Management Plan (TtEC, 2014a):

Equation 7-5 from the Basewide Radiological Management Plan (TtEC, 2014a)

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

Where:

$MDCR$ = minimum detectable count rate
d' = index of sensitivity (α and β errors) = 3.28
b_i = number of background counts in scan time interval = 96.77 cpm
i = scan or observation interval = 1 seconds

For this calculation, the observed background count rate of 5,806 cpm is 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 96.77 [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 (DoD et al. 2000), the value of *d'*, representing this performance goal, is 3.28. Using these inputs, the MDCR for Building 584 is 1936 cpm.

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

The minimum detectable count rate calculated assuming a surveyor efficiency ($MDCR_{Surveyor}$) can be calculated assuming a surveyor efficiency (*P*) of 0.5 and the observed background count rate of 5,806 cpm using Equation 7-9 from the Basewide Radiological Management Plan (TtEC, 2014a) as follows:

Equation 7-9 from the Basewide Radiological Management Plan (TtEC, 2014a)

$$MDCR_{SURVEYOR} = \frac{MDCR}{\sqrt{P}} = \frac{1{,}936}{\sqrt{0.5}} = 2{,}738 cpm$$

3.9 Exposure/Dose Rate Measurements

Before any MARSSIM based surveys are conducted, a general area gamma exposure/dose rate survey will be conducted for safety and radiological posting purposes, as well as to identify any areas with comparatively elevated gamma exposure rates. Ludlum Model 19, or equivalent, scintillation detectors will be used to perform the measurements. The measurements will be conducted with the instrument at one meter from the floor.

3.10 Media Samples

Swipe surveys will be collected at each of the specified systematic locations for each survey unit. Additional samples may also be collected based on scan survey results exceeding the investigation level. All swipe surveys will be screened using a Ludlum 2929 or 3030 scaler rate meter with a Ludlum 43-10-1 detector (or equivalent). Swipe surveys will be performed and documented in accordance with SOP 001, Radiation and Contamination Surveys.

When applicable, general area removable contamination will be assessed using Masslinn® cloths and monitoring the cloths with a Ludlum 43-68 or 43-89 detector coupled to a Ludlum 2360 or 2221 survey meter. The detector will be operated on the alpha plus beta plateau. Areas with a Masslinn® cloth indicating any increase in activity will be rewiped with another Masslinn® cloth to determine the specific area that contains the removable contamination.

In addition to swipes to determine the presence of alpha and beta emitting radionuclides, swipes will be taken at the systematic data collection points for the presence of H-3. The swipes will be wetted with distilled water prior to survey. Tritium swipes will be sent to an off-site laboratory for analysis using liquid scintillation methods.

3.11 Dose Modeling in Support for Unrestricted Release

The intent of the Building 584 FSS is to achieve unrestricted release for the building. To accomplish this goal, it is necessary to provide a means for calculating residual dose to the critical group; the residential scenario in RESRAD-BUILD was selected. The modifications to the default scenario presented in RESRAD-BUILD will be to use the net mean concentrations for Co-60, Cs-137, H-3, Ra-226, Sr-90, Th-232, and U-238 above background, use the actual surface area for the SU, and change the removable fraction to 20 percent.

After the residual dose is determined, the Navy will also determine the excess lifetime cancer risk to the critical group. These values will be provided in the final report.

4.0 QUALITY CONTROL

The data quality objectives for the survey are provided in Table 3-1.

Definable features of work (DFWs) 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 4-1.

5.0 ENVIRONMENTAL PROTECTION

The environmental protection-driven requirements have been addressed in the Environmental Protection Plan (TtEC, 2014c). No additional requirements are necessary.

6.0 REFERENCES

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

Matzke et al. 2010. Visual Sample Plan. Upgrade version 6.0 released June 2010. Pacific Northwest National Laboratory. June.

NAVSEA (Naval Sea Systems Command.). 2013. Draft Final Historical Radiological Assessment, History of the Use of General Radioactive Materials 1943 to 201, Naval Air Station Brunswick, Brunswick, Maine. June.

TtEC (Tetra Tech EC, Inc.). 2014a. Basewide Radiological Management Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.

TtEC. 2014b. Accident Prevention Plan/Site Safety and Health Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress

TtEC. 2014c. Environmental Protection Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.

TABLES

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TABLE 2-1
BUILDING 9
PRIMARY RADIATION PROPERTIES AND RELEASE CRITERIA FOR RADIONUCLIDES OF CONCERN

	Primary Radiation Properties		Release Criteria			
			Materials & Equipment		Building Surfaces	
Radionuclide	**Half-Life**	**Type**	**Total Surface Activity**	**Removable Activity**	**Total Surface Activity**	**Removable Activity**
Co-60	5.27 years	Beta	5,000	1,000	5,000	1,000
Cs-137	3.01E01 years	Beta	5,000	1,000	5,000	1,000
H-3	1.23E01 years	Beta	5,000	1,000	5,000	1,000
Ra-226	1.6E03 years	Alpha	100	20	100	20
Sr-90	2.86E01 years	Beta	1,000	200	1,000	200
Th-232	1.41E10 years	Alpha	1,000	200	1,000	200
U-238	4.47E09 years	Alpha/Beta	5,000	1,000	5,000	1,000

Notes:
[a] Units are disintegrations per minute per 100 square centimeters.

Abbreviations and Acronyms:
Co-60 – Cobalt-60
Cs-137 – Cesium-137
H-3 – Tritium
Sr-90 – Strontium-90
Ra-226 – Radium-226
Th-232 – Thorium-232
U-238 – Uranium-238

TABLE 3-1
SUMMARY OF DATA QUALITY OBJECTIVES

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
State the Problem	**Identify the Goal of the Study**	**Identify Information Inputs**	**Define the Boundaries of the Study**	**Develop the Analytical Approach**	**Specify Performance or Acceptance Criteria**	**Develop the Plan for Obtaining Data**
Building 584 is listed in the HRA as an area impacted by radiological activities. The radionuclides of concern are Co-60, Cs-137, H-3, Ra-226, Sr-90, Th-232, and U-238. It must be determined if the site-specific release criteria for these radionuclides 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 584. 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 584 will include: • 25 percent scan survey of the Class 3area • A minimum of 16 systematic static measurements in the Class 3 area • One swipe survey at each systematic sample location • Static and swipe survey measurements at biased locations	The lateral and vertical spatial boundaries for this survey effort are confined to the interior of Building 584 as shown on the figures in Appendix A.	If the concentration of radioactivity on building surfaces 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 further investigated.	Limits on decision errors are set at 5 percent as specified in the Basewide Radiological Management Plan (TtEC, 2014a).	Operation details for the radiological survey process have been developed. The theoretical assumptions are based on guidelines contained in MARSSIM (DoD et al. 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 Basewide Radiological Management Plan (TtEC, 2014a).

