

# Horsley Witten Group

**Sustainable Environmental Solutions**

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June 19, 2015

Ms. Crystal Gardiner  
U.S. Army Corps of Engineers New England District  
Regulatory Branch  
696 Virginia Road  
Concord, MA 01742-2751

RE: Permittee-Responsible Mitigation  
Provincetown Municipal Airport CIP Improvements Project  
Provincetown, Massachusetts  
**NAE-2006-4281**

Dear Ms. Gardiner:

This letter responds to your suggestion at the recent pre-permitting meeting that we submit justification for Permittee-Responsible (on-site) mitigation for the CIP Improvements Project at Provincetown Municipal Airport. As discussed at the May 18, 2015 meeting, past permit coordination meetings with the U.S. Army Corps of Engineers (Corps) resulted in the development of a mitigation package consisting of on-site, permittee-responsible mitigation. However, we understand that the Corps has a regulatory preference for participation in third party mitigation, and specifically for the In Lieu Fee (ILF) Program that was launched in Massachusetts in May 2014. Of note, the ILF option was unavailable in Massachusetts during the project planning and design for the Airport CIP, and most importantly at the time that the Federal Aviation Administration (FAA) and National Park Service (NPS) issued their respective Findings of No Significant Impact (FONSI) for the proposed Capital Improvement Plan (CIP) Project.

During our discussions, you and other Corps staff indicated that there may be circumstances where on-site, in-kind, permittee-responsible mitigation is more appropriate, and encouraged the Airport Project Team to present a case for Corps consideration that includes the proposed on-site restoration as part of the approved mitigation plan for the Airport.

On behalf of the Airport Commission, Horsley Witten Group, Inc. (HW) in conjunction with Jacobs Engineering, Inc., presents our justification for the need for on-site mitigation to preserve the important and unique aquatic habitat at the Airport within the Cape Cod National Seashore. The context of the environmental setting, the aquatic resources, and the important habitat that they provide is presented in the attached discussion.

Ms. Crystal Gardiner  
June 19, 2015  
Page 2 of 2

Thank you in advance for your consideration. We look forward to hearing from you and meeting with you again in the near future. Please do not hesitate to contact me, should you have any questions or require additional information.

Sincerely,

HORSLEY WITTEN GROUP, INC.



Amy M. Ball, PWS, CWS  
Project Manager – Senior Ecologist

Enclosure

cc: Edward Reiner, U.S. EPA, Region 1  
Michelle Ricci, FAA, New England Division  
Richard Doucette, FAA, New England Division  
Airport Commission c/o Arthur Lisenby, Airport Manager  
Nathan Rawding, MassDOT – Aeronautics Division  
Jonathan Idman, Cape Cod Commission  
George Price, National Park Service  
Dennis Minsky, Chairman, Provincetown Conservation Commission

# ATTACHMENT

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## *Justification for Permittee-Responsible On-Site Mitigation at Provincetown Municipal Airport*

### **1 BACKGROUND**

The Provincetown Airport Commission (Airport Commission) is proposing a Capital Improvements Plan (CIP Project) for the Provincetown Municipal Airport (Airport). All of the proposed CIP project elements were identified through a master planning process. The purpose of the CIP Project is to enhance airport safety and security and enhance the efficiency of the Airport to meet current and anticipated demand. Implementation of the CIP will fulfill the mission of the Airport to operate a safe, secure, and reliable non-hub primary service airport receiving scheduled airline passenger service.

The elements of the CIP Project, as presented in the Final Environmental Impact Report/Environmental Assessment (FEIR/EA) include:

- 1) Westerly Taxiway System Improvements;\*
- 2) Relocate East End Taxiway;\*
- 3) Reconstruct Terminal Apron;
- 4) Reconstruct Easterly End of Taxiway;
- 5) Install Taxiway Lighting and Construct Electric Vault;
- 6) Repair Sightseeing Shack;
- 7) Improve Access Road to Approach Light System;\*
- 8) Construct Service Access Roads to the Localizer Equipment Shelter (LES) and to the Automated Weather Observation Station (AWOS);\*
- 9) Install a Perimeter Safety/Security Fence;\*
- 10) Expand Auto Parking;
- 11) Expand Terminal Building; and
- 12) Expand Turf Apron.

