APPENDIX F.2

Asbestos Containing Materials and Lead Based Paint Survey Report

LIMITED LEAD-BASED PAINT AND ASBESTOS-CONTAINING MATERIAL SURVEY FOR VACANT STRUCTURES TO BE DEMOLISHED

PUERTO RICO PORTS AUTHORITY (PRPA)
RAFAEL HERNÁNDEZ AIRPORT
AGUADILLA, PR

June, 2018

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EXECUTIVE SUMMARY

AECOM Caribe, LLP (AECOM) was retained by the Puerto Rico Ports Authority (PRPA) to perform a Limited Asbestos and Lead-Based Paint (LBP) Survey at several vacant and deteriorated buildings scheduled for demolition at Rafael Hernández Airport (BQN Airport) in the municipality of Aguadilla, Puerto Rico. The mentioned buildings are located in a former industrial area at the north side of the old runway 8-26. The subject site comprises a portion of the airport of approximately 40 acres. The mentioned structures will be demolished to provide space for the reconstruction of the old runway 8-26.

The purpose of this survey is to identify the presence of ACM and LBP in the buildings scheduled for demolition. This survey report includes a brief description of the structures, field sampling protocols, analytical methods and limitations, summary of findings, and recommendations.

Sampling activities were conducted during February 13-23, 2018. The sampling points were determined based on field observation of suspect materials, painted areas and in accordance with the protocols recommended for sampling inspections. The structures were evaluated to identify the presence of Suspect Asbestos Containing Materials (SACM) and Lead-Based Paint (LBP) materials. After performing the evaluation, and based upon professional judgment and experience, one hundred fifteen (115) ACM samples were taken due to the presence of Suspect Asbestos-Containing Material (SACM), and three hundred fifteen (315) LBP samples were taken due to the presence of Suspect Lead-Based Paint in the referenced structures. The surveyed structures were identified as Bld. 1000 and a Guardhouse; Bld. 1029 and an Herbicides storage room; Bld. 1070, Bld. 1089 (Airport old Control Tower); Bld. 1071 and related utilities; Bld. 1128 and various utility structures; Bld. 1120 (Former Fuel Storage Station); Bld. 2000, and Bld. 1251. Two other buildings identified as Bld. 1129 and 1132 were evaluated by the subcontractor CMC Environmental Consultants. Copy of the referenced evaluation report is included in Appendix G.

The collected samples and prepared chain of custody sheets were delivered to AES International, Inc. which is a local accredited laboratory for analysis. Samples for asbestos analysis were analyzed by PLM, (EPA Method 600/R-93/116). Paint chip samples were analyzed for detection of lead in paint chips using EPA SW-846 Method 7420 by Flame Atomic Absorption Spectroscopy (AAS). Based on the survey results obtained the following is concluded:

- Lead-Based Paint (LBP) was detected in the following structures: Bld. 1000, Bld. 1029, Bld. 1070, Bld. 1071, Bld. 1089, Bld. 1128, Bld. 1251 and Bld. 2000. No LBP was detected in Bld. 1120.

- Asbestos Containing Materials were detected in the following buildings: Bld. 1000, Bld. 1029, Bld. 1071, Bld. 1128, Bld. 1251, Bld. 2000, and Bld. 1120. No ACM was detected in Bld. 1070 and Bld. 1089.

According to the mentioned findings, LBP and ACM abatement activities are recommended at the evaluated buildings prior to the start any demolition activity in the site.

DISCLAIMER

This report is prepared by AECOM for the express use and benefit of PRPA, its agents and employees. The information in this report or portions thereof may be required to be included in notifications to employees, contractors or other visitors to the Site. This report is not intended to be used as a specification or work plan for any of the work suggested or recommended in this report.

This report is based upon conditions and practices observed at the property the date of site visit and information made available to the surveyor. This report does not intend to identify all hazards or unsafe practices, or to indicate that other hazards or unsafe practices do not exist at the premises.

1.0 INTRODUCTION

AECOM Caribe, LLP (AECOM) was retained by the Puerto Rico Ports Authority (PRPA) to perform a Limited Asbestos-Containing Material (ACM) and Lead-Based Paint (LBP) Survey at several vacant and deteriorated buildings scheduled for demolition at Rafael Hernández Airport (BQN Airport) in the municipality of Aguadilla, Puerto Rico. The mentioned buildings are located in a former industrial area at the north side of the old runway 8-26. The subject site comprises a portion of the airport of approximately 40 acres. The abandoned structures will be demolished to provide space for the reconstruction of the old runway 8-26.

The purpose of this survey is to identify the presence or not of ACM and LBP in the buildings scheduled for demolition (see Figure 1 in **Appendix A** for site location).

Sampling activities of this survey were conducted during February 13-23, 2018. The sampling points were determined based on field observation of suspect materials, painted areas and in accordance with the protocols recommended for sampling inspections. The structures were evaluated to identify the presence of Suspect Asbestos Containing Materials (SACM) and Lead-Based Paint (LBP) materials.

The survey is a working document designed to effectively manage waste disposal and minimize asbestos and lead based paint-related health risks during removal or demolition activities to personnel working on the subject site located in the municipality of Aguadilla, Puerto Rico. This report presents a description of the scope, methods and protocols, results of chemical analyses, conclusions and recommendations.

1.1 REGULATORY BACKGROUND

1.1.1 Asbestos Containing Building Materials

The term asbestos describes six naturally occurring fibrous minerals found in certain types of rock formations. Among that group, the minerals chrysotile, amosite, and crocidolite have been most commonly used in building products such as floor tile, pipe insulation, boiler insulation, and plasters. The minerals anthophyllite, actinolite and tremolite are not frequently found in ACBM. Asbestos can be found in numerous building materials. If maintained intact and undisturbed ACBM do not pose a health risk. They may, however, become a health hazard if they are damaged, disturbed, or deteriorate over time and release fibers into the air.

Asbestos materials can be classified as friable and non-friable. A friable Asbestos-Containing Building Material (ACM) is defined as any material that contains more than 1% asbestos, and that it is friable by hand pressure in its dry state. A Non-Friable ACM is any material that contains more than 1% asbestos and that in its dry state it is not friable by hand pressure. EPA has further divided Non Friable ACM as Categories I and II.

There are two EPA regulations governing asbestos, the Asbestos Hazard Emergency Response Act (AHERA) and the National Emission Standards for Hazardous Air Pollutants (NESHAP). AHERA (Title 40 CFR Part 763) was enacted by the Congress in 1986, which mandated a regulatory program to address the asbestos hazards in schools. Subsequently, on November 28, 1990 the Congress enacted the Asbestos School Hazard Abatement Reauthorization Act (ASHARA) which expanded the requirements of AHERA to persons who work with asbestos in public and commercial buildings, as well as schools.

As per requirements of the Clean Air Act (CAA) of 1970, EPA promulgated NESHAP (Title 40 CFR Part 61) on April 1973. NESHAP is intended to minimize the release of asbestos fibers during certain activities (i.e., installations, renovations, and demolitions). The NESHAP regulation also requires owners and operators to notify delegated State and local agencies and/or the regional EPA offices before demolition or renovation activities begin. In addition, NESHAP requires the removal of all friable ACBM prior to demolition.

The Occupational Safety and Health Administration (OSHA), and delegated States are responsible for regulating environmental exposure and protecting workers from asbestos exposure. OSHA requires owners of pre-1981 buildings to assume that all suspects ACBM is asbestos-containing until a survey is performed.

1.1.2 Lead-Based Paint

Lead-Based Paint (LBP) is defined as any paint or other surface coatings with a concentration equal or greater than 1.0 milligram per square centimeter of lead, when the analysis is conducted on site with an X-Ray Fluorescence Detector, or 0.5 percent by weight when the analysis is conducted using Atomic Absorption (AA) by an external laboratory. Equivalent units are 5,000 ug/g, 5,000 mg/kg or 5,000 ppm by weight. Surface coatings include paint, shellac, varnish, or any other coating, including wallpaper which covers painted surfaces.

The USEPA has proposed that LBP is a hazard when:

- There are more than 2 square feet of damaged paint at interior surfaces (walls, roofs, floors and doors);
- More than 10 square feet of the same at exterior surfaces; and,

- More than 10% of the surface total of all components with small surface areas such as window sills, window wells, trim, baseboards, etc.

1.2 DISPOSAL OF LEAD-BASED PAINT AND ASBESTOS-CONTAINING MATERIAL

1.2.1 Lead Based Paint Disposal Requirements

The Puerto Rico Environmental Quality Board allows the disposal of lead based paint abated from structures in authorized, Non-Hazardous waste industrial landfills. Likewise, lead-based paint containing debris can be disposed as non-hazardous waste, provided the waste has been tested for non-hazardous characteristics by a certified analytical laboratory.

1.2.2 Asbestos Disposal Requirements

Asbestos waste or debris must be promptly disposed of at an approved disposal site. Disposal of asbestos must follow EPA's National Emissions Standards for Hazardous Air Pollutants (NESHAP) 40 CFR part 61, subpart M. The EPA's Asbestos Waste Management Guidance offers useful information disposal. The rule requires:

- Methods to contain asbestos waste (wet, double-bagged).
- Procedures for hauling waste. Asbestos must not leak from the containers used to haul it.
- Disposal of asbestos containing material in an authorized landfill. Landfilling is the environmentally preferred method of asbestos disposal because asbestos fibers are immobilized by soil. Asbestos cannot be safely incinerated or chemically treated for disposal.
- Formal record keeping of asbestos waste disposal.

Puerto Rico’s Industrial Landfill Facilities are permitted by the Puerto Rico Environmental Quality Board to receive and dispose Asbestos-Containing Materials, as long as these are not mixed with, or contain hazardous constituents as defined by RCRA.

2.0 SURVEY AND SAMPLING PROCEDURES

2.1 SURVEYED SITES

Suspect ACM and LBP samples were collected from all the buildings and related structures scheduled for demolition located within the study area. A brief description of the surveyed structures is presented below. The date of construction of the buildings was unknown.

a- **Building 1000**: This structure consists of a one-story building of approximately 3,200 square feet and a guardhouse at the south side. It was used as an industrial facility in the past.

b- **Building 1029**: This structure consists of a one-story building of approximately 4,850 square feet and an herbicides storage room (398 square feet) at the northeast side. The building is being used as a mechanical shop by personnel of the Ports Authority.

c- **Building 1070**: This structure consists of a one-story building of approximately 8,600 square feet. It was used as an industrial facility in the past.

d- **Building 1071**: This structure consists of a one-story building of approximately 10,600 square feet and a water storage tank at the south. It was used as an industrial facility in the past.

e- **Building 1089**: This is the old Control Tower of the airport and consists of a two-story building of approximately 400 square feet.

f- **Building 1120**: This structure consists of a one-story building of approximately 300 square feet. It was used as the control/operation room of the former fuel storage facility of the airport.

g- **Building 1128**: This structure consists of a one-story building of approximately 19,800 square feet, a water treatment house, two storage tanks, a fuel storage tank and a control room. It was used as an industrial facility in the past.

h- **Building 1129**: This structure consists of a one-story building of approximately 24,000 square feet which was used as an industrial facility in the past. To the southwest side of this building there is a concrete utilities room of approximately 3,000 square feet. Building 1129 was used as a pharmaceutical facility for several years. This structure was surveyed by the subcontractor Carlos Carrion.

i- **Building 1132**: This structure consists of a one-story building of approximately 18,600 square feet which was used as an industrial facility in the past. This structure was surveyed by the subcontractor Carlos Carrion.

j- **Building 2000**: This structure consists of a one-story building of approximately 17,100 square feet. It was used as an industrial facility in the past.

k- **Building 1251**: This structure consists of a one-story building of approximately 8,100 square feet. It was used as an industrial facility in the past.

Based on the observations made during the site reconnaissance, all the structures were evaluated and sampled as follows:

- Painted components of the evaluated structures were sampled and analyzed to determine the presence or not of lead in paint chips.
- All suspect material observed in the structures scheduled for demolition was sampled to determine the presence or not of asbestos fibers in them.

A photographic log of surveyed structures that were found positive to LBP and ACM is included in **Appendix B.**

2.1.1 Sampling for Asbestos Content Determination

Sampling for ACM was conducted following EPA-recommended applicable guidelines. The procedure used for sampling suspect materials was designed to minimize possible fiber release. Samples of representative suspect materials were collected in accordance with the EPA guidelines and procedures presented in "Guide for Controlling Asbestos Containing Material in Buildings". Once the suspect material was identified, it was sprayed with water.

Then a representative sample of the material was collected and placed in an airtight bag. The bagged sample was properly labeled and stored. If any debris was generated during sampling it was properly cleaned.

A chain of custody form was completed for the bulk samples collected; samples were delivered to the analytical laboratory for analysis using Polarized Light Microscopy (PLM). Chains of Custody and analytical results are included in **Appendix C**.

2.1.2 Sampling for Lead-Based Paint

A standard method for collecting paint chip samples was followed. Several Standards have been provided:

- ASTM E 1729, *Standard Practice for Field Collection of Dried Paint Samples for Lead Determination by Atomic Spectrometry Techniques*.
- The paint chip collection protocol in *Appendix 13.2* of the 1995 HUD Guidelines.

- ASTM E 1645, *Standard Practice for the Preparation of Dried Paint Samples for Subsequent Lead Analysis* by Atomic Spectrometry, is a related standard that may also be consulted regarding the preparation of paint chip samples for laboratory analysis. Paint samples should be selected and collected by a PREQB-Certified Lead Inspector. All layers of paint in the area selected shall be collected, with enough samples to run the anticipated test method.
- The results may be reported in either, percent by weight, milligrams of lead per square centimeter or in micrograms of lead per gram, or both.
- If results are to be reported in milligrams per square centimeter, sample must be taken within a demarcated area of 100 cm^2, and all the paint within that area must be removed for testing.
- Results in milligrams per square centimeter are usually not affected by including any material underneath the paint.

To obtain each paint-chip sample, a minimum area of approximately one square inch was scored using a knife. The collected samples were placed in Zip-Lock Type re-sellable plastic bags, labeled and delivered to the laboratory for analysis. All samples were properly documented using the chain of custody form with the corresponding sample number. Chains of Custody and analytical results are included in **Appendix C**. Samples were analyzed using EPA Method 7420/6010.

2.1.3 Analytical Laboratory

AES International, Inc. was retained by AECOM conduct the Asbestos and Lead-Based Paint analyses. EMSL Accreditation documents are included in **Appendix D**.

3.0 RESULTS

3.1 LEAD BASED PAINT SAMPLING RESULTS

Results indicate that Lead-Based Paint was found in the following sampled structures. Laboratory results are presented in **Table 1-A to 9-A**. The location of the subject structures is illustrated in **Figure 2, Appendix A**.

1- Building 1000 – Eleven (11) of twenty (20) samples collected from this structure were found with LBP. Laboratory results are presented in **Table 1-A of Appendix E**.

2- Building 1029 – Fourteen (14) of forty-three (43) samples collected from this structure were found with LBP. Laboratory results are presented in **Table 2-A of Appendix E**.

3- Building 1070 – Six (6) of thirty-eight (38) samples collected from this structure were found with LBP. Laboratory results are presented in **Table 3-A of Appendix E**.

4- Building 1089 – Five (5) of nine (9) samples collected from this structure were found with LBP. Laboratory results are presented in **Table 4-A of Appendix E**.

5- Building 1071 – Three (3) of forty-five (45) samples collected from this structure were found with LBP. Laboratory results are presented in **Table 5-A of Appendix E**.

6- Building 1128 - One (1) of sixty-two (62) samples collected from this structure were found with LBP. Laboratory results are presented in **Table 6-A of Appendix E**.