Abbreviations and Acronyms:
Co-60 – Cobalt-60
H-3 - Tritium
HRA – Historical Radiological Assessment
MARSSIM – Multi-Agency Radiation Survey and Site Investigation Manual
Ra-226 – Radium-226
Sr-90 – Strontium-90
SU – survey unit
Th-232 – Thorium-232
TSP – Task-Specific Plan
U-238 – Uranium-238

TABLE 4-1
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 and sampling	• Verify that an approved TSP is in place. • Verify that the Remedial Project Manager, Navy Technical Representative, and the Caretaker Site Office are notified about mobilization. • Verify that an approved RWP, if required, is available and has been read and signed by assigned personnel. • Verify that the Basewide Radiological Management Plan (TtEC, 2014a), APP/SSHP (TtEC, 2014b), 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 dosimetry have completed NRC Form 4. • Verify that relevant SOPs and/or manufacturers' instructions 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 Basewide Radiological Management Plan (TtEC, 2014a) and TSP. • Inspect Training Records. • Verify that a qualified RCT and SSHO are present in the active work areas. • Verify that reference area measurements have been obtained in accordance with the Basewide Radiological Management Plan (TtEC, 2014a) and this TSP. 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 survey instruments. • Verify that instrument calibration and setup are current. • Verify that required dosimetry is being worn. • Verify that field logbooks, chain-of-custody documents, and proper forms are in use. • Verify that samples and measurements are being collected in accordance with the TSP, Basewide Radiological Management Plan (TtEC, 2014a), and applicable SOPs. • Verify the sample handling is in accordance with the Basewide Radiological Management Plan (TtEC, 2014a) and applicable SOPs.		• Verify that the site is properly posted and secured, if necessary. • Conduct ongoing inspections of material and equipment. • Verify that a qualified RCT and SSHO are present at active work areas. • Verify that daily instrument checks were obtained and documented. • Verify the survey results were documented. • Verify that personnel have read and signed the revised RWP, if revision is required. • Inspect chain-of-custody and survey logs for completeness. • Verify the survey 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 RSOR.	

Abbreviations and Acronyms:

APP – Accident Prevention Plan
NRC – Nuclear Regulatory Commission
RCT – Radiation Control Technician
RSOR – Radiation Safety Officer Representative
RWP – Radiation Work Permit
SOP – Standard Operating Procedure
SSHO – Site Safety and Health Officer
SSHP – Site Safety and Health Plan
TSP – Task-Specific Plan

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APPENDIX A

FIGURES FOR BUILDING 584 SURVEYS

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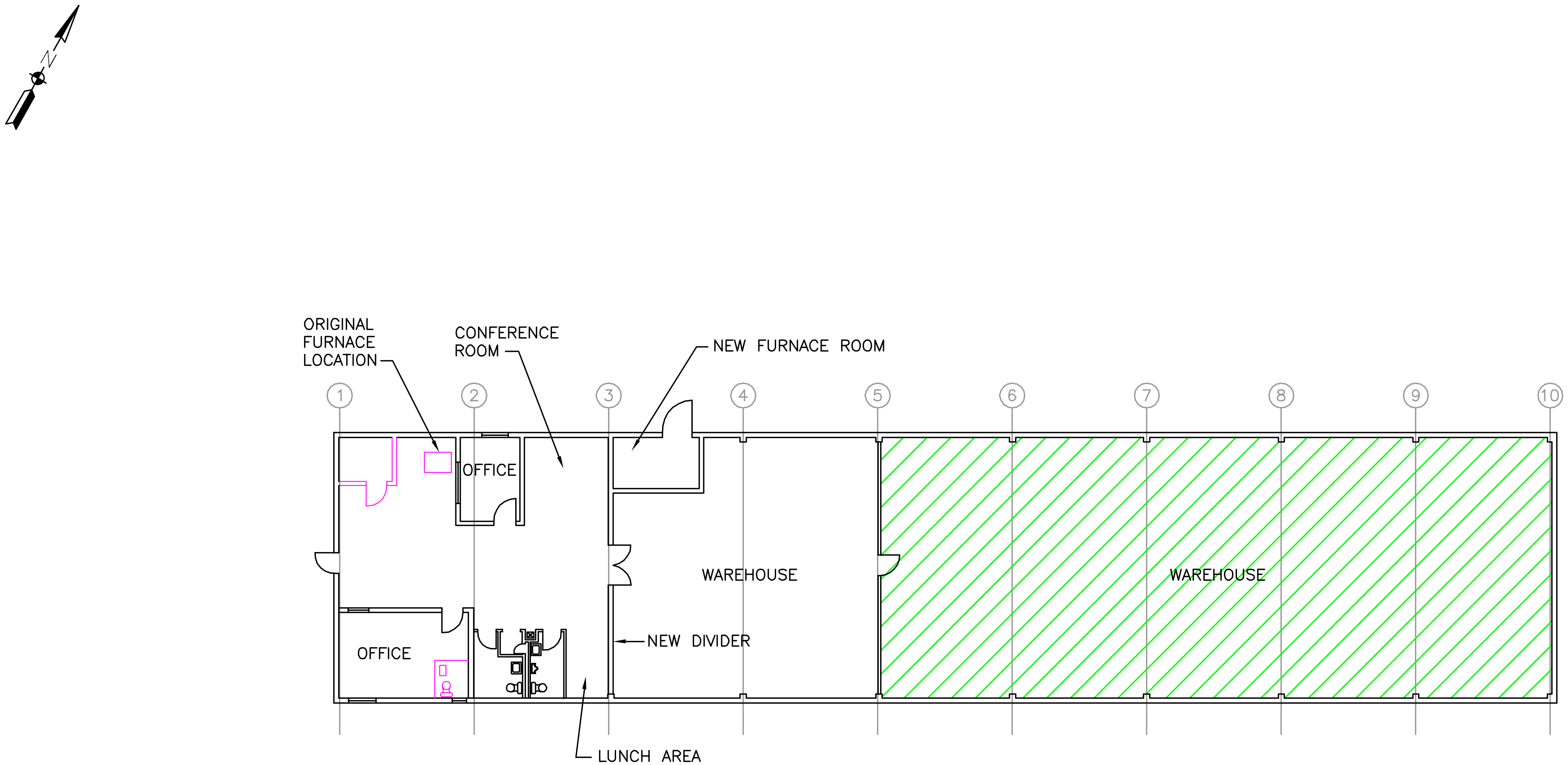

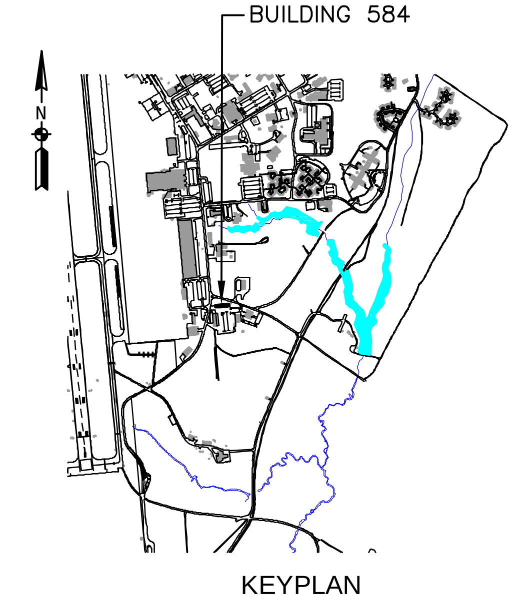

LEGEND

REMOVED DURING REMODEL

NEW ADDITION

TASK-SPECIFIC PLAN FOR BUILDING 584
FINAL STATUS SURVEY

FIGURE A-1

BUILDING 584 PLAN VIEW

FORMER NAVAL AIR STATION, BRUNSWICK, MAINE

REVISION: –
AUTHOR: A.CRABTREE
PROJECT NO:
FILE: SEE BELOW

TETRA TECH EC, INC.