\*project elements with proposed alterations to aquatic resources

Each of the CIP project elements associated with aquatic resource impacts will provide operational safety and security improvements at Provincetown Municipal Airport that comply with current FAA, Massachusetts Department of Transportation (MassDOT) Aeronautics Division, and TSA safety and security design standards for a non-hub primary service airport. The use of these standards is mandatory for airport projects receiving Federal grant-in-aid assistance. It is the policy of the Airports Division of the FAA New England regional office that airport improvement projects must comply with the national airport design standards. Site specific constraints are also taken into account. The need for these improvements is driven by the fact that certain airfield facilities do not meet current safety and security standards.

The Airport presented an extensive alternatives analysis within the FEIR/EA prepared for the National Park Service (NPS). Through this alternatives analysis, it was determined that the proposed alternative for each of the CIP project elements is necessary to meet the project purpose and need. Implementation of these safety and security projects will result in unavoidable alterations to adjacent wetlands as regulated under Section 404 of the Federal *Clean Water Act* (33 U.S.C. 1251, *et seq.*). Impacts to natural resources have been avoided and minimized to the extent practicable; unavoidable impacts are proposed to be mitigated. Any alteration is the minimum necessary to accomplish the CIP goals.

The CIP Project will cumulatively alter approximately 1.95 acres of aquatic resources in order to construct five of the CIP project elements as indicated by an asterisk (\*) in the list above. As a result, the CIP Project will require several state, regional, and federal permits including:

- Final Order of Conditions under the Massachusetts Wetlands Protection Act (WPA);
- Variance pursuant to Section 401 Water Quality Certification;
- Development of Regional Impact (DRI) Decision from the Cape Cod Commission;
- Individual Permit pursuant to Section 404 of the Clean Water Act; and
- Individual CZM Consistency review.

At the present time, the Airport Commission seeks to permit eleven of the twelve CIP Project elements this year, deferring the terminal building expansion for further design considerations.

## 2 SITE CONTEXT

The Provincetown Municipal Airport is located in Provincetown, Massachusetts, on the northern tip of Cape Cod, in an area known as the Province Lands (Figure 1). The Province Lands are comprised of an expansive coastal dune system of primary and secondary dunes (Figure 2, Photo 1). The entire Airport is located within the confines of the Cape Cod National Seashore (CCNS)(Figure 3), and leases approximately 331 acres from the National Park Service (NPS) under a Special Use Permit. The Airport facilities are situated within a low-lying area between



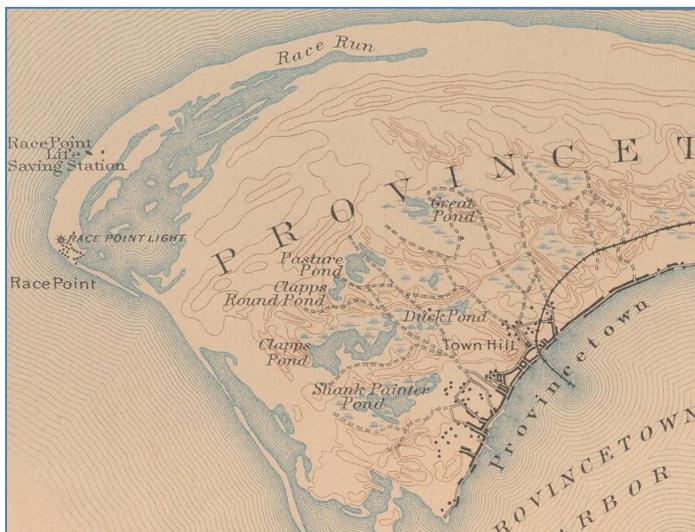
**Photo 1. Provincetown Municipal Airport is located between two major coastal dune ridges. Photo credit Bill Richardson.**

parallel dune ridges located within the 100-year coastal floodplain (Figure 4).