7- Building 2000 – Thirteen (13) of fifty-eight (58) samples collected from this structure were found with LBP. Laboratory results are presented in **Table 7-A of Appendix E**.

8- Building 1251 – Seven (7) of thirty-five (35) samples collected from this structure were found with LBP. Laboratory results are presented in **Table 8-A of Appendix E**.

9- Building 1120 - None of five (5) samples collected from building 1120 resulted positive to LBP. Laboratory results are presented in **Table 9-A of Appendix E**.

TABLE A:
LEAD ANALYSIS RESULTS (POSITIVES)

RAFAEL HERNÁNDEZ AIRPORT-AGUADILLA, PR			
#	SAMPLE ID	SAMPLE DESCRIPTION/ LOCATION	LEAD RESULTS (% wt.)
Building 1000			
1	PRPA-1000-LBP-01	Metal door Reddish/Brown paint- Exterior – South	2.86
2	PRPA-1000-LBP-02	Rolling door Reddish/Brown paint- Exterior – South	2.09
3	PRPA-1000-LBP-03	Metal door Baby Yellow paint- Int. –R-1	1.02
4	PRPA-1000-LBP-08	Metal door Gray paint- Int. –R-1	0.640
5	PRPA-1000-LBP-10	Concrete wall bone white paint – Exterior	1.01
6	PRPA-1000-LBP-11	Metal door Reddish/Brown paint- Exterior	5.30
7	PRPA-1000-LBP-12	Concrete wall bone white paint – Exterior	3.90
8	PRPA-1000-LBP-13	Rolling door Reddish/Brown paint – Exterior-North	1.55
9	PRPA-1000-LBP-14	Metal edge Gray/Beige paint-Ext. – North	2.48
10	PRPA-1000-LBP-18	Metal edge roof gutter Red paint – Exterior	1.14
11	PRPA-1000-LBP-19	Guard H. metal door White/Light Gray paint – Exterior	4.58
Building 1029			
12	PRPA-1029-LBP-14	Metal door Gray paint- Ext. West	1.39
13	PRPA-1029-LBP-16	Wall edge (Entrance) Traffic Yellow paint - North	1.52
14	PRPA-1029-LBP-17	Concrete wall Gray/green paint – Interior R-1	3.28
15	PRPA-1029-LBP-18	Concrete wall Gray/green paint – Interior R-1	4.40
16	PRPA-1029-LBP-20	Concrete wall Light gray/green paint – Interior R-2	1.68
17	PRPA-1029-LBP-21	Concrete wall Bone white/green paint – Interior R-3	0.690
18	PRPA-1029-LBP-22	Concrete wall Bone white/green paint – Interior R-1	1.38
19	PRPA-1029-LBP-25	Concrete wall Bone white/green paint – Interior R-5	2.52
20	PRPA-1029-LBP-27	Concrete wall Blue/green paint – Interior R-6	2.34
21	PRPA-1029-LBP-28	Concrete wall Bone white paint – Interior R-8	1.67
22	PRPA-1029-LBP-30	Concrete wall Bone white/green/almond paint – Office Interior R-8	1.15
23	PRPA-1029-LBP-31	Concrete wall Bone white/green paint – Compressor Room R-7	1.64

RAFAEL HERNÁNDEZ AIRPORT-AGUADILLA, PR			
#	SAMPLE ID	SAMPLE DESCRIPTION/ LOCATION	LEAD RESULTS (% wt.)
24	PRPA-1029-LBP-33	Concrete wall Dark gray paint – Interior R-1	3.06
25	PRPA-1029-LBP-34	Concrete wall Dark gray paint – Interior R-1	3.70
Building 1070			
26	PRPA-1070-LBP-04	Traffic Yellow paint – South Parking	4.52
27	PRPA-1070-LBP-24	Concrete wall Almond/terracotta/green paint – Interior R-8	0.820
28	PRPA-1070-LBP-26	Concrete wall Red/almond paint – Interior R-3	1.04
29	PRPA-1070-LBP-31	Concrete wall Red/almond paint – Interior	1.85
30	PRPA-1070-LBP-36	Concrete wall Red paint – Interior	3.09
31	PRPA-1070-LBP-37	Electric Pipe/Telephone panel Orange paint- Interior R-11	5.52
Building 1089			
32	PRPA-1089-LBP-01	Concrete wall Dark gray/red paint – Exterior South wall	12.2
33	PRPA-1089-LBP-02	Concrete wall Light gray/red paint – Exterior West wall	2.76
34	PRPA-1089-LBP-03	Concrete wall Dark gray/dark blue paint – Exterior West wall	8.44
35	PRPA-1089-LBP-04	Concrete wall Light gray/red paint – Exterior	19.0
36	PRPA-1089-LBP-07	Concrete wall Light gray/bone white, red, green paint – Exterior East wall	4.52
Building 1071			
37	PRPA-1071-LBP-31	Electric Pipe Orange paint – Interior Room 15	2.96
38	PRPA-1071-LBP-34	Concrete floor Traffic yellow paint – West entrance	8.72
39	PRPA-1071-LBP-35	Eave of the Building Terracota/brown/ivory paint – West Entrance	0.680
Building 1128			
40	PRPA-1128-LBP-22	Metal Door Gray/brown paint – Interior Room 7	0.780
Building 2000			
41	PRPA-2000-LBP-17	Concrete wall Dark gray paint – Interior Room 1	0.780
42	PRPA-2000-LBP-18	Concrete wall White/light green/terracotta paint – Interior Room 1	4.74
43	PRPA-2000-LBP-20	Concrete wall Dark gray paint – Interior Room 1	1.46
44	PRPA-2000-LBP-49	Concrete wall Light green paint – Exterior	3.46
45	PRPA-2000-LBP-50	Concrete wall Light gray paint – Exterior	1.17
46	PRPA-2000-LBP-51	Concrete wall Light gray paint – Exterior	1.57

RAFAEL HERNÁNDEZ AIRPORT-AGUADILLA, PR			
#	SAMPLE ID	SAMPLE DESCRIPTION/ LOCATION	LEAD RESULTS (% wt.)
47	PRPA-2000-LBP-52	Concrete wall Green paint – Exterior	1.81
48	PRPA-2000-LBP-53	Concrete wall Light pink paint – Exterior	1.57
49	PRPA-2000-LBP-54	Concrete wall Light gray/beige paint – Exterior West	4.74
50	PRPA-2000-LBP-55	Concrete wall Light gray/beige paint – Exterior Northwest	6.12
51	PRPA-2000-LBP-56	Concrete wall Light gray/beige paint – Exterior North	4.80
52	PRPA-2000-LBP-57	Concrete wall Dark green/beige paint – Exterior Northeast	4.56
53	PRPA-2000-LBP-58	Concrete wall Light green paint – Exterior East	1.05
Building 1251			
54	PRPA-1251-LBP-01	Concrete wall Bone white/light green paint – Interior Room 1	1.23
55	PRPA-1251-LBP-02	Concrete wall Bone white paint – Interior Room 1	5.80
56	PRPA-1251-LBP-04	Concrete wall Bone white/light green paint – Interior Room 1	1.26
57	PRPA-1251-LBP-07	Concrete wall Bone white/light green paint – Interior Room 1	2.98
58	PRPA-1251-LBP-16	Concrete wall Bone white/light green paint – Interior Hall	7.90
59	PRPA-1251-LBP-17	Concrete wall Bone white/green paint – Interior Room 6	0.840
60	PRPA-1251-LBP-19	Concrete wall Bone white paint – Interior Hall	1.62

3.2 ASBESTOS CONTAINING MATERIALS SAMPLING RESULTS

Results indicate that asbestos containing materials were found in the following sampled structures. Laboratory results are presented in **Table 1-B to 9-B, Appendix E**. The location of the subject structures is illustrated in **Figure 2, Appendix A**.

1- Building 1000 – Five (5) of ten (10) samples collected from the evaluated structure were found with ACM. Laboratory results are presented in **Table 1-B of Appendix E**.

2- Building 1029 – Two (2) of ten (10) samples collected from the evaluated structure were found with ACM. Laboratory results are presented in **Table 2-B of Appendix E**.

3- Building 1070 – None of the eighteen (18) samples collected from this structure were found with ACM. Laboratory results are presented in **Table 3-B of Appendix E**.

4- Building 1089 – None of the three (3) samples collected from this structure were found with ACM. Laboratory results are presented in **Table 4-B of Appendix E**.

5- Building 1071 – Twelve (12) of thirty-six (36) samples collected from the evaluated structure were found with ACM. Laboratory results are presented in **Table 5-B of Appendix E**.

6- Building 1128 – Two (2) of eighteen (18) samples collected from the evaluated structure were found with ACM. Laboratory results are presented in **Table 6-B of Appendix E**.

7- Building 2000 – Eighteen (18) of twenty-nine (29) samples collected from the evaluated structure were found with ACM. Laboratory results are presented in **Table 7-B of Appendix E**.

8- Building 1251 – Eight (8) of ten (10) samples collected from the evaluated structure were found with ACM. Laboratory results are presented in **Table 8-B of Appendix E**.

9- Building 1120 – Two (2) of three (3) samples collected from the evaluated structure were found with ACM. Laboratory results are presented in **Table 9-B of Appendix E**.

TABLE B:
ASBESTOS ANALYSIS RESULTS (POSITIVES)

RAFAEL HERNÁNDEZ AIRPORT - AGUADILLA, PR			
#	SAMPLE ID	SAMPLE DESCRIPTION/ LOCATION	ACM RESULTS (% ASBESTOS)
Building 1000			
1	PRPA-1000-ACM-02	8" x 8" VFT-green & mastic-Interior Room 1	3 % Chrysotile
2	PRPA-1000-ACM-03	8" x 8" VFT-green & mastic- Interior Room 1	4 % Chrysotile
3	PRPA-1000-ACM-05	8" x 8" VFT-brown & mastic- Interior Room 2	3 % Chrysotile
4	PRPA-1000-ACM-06	8" x 8" VFT-brown & mastic- Interior Room 2	4 % Chrysotile
5	PRPA-1000-ACM-10	White insulation material- Interior room 3	15 % Chrysotile 20 % Amosite
Building 1029			
6	PRPA-1029-ACM-01-B	12" x 12" VFT- Cafeteria	3 % Chrysotile
7	PRPA-1029-ACM-01-C	12" x 12" VFT- Cafeteria	4 % Chrysotile
Building 1071			
8	PRPA-1071-ACM-03-A	12" x 12" Black VFT & mastic- Under carpet-Hall	2 % Chrysotile
9	PRPA-1071-ACM-03-B	12" x 12" Brown VFT & mastic- Under carpet-Hall	2 % Chrysotile
10	PRPA-1071-ACM-07	12" x 12" Cream VFT & mastic- below carpet	3 % Chrysotile
11	PRPA-1071-ACM-11-B	12" x 12" Cream VFT & black mastic- Room 2	2 % Chrysotile
12	PRPA-1071-ACM-14	9" x 9" Green VFT & black mastic- Room 2	4 % Chrysotile
13	PRPA-1071-ACM-15	9" x 9" Ivory VFT & black mastic- Room 2	4 % Chrysotile
14	PRPA-1071-ACM-16	10" x 10" Brown VFT & black mastic-Hall	2 % Chrysotile
15	PRPA-1071-ACM-17-A	9" x 9" Green VFT & black mastic- Room 4	4 % Chrysotile
16	PRPA-1071-ACM-17-B	9" x 9" Dark gray VFT & black mastic- Room 4	4 % Chrysotile
17	PRPA-1071-ACM-22-A	9" x 9" Brown VFT & mastic - Right	3 % Chrysotile
18	PRPA-1071-ACM-22-B	9" x 9" Black VFT & mastic - Right	3 % Chrysotile
19	PRPA-1071-ACM-26	12" x 12" Black VFT & mastic - Interior Room	3 % Chrysotile
Building 1128			
20	PRPA-1128-ACM-10-B	12" x 12" VFT & mastic - Lobby	2 % Chrysotile
21	PRPA-1128-ACM-14-B	12" x 12" VFT & mastic – Main Hall	3 % Chrysotile
Building 2000			
22	PRPA-2000-ACM-01	9" x 9" Ivory VFT & mastic- Bld. 2 Room 1	4 % Chrysotile

RAFAEL HERNÁNDEZ AIRPORT - AGUADILLA, PR			
#	SAMPLE ID	SAMPLE DESCRIPTION/ LOCATION	ACM RESULTS (% ASBESTOS)
23	PRPA-2000-ACM-02	9" x 9" Green VFT & mastic- Bld. 2 Room 1	3 % Chrysotile
24	PRPA-2000-ACM-04	9" x 9" Green VFT & mastic- Bld. 2 Room 3	5 % Chrysotile
25	PRPA-2000-ACM-05	9" x 9" VFT & mastic- Bld. 2 Room 2	3 % Chrysotile
26	PRPA-2000-ACM-06-B	12" x 12" VFT & mastic- Bld. 2 Room	4 % Chrysotile
27	PRPA-2000-ACM-07-B	12" x 12" VFT & black mastic	3 % Chrysotile
28	PRPA-2000-ACM-08-B	12" x 12" VFT & black mastic	2 % Chrysotile
29	PRPA-2000-ACM-13	9" x 9" VFT	4 % Chrysotile
30	PRPA-2000-ACM-14	9" x 9" VFT & mastic	4 % Chrysotile
31	PRPA-2000-ACM-17	Transite panel	15 % Chrysotile
32	PRPA-2000-ACM-18	9" x 9" Brown VFT & mastic	4 % Chrysotile
33	PRPA-2000-ACM-19	9" x 9" Blue VFT & mastic	5 % Chrysotile
34	PRPA-2000-ACM-20	9" x 9" Green VFT & mastic	4 % Chrysotile
35	PRPA-2000-ACM-21	9" x 9" Green VFT & mastic	5 % Chrysotile
36	PRPA-2000-ACM-22	9" x 9" Brown VFT & mastic	5 % Chrysotile
37	PRPA-2000-ACM-23	9" x 9" Green VFT & mastic	4 % Chrysotile
38	PRPA-2000-ACM-24	9" x 9" Brown VFT & mastic	3 % Chrysotile
39	PRPA-2000-ACM-25	Black Pipe Insulation material – North wall	3 % Chrysotile
Building 1251			
40	PRPA-1251-ACM-01-A	9" x 9" Black VFT & mastic – Bld. A Room	3 % Chrysotile
41	PRPA-1251-ACM-01-B	9" x 9" Black VFT & mastic – Bld. A Room	4 % Chrysotile
42	PRPA-1251-ACM-02-A	9" x 9" Brown/Ivory VFT & mastic – Room	3 % Chrysotile
43	PRPA-1251-ACM-02-B	9" x 9" Brown/Ivory VFT & mastic – Room	4 % Chrysotile
44	PRPA-1251-ACM-03	9" x 9" Green VFT & mastic – Room	4 % Chrysotile
45	PRPA-1251-ACM-04	9" x 9" Black VFT & mastic – Room	3 % Chrysotile
46	PRPA-1251-ACM-05	9" x 9" Brown VFT & mastic – Bld. B Room 4	4 % Chrysotile
47	PRPA-1251-ACM-06	9" x 9" Black VFT & mastic – Bld. B Room	4 % Chrysotile
Building 1120			
48	PRPA-1120-ACM-01	9" x 9" Ivory VFT & mastic – Bld. Interior	3 % Chrysotile
49	PRPA-1120-ACM-02	9" x 9" Brown VFT & mastic – Interior Room 1	4 % Chrysotile

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the sampling program the following conclusions are made:

- The survey revealed the presence of lead in Paint above the regulatory threshold standard of 0.5 % by weight in the following structures: Bld. 1000, Bld. 1029, Bld. 1070, Bld. 1071, Bld. 1089, Bld. 1251, and Bld. 2000.
- The survey revealed the presence of Asbestos Containing Materials (1 % or more of asbestos fibers content) in the following structures: Bld. 1000, Bld. 1029, Bld. 1071, Bld. 1251, Bld. 1120, Bld. 1128 and Bld. 2000.