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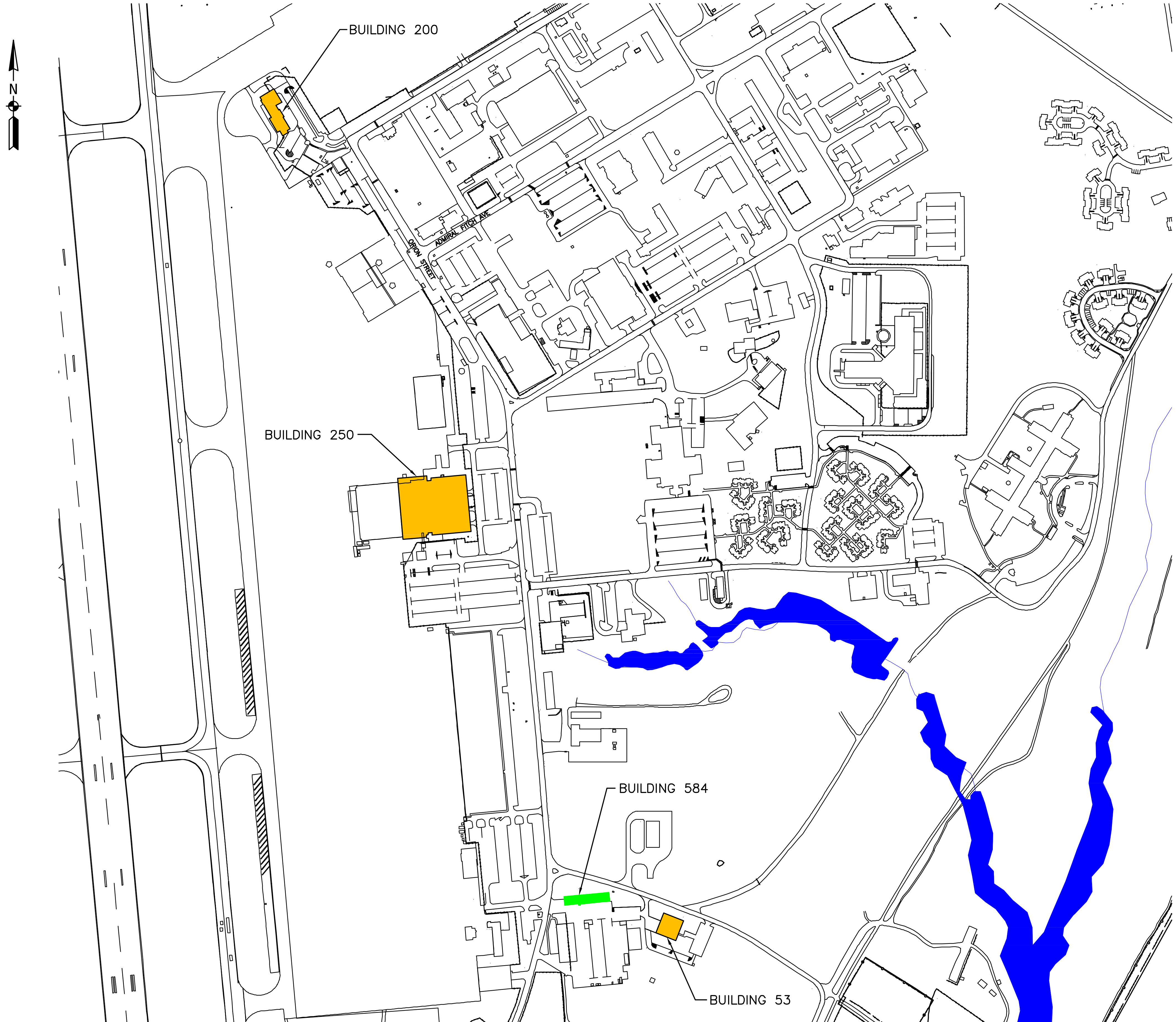

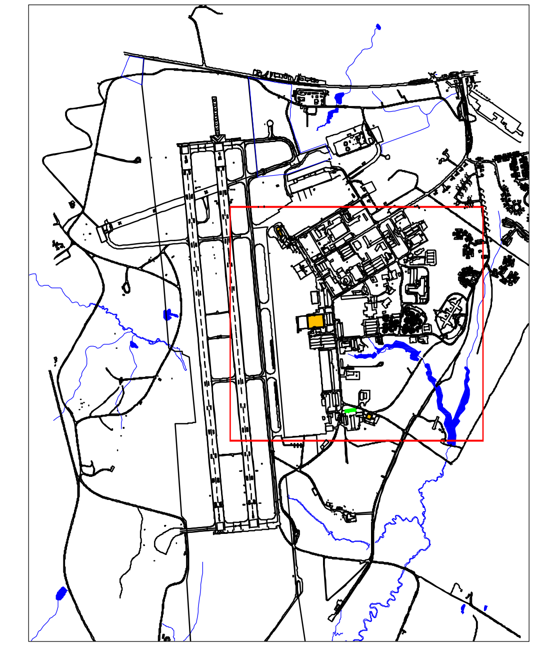

KEYPLAN

LEGEND

BUILDING 584

BUILDINGS 53, 200, AND 250

WATER

250 0 250 500

(feet)

TASK-SPECIFIC PLAN FOR BUILDING 584
FINAL STATUS SURVEY

FIGURE A-2

BUILDING 584 AND BACKGROUND REFERENCE AREAS

FORMER NAVAL AIR STATION, BRUNSWICK, MAINE

REVISION: –
AUTHOR: A.CRABTREE
PROJECT NO:
FILE: SEE BELOW

TETRA TECH EC, INC.

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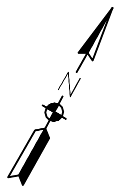
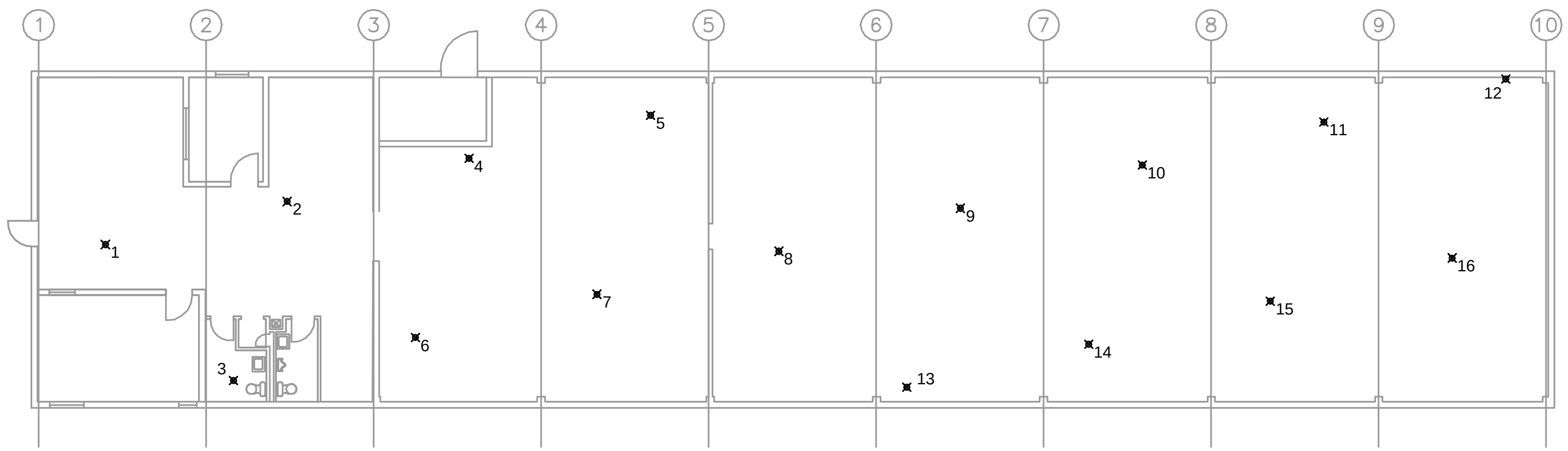
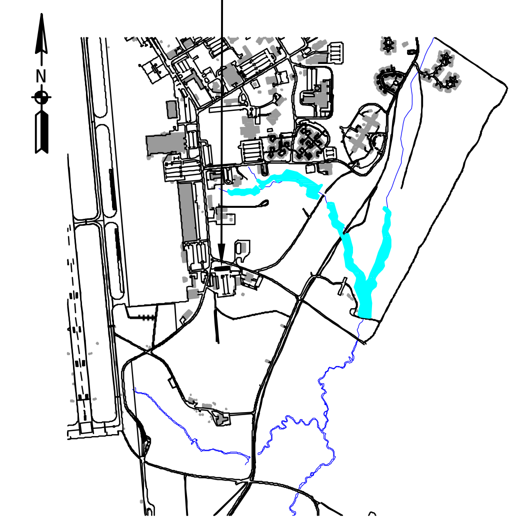