Constructed in the 1940s, the Airport consists of developed airside and landside areas that are maintained for airport facilities and operations. The Airport facilities occupy approximately 132 acres of the Lease Area, and are referred to in this document as the Airport Area (Figure 5). Generally speaking, naturally-vegetated areas within the Airport Area fall into one of three categories: coastal dunes, freshwater wetlands, or managed grasslands. Vegetation immediately adjacent to the Airport facilities is routinely cut to maintain operational safety areas. Otherwise, the lands within the Airport Area are occupied by existing airport facilities and infrastructure. Much of the 331-acre Lease Area is undeveloped and consists of diverse wetland and upland habitats, including salt marsh, freshwater wetlands (interdunal swales), forested areas, and a coastal dune system.

### 3 AQUATIC RESOURCES

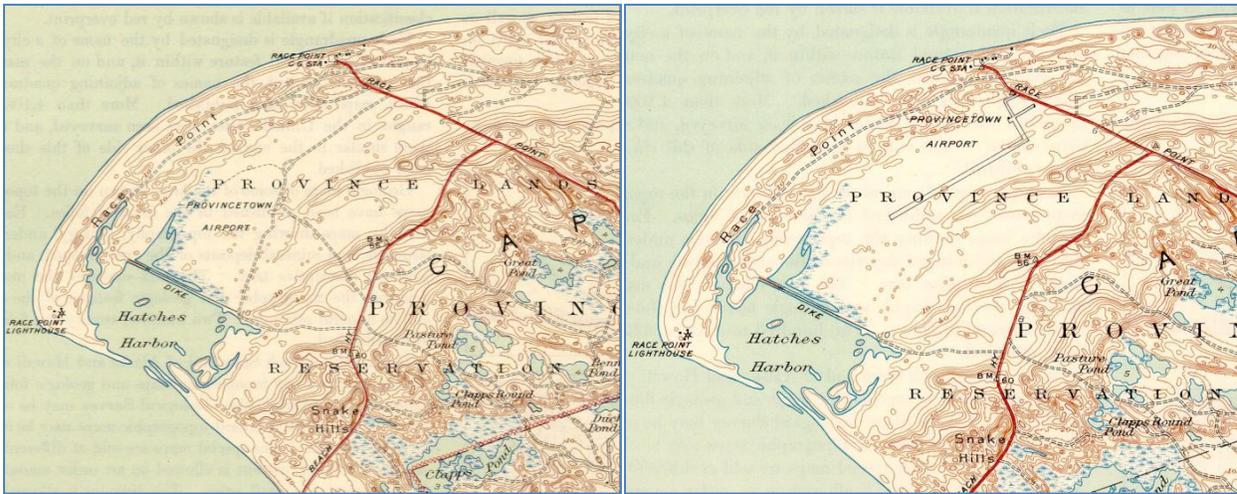
The Cape Cod National Seashore (CCNS) supports a wide variety of marine and freshwater resources formed by the geological events that created Cape Cod, many of which are found within the Airport property. All aquatic resources in the CCNS have been designated as Outstanding Resource Waters (ORWs) as regulated under the Massachusetts Surface Water Quality Standards and associated regulations at 314 CMR 4.00. A Preliminary Jurisdictional Determination (PJD) from the U.S. Army Corps of Engineers (Corps) indicates that all aquatic resources at the Airport are jurisdictional waters of the United States.



**Photo 2. Excerpt from 1893 USGS map of Provincetown (Provincetown, MA Quadrangle; southwest quadrant). Source: Historic USGS Maps of New England (unh.edu).**

The geologic characteristics combined with a fluctuating, seasonally-high groundwater table results in seasonal saturation of the upper portion of the soil profile for significantly long periods of time during early portions of the growing season. Inundated and/or saturated soil conditions favor the establishment of hydrophyte-dominant plant communities and the deposition of organic material, which are typical of wetland habitats. Rainfall received during storm events also contributes to saturated soil and inundated land conditions.