RECOMMENDATIONS:

- LBP Abatement activities are recommended for the removal of the lead-based paint prior to the start of demolition activities. After abatement activities are completed, the debris from the demolition can be disposed as non-hazardous, in an authorized industrial landfill
- ACM Abatement activities are recommended for the removal of the asbestos-containing material prior to the start of demolition activities. After abatement activities are completed, the debris from the demolition can be disposed as non-hazardous, in an authorized industrial landfill.
- A notification shall be submitted to the PR Environmental Quality Board and the PR Office of General Permits (OGPe) in order to apply and obtain a Demolition Permit prior to beginning demolition of structures.
- A copy of this Survey Report must be maintained on site during demolition activities.

5.0 LIMITATIONS

URS Caribe has completed this program using applicable practices and rationale. The testing and sampling documented herein considers general practice's recommended guidelines, as well as those criteria that follows experience and common sense in the field of environmental sampling and site-specific constraints and limitations, as well as safety issues.

Samuel Hernández, EIT
Project Engineer / / Certified LBP & ACM Inspector

Víctor Morales, PE
Project Manager

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APPENDIX G

Cultural Resources Assessment Survey

Rafael Hernandez Airport
Runway 8-26 Reconstruction
Environmental Assessment

Phase I Cultural Resources Assessment Survey

Prepared for:

Puerto Rico Ports Authority
and
Federal Aviation Administration

Prepared by:

AECOM

March 2020

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ACRONYMS AND ABBREVIATIONS

AC	Advisory Circular
ASGCA	American Society of Golf Course Architects
APE	Area of Potential Effect
BQN	Rafael Hernandez Airport
CFR	Code of Federal Regulations
cmbgs	Centimeters Below Ground Surface
CRAS	Cultural Resources Assessment Survey
DoD	Department of Defense
EA	Environmental Assessment
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GSA	General Services Administration
PCC	Portland Cement Concrete
PCI	Pavement Condition Index
PRPA	Puerto Rico Ports Authority
PRSHPO	Puerto Rico State Historic Preservation Office
RAFBHA	Ramey Air Force Base Historical Association
RPZ	Runway Protection Zone
SAC	Strategic Air Command
STP	Shovel Test Pit
US	United States
USCG	US Coast Guard
USGS	US Geological Survey
WWII	World War II

CHAPTER 1 INTRODUCTION

The Puerto Rico Ports Authority (PRPA) and the Federal Aviation Administration (FAA) are preparing an Environmental Assessment (EA) for the reconstruction of Runway 8-26 at Rafael Hernandez Airport, Aguadilla, Puerto Rico (BQN), hereinafter referred to as the Proposed Project. The EA focuses on two primary alternatives for Proposed Project implementation.

This Phase I Cultural Resources Assessment Survey (CRAS) was conducted in support of the EA. Archaeological and historic architectural investigations summarized in this CRAS were conducted pursuant to Section 106 of the National Historic Preservation Act, in compliance with the regulations issued by the Advisory Council on Historic Preservation (36 Code of Federal Regulation (CFR) 800). All work conforms to professional guidelines set forth in the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 CFR 44716, as amended and annotated). The study is also in accordance with Section 10 of Law 112 of July 20, 1988, also known as the Terrestrial Archeology Act of Puerto Rico.

1.1. DESCRIPTION OF THE PROPOSED PROJECT

The Proposed Project would construct a new permanent Runway 8-26, 500 feet south of the existing Runway 8-26 centerline, to replace the existing Runway 8-26. The runway would measure 11,000 foot by 200 foot, comprised of Portland Cement Concrete (PCC) with asphalt overlay. The existing Runway 8-26 would be converted to a full length partial parallel taxiway.

The purpose of the Proposed Project to provide an air carrier runway of sufficient pavement strength and condition to accommodate existing and future operations at BQN, while maintaining adequate runway length for the existing and future aircraft fleet mix using BQN during pavement rehabilitation and reconstruction.

A 2004 pavement evaluation[1] concluded that the PCC sections on both ends of the existing runway are in good condition with Pavement Condition Index (PCI) values of 88 (i.e., "Good"), but the asphalt concrete overlay sections across the approximate 8,200-foot center portion had PCI values ranging from 0 to 13 (i.e., "Failed"). The two-inch asphalt overlay had totally failed and the underlying asphalt was heavily oxidized. It was also determined that based on PCC modulus values the PCC underlying the asphalt pavement must be removed and replaced.

A pavement condition study was subsequently conducted by the United States (US) Air Force in 2013[2], noting that although approximately 4,000 feet within this section of the runway has been repaired, a 2,000-foot section has a PCI Rating of "Very Poor" (i.e., less than 40) causing a 25-percent reduction in adjusted gross loads for aircraft using the runway. In that same year, an

[1] *Final Pavement Evaluation Report, Runway 8-26, Rafael Hernandez International Airport (BQN), Aguadilla, Puerto Rico*. Prepared by DMJM Aviation, Inc., June 2004.
[2] *Airfield Pavement Summary*. Prepared by US Air Force, February 2013.

airport inspection was conducted by the FAA[3] in accordance with 14 CFR Part 139 and revealed that BQN was not in compliance with 14 CFR Section 139.305(a)(6):

> *"Ponding was observed along the length of Runway 8-26. The runway needs to be crowned and grooved to avoid standing water. Runway grooving is needed to eliminate hydroplaning on the wet runway, resulting in shorter braking distance of aircraft on wet pavement. The pavement condition of the runway is poor and must be addressed. Although Foreign Object Debris was not found on the runway, it needs to be resurfaced. The certificate holder must develop a project to correct the pavement condition [by Dec 16, 2013]. An overlay should be designed to build up the centerline and create a crowned section with a shortened drainage length"*

Subsequent analysis as part of the PRPA Regional Airports Pavement Maintenance and Management Program[4] corroborated previous PCI reports. The Program further forecasted that additional sections of Runway 8-26 would degrade to "Very Poor" rating by 2021.

Recent analysis of runway take-off length requirements for existing and future operations at BQN indicates that the existing runway length of 11,700 feet is sufficient for all passenger and cargo aircraft flying to the continental US to operate at 100 percent load factors. With the exception of the B747-800, long-range international cargo aircraft take-off operations are restricted to no more than 90 percent of maximum payload capacity. Existing available landing lengths on the runway are sufficient for fleet operations even under hottest day/wettest conditions.

The runway length analysis concluded that payload restrictions would begin to occur for domestic passenger aircraft at a length of 9,050 feet Take-Off Run Available, and that at this length long-range international cargo aircraft would operate with load factors between 64 percent and 74 percent, which is considered to be unprofitable to cargo operators. Cargo operators that would experience this level of payload restriction have indicated that a minimum 10,500 feet of useable runway take-off length is required; else these operators may elect to use an alternative airport.

1.2. ALTERNATIVES

To date, the PRPA and FAA have evaluated a variety of Runway 8-26 replacement and reconstruction alternatives which would alleviate the pavement conditions described in **Section 1.1** while maintaining sufficient runway length. The full catchment of alternatives evaluated included temporary and permanent runway replacement options, which are described in **Appendix A**. Ultimately, and as described in further detail within the EA, the PRPA and FAA

[3] Letter of Correction from Charlotte Jones, FAA Southern Region, to Edgar Sierra, Rafael Hernandez Airport, regarding CY 2013 14 CFR Part 139 Compliance Inspection, EIR Number: 2013SO800102, September 10, 2013.
[4] *Regional Airport Pavement Maintenance and Management Program, Rafael Hernandez Airport (BQN)*. Prepared by Kimley-Horn and Associates, Inc., June 2016.

arrived at two principal alternatives which fully meet the established purpose and need, described below:

- Alternative 2B (**Figure 1.2-1**): Shifts Runway 8-26 500 feet south and 862 feet east of current alignment. Achieves current FAA design standards and land use compatibility requirements for Runway Protection Zones (RPZ), as directed by FAA Advisory Circular (AC) 150/5300-13A, Change 1, by applying a displaced threshold of 325 feet on Runway 8, 130 feet on Runway 26, and utilizing declared distances. Reduces usable take-off runway length to 10,698 feet on Runway 26. Further reduces useable landing length to 10,870 feet on Runway 26, and 10,145 feet on Runway 8. All RPZ areas would be contained on Airport property.

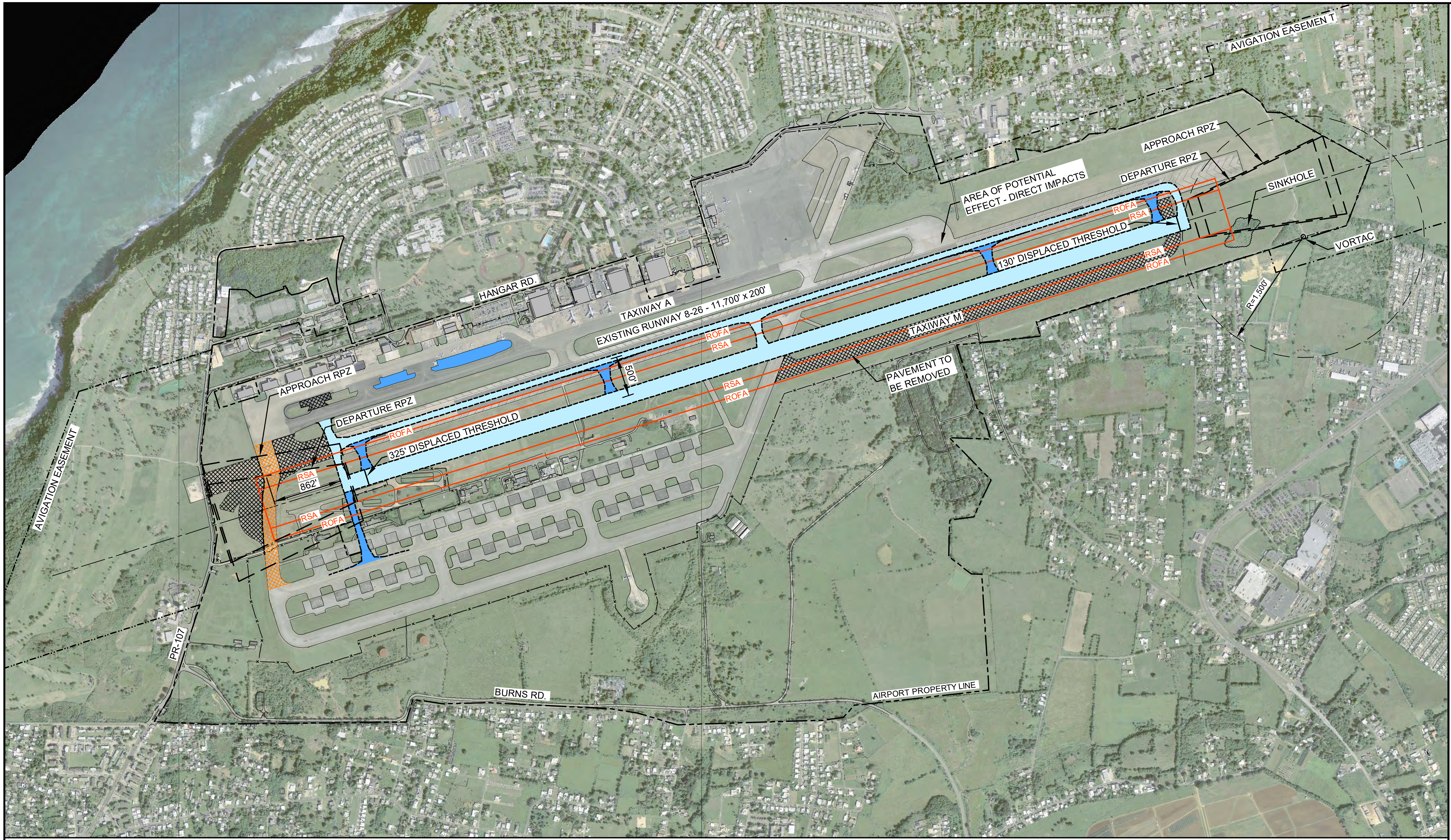
- Alternative 2D (**Figure 1.2-2**): Shifts Runway 8-26 500 feet south and 1,187 feet east of current alignment. Achieves current FAA design standards and land use compatibility requirements for RPZs, as directed by AC 150/5300-13A, Change 1, by applying a displaced threshold of 452 feet on Runway 8 and utilizing declared distances. Reduces usable take-off runway length to 10,675 feet on Runway 8. Further reduces useable landing length to 10,548 feet on Runway 26, and 10,148 feet on Runway 8. All RPZ areas would be contained on Airport property.

Regulations codified at 14 CFR Part 77 are designed to promote the safe and efficient use of navigable airspace, by providing instructions on the determination and disposition of manmade or natural obstructions to air navigation, navigational aids or facilities. Specifically, 14 CFR 77.17(a)(5) prevents the persistence or placement of objects within the surface of a takeoff and/or landing area of an airport, or within any imaginary surface (including, primary, horizontal, conical, approach or transitional surfaces).

So, although Alternatives 2B and 2D both achieve the Proposed Project purpose and need, as well as full compliance with design and safety standards for RPZs and safety areas, both alternatives must also fully comply with Part 77 regulations. As shown on **Figures 1.2-3** and **1.2-4**, buildings 1251, 1245, 3, 1104, 1032, 6, 1071, 1089, 1029, 1031, 2017 are all contained within the primary surface and/or approach surface of the new runway and cannot remain per Part 77.

Further, the remainder of the southern campus buildings are located in the Part 77 7:1 transitional surface of the runway and would be considered obstructions to navigable airspace. Also shown on the figures, the majority of these buildings penetrate the 7:1 surface by a significant amount, with the only exceptions being buildings 9, 15 and 1073. Preliminary airspace analysis has determined that all of these buildings cannot persist in the transitional surface without compromising the operational capabilities of arriving and departing aircraft. Therefore, as determined by FAA regulations, all buildings shown on **Figures 1.2-3** and **1.2-4** must be demolished as part of Alternatives 2B and 2D in order to achieve compliance with Part 77 regulations.