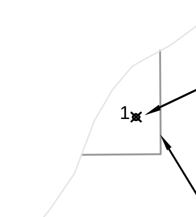
SU 1
CLASS 3
640.08 m^2 (6889.86 ft^2)

BUILDING 584



KEYPLAN

LEGEND



TASK-SPECIFIC PLAN FOR BUILDING 584
FINAL STATUS SURVEY

FIGURE A-3

BUILDING 584 CLASS 3 SURVEY UNIT

FORMER NAVAL AIR STATION, BRUNSWICK, MAINE

REVISION: –
AUTHOR: A.CRABTREE
PROJECT NO:
FILE: SEE BELOW

TETRA TECH EC, INC.

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APPENDIX B

PUBLIC WORK DRAWINGS

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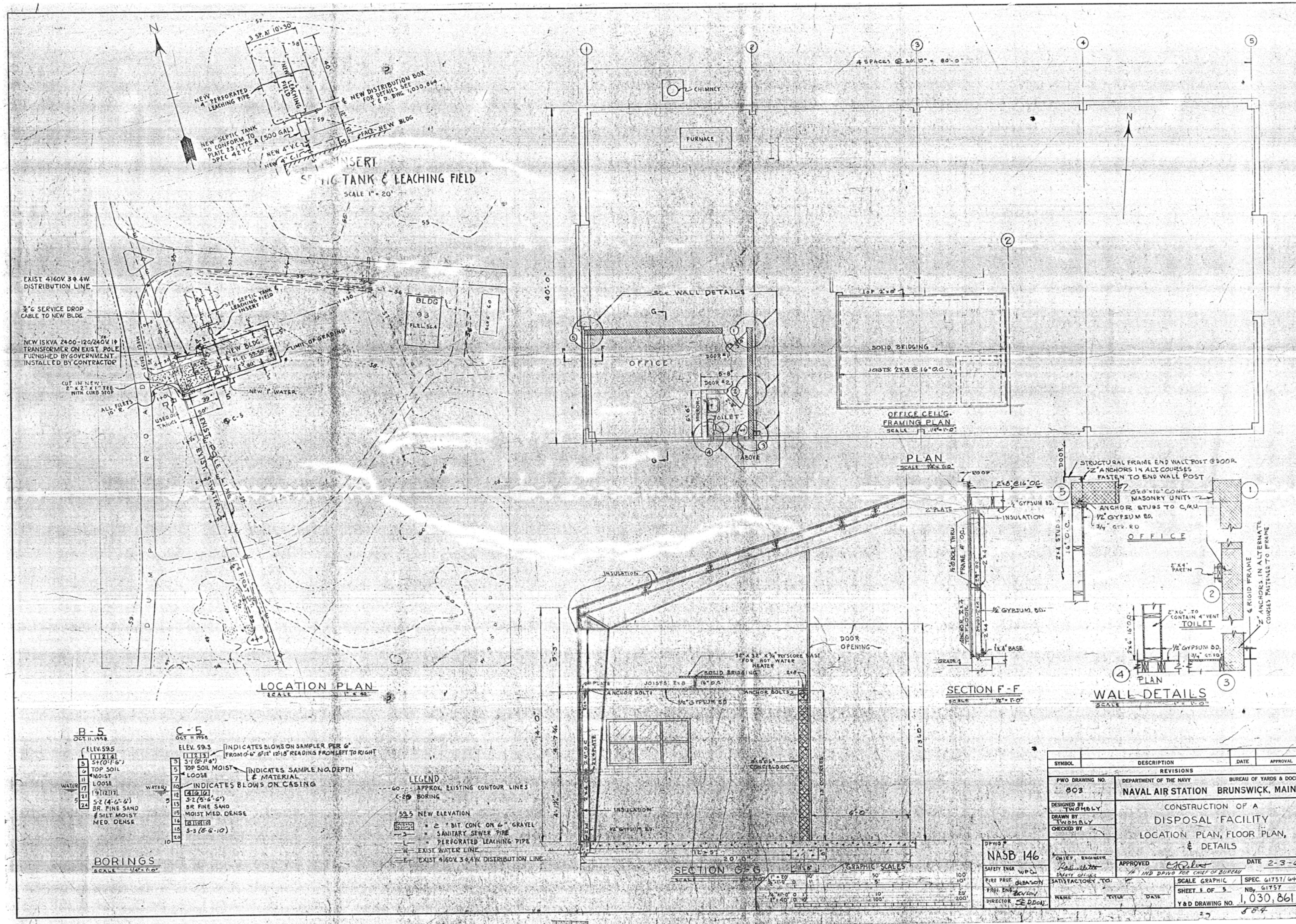
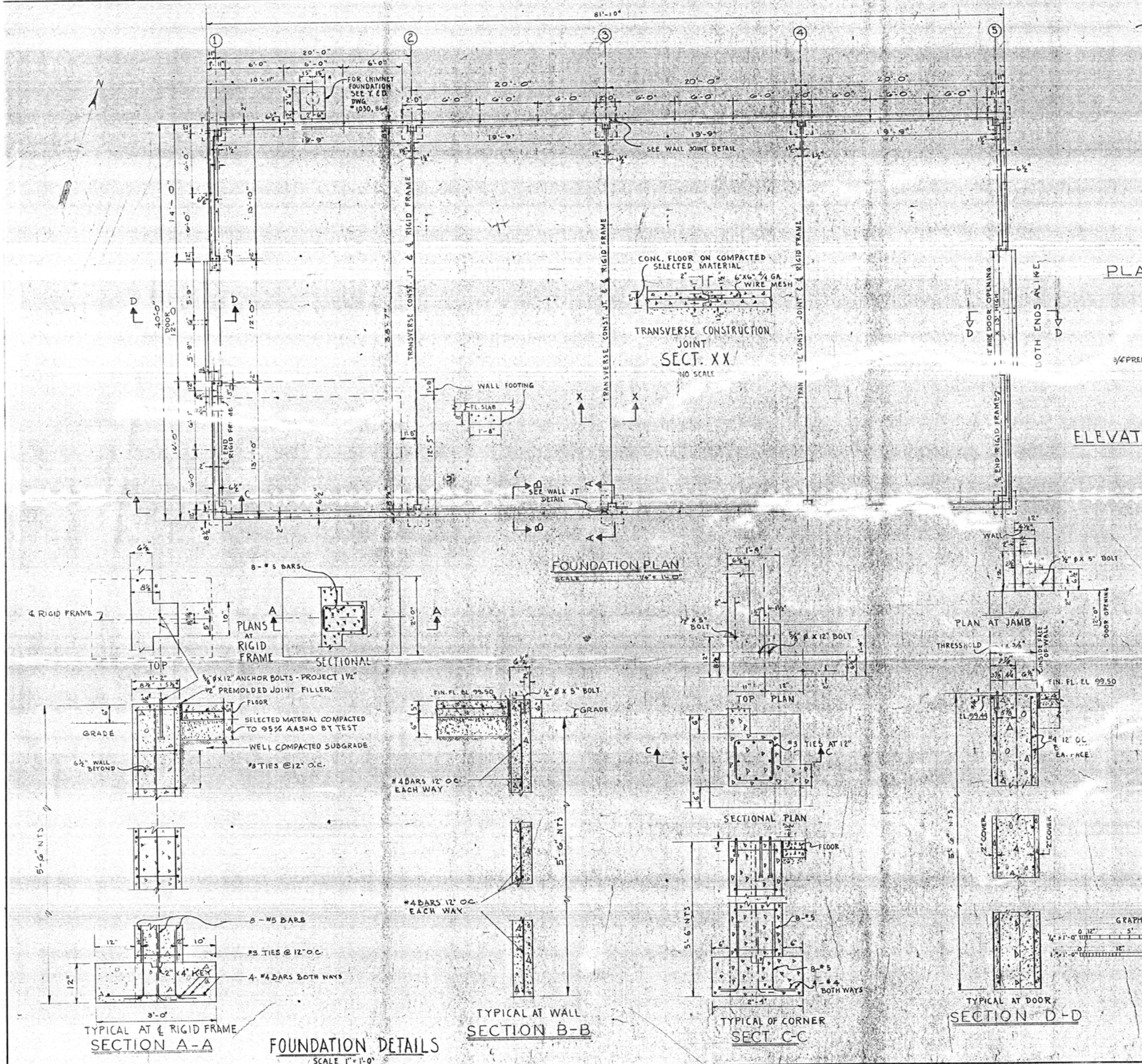
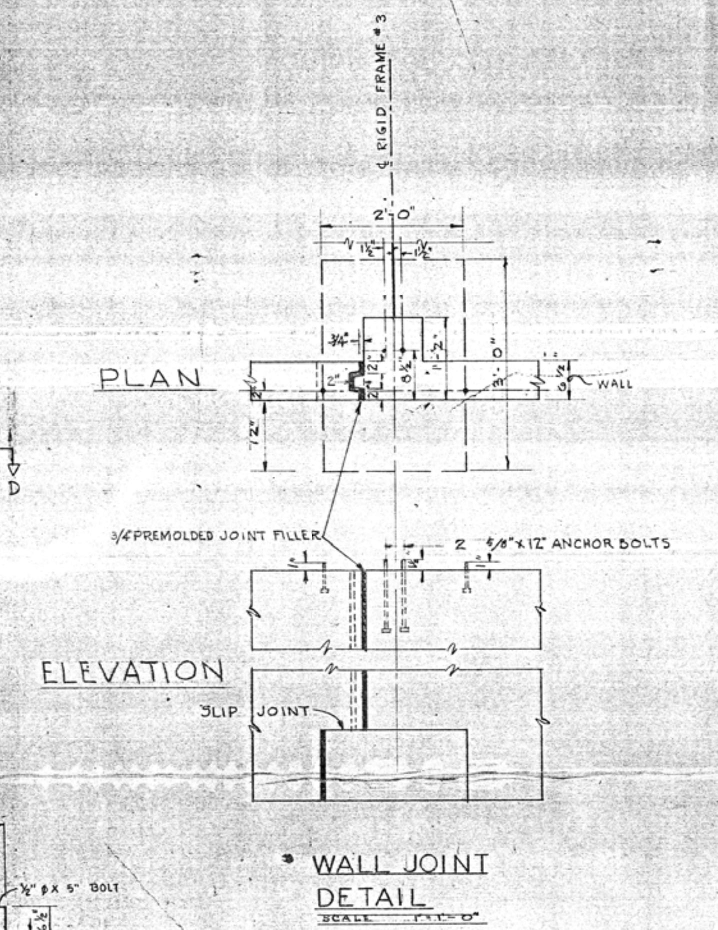