A review of historic maps indicates that the land on which the Airport was constructed consisted of open water and/or wetlands interspersed with areas of dune (Photos 2 and 3).



**Photo 3. Excerpts from 1944 USGS maps of Provincetown (Provincetown, MA Quadrangle, northwest quadrants). Source: Historic USGS Maps of New England (unh.edu).**

Wetland habitats at the Airport include freshwater wetlands, regulated under the Federal Clean Water Act as adjacent wetlands, that are dominated by grass and herbaceous species (Palustrine Emergent Wetlands or PEM); shrub-dominated wetlands (Palustrine Scrub-Shrub Wetland or PSS); and freshwater forested wetlands (Palustrine Forested Wetland or PFO), dominated by pitch pine (*Pinus rigida*). These adjacent wetlands, ranging in size from a few hundred square feet to several acres in size, are associated with a coastal interdunal swale system, and are often separated from each other by low to moderate dune ridges closer to the airfield. More extensive dune ridges, oriented approximately parallel to the Airport runway, located further out from the airfield separate those wetlands from larger adjacent wetlands. Adjacent PSS wetlands also occur within the existing airfield, located between the taxiways and the runway, and are separated from paved surfaces by managed grassland communities of varying width.



**Photo 4. Wetland I, located between the taxiway and runway, provides potential Spadefoot breeding habitat.**

Wetland areas are identified on Figure 6 and in Table 1. These wetlands and were approved under a Preliminary Jurisdictional Determination (copy attached).

**Table 1. Summary of jurisdictional wetland areas delineated at the Provincetown Municipal Airport, Provincetown, Massachusetts.**

WETLAND AREA	CLASSIFICATION	JURISDICTION <sup>1</sup>	FUNCTIONS AND VALUES
Salt Marsh	EEM	ACOE, DEP, PCC, CCC	Protection of Marine Fisheries, Wildlife Habitat; Storm Damage Prevention; Groundwater and Water Quality
Wetland AA	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland AB	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland AC	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland AD	PSS/PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland AE	PSS/PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland AF	PSS/PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland AG	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland AI	PSS/PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland AJ	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland AK	PSS/PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality
Wetland AL	PFO/PSS/PEM	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality
Wetland AM	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland BA	PSS/PEM/PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland BB	PEM	ACOE, PCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland BC	PSS/PEM/PFO	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CA	PSS/PEM/PFO	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CB	PSS/PEM/PFO	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CC	PSS/PEM/PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CD	PSS/PEM/PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CE	PSS/PEM/PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CF	PSS/PEM/PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CG	PSS/PEM/PFO	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CH	PSS/PEM/PFO	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CI	PSS	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CJ	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CK	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CL	PFO/PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CM	PSS/PEM/PFO	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CN	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CO	PSS/PEM/PFO	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CP	PFO/PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CQ	PFO/PSS/PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CR	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CS	PFO/PSS/PEM	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CT	PFO/PSS/PEM	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland CU	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality
Wetland CV	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality
Wetland DA	PSS/PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DB/FG	PSS/PEM/PFO	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DC	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DD	PSS/PEM/PFO	ACOE, PCC, CCC (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DE	PSS/PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DF	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DG	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DH	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DI	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DJ	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DK	PSS/PEM/PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DL	PSS/PEM/PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland DM	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat

<sup>1</sup> Note: the jurisdictional status of Isolated Land Subject to Flooding (ILSF) under the State Regulations at 310 CMR 10.57(2)(b) has not yet been determined.

Table 1 (cont.)