S:\Projects\P\Puerto Rico 2018\60579568_BQNEARW826\Environmental\900-Work\910 CAD\Figures\Final Figures\FIG 1.2-1_CRAS.dwg 03/04/2020 14:58



LEGEND

- INITIAL PAVEMENT CONSTRUCTION
- FUTURE TAXIWAY CONNECTIONS (ONCE JUSTIFIED)
- TO BE DEMOLISHED UPON TAXIWAY CONNECTION TO THE SOUTH

DECLARED DISTANCES

RUNWAY	TORA	TODA	ASDA	LDA
8	11,000'	11,000'	10,470'	10,145'
26	10,698'	11,000'	11,000'	10,870'

N

1000 0 1000

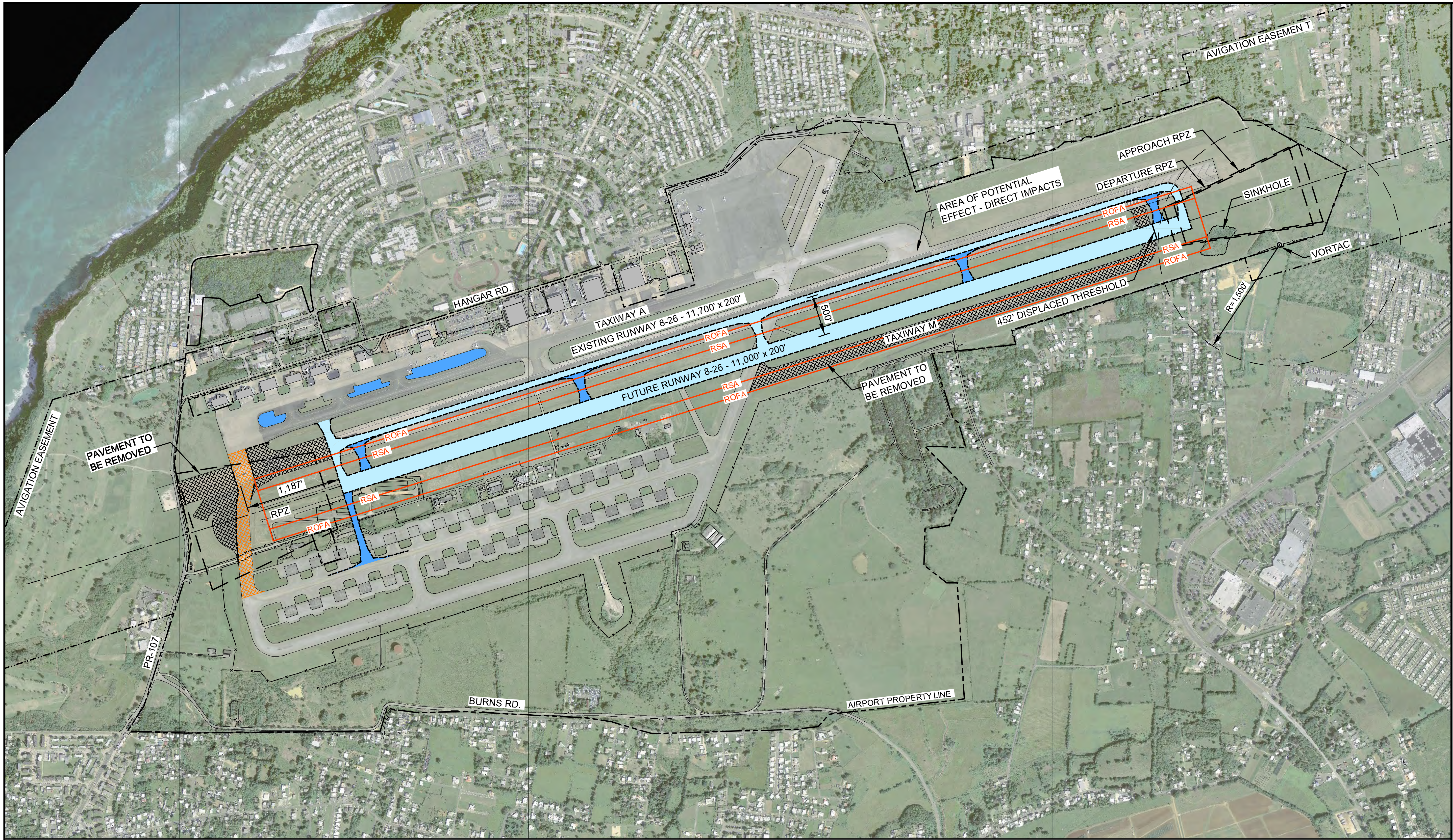
GRAPHIC SCALE IN FEET

RAFAEL HERNANDEZ AIRPORT
Aguadilla, Puerto Rico

RUNWAY 8-26 RECONSTRUCTION
ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 2B

FIGURE
1.2-1



LEGEND

- INITIAL PAVEMENT CONSTRUCTION
- FUTURE TAXIWAY CONNECTIONS (ONCE JUSTIFIED)
- TO BE DEMOLISHED UPON TAXIWAY CONNECTION TO THE SOUTH

DECLARED DISTANCES

RUNWAY	TORA	TODA	ASDA	LDA
8	10,675'	11,000'	10,148'	10,148'
26	11,000'	11,000'	11,000'	10,548'

N

1000 0 1000

GRAPHIC SCALE IN FEET

RAFAEL HERNANDEZ AIRPORT

Aguadilla, Puerto Rico

RUNWAY 8-26 RECONSTRUCTION
ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 2D

FIGURE
1.2-2

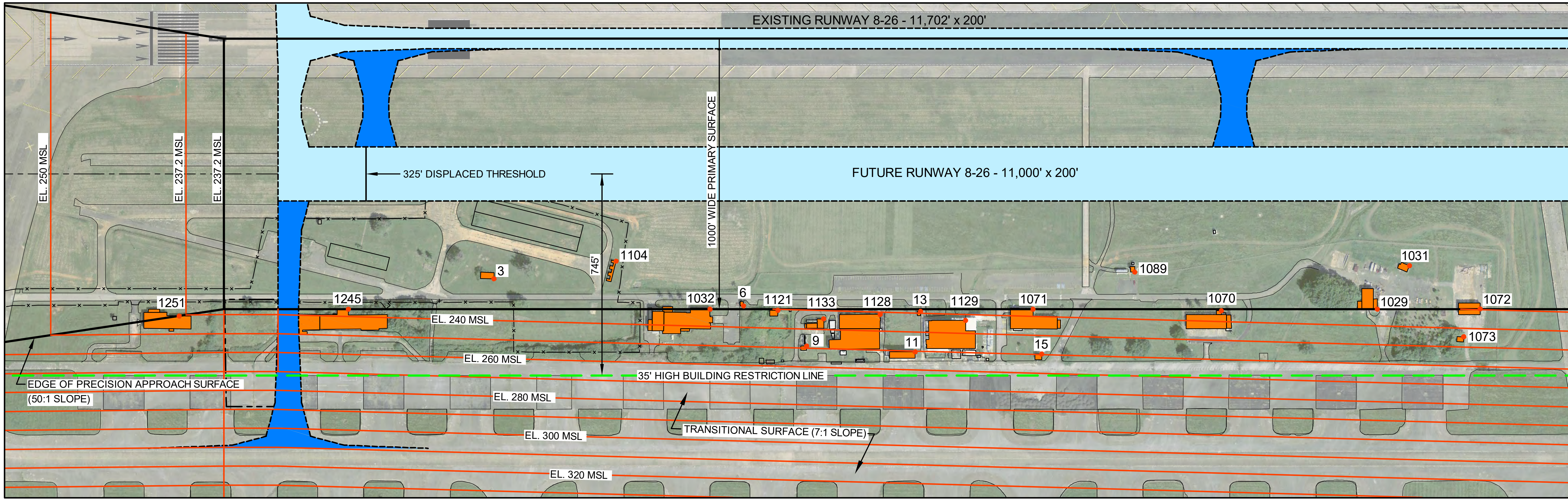
S:\Projects\P\Puerto Rico 2018\60579568_BQNEARW826\Environmental\900-Work\910 CAD\Figures\Final Figures\FIG 1.2-2_CRAS.dwg 03/04/2020 15:00

RAFAEL HERNANDEZ AIRPORT
Aguadilla, Puerto Rico

RUNWAY 8-26 RECONSTRUCTION
ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 2B (BUILDINGS WITHIN PROPOSED IMAGINARY SURFACES)

FIGURE 1.2-3



PLAN VIEW

OBSTRUCTION DATA TABLE

NO.	DESCRIPTION	LATITUDE	LONGITUDE	GROUND ELEVATION FEET (MSL)	BUILDING HEIGHT (FEET)	BUILDING ELEVATION FEET (MSL)	LOWEST AFFECTED FAR PART 77 SURFACE	SURFACE ELEVATION FEET (MSL)	PENETRATION (FEET)
1251	BUILDING	N 18°29'15.74"	W 067°08'35.79"	245	15	260	RUNWAY 8 APPROACH	240.5	19.5
1245	BUILDING	N 18°29'17.84"	W 067°08'29.67"	238	12	250	PRIMARY	236.2	13.8
3	BUILDING	N 18°29'20.52"	W 067°08'24.70"	242	12	254	PRIMARY	234.1	19.9
1104	BUILDING	N 18°29'22.49"	W 067°08'20.43"	240	12	252	PRIMARY	232.3	19.7
1032	BUILDING	N 18°29'21.85"	W 067°08'16.44"	233	25	258	PRIMARY	230.9	27.1
6	BUILDING	N 18°29'22.33"	W 067°08'15.25"	231	15	246	PRIMARY	230.4	15.6
1121	BUILDING	N 18°29'22.56"	W 067°08'13.94"	231	15	246	7:1 TRANSITIONAL	230.5	15.5
1133	BUILDING	N 18°29'22.77"	W 067°08'12.16"	234	20	254	7:1 TRANSITIONAL	234.3	19.7
9	BUILDING	N 18°29'21.63"	W 067°08'12.47"	234	15	249	7:1 TRANSITIONAL	249.0	0.0
1128	BUILDING	N 18°29'23.55"	W 067°08'10.15"	231	30	261	7:1 TRANSITIONAL	231.2	29.8
11	BUILDING	N 18°29'22.63"	W 067°08'08.43"	232	25	257	7:1 TRANSITIONAL	250.4	6.6
13	BUILDING	N 18°29'24.10"	W 067°08'08.71"	232	15	247	7:1 TRANSITIONAL	229.0	18.0
1129	BUILDING	N 18°29'24.29"	W 067°08'06.95"	232	30	262	7:1 TRANSITIONAL	233.1	28.9
15	BUILDING	N 18°29'23.95"	W 067°08'03.78"	231	12	243	7:1 TRANSITIONAL	249.8	-6.8
1071	BUILDING	N 18°29'25.42"	W 067°08'04.61"	231	15	246	PRIMARY	226.2	19.8
1089	BUILDING	N 18°29'27.85"	W 067°08'01.32"	230	25	255	PRIMARY	224.7	30.3
1070	BUILDING	N 18°29'27.46"	W 067°07'57.70"	228	15	243	7:1 TRANSITIONAL	224.3	18.7
1029	BUILDING	N 18°29'29.24"	W 067°07'52.02"	223	30	253	PRIMARY	221.2	31.8
1031	BUILDING	N 18°29'31.11"	W 067°07'51.34"	226	15	241	PRIMARY	220.7	20.3
1072	BUILDING	N 18°29'30.38"	W 067°07'48.25"	225	20	245	PRIMARY	219.7	25.3
1073	BUILDING	N 18°29'29.23"	W 067°07'48.53"	223	12	235	7:1 TRANSITIONAL	234.5	0.5

LEGEND

- INITIAL PAVEMENT CONSTRUCTION
- FUTURE TAXIWAY CONNECTIONS (ONCE JUSTIFIED)
- AFFECTED BUILDINGS
- 240 MSL — 7:1 TRANSITIONAL SURFACE CONTOUR
- BUILDING RESTRICTION LINE
- 1251 • OBSTRUCTION POINT LOCATION

N

400 0 400

GRAPHIC SCALE IN FEET

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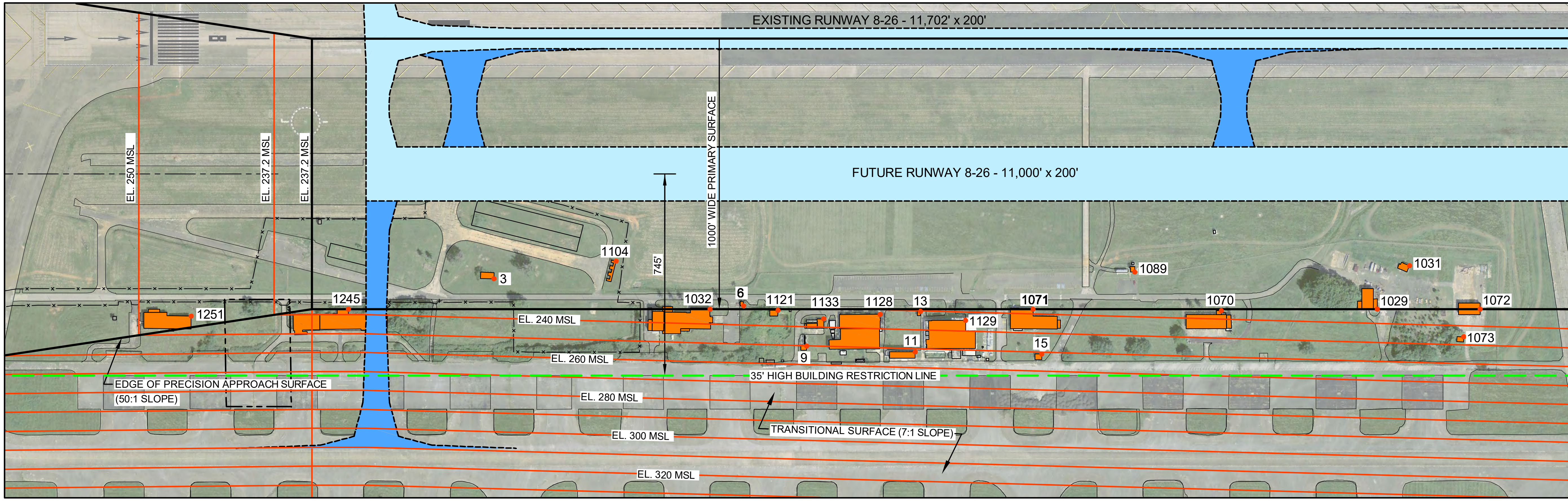

PLAN VIEW

OBSTRUCTION DATA TABLE

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6	BUILDING	N 18°29'22.33"	W 067°08'15.25"	231	15	246	PRIMARY	231.7	14.3
1121	BUILDING	N 18°29'22.56"	W 067°08'13.94"	231	15	246	7:1 TRANSITIONAL	231.8	14.2
1133	BUILDING	N 18°29'22.77"	W 067°08'12.16"	234	20	254	7:1 TRANSITIONAL	235.6	18.4
9	BUILDING	N 18°29'21.63"	W 067°08'12.47"	234	15	249	7:1 TRANSITIONAL	250.2	-1.2
1128	BUILDING	N 18°29'23.55"	W 067°08'10.15"	231	30	261	7:1 TRANSITIONAL	232.5	28.5
11	BUILDING	N 18°29'22.63"	W 067°08'08.43"	232	25	257	7:1 TRANSITIONAL	251.7	5.3
13	BUILDING	N 18°29'24.10"	W 067°08'08.71"	232	15	247	7:1 TRANSITIONAL	230.3	16.7
1129	BUILDING	N 18°29'24.29"	W 067°08'06.95"	232	30	262	7:1 TRANSITIONAL	234.4	27.6
15	BUILDING	N 18°29'23.95"	W 067°08'03.78"	231	12	243	7:1 TRANSITIONAL	251.0	-8.0
1071	BUILDING	N 18°29'25.42"	W 067°08'04.61"	231	15	246	PRIMARY	227.5	18.5
1089	BUILDING	N 18°29'27.85"	W 067°08'01.32"	230	25	255	PRIMARY	226.0	29.0
1070	BUILDING	N 18°29'27.46"	W 067°07'57.70"	228	15	243	7:1 TRANSITIONAL	225.6	17.4
1029	BUILDING	N 18°29'29.24"	W 067°07'52.02"	223	30	253	PRIMARY	222.5	30.5
1031	BUILDING	N 18°29'31.11"	W 067°07'51.34"	226	15	241	PRIMARY	222.0	19.0
1072	BUILDING	N 18°29'30.38"	W 067°07'48.25"	225	20	245	PRIMARY	221.0	24.0
1073	BUILDING	N 18°29'29.23"	W 067°07'48.53"	223	12	235	7:1 TRANSITIONAL	235.8	-0.8

LEGEND
- INITIAL PAVEMENT CONSTRUCTION
- FUTURE TAXIWAY CONNECTIONS (ONCE JUSTIFIED)
- AFFECTED BUILDINGS
- 240 MSL — 7:1 TRANSITIONAL SURFACE CONTOUR
- BUILDING RESTRICTION LINE
- 1251 — OBSTRUCTION POINT LOCATION

N

400 0 400

GRAPHIC SCALE IN FEET

RAFAEL HERNANDEZ AIRPORT
Aguadilla, Puerto Rico
RUNWAY 8-26 RECONSTRUCTION
ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 2D
(BUILDINGS WITHIN PROPOSED IMAGINARY SURFACES)

FIGURE 1.2-4

1.3. AREAS OF POTENTIAL EFFECT

Based on the foregoing, Areas of Potential Effect (APE) have been delineated for the assessment of potential impacts of the Proposed Project on archaeological and historic architectural resources.