INSERT
SEPTIC TANK & LEACHING FIELD
SCALE 1" = 20'
NEW 4" PERFORATED LEACHING PIPE
LEACHING FIELD
NEW DISTRIBUTION BOX FOR DETAILS SEE Y. & D. DWG. 1,030,864
NEW SEPTIC TANK TO CONFORM TO PLATE 23, TYPE A (500 GAL) SPEC 42YC
FACE-NEW BLDG
EXIST 4160V 3Φ 4W DISTRIBUTION LINE
NEW 15KVA 2400-120/240V 1Φ TRANSFORMER ON EXIST. POLE FURNISHED BY GOVERNMENT INSTALLED BY CONTRACTOR
CUT IN NEW 2" x 2" x 1" TEE WITH CURB STOP
NEW BLDG.
BLDG 93
LIMIT OF GRADING
NEW 1" WATER
EXIST. POLE LINE
EXIST. WATER
LOCATION PLAN
SCALE 1" = 50'
CHIMNEY
FURNACE
4 SPACES @ 20'-0" = 80'-0"
40'-0"
SEE WALL DETAILS
OFFICE
TOILET
ABOVE
PLAN
SOLID BRIDGING
JOISTS: 2x8 @ 16" O.C.
OFFICE CEIL'G. FRAMING PLAN
INSULATION
DOOR OPENING
SOLID BRIDGING
ANCHOR BOLTS
1/2" GYPSUM BD.
SECTION G-G
GRAPHIC SCALES
SECTION F-F
SCALE 1/2" = 1'-0"
STRUCTURAL FRAME END WALL POST @ DOOR
"Z" ANCHORS IN ALT. COURSES FASTEN TO END WALL POST
8"x8"x16" CONC. MASONRY UNITS
ANCHOR STUDS TO C.M.U.
1/2" GYPSUM BD.
OFFICE
TOILET
WALL DETAILS
SCALE 1" = 1'-0"
B-5
C-5
INDICATES BLOWS ON SAMPLER PER 6" FROM 0-6" 6-12" 12-18" READINGS FROM LEFT TO RIGHT
INDICATES SAMPLE NO. DEPTH & MATERIAL
INDICATES BLOWS ON CASING
BORINGS
SCALE 1/4" = 1'-0"
LEGEND
APPROX. EXISTING CONTOUR LINES
BORING
NEW ELEVATION
2" BIT. CONC. ON 6" GRAVEL
SANITARY SEWER PIPE
PERFORATED LEACHING PIPE
EXIST. WATER LINE
EXIST. 4160V 3Φ 4W DISTRIBUTION LINE
SYMBOL
DESCRIPTION
DATE
APPROVAL
REVISIONS
PWO DRAWING NO. 803
DEPARTMENT OF THE NAVY
BUREAU OF YARDS & DOCKS
NAVAL AIR STATION BRUNSWICK, MAINE
DESIGNED BY TWOMBLY
DRAWN BY TWOMBLY
CHECKED BY
CONSTRUCTION OF A
DISPOSAL FACILITY
LOCATION PLAN, FLOOR PLAN, & DETAILS
NASB 146
CHIEF ENGINEER
SAFETY OFFICER
APPROVED
IND DPWO FOR CHIEF OF BUREAU
DATE 2-3-65
SATISFACTORY TO:
NAME
TITLE
DATE
SCALE GRAPHIC
SPEC. 61757/64
SHEET 1 OF 5
NBy 61757
Y & D DRAWING NO. 1,030,861