WETLAND AREA	CLASSIFICATION	JURISDICTION	FUNCTIONS AND VALUES
Wetland EA	PSS	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland EB	PSS/PEM	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland FA	PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland FB	PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland FC	PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland FD	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland FE	PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland FF	PFO	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland FH	PEM/PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland FI	PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland FJ	PEM/PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland A	PSS/PFO	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland B	PSS/PEM	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland C	PSS/PEM	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland C/J/FK	PSS/PEM/PFO	ACOE, PCC, CCC (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland D	PFO	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland E	PFO/PSS	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland F	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland G	PSS	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland H	PSS	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland I	PSS	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland K	PEM	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland L	PFO/PSS	ACOE, PCC, CCC, (DEP)	Flood Storage/Flood Control; Groundwater and Water Quality; Wildlife Habitat
Wetland M	PEM	ACOE, PCC, CCC	Flood Storage/Flood Control; Groundwater and Water Quality
Wetland N	PEM	ACOE	Flood Storage/Flood Control; Groundwater and Water Quality

**KEY**

**Classification** (Cowardin, et al., 1979)

- PSS Palustrine Scrub-Shrub wetland
- PFO Palustrine Forested habitat
- PEM Palustrine Emergent Marsh
- EEM Estuarine Emergent Marsh

**Jurisdiction**

- DEP Massachusetts *Wetlands Protection Act* (M.G.L. Ch. 131 § 40) and Regulations (310 CMR 10.00)
- ACOE Section 404 of the Federal *Clean Water Act* (33 U.S.C. 1251, *et seq.*) (Army Corps of Engineers)
- PCC Provincetown *Wetlands Protection Bylaw* (Chapter 12)
- CCC Cape Cod Commission Regional Policy Plan

Shrub-dominant interdunal wetlands (PSS), which are the predominant type of wetland habitat at the Airport, have a non-tidal, seasonally or temporarily flooded water regime. The relatively dense shrub communities include plant species such as winterberry (*Ilex verticillata*), red maple (*Acer rubrum*), meadowsweet (*Spiraea latifolia*), highbush blueberry (*Vaccinium corymbosum*), northern bayberry (*Morella pensylvanica*), red chokeberry (*Aronia* spp.), dwarf huckleberry (*Gaylussacia dumosa*), and American cranberry (*Vaccinium macrocarpon*), which often occurs in dense mats. Herbaceous plants observed frequently among the Airport wetlands include sphagnum moss (*Sphagnum* spp.), various sedges (*Carex* spp.), rushes (*Juncus* spp.), cinnamon fern (*Osmunda cinnamomea*), royal fern (*O. regalis*), and sensitive fern (*Onoclea sensibilis*), common reed (*Phragmites australis*), cattail (*Typha* sp.), woolgrass (*Scirpus cyperinus*), and various asters (*Aster* spp.) and goldenrods (*Solidago* spp.) (Photo 4).

Within the pitch pine forested area between the runway and the steep coastal dune habitat to the southeast of the Airport managed areas, there is an extensive mosaic of additional



Photo 5. Aerial view, facing northeast, provides perspective on the extent of wetlands at the Airport. Photo credit Bill Richardson

interdunal forested wetland swales. Within these freshwater wetlands, pitch pine (*Pinus rigida*) has adapted to the seasonally saturated conditions and is considered a local wetland indicator species.

In the far western reaches of the Airport, there is a larger wetland system (Wetland C/J/FK) that transitions along a salinity gradient from a freshwater system (PEM-PSS-PFO) to a brackish system (primarily PEM, trending toward Estuarine Emergent Marsh or EEM) as groundwater seeps are met with the tidal influence of the Hatches Harbor estuarine system (Photo 5). Brackish portions of this wetland system are dominated by a non-native invasive species, common reed (*Phragmites australis*). Efforts to control and manage this invasive plant community were implemented by NPS in the early 2000s through the Hatches Harbor Restoration Project, and areas of *Phragmites* die-back with an emerging salt marsh community can be observed along the landward-reaches of the restored salt water regime influence.

## 4 HABITAT CHARACTERISTICS

The Airport is located in a unique setting, encompassing fresh, brackish, and salt water ecosystems, among arid coastal dunes, which supports a variety of wildlife habitats from wetlands to arid dunes. The interdunal system of coastal dunes and adjacent freshwater wetlands provides habitat for large mammals including coyotes, raccoons, and foxes to small invertebrates, including both residential and migratory species, in addition to habitat for state-listed rare species as discussed below. These habitats both surround the Airport and occur in areas between the paved runway and taxiways, buffered by areas of managed grasslands.