For archaeological resources potentially impacted by direct construction activities, the archaeological APE corresponds to areas of planned construction and demolition activities for all alternatives evaluated in the EA, including Alternatives 2B and 2D. Refer to **Appendix A** for a depiction of all Alternatives which led to derivation of this composite APE. Additionally, to account for indirect ground disturbance activities that may occur during construction, such as materials and equipment staging, the archaeological APE includes a 100-foot buffer around planned construction areas.

For evaluation of historic architectural resources, a separate APE was also delineated to assess potential impacts not related to the construction footprint of the Proposed Project alternatives, and corresponds to the area within the composite 60 decibel day night average aircraft noise contour of the Proposed Project and retained alternatives. To ensure full evaluation of potentially significant architectural structures, all structures within the airport boundary, even those not contained within the established APE, were also evaluated in this CRAS.

Both the archaeological resources APE, the historic architecture APE, and the airport boundary area that were evaluated within this CRAS are shown on **Figure 1.3-1**.

RAFAEL HERNANDEZ AIRPORT

RUNWAY 8-26 RECONSTRUCTION
ENVIRONMENTAL ASSESSMENT

AREAS OF POTENTIAL EFFECT

FIGURE 1.3-1

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CHAPTER 2 ENVIRONMENTAL OVERVIEW

2.1. PHYSIOGRAPHY AND GEOLOGY

The APE is located within the northwestern portion of Puerto Rico. This physiographic region is characterized by the dissolution of limestone and has resulted in a belt of karst topography 15-23 kilometers (9.3 to 14.3 miles) wide and about 135 kilometers (83.8 miles) long known as the Northern Karst province (Monroe 1980:1). The elevation within the APE generally ranges from 200-250 feet Above Mean Sea Level.

The topography of the immediate APE has not been subjected to specific soil testing due to the presence of the airfield. Therefore, information regarding the soils has been gleaned from data within a one-mile radius surrounding the APE. This area generally consists of limestone outcrops, clay, and sandy loam soil types, described in detail below.

2.2. HYDROLOGY

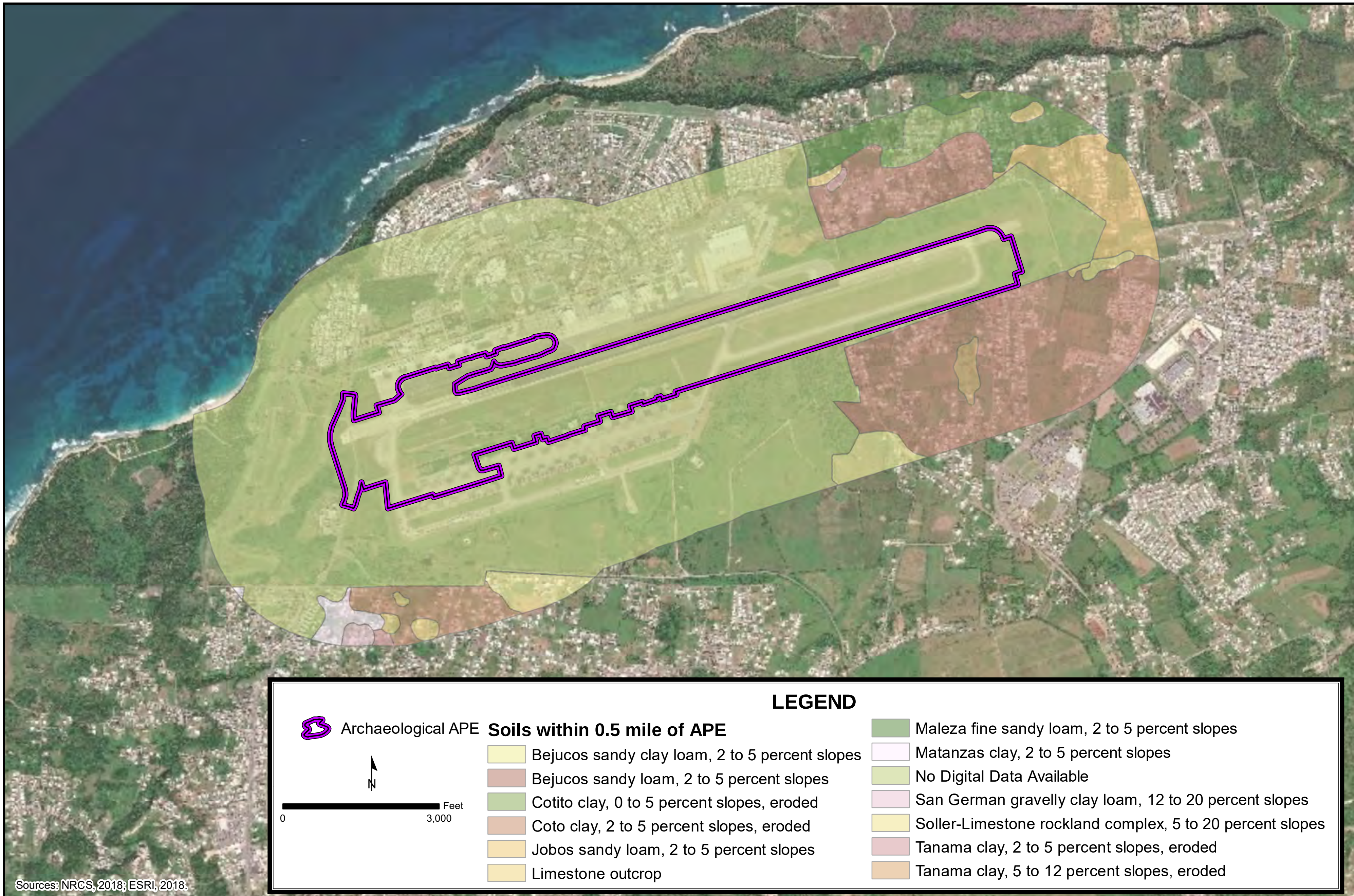
From San Juan continuing west, the karst belt is interrupted only by the relatively wide alluvial valleys of rivers, which have their headwaters in the upland area and which pass through the belt to the Atlantic Ocean. Aside from these through-flowing rivers and some relatively short tributaries, all the rest of the drainage of the karst belt is underground (Monroe 1980:20-21). Approximately 800 meters (0.5 mile) to the south, Canal Aguadilla, a man-made feature, acts as the principal drainage surrounding the APE and drains westerly approximately 2.19 kilometers (1.36 miles) towards Borinquen and then to the Atlantic Ocean near Punta Borinquen (Aguadilla 7.5-minute Quadrangle 2018).

2.3. PROJECT VICINITY SOILS

The US Department of Agriculture Natural Resources Conservation Service Web Soil Survey maps 12 distinct soil types within a 0.5-mile radius of the survey area (**Figure 2.3-1**). Considering soils data was unavailable for entirety of the project APE, soils data from the surrounding 0.5-mile radius will be used to interpret the probability that soils were similar within the APE. The following soil types were identified:

Bejucos sandy clay loam (BcB), 2 to 5 percent slopes / Bejucos sandy loam (BeB), 2 to 5 percent slopes: Bejucos sandy loam soils are situated within interior valleys and toeslopes and all areas are considered prime farmland. These soils are considered to be well drained.

Cotito clay (CtB2), 0 to 5 percent slopes, eroded: Cotito clay soils are situated on alluvial fan geomorphic positions along footslopes and toeslopes. This soil type is considered farmland of statewide importance and is well drained.



RAFAEL HERNANDEZ AIRPORT

RUNWAY 8-26 RECONSTRUCTION
ENVIRONMENTAL ASSESSMENT

SOILS

FIGURE 2.3-1

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Coto clay (CuB2), 2 to 5 percent slopes, eroded: Coto clay soils are situated on alluvial fan geomorphic positions along toeslopes. This soil type is well drained and all areas are considered to be prime farmland.

Jobos sandy loam (JoB), 2 to 5 percent slopes: Jobos sandy loam soils are situated on coastal plains, toeslopes and footslopes. This soil type is not considered prime farmland and is moderately well drained.

Limestone Outcrop (Lo): Limestone Outcrops have limited data and are not considered prime farmland.

Matanzas clay (MsB), 2 to 5 percent slopes: Matanzas clay soils are located within interior valleys at toeslopes and footslopes and all areas are considered prime farmland. These soil types are considered well drained.

Maleza fine sandy loam (MdB), 2 to 5 percent slopes: Maleza fine sandy loam soils are situated on alluvial fan geomorphic positions along toeslopes and footslopes. This soil type is considered prime farmland and is well drained.

San German gravelly clay loam (SaD), 12 to 20 percent slopes: San German gravelly clay loam soils are situated on hillslopes, mountain slopes, and ridges along summits, mountaintops, head slopes, side slopes, and shoulders. This soils is not considered to be prime farmland and is well drained.

Soller-Limestone rockland complex (SrD), 5 to 20 percent slopes: Soller-Limestone rockland complex soils are situated on mogotes, backslopes, shoulders, and summits. Mogotes are a generally isolated steep-sided residual hill composed of either limestone, marble, or dolomite and surrounded by flat alluvial plains. These soil types are not considered prime farmland, but are well drained. Th.

Tanama clay, 2 to 5 percent slopes, eroded(TcB2) / Tanama clay (TcC2), 5 to 12 percent slopes, eroded : Tanama clay soils are situated on mogotes on footslopes and backslopes. This soil type is not considered prime farmland and is well drained.

2.4. FLORA AND FAUNA

Predominant flora within the region consists of African tulip tree, tall albizzia, Guinea grass, zarcilla, cocklebur, morivivi, Oxhorn budica and Madras thorn. Fauna are represented by species such as the Gray Kingbird, Greater Antillean Grackle, Bananaquit, Cattle Egret, Northern Mockingbird, White-winged Dove, and frogs such as the Coqui and lizards (Rodriguez and Rodriguez 2010:7).

2.5. CURRENT CONDITIONS AND LAND USE

The APE is historically agricultural lands reserved for sugarcane plantations, and as such, has been subjected to ground-disturbing activities. In the more recent historic past, the majority of the APE has been subjected to significant grading and other ground-disturbing activities related to the rapid construction of BQN property associated with World War II (WWII) operations. Areas of disturbed soil were consistently encountered within the APE during the current survey efforts.

The APE is located at the confluence of three portions of various US Geological Survey (USGS) quadrangle maps (Aguadilla, Isabela, and Moca). The area immediately west of the APE and outside of the property boundary consists of Borinquen Avenue (Rt. 107) and a golf course on the bluff above Playa La Ruina, or Ruins Beach. North and east of the APE consists of residential and commercial properties labeled on the quadrangle maps as Maleza Baja and Aguacate. South of the APE contains undeveloped parcels associated with BQN.

CHAPTER 3 CULTURAL CONTEXT

3.1. PREHISTORIC CONTEXT

The accepted view of human colonization of the Caribbean has been that maritime settlement of the island chain occurred at various stages through time. The settlement of the Greater Antilles (Cuba, Hispaniola, Puerto Rico) has been thought to have occurred in different ways. In the traditional "Stepping Stone" model cultural groups moved northward up to through the Lesser Antilles island chain to the Greater Antilles. In this model Puerto Rico was the first island of the Greater Antilles to be settled, then Hispaniola and Cuba. Current evidence indicates that these ancient Amerindian groups used single-hulled canoes to make the journey between islands, even though many of the islands were beyond the sight of land (Rouse 1951; Napolitano, et al 2019).

An alternative hypothesis (Bayesian Model) proposes a different theme, one of multiple crossings of the Caribbean Sea that bypassed the Lesser Antilles in favor of more direct route across open water. The Bayesian model postulates that two major crossings were undertaken, with Cuba and Hispaniola being settled by a crossing from Mesoamerica (Napolitano, et al. 2019).

Research leading to the current accepted prehistoric cultural framework in Northwestern Puerto Rico began in the late 19th century beginning with several notable researchers who visited the island, specifically the Northern Puerto Rican coast. These researchers included: Agustin Stahl (1889-90), A.L. Pinart (1893), and J. Walter Fewkes (1902), among others. However, the first stratigraphically controlled archaeological excavations were conducted in the mid-1930s by Froelich G. Rainey who worked with Yale University. Rainey excavated two sites, one at the Coto Ward of Isabela and one in Moserrate, Luquillo. Later that decade Rainey excavated in Southern Puerto Rico at the Canas site in Ponce. Rainey observed at the Canas site that the upper strata contained undecorated pottery with a red slip in association with dense deposits of marine mollusks. A sterile layer was observed, under which were deposits containing elaborate vessel forms and detailed decorations in association with land crab claws (Keegan and Hofman 2017:85). Rainey developed the first two prehistoric cultural definitions based on pottery types, with the older culture designated as Crab and the later culture named Shell (Rodriguez and Rodriguez 2010:13-16).

A program of stratigraphic excavations, deemed the Scientific Survey of Puerto Rico, was conducted by Dr. Irving B. Rouse on the North Coast of Puerto Rico. The excavations took place from 1936-1938 while the investigator excavated on seven sites with potential for defining stratigraphic sequences and establishing correlations with other areas of Puerto Rico. Rouse did not find evidence of preceramic cultures (although he did on future excavations). Rouse excavated at the following sites: Carmona, Coto, Cuevas, Los Indios, Moserrate, Puerta de Tierra, and Santa Elena. Rouse found that four of the seven sites exhibited distinct cultural layers and deposits. Rouses excavation conclusions corresponded with and expanded upon several of Rainey's conclusions. Rouse proposed that Period I is the Coroso or Archaic (3000 BP-2400 BP). The Saladoid culture follows the Archaic and ranged from 2400 BP-1400 BP and is Period II.

Finally, the Ostinoiod culture ranged from 1400 BP-500 BP and encompasses Periods III and IV. The stratigraphical data from Rainey's Coto Ward excavations confirm the periods II, III, and IV (Rouse 1992:52).

3.2. ROUSES CULTURAL SEQUENCES IN NORTHWESTERN PUERTO RICO

The currently accepted cultural framework was developed by Irving Rouse. The following cultural sequences are Rouses adaptations for the Northwestern Puerto Rico area. Rouse and others have identified the region as having fewer prehistoric sites in general than the remainder of the Puerto Rican North Coast. The North Coast is characterized by fertile soils; however Northwestern Puerto Rico displays less fertile terrain. Rouse theorized that the lack of prehistoric settlement in this region was due to strong ocean currents, strong winds, and surf. It was also possible the strong and consistent winds from the Atlantic Ocean along with the presence of few protected bays and inlets made the prehistoric population favor more agreeable parts of Puerto Rico (Rodriguez and Rodriguez 2010:12).

Rouses dates are provided for the main cultural periods listed below (Archaic, Saladoid, Ostinoid) but current research has indicated that populations of Archaic peoples were present until 1800 BP and coexisted with later cultures (Ramos 2019:7).