NOTES:

1. A GOVERNMENT FURNISHED RIGID FRAME BUTLER BUILDING 40'X100' IS LOCATED ON STATION, FOR ASSEMBLY BY THE SUCCESSFUL BIDDER. IT CONSISTS OF 6 RIGID FRAMES WITH PURLINS & GIRTS - FOUR 6'X15' SLIDING DOORS W/ HARDWARE, FOUR WINDOWS, SIDING & ROOFING WITH HARDWARE FOR ASSEMBLY ON THE 40' X 80' FOUNDATION BY OMISSION OF ONE 20' BAY.
2. LIVE LOADS
   - ROOF = 30 PSF — WIND = 20 PSF
   - FLOOR = 200 PSF
3. CONCRETE
   - CLASS D-1 f'_c = 2500 P.S.I. f_c = 1125 P.S.I.
4. STEEL (REINF.)
   - INTERMEDIATE GRADE, BILLET STEEL - DEFORMED BARS.
5. ALL COL. FOOTINGS TO BEAR ON UNDISTURBED SOIL.
6. TOP OF FOUNDATION SHALL BE SQUARE, LEVEL & TROWELED TO A SMOOTH FINISH.
7. THE RIGID FRAMED BUILDING WILL BE FURNISHED BY THE GOVERNMENT.