3.2.1. ARCHAIC (6000 BP – 2400 BP)

The earliest culture to spread across the Greater and Lesser Antilles is often referred to as the Lithic, and there has been some debate as to specific arrival times and origins. The current research indicates that human colonization of the Caribbean Islands began around 7,000 years BP and the earliest sites are located in Cuba and Hispaniola, although this information is not widely disseminated due to language barriers. These earliest sites contained chipped stone tools and this is the dominant lithic technology of the time. There is evidence that flaked stone technology spread from Mesoamerica where this practice is the primary lithic technology. There have been no Lithic age sites recorded in Puerto Rico (Keegan and Hofman 2017: 23; Fitzgerald 2006: 392).

A later wave of settlement from South America has been postulated as bringing ground stone technology to the Island. The early ground stone technology sites are often referred to as the Archaic or preceramic. The oldest recorded sites on Puerto Rico are the Angostura and Maruca sites which date to 6,000 BP. Rouse and Allaire, among others, also have recorded dates in the 6400-6600 BP range but they are not considered firm (Keegan and Hoffman 2017:24-25).

The Archaic culture were the first humans to arrive on the island of Puerto Rico and occupy it continuously. These societies were generally fisherman and hunter gatherers, although there was likely some degree of horticulture present. Numerous paleobotanical studies indicate that manioc, sweet potatoes, and avocado was present during the Archaic period. Marine mollusks were also an important part of their diet (Keegan and Hofman 2017: 85). The archaic culture utilized both groundstone and flaked tools. Early settlements at several sites indicate settlements were situated in locations with access to mangroves, maritime resources, and riverine areas (Ramos 2019:4-7).

Rock art such as petroglyphs is attributed to the later Archaic culture and may be the result of ground stone technology brought from South America. A ground stone industry was active, with stone spheres, heart-shaped stones, and three-pointed objects being found in middens and in burial contexts. The culture has long been thought to be aceramic, although there is some debate regarding the possible presence at several sites (Ramos 2019:4-7).

3.2.1.1. SALADOID (2400 BP – 1600 BP)

It is widely believed that the Saladoid culture entered Puerto Rico during a migration from the lower Orinoco River in modern day Venezuela. These people were ceramicists, and Another culture, the Huecoid, have fairly similar material culture to the Saladoid. but did not settle in Northwestern Puerto Rico (Laffoon et al. 2014:222). In Western Puerto Rico the Saladoid Series is broken down into two periods. Period IIA has been named Hacienda Grande Period (2400-1600 BP) while Period IIB has been designated the Cuevas Period (1600-1400 BP) (Rouse 1992:52). During both Saladoid Periods larger quantities of terrestrial land crab were found in middens than shell (primarily oyster). The cultural chronology of the Saladoid and Ostinoid Cultures are generally defined by pottery styles.

The Hacienda Grande Period is defined by pottery that is thin and well fired. About a third of the pottery is decorated with polychrome painting, incisions, and zoomorphic lugs and handles. Ceramic griddles for processing manioc root are also found in Hacienda Grande sites and are considered evidence of a subsistence change from the Archaic period (Keegan and Hofman:117).

The Cuevas Period is named for the Cuevas site, which is located many miles upriver on the Rio de Loiza on the Puerto Rican north coast. Cuevas pottery is generally thin, with a finely tempered past and range in color from light brown to ivory. The vessels have been described as plain but ornate (Rouse 1952:336-338). There is often red paint applied to the surface in many designs, including spirals, circles, and semicircles (Keegan and Hofman 2017:87). (Keegan and Hofman 2017:87-88).

3.2.2. OSTINOID (1400 BP – 500 BP)

The Ostiones culture, Spanish for oyster, were a culture known for extensive shell middens (Vega 1990:55). In Western Puerto Rico, the Ostinoid Series is divided into three periods. Period IIIA is referred to as Pure Ostiones Period and ranges from 1400-1100 BP. Period IIIB is named Modified Ostiones and was in place from 1100-800 BP. Finally, the Capa Period (IV) ranged from 800-500 BP (Rouse 1992:52). During the three Ostiones periods larger quantities of oyster shell were found in middens compared to other species, such as land crab.

The Pure Ostiones culture was first identified at the Cabo Rojo site in the vicinity of Punta Ostiones in southwestern Puerto Rico. The pottery of this time period is characterized by thin, hard surfaced wares.

The Modified Ostiones culture appeared later and is predominant on the western half of the island by 1100 BP. The pottery of this time period is primarily red with geometric designs incised into the surface (Keegan and Hofman 2017:88).

The Capa Culture is found in western Puerto Rico. This period is characterized by rapid population growth and the continued settlement in the interior, primarily at the foothills of the limestone mountains. Despite being the latest prehistoric culture, the pottery is widely accepted as the crudest in Puerto Rico. The pottery is heavily sand-tempered and crumbles easily, and the vessel designs are often hard to discern. The surface decoration is typically identified by incised lines beginning and ending with punctations (Keegan and Hoffman:104-105).

3.3. HISTORIC CONTEXT

3.3.1. BORINQUEN FIELD, 1939-1947

In 1936 the US began to consider establishing a military air base on Puerto Rico. With the prospect of war increasing, in early 1939 the War Department investigated numerous potential sites. In mid-April, it decided to locate a major air base at Punta or Point Borinquen. On the island's northwest corner, the site stood 60 miles west of San Juan and six miles north of the small community of Aguadilla. It was occupied by the hamlet of San Antonio and 1,000s of acres of farmland that mostly produced sugar cane, along with cassava, coconuts, cotton, fruits, and sweet potatoes. No historic resources were identified within the project's historic architecture APE that date from prior to establishment of Borinquen Field. The construction of what was to become the US Army's Borinquen Field brought jobs to the area, but at the cost of much dislocation. The military purchased the land and required San Antonio and its residents to move to a new site east of the airbase (Smith and Ramey Air Force Base Historical Association [RAFBHA] 2004; Feliciano Ramos 2011:5-6; Conn et al. 2000:322-325; Reynolds and Gardner 2014:26-30). [5]

Work proceeded quickly. By early September 1939, the Quartermaster Corps had purchased just under 3,800 acres of land for a total of $1,215,000. By the middle of the month, the first forces—Puerto Rican troops from Henry Barracks in Cayey—arrived at the largely sugar cane-covered

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[5] The following attempts to present an objective summary of the history of Borinquen Field and its successor, Ramey Air Force Base. Within a colonial environment, however, an objective viewpoint can be difficult to locate. On the one hand, American military histories and other mostly English language accounts dispassionately focus on the War Department's reasons for building the base: protection of the Panama Canal, the Caribbean and, by extension, the US mainland (see, for example, Conn et al. (2000): 322-326 and Smith (2004)). A mainland newspaper article about the construction of Borinquen Field, for example, was headlined ""Flying Maginot Line" Anchored at Puerto Rico to Guard America," and glibly reported that when the Army arrived "Punta Borinquen was a point of land covered with royal palms and Australian pines. Except for the little village of San Antonio, with 500 inhabitants, the region was sparsely settled by "Jibaros" (hill people)" (*Knoxville Journal*, March 31, 1940). Other scholarly accounts, largely written in Spanish, consider the local disruptions caused by the construction of Borinquen and other American military installations (see, for example, Feliciano Ramos (2011) and García Muñiz (1991)). The hard facts of construction—clearing, grading, erecting runways and scores of buildings—remain the same, though.

property. They set up their tents on the future site of Hangar 5, which now houses BQN's passenger terminal (**Photo 3.3-1**). By mid-October workers were constructing administrative buildings, a hospital, and temporary (frame) and permanent (concrete) housing (Smith and RAFBHA 2004; Conn et al. 2000:322-325; Coast Artillery Journal 1941:84). Troops and planes from the mainland arrived in November and December 1939. The first B-18 bomber landed at Borinquen on November 27, 1939. By December 5, 1939, 18 were stationed at the field (Smith and RAFBHA 2004; Conn et al. 2000:322-325) (**Photos 3.3-2 and 3.3-3**).

Photo 3.3-1 "Base housing" in 1939 (source: RAFBHA 2015a).

Photo 3.3-2 Left, first B-18 bombers at Borinquen Field (source: *El Mundo*, December 8, 1939); Photo 3.3-3 right, bombers on future site of Hangar 5, c1939 (source: RAFBHA 2015a).

The nearby presence of a railroad facilitated construction of the base and its many facilities. By 1893 Aguadilla had received its first rail line from Mayagüez to its south. According to Aguadilla historian Haydée E. Reichard de Cancio (2009), in 1907 Aguadillanos were first able to take a direct train to San Juan. Not until as late as 1918-19, however, did the American Railroad Company of Porto Rico connect Aguadilla with Hatillo. This line passed within a few miles of the future base. In late 1939, in all likelihood, the War Department constructed a spur line from the American Railroad directly to the base's construction site (Surillo Luna 2017:87-91, 154-157, 209-212, 253-255; Aponte Pargas 2012; Conn et al. 2000:322-325) (**Photos 3.3-4 and 3.3-5**). Some warehouses constructed at the time (discussed below) remain near the former base. In 1954 the government eliminated the railroad and neither tracks nor rails remain in place (Reichard de Cancio 2009).

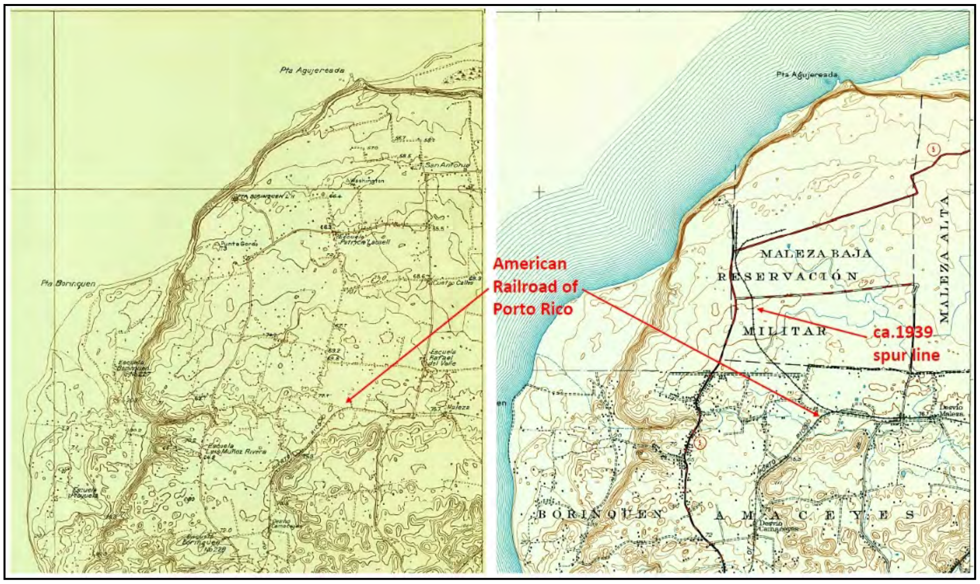

Photo 3.3-4 at left, Annotated sections of USGS, Aguadillo Quadrangle sheets, 1937; Photo 3.3-5 at right, c1949.

From late 1939 through the end of 1940 work continued apace. During this period, according to Dennis Smith and the RAFBHA (2004):

> …much work [was] done on aircraft hangars, runways, barracks, base hospital, officer, NCO and enlisted quarters, instrument repair building, photo laboratory, administrative buildings, post exchange, school house, etc. Work was underway on permanent facilities including an athletic and recreational building, swimming pool, golf course, water filtration plant, power plant, laundry, commissary, service club, officers club, and other needed and desirable facilities.

By the end of October 1939, the runway was "practically completed," according to an account carried in numerous mainland newspapers (*Clarion-Ledger*, October 27, 1939.) A second much-reported account of late March 1940 averred (*Knoxville Journal*, March 31, 1940):

> Three thousand men were put to work clearing 1900 acres at 8 o'clock one morning. At 4 o'clock that afternoon enough space was cut out to land the first plane. Before six months had passed a 4000-foot-long runway had been built parallel to the trade winds track, and temporary Army barracks were complete.

The runway was built of "native rock and asphalt" (*Arizona Daily Star*, May 7, 1940). Work on the entire base proceeded at "breakneck speed" during the year. In October its cost was projected at $8,400,000 (*Dayton Daily News*, August 17, 1940) (**Photo 3.3-6**).

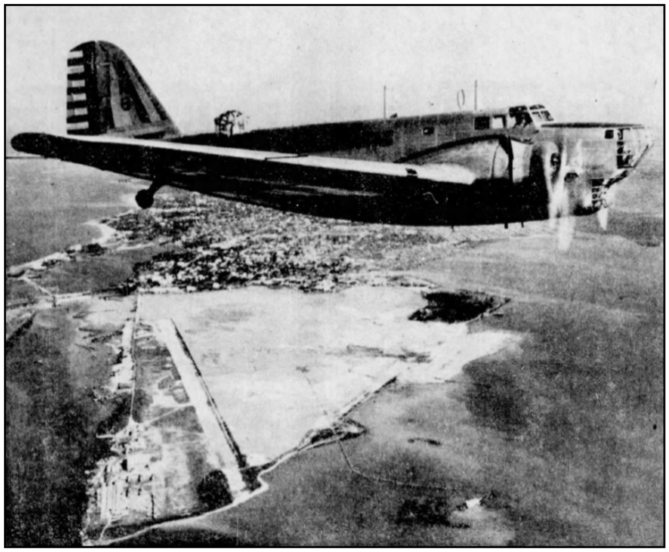

Photo 3.3-6 B-17 Flying Fortress bomber over Borinquen Field, 1940 (source: *Tampa Tribune,* March 31, 1940).

Landscape architects George W. Wickstead, of the Chicago firm of Graham, Anderson, Probst and White, and Edwin A. Farlow wrote of their professional experiences at Borinquen in 1941, another year of extensive work (Baylis et al. 1941:216-217). In April, Wickstead noted that the pay and living conditions were good, although the standard work week exceeded 55 hours. In addition to being competent professionals, he wrote, the project landscape architects "should have some engineering training and experience, as well as being good draftsmen." The "heavy dust," he reported, largely precluded wearing white. Farlow also commented on the hours, which included drafting room work three nights a week and on Saturday afternoons. He further addressed the grading and construction that dirtied the air: "At present [June 5, 1941] the landscape architect's department is concentrating on five grading plans, of which there are many required in very much of a hurry. There is a tremendous amount of construction in progress… [of] buildings, roads, runways, and hangars." In a brief July update (American Society of Landscape Architects 1941:205), Wickstead identified an additional factor that increased the workload, the required "adaptation of former plans to new and more economical ones."

The changes may have resulted from the US Army Corps of Engineers (USACE)assuming responsibility of Borinquen Field from the Quartermaster Corps, in January 1941, and the decision by the USACE to assign major Caribbean construction tasks "from the start" to civilian contractors (Hendricks 1993:22). In late January 1941, more than a year after the start of work, the War Department awarded McCloskey & Co. of Philadelphia a $4,763,750 contract for the construction of the air base at Borinquen. Graham, Anderson, Probst & White was selected as architect and engineers for the project (*Honolulu Star-Bulletin*, January 22, 1941; *Tampa Tribune*, January 23, 1941; *Defense* 1941:3).