GRAPHIC SCALES

SYMBOL	DESCRIPTION	DATE	APPROVAL

REVISIONS

PWO DRAWING NO. 804

DEPARTMENT OF THE NAVY — BUREAU OF YARDS & DOCKS

NAVAL AIR STATION BRUNSWICK, MAINE

CONSTRUCTION OF A
DISPOSAL FACILITY
FOUNDATION PLAN, & DETAILS

DESIGNED BY TWOMBLY
DRAWN BY TWOMBLY
CHECKED BY

DPWO# NASB-146
SAFETY ENGR. WPG
FIRE PROT GLEASON
PROJ. ENGR. BENSON
DIRECTOR SEDDON

CHIEF ENGINEER
SAFETY OFFICER

APPROVED — DATE 2-3-65
IND DPWO FOR CHIEF OF BUREAU

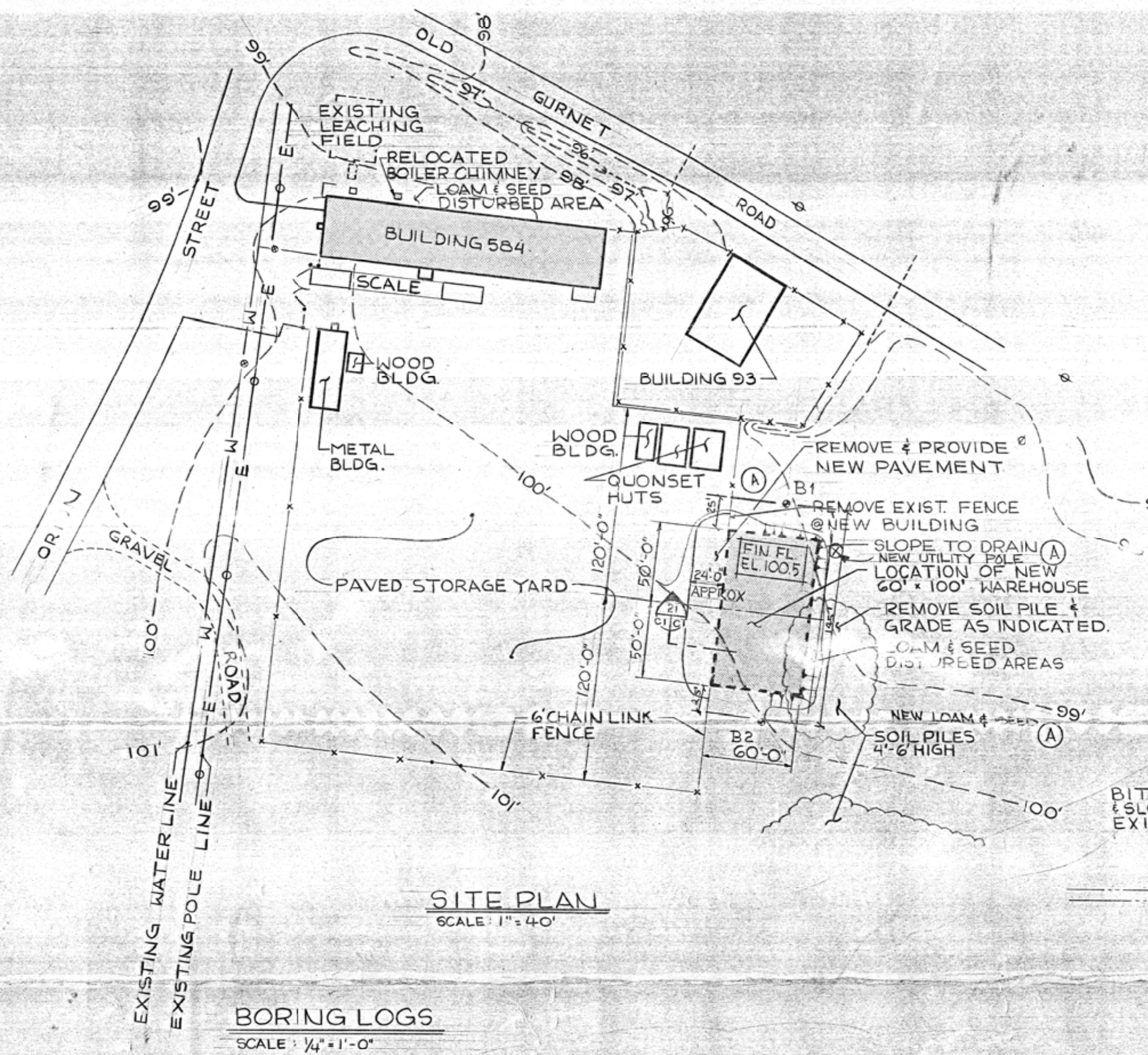
SATISFACTORY TO: NAME / TITLE / DATE

SCALE GRAPHIC — SPEC. 61757/64
SHEET 2 OF 5 — NBy 61757
Y&D DRAWING NO. 1,030,862

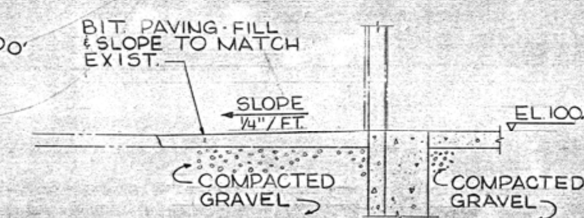
29 584

LTR	DESCRIPTION	PREP'D BY	DATE	APPROVED
A	REVISED AS BUILT	DB	11-1-82	DB

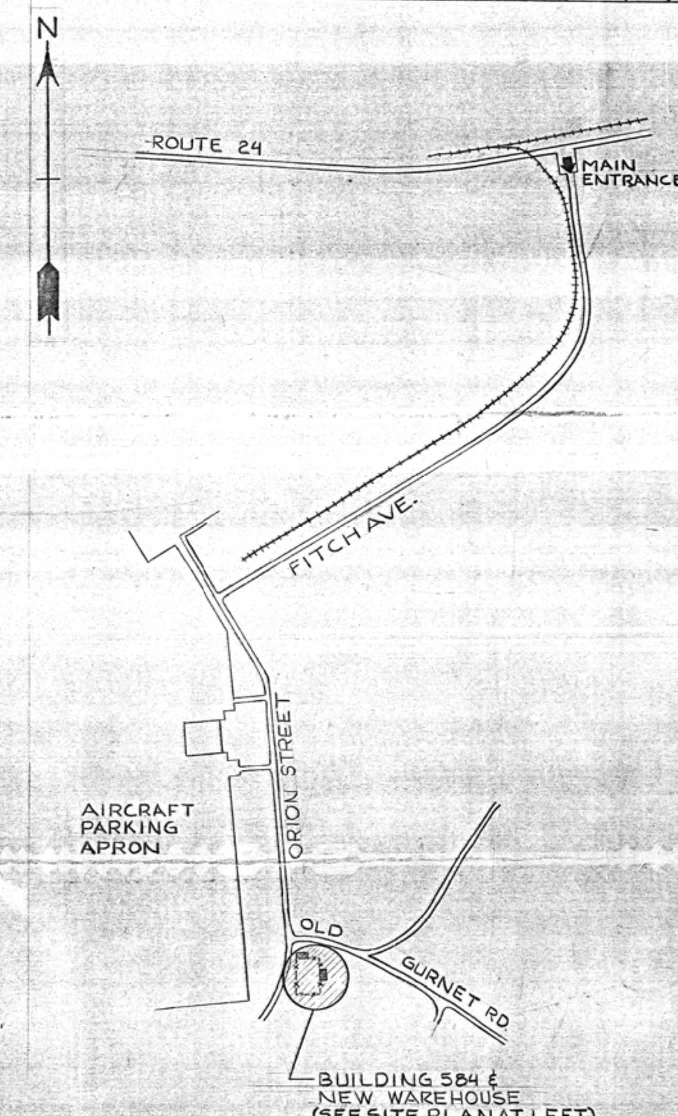
REVISIONS



SITE PLAN
SCALE: 1" = 40'

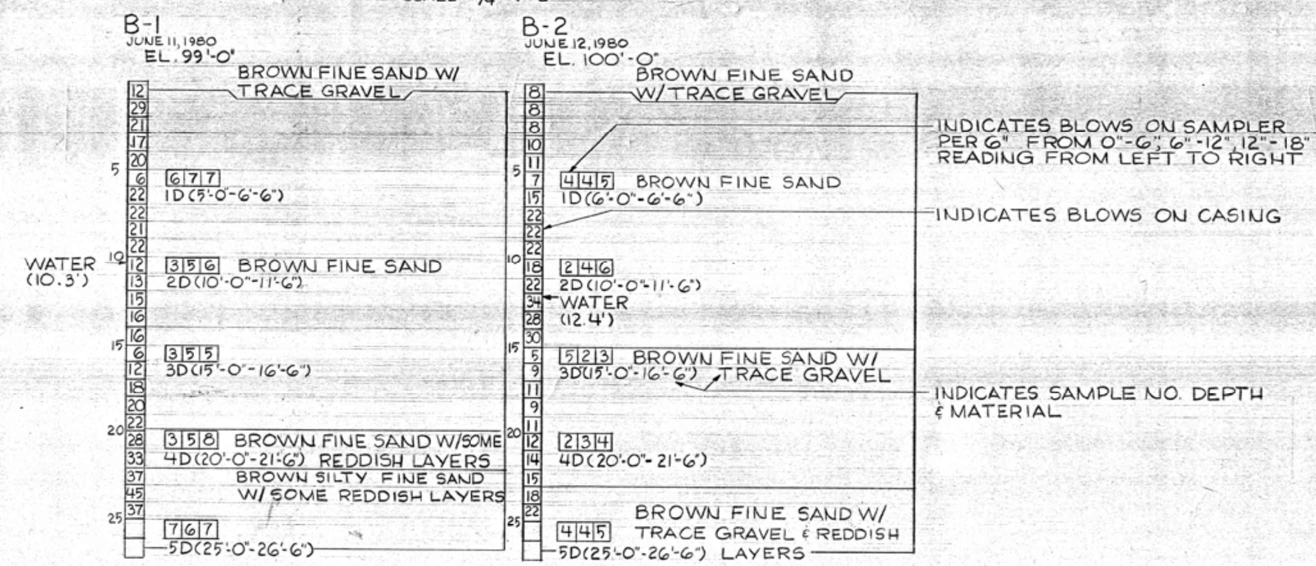


SECTION 21
SCALE: 1/2" = 1'-0" C-1 | C-1

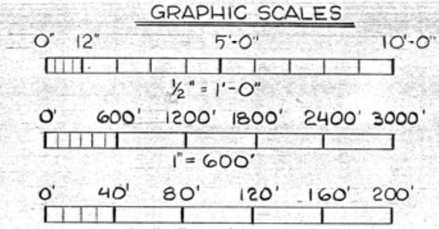


VICINITY PLAN
SCALE: 1" = 600'

BORING LOGS
SCALE: 1/4" = 1'-0"



GRAPHIC SCALES



CHECK GRAPHIC SCALE BEFORE USING

LEGEND

- AREAS OF RECONSTRUCTION
- AREAS OF NEW CONSTRUCTION
- EXISTING STRUCTURE

STATE OF MAINE — FRANCIS L. MACKELL — PROFESSIONAL ENGINEER

NEILL and GUNTER
Consulting and Design Engineers
P. O. Box 1959
PORTLAND, ME 04104

SUBMITTED BY _____ DATE 1/81
FIRM MEMBER EXECUTIVE ENG.
NORTHDIV
HD. _____ A E.I.C. _____
HD. _____ DIR. _____
APPROVED _____ DATE
OFFICER IN CHARGE
APPROVED _____ DATE 20/3/81
NORTHDIV FOR COMMANDER NAVFAC
SATISFACTORY TO _____ DATE

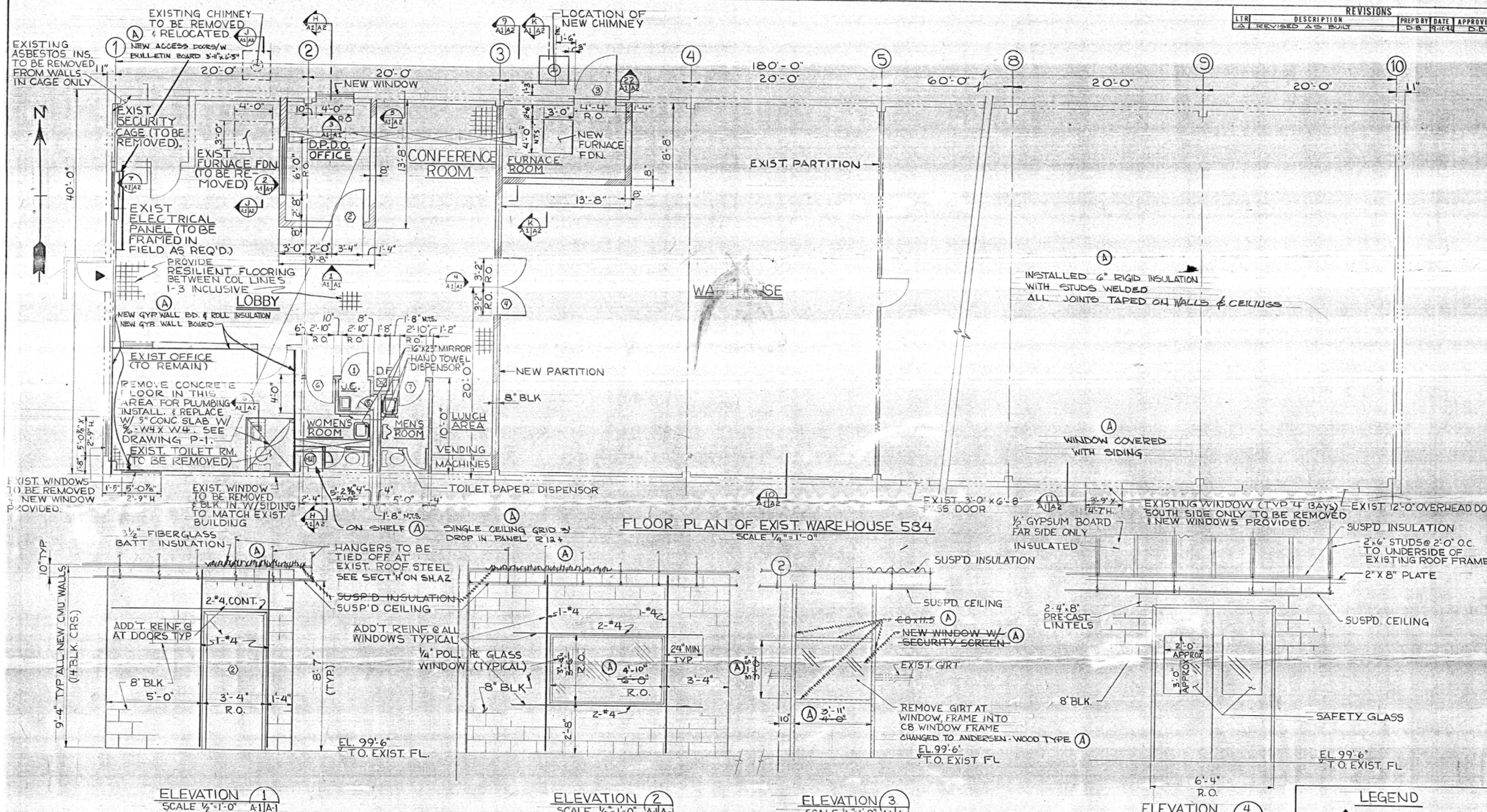
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
NORTHERN DIVISION
NAVAL BASE PHILADELPHIA, PA.
NAVAL AIR STATION BRUNSWICK, ME.
D.P.D.O. - COVERED STORAGE FACILITIES

SITE PLAN

SIZE	CODE IDENT. NO.	NAVFAC DRAWING NO.
F	80091	2048160

CONSTR. CONTR. NO. N62472-80-C-0033
SCALE: AS SHOWN | SPEC. 04-80-0033 | SHEET 1 OF 11 | C-1

BLDG 584



DOOR SCHEDULE

LOCATION				FRAME					DOOR				HARDWARE	REMARKS
DOOR NO.	OUTSIDE	HAND	INSIDE	WIDTH	HEIGHT	THK	TYPE	WALL CONST	WIDTH	HEIGHT	THK	TYPE	SET NUMBER (SEE SPECS.)	
1	LOBBY	L.H.R.	J.C.	2'-10"	6'-10	SEE SPECS	METAL	4" BLK	2'-6"	6'-8"	1 3/8"	METAL	1	—
2	LOBBY	RH.	OFFICE	3'-4"	7'-2"		METAL	8" BLK	3'-0"	7'-0"	1 3/4"		2	—
3	OUTDOOR	LHR.	FURN.	4'-4"	7'-2"		C8x11.5	METAL	4'-0"	7'-0"	1 3/4"		2	SEE NOTE 1.
4	LOBBY	LH&RH	WAREH.	6'-4"	7'-2"		METAL	8" BLK	3'-0"	7'-0"	1 3/4"		3	SEE NOTE 2.
5	JC	RHR	PIPE C.	1'-10"	7'-0"			4" BLK	1'-6"	6'-8"	1 3/8"		4	—
6	LOBBY	LH.	W. RM	2'-10"	6'-10"				2'-6"	6'-8"	1 3/8"		4	—
7	LOBBY	RH.	M. RM	2'-10"	6'-10"				2'-6"	6'-8"	1 3/8"		4	—
8	OUTDOOR	RHR	NEW WH.	3'-4"	7'-2"		C8x11.5	METAL	3'-0"	7'-0"	1 3/4	METAL	2	

DOOR NOTES:

1. DOOR Nº 3 TO HAVE 10"x14" LOUVER & 1HR FIRE RATING MIN.
2. DOOR Nº 4 TO HAVE HALF GLASS, W/WIRE SAFETY GLASS.

WINDOW NOTES:

1. ALL EXTERIOR WINDOWS TO BE DOUBLE INSULATED WINDOWS W/ SECURITY SCREEN PROVIDED IN A STEEL FRAME.

GENERAL NOTES:

1. ALL CMU PARTITIONS TO BE NON STRUC. WALLS AND REINF. VERTICALLY W/1-#4 @ 20" O.C & HORZ. W/ WIRE JOINT REINF. AT EACH COURSE & ADD'T REINF AT OPN'GS.
2. FOR SPECIAL REQUIREMENTS REGARDING THE HANDLING & REMOVAL OF ASBESTOS REFER TO SECT. 02119 OF SPEC

CHECK GRAPHIC SCALE BEFORE USING

GRAPHIC SCALES

0' 12" 5'-0" 10'-0" 15'-0" 20'-0"
1/4"=1'-0"

0" 12" 5'-0" 10'-0"
1/2"=1'-0"

LEGEND

SECT. OR ELEVATION NUMBER OR LETTER
SHEET SHOWN ON.
SHEET TAKEN ON.
EXISTING WALL
NEW WALL
J.C. JANITORS CLOSET
D.F. DRINKING FOUNTAIN

STATE OF MAINE FRANCIS L. MACKELL 3016 REGISTERED PROFESSIONAL ENGINEER

SATISFACTORY TO DATE

NEILL and GUNTER
Consulting and Design Engineers
P. O. Box 1959
PORTLAND, ME 04104

SUBMITTED BY DATE
FIRM MEMBER EXECUTIVE ENG
NORTHDIV
HD. EIC
HD. DIR
APPROVED DATE
OFFICER IN CHARGE
APPROVED DATE 20/3/81
NORTHDIV FOR COMMANDER NAVFAC

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
NAVAL BASE NORTHERN DIVISION PHILADELPHIA, PA.
NAVAL AIR STATION BRUNSWICK, ME.
D.P.D.O. - COVERED STORAGE FACILITIES
BUILDING 584 ARCHICTECTURAL FLOOR PLAN & ELEVATIONS

SIZE F | CODE IDENT. NO. 80091 | NAVFAC DRAWING NO. 2048161
CONSTR. CONTR. NO. N62472-80-C-0033
SCALE: 1/4"=1'-0" | SPEC. 04-80-0033 | SHEET 2 OF 11 | A1