Matthew H. McCloskey, Jr. founded McCloskey & Company in 1910 or 1911, at the age of 18. In 1917 he landed his first big construction job at the Philadelphia Naval Yard, "a project that typified the hard-driving McCloskey, whose men built 160,000 square feet of construction in sixty days" (Clark 1973:157). In 1923 his company completed a barracks at the US Military Academy at West

Point. He went on to build more schools in Philadelphia than any other single contractor and erected a number of government buildings in the capital city of Harrisburg. His construction firm was to grow into one of the ten largest in the country (*Evening Press*, April 27, 1973). McCloskey's drive, connections, and political leanings led him into Democratic politics, in fundraising and finance roles, at the state and national level beginning in 1932. (In 1962 he was appointed US ambassador to Ireland.) According to one account, for "six decades McCloskey pursued his business, with a reputation as an intense competitor and a shrewd calculator of contract costs" (Clark 1973:157-158; *New York Times*, April 27, 1973; Philadelphia Architects and Buildings website).

Graham, Anderson, Probst & White grew out of the landmark Chicago architecture firm D.H. Burnham & Company, which Edward Probst joined in 1901 and which by the 1920s had taken on his name. Notable commissions of the firm in the 1920s and 1930s included, in Chicago, the Wrigley Building (1921, 1924); Union Station train station (1924); the Merchandise Mart (1928-1931), the largest building in the world for many years; and the Chicago Main Post Office, the world's largest post office when completed in 1932. Other commissions included Cleveland's Terminal Tower skyscraper (1926-1930) and Philadelphia's Pennsylvania Railroad (30th Street) Station (1929-1933) and Suburban Station (1930) (Slaton and Barton 2014; Chappell 1992). They were perhaps the world's largest architectural firm in the first half of the 20th century and "achieved tremendous recognition…for their finesse in combining sophisticated architectural design with state-of-the-art building technology" (Mintz 1985). Edward Probst's 1942 obituary listed many of the firm's monumental past works but only one on-going project, that at Borinquen (*Chicago Tribune*, January 10, 1942). McCloskey and Graham, Anderson, Probst & White were formidable firms and it is not surprising that they received such a large, complicated, and time-sensitive commission.

Smith and the RAFBHA (2004) address some of the impacts the construction of the base had on local communities. Some were positive, others were not:

> All the construction and activity had significant impact on the surrounding communities, especially Aguadilla. Cash was flowing and business flourished. Puerto Rico had suffered severely from the depression and greatly needed some relief, but although a new excitement was captivating the district, the undesirable elements that always accompany money were indirectly infused into the district. The pace of life was affected, and transformation of cultural patterns accelerated. Cultural patterns usually change slowly, but the acceleration that started in WWII is now more than fifty years into its cycle with no turning point in sight. The Puerto Ricans in the area became more Americanized than in remote locations, and the aftereffects are still apparent in towns like Aguadilla, Aguada, Moca and Isabela.
>
> The military and Puerto Ricans from the surrounding communities generally had good formal relations, but the undercurrent of resentment in many aspects of the relationship was always just below the surface. The Ugly American attitude was far more prevalent in those days than today, and almost all Puerto Ricans have

> stories of abusive treatment or gross discrimination. They were often treated like second class citizens in their own homeland. In fact, many Americans stationed in the area didn't even realize that their fellow Americans were even American citizens. They expected the Puerto Ricans to treat them as if they were their great benefactors, rather than fellow American citizens.

In spite of any tensions, by the opening of 1942, with the US officially at war, many of the first-constructed temporary facilities at Borinquen Field had been replaced by permanent buildings. Large numbers of troops were stationed there, some of whom manned heavy antiaircraft guns emplaced on the cliffs near the base overlooking the sea. Various bombardment squadrons were stationed at Borinquen throughout the war and its "primary mission…gradually became as a landing field, refueling station and aircraft service depot for American aircraft of all types flying to the European and African war theaters" (Smith and RAFBHA 2004). This heavy usage was in part because of the field's location and in part due to its generous runway, which extended more than 11,000 feet.

In 1943, Borinquen processed more than 10,000 aircraft, almost equally split between tactical and cargo/passenger aircraft. These aircraft carried more than 90,000 officers, enlisted men, and civilians. Some construction took place during the year. It included the addition of base buildings, warehouses, and utility systems, as well as the completion of a 150-bed hospital (Smith and RAFBHA 2004). A similar volume of planes serviced (more than 10,000) and passengers (over 100,000) continued in 1944. In late September, a theater with over 800 seats opened. Service members at Borinquen at the end of the year topped 2,000 (Smith and RAFBHA 2004).

Numbers of flights and passengers did not drop until 1945, with the winding down of the war. Due to the airlift of troops coming home from Europe, however, military personnel at Borinquen exceeded 5,000 in July 1945, but dropped below 1,000 by the end of the year. The draw down did not foretell the end of the base or continued growth, however. During the year various new facilities opened, including two swimming pools, a dry cleaning plant, and a new finance building, restaurant, and beer garden. In January 1946, Borinquen extended its runways and raised a 500,000-gallon water storage tank (Smith and RAFBHA 2004).

A newspaper article in 1945 stated that Borinquen was intended to be fully built out as a "permanent field," but was only half completed when the US entered WWII in December 1941. "The swift advent of war," it continued, "forced suspension of permanent construction and Borinquen was rushed into operation as a tactical field with a vast mélange of temporary building to supplement the permanent" (*Oakland Tribune*, August 23, 1945). The planned buildout occurred during the next phase of the base's history.

3.3.2. RAMEY AIR FORCE BASE, 1948-1973

In January 1948, Borinquen Field was re-designated as Ramey Air Force Base. In May 1950, Ramey Air Force Base was transferred from the Caribbean Air Command to the Strategic Air Command (SAC). These actions and the advent of the Korean War in June 1950 led to major construction activity during much of the decade (Smith and RAFBHA 2004). According to the base historical association: "The character of the base changed at this time from that of a support facility for transient aircraft traffic, to that of an operational base supporting an active program of strategic reconnaissance, charting photography, electronic geodetic mapping and surveying, and related reconnaissance functions for the SAC" (RAFBHA 2015d).

In October 1950, a $6,000,000 contract was awarded to build 575 Wherry Housing units at Ramey (discussed further below). Construction also commenced on a new two-story quarters for nurses. With more housing came more families with children and January 1952 opened with construction of a new $600,000 base school. The Wherry Housing project broke ground in March and in May the base "contracted for construction of airman dormitories, a new mess hall, and administrative buildings at a cost of $1,943,226." The first Wherry units opened at the end of January 1952 and the project was completed and accepted by September. New airmen's barracks were completed in late 1953 and early 1954 (Smith and RAFBHA 2004).

A new base chapel in concrete—the original frame one having burned—was constructed in 1955, as was a new NCO club. In June the Air Force approved 420 additional Wherry Housing units, 252 for airmen and 168 for officers. The Fullana Construction Company of San Juan received the $4,000,000 contract. The following year in March, Banco Popular de Puerto Rico, a new base bank with a drive-up window, opened its doors (Smith and RAFBHA 2004) (**Photos 3.3-7 and 3.3-8**).


Photo 3.3-7 (left) Banco Popular, 1972-1973 (source: www.flickr.com/photos/19191522@N06/3897209403/in/album-72157622217445947/); Photo 3.3-8 (right) bank building in December 2019.

In 1955 the mission of the base's reconnaissance wing and squadrons "officially changed from reconnaissance to bombardment on a global scale." In 1958 B-52 heavy bombers—the Stratofortress—began to arrive at the base. They were accompanied by KC-135 aircraft—the Stratotanker—which fueled the B-52s in the air (RAFBHA 2015d).

In early 1958, the federal government purchased and assumed control of all 995 Wherry Housing units at Ramey at a cost of $10,500,000 (US Congress 1958:56-58). From April 1961 through July 1962, the government "completely renovated" the 995 units (Smith and RAFBHA 2004).

Construction activity at Ramey was limited in the 1960s and early 1970s, particularly when compared to the previous two decades. A few new schools were built—an elementary school (1962); a junior/senior high school (1969-1970) for 1,000 students at a cost of $3.5 million—and utilities and services were improved via new power generators (1961), street lights (1961), and sewer treatment facilities (1969-1970) (Smith and RAFBHA 2004).

The slowdown in construction foreshadowed the closing of Ramey. Throughout 1972 and early 1973, all of the base's units were deactivated. The base formally closed in 1973 (Smith and RAFBHA 2004).

3.3.3. AFTER THE BASES, 1974-2019

In 1974, the General Services Administration (GSA) declared 3,138 of Ramey Air Force Base's 3,139.55 acres as excess. In the following 10 years, much of the property was distributed to a variety of military and other governmental entities. In July 1974, the Air Force transferred 303 acres to the Navy. The Navy subsequently transferred much of holdings, including about 57 acres to the Army and 129 acres to the US Coast Guard (USCG). It still retains title to about 47 acres. In December 1974 the USCG received an additional 21 acres from the Air Force (Smith and RAFBHA 2004).

In 1978 the GSA conveyed about 1,486 acres, and about 309 acres more in easements, to the PRPA for airport purposes. This property is now BQN. Between 1974 and 1978 the former federal Department of Health Education and Welfare conveyed about 71 acres to the Puerto Rico Department of Education and the University of Puerto Rico. In 1980 Puerto Rico received about 643 acres for public park uses. The GSA transferred about 229 acres to Puerto Rico's Department of Housing. This included portions of Ramey's military housing. In turn, the Department of Housing has conveyed portions of this property to private owners (Smith and RAFBHA 2004).

The RAFBHA summarizes the base's status in the early 2000s (RAFBHA 2004):

> Running roughly along the lines of property disposal stated above, the base is presently owned and operated as an airport and industrial park by numerous public and private agencies. Hangar #5 is now the terminal for BQN and the flight line remains intact and quite similar in appearance to what it was 50 years ago. Many air cargo lines use it on a daily basis. Other passenger airlines, including Pan Am and Continental, maintain one daily flight three or more times per week from the mainland at this time (2004). The terminal is in good shape. One is able to select rental cars from Hertz, Avis, etc. and can drop into the terminal café for refreshments. There have been constant rumors that multi-million-dollar investments will be made to improve BQN and transform it into a major international air hub. Work has begun on the terminal and runways. The USCG has a major base in Puerto Rico at Ramey. The Puerto Rico Air National Guard and a sizable number of private aircraft are also housed here, and thus, the runway remains quite active.

> Much of the housing on base has been rehabilitated and, of course, those still included within the rather sizable USCG perimeter, are in excellent shape, and the grounds are absolutely beautiful. A post office is still operated at Ramey Base and the gymnasium and swimming pools continue to be much used. The University of Puerto Rico conducts a branch at Ramey and the secondary school is an absolute thing of beauty. The golf club continues to serve an avid group of enthusiasts and the view from the pro shop deck is second to none.
>
> Many changes have occurred over the years, and changes will continue in the future. But for those who served in the Air Force at Ramey, the major structures are all still intact and the memories of the control tower, B-17s and the giant B-36s are all as visible today as they were “way back then.” Time, of course, can never change that.

3.4. LITERATURE SEARCH AND PUERTO RICO SITE FILE REVIEW

Prior to the commencement of fieldwork, a search of the Puerto Rico State Historic Preservation Office (PRSHPO) cultural resource files was made for previously recorded sites within 1 mile (0.8 kilometer) of the survey area. Examination of the PRSHPO indicated that no National Register-listed sites are present within the APE or within a one-mile (0.8 kilometer) radius of the APE. The PRSHPO indicated that there are no archaeological sites recorded within one mile (0.8 kilometer) of the airport property. The closest recorded sites to the APE are located 1.5 meters (2.4 kilometers) to the west-southwest of the study area. These sites are the Borinquen Lighthouse (AL0100001) and Antiguo Faro Espaol (AL0100005). Two cultural resource assessment surveys were conducted on the airport property and are discussed here.

In 2004 MWH Americas, Inc. conducted a Historic and Architectural Resources Survey and Evaluation of the USCG Station Borinquen in Aguadilla, Puerto Rico on behalf of the USCG. The survey identified 201 architectural resources at Air Station Borinquen that were constructed between 1939 and 1990, dating from the time the base was established to the end of the Cold War. This survey excluded a large portion of the former Ramey Air Force Base as it lies outside of the USCG ownership. Building 402 (old Flight Hangar 2) was individually eligible for listing in the National Register of Historic Places based on Criterion A for association with US Military operations in the Caribbean theater, and under Criterion C as an outstanding and unique example of monolithic concrete design (MWH Americas 2004).

In 2014 Armando Marti conducted a Phase IA and IB study at BQN on behalf of Federal Emergency Management Agency (FEMA) in support of an EA for hangar improvements. A hangar (currently Building PR4043) was formerly Building 575. Building 575 was associated with the SAC dispersal program that brought B-52 bombers to Ramey Air Force Base. However, the building had been altered and did not retain integrity. No archaeological resources were identified, and the author noted that the airport terrain displayed a low probability for encountering archaeological sites (Marti 2014).

CHAPTER 4 RESEARCH DESIGN AND METHODS

4.1. RESEARCH

Prior to the start of the fieldwork, background research was conducted at a variety of institutions to characterize the general history of occupation and land use of the survey areas to identify previously documented archaeological sites and historic structures, and the potential locations of historic structures and occupations. Resources accessed included:

- PRSHPO Research,
- USGS Historical Topographic Map Explorer (http://historicalmaps.arcgis.com/usgs/).

4.2. HISTORIC ARCHITECTURE SURVEY

AECOM conducted an intensive-level field survey on December 16-19, 2020 that included identifying, analyzing and evaluating all properties 50 years old and older, or of exceptional importance, within the historic architecture APE. This survey included review of digital photography of resources, settings, landscape features, and any alterations to resources that might affect their integrity. It also documented the relationship of resources to each other and any potential historic district. The USCG and PRPA assisted in getting access to areas within the Airport that are not open to the public. The only area that was not accessed was the no-longer-occupied site of the former Civilian War Housing (Tropical Acres) southwest of the Airport, which is heavily overgrown and fenced off. It was viewed through the fence line and otherwise viewed and studied through aerial photographs, historic maps, historic photographs, and YouTube videos taken by paintball teams that sneak into the area they refer to as “Las Ruinas Base Ramey” and “Ghost Town Aguadilla.”

4.3. ARCHAEOLOGICAL SURVEY

4.3.1. PREVIOUS RECONNAISSANCE EFFORTS

Previous reconnaissance efforts in support of the Proposed Project have been conducted (AM Group, 2015; AM Group 2019). Between the two investigations completed in 2014 and 2018, a total of 117 trenches parallel to the entire length of existing Runway 8-26 were excavated, thirty meters apart from one another. Each trench measured at a minimum three meters long, 60 centimeters wide and between 50 centimeters and one meter deep. Trench locations are depicted on **Figure 4.3-1 and 1a**, with the Proposed Project Alternatives 2B and 2D overlain on each respectively to show the location of trenches in relation to the proposed runway construction.

Based on the initial reconnaissance, positive recoveries and interpretations were encountered at the following locations. **Appendix B** contains excerpts from the previous survey report that provides more methodological and interpretive information on these findings.

- Trench 29 (2018): east-west water channel at depth of 45-59 centimeters, measuring 25 centimeters wide and twenty centimeters deep.

- Trench 39 (2018): cement block, 74 centimeters wide, at 39-85 centimeters depth.
- Trench 42 (2018): cement block with rod at 74 cm depth.
- Trench 93 (2014, 2018): foundational limestone structures interspersed with cement located in 2014; determined upon reinspection in 2018 to be natural calcareous outcrop.
- Trench 107 (2014, 2018): foundational limestone structures interspersed with cement located in 2014; determined upon reinspection in 2018 to be natural calcareous outcrop.

4.3.2. CURRENT SURVEY

During the current study (December 16-19, 2020), trench locations described in **Section 4.3.1** where positive recoveries were encountered were re-inspected to corroborate the previous findings. The conclusions reported in the 2018 reconnaissance study were corroborated.

To determine the need for survey throughout the remainder of the APE, the property was investigated using a combination of visual surface inspection, photo documentation of existing field conditions, and subsurface shovel testing. The majority of the APE contained large portions of heavily disturbed soils and was subjected to visual surface inspection. Shovel testing was then completed in areas where potential for intact deposits existed.

4.3.2.1. ARCHAEOLOGICAL PROBABILITY MODEL

Prior to the field survey, a probability model was developed to aid in determining the shovel testing intensity to be applied within a particular portion of the Airport property. Due to the absence of mapped soils data, it was difficult to develop a probability model based on environmental conditions. Instead, the 1941-42 topographic maps depicting the project area were consulted as they depict several buildings and roads within the project area (**Figure 4.3-2**). These buildings were related to the communities of Maleza Alta, Maleza Baja, and San Antonio. The building locations were georeferenced with the current aerial maps to display the locations within the project area. Testing in the mapped locations of these structures was planned if soil conditions were not disturbed; however, since visual and subsurface inspection revealed disturbed soils across the airport property, these locations were not subjected to systematic subsurface testing.

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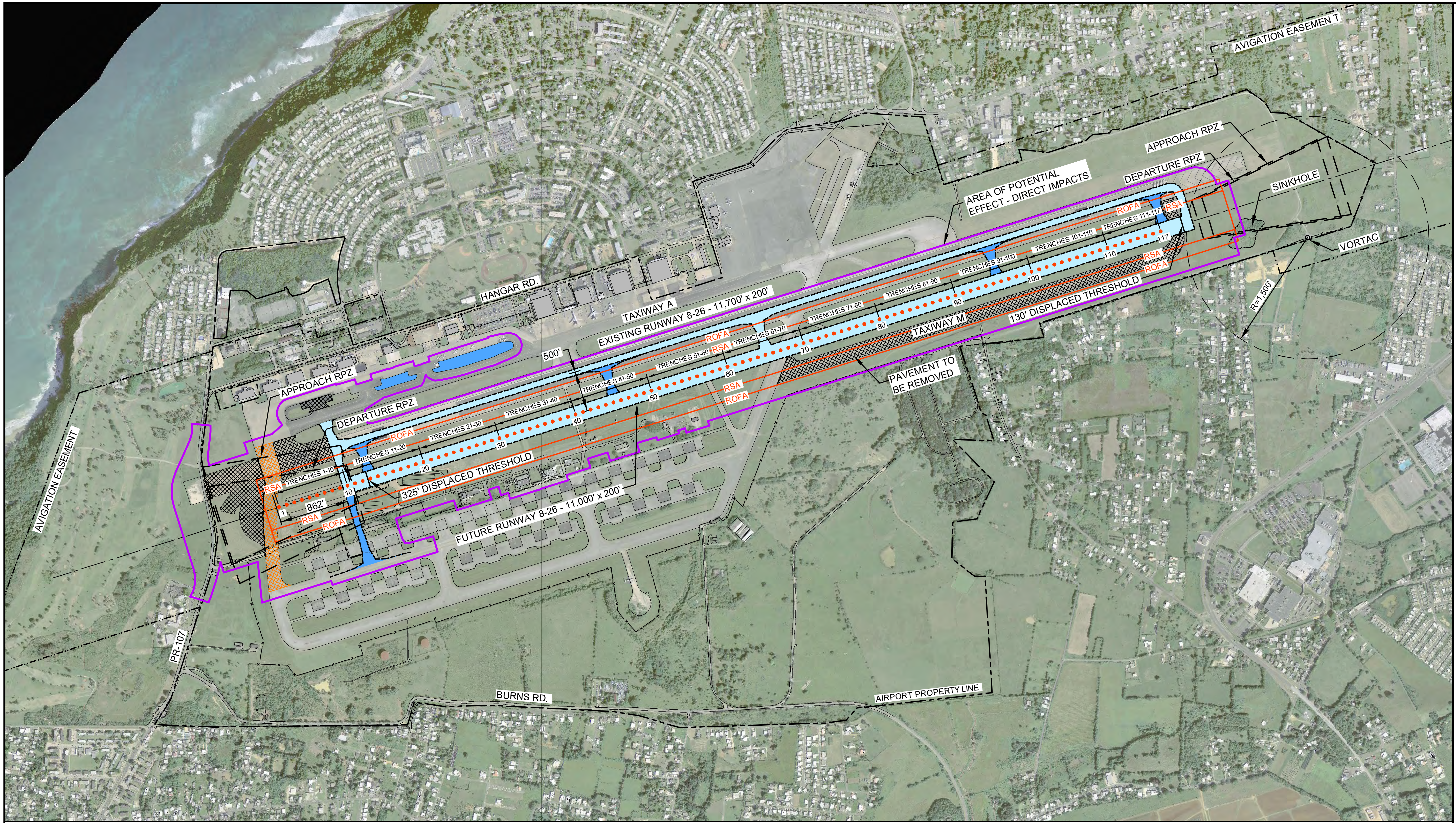

LEGEND

- INITIAL PAVEMENT CONSTRUCTION
- FUTURE TAXIWAY CONNECTIONS (ONCE JUSTIFIED)
- TO BE DEMOLISHED UPON TAXIWAY CONNECTION TO THE SOUTH
- AREA OF POTENTIAL EFFECT - DIRECT IMPACTS
- ARCHAEOLOGICAL TRENCH LOCATION

DECLARED DISTANCES

RUNWAY	TORA	TODA	ASDA	LDA
8	11,000'	11,000'	10,470'	10,145'
26	10,698'	11,000'	11,000'	10,870'

N

1000 0 1000

GRAPHIC SCALE IN FEET

RAFAEL HERNANDEZ AIRPORT

Aguadilla, Puerto Rico

RUNWAY 8-26 RECONSTRUCTION ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 2B PREVIOUS SURVEY TESTING LOCATIONS

FIGURE 4.3-1

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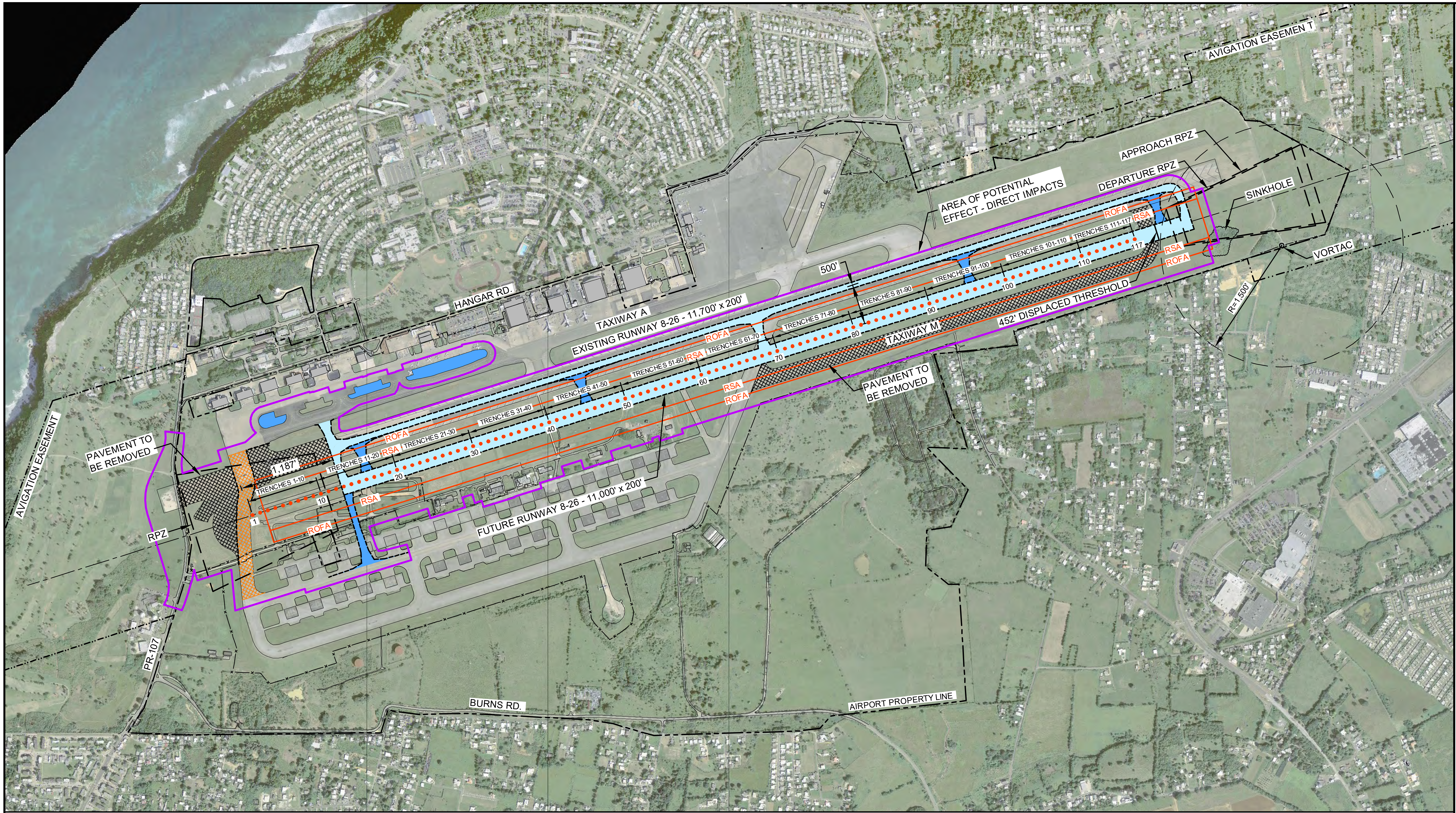

LEGEND

- INITIAL PAVEMENT CONSTRUCTION
- FUTURE TAXIWAY CONNECTIONS (ONCE JUSTIFIED)
- TO BE DEMOLISHED UPON TAXIWAY CONNECTION TO THE SOUTH
- AREA OF POTENTIAL EFFECT - DIRECT IMPACTS
- ARCHAEOLOGICAL TRENCH LOCATION

DECLARED DISTANCES

RUNWAY	TORA	TODA	ASDA	LDA
8	10,675'	11,000'	10,148'	10,148'
26	11,000'	11,000'	11,000'	10,548'

N

1000 0 1000

GRAPHIC SCALE IN FEET

RAFAEL HERNANDEZ AIRPORT
Aguadilla, Puerto Rico

RUNWAY 8-26 RECONSTRUCTION
ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 2D
PREVIOUS SURVEY TESTING LOCATIONS

FIGURE 4.3-1a

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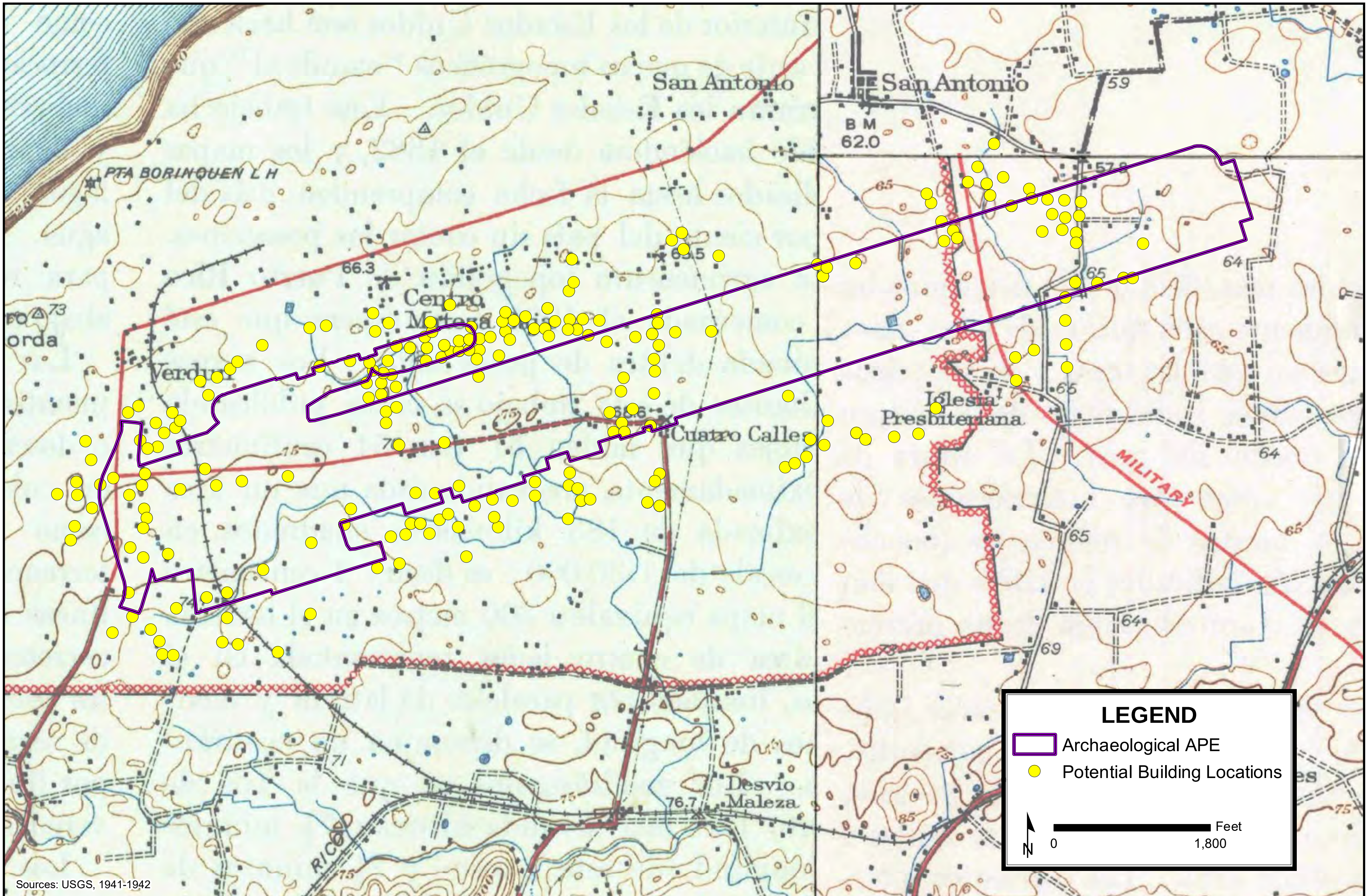

RAFAEL HERNANDEZ AIRPORT

RUNWAY 8-26 RECONSTRUCTION
ENVIRONMENTAL ASSESSMENT

POTENTIAL BUILDING LOCATIONS
AS DISPLAYED ON 1941-1942 QUADRANGLE MAPS

FIGURE
4.3-2

4.3.2.2. SHOVEL TESTING

Archaeological fieldwork began with systematic pedestrian reconnaissance of the entire APE to evaluate current conditions and identify any archaeological resources visible on the surface. This was followed by systematic shovel test pit (STP) excavation where needed.

Shovel test transects were spaced at 25-meter (75-foot), 50-meter (150-foot), or 100-meter (300-foot) intervals as appropriate, STPs along transects were likewise spaced at 25-meter (75-foot), 50-meter (150-foot), or 100-meter (300-foot) intervals. STPs were round, approximately 50 centimeters (18 inches) in diameter, and excavated by natural stratigraphy into culturally sterile subsoil or to a maximum of one meter in depth. All soils removed from the STP were screened using quarter-inch wire mesh for uniform artifact recovery. Detailed information for each STP was recorded on standardized field forms. The locations of all STPs were recorded in the field using a differentially corrected sub-meter accurate GPS device. All of the STPs were backfilled.