While the Airport Area does not support any federally-listed Threatened and Endangered (T&E) species, it provides habitat for three Massachusetts State-Listed species that have been documented by the Massachusetts Natural Heritage and Endangered Species Program (NHESP)(Figure 7). Habitat for the Vesper Sparrow (*Pooecetes gramineus*) is provided within the managed cultural grasslands; habitat for the Eastern Spadefoot toad (*Scaphiopus h. holbrookii*) and Eastern Box Turtle (*Terrapene carolina*) is provided in the wetlands and uplands (coastal dunes). The Northern Harrier (*Circus cyaneus*), as state-listed Threatened species, is frequently observed, but is not recorded by NHESP.

- The Vesper Sparrow is a large sparrow that inhabits grasslands and fields. In Massachusetts, it is ranked as Threatened. This species is reported to inhabit open areas (cultivated fields, grasslands, fallow fields, and pastures), with nests consisting of shallow cups of woven grasses, located on the ground. Potential habitat for the Vesper Sparrow occurs within the managed grasslands adjacent to the Airport runway, taxiway, and runway approach areas and the immediately adjacent maintained shrub thickets, as well as throughout the open grassy dune habitats to the north and west of the Airport. Regular mowing of the grasslands as part of routine Airport maintenance contributes suitable habitat for this species.
- The Eastern Spadefoot is protected as a Threatened Species. Reported habitat for this medium-sized toad includes dry sandy or loose soils in areas of sparse shrub growth of open forest areas with adjacent shallow, temporary pools that provide breeding habitat. Presence of this species has been observed at the Airport by NPS biologists. At the direction of NHESP, HW field biologists conducted an in-depth habitat suitability study in the spring of 2008 to identify prime and potential breeding habitat for this species at the Airport. HW worked in conjunction with Brad Timm, Ph.D., an Eastern Spadefoot specialist, to complete the field surveys, the results of which are depicted on Figure 8. Based upon the results of that study, it was determined that portions of the Airport provide suitable habitat features for this species, particularly south and southeast of the Airport runway, as well as portions of the wetlands confined by the Airport runway and taxiway system. Therefore, Wetlands B, H, and I provide potential breeding areas for the Spadefoot Toad.

- The Eastern Box Turtle is a Massachusetts Species of Special Concern. This small terrestrial turtle uses a relatively wide range of habitats, including woodlands, field edges, thickets, and wetlands. Optimal habitats on Cape Cod include pine barrens and oak thickets, where box turtles are associated with cranberry-dominated swales. This species would be considered a generalist species in the context of habitat preference, and potential habitat for this species is found throughout the Airport lease area. Suitable habitat for this species is present, particularly in areas within the southern portions of the Airport, where foraging habitat and abundant food sources are found within close proximity to open areas of sand suitable for nesting habitat within the coastal interdunal swale mosaic. Pitch-pine dominated habitats, including the cranberry-pine swales, as well as the lower slopes of the pitch pine and oak-dominant dune habitats provide potential habitat for Eastern Box Turtles.

Additionally, NHESP has identified this entire area as Core Habitat, key areas that are critical for the long-term persistence of rare species, as well as Critical Natural Landscape, large natural landscape blocks that are minimally impacted by development. According to BioMap2, “if protected, these areas will provide habitat for wide-ranging native species, support intact ecological processes, maintain connectivity among habitats, and enhance ecological resilience to natural and anthropogenic disturbances.”

## **5 PROPOSED IMPACTS**

Of the 12 CIP Project elements, five project elements will result in unavoidable impacts to aquatic resources, and specifically to wetlands:

- (1) Westerly Taxiway System Improvements;
- (2) Relocate East End Taxiway;
- (7) Improve Access Road to Approach Light System;
- (8) Construct Service Access Roads to the AWOS; and
- (9) Install a Perimeter Safety/Security Fence.

Impacts from implementation of the individual project elements are broken down in Table 2, below.

**Table 2. Summary of Aquatic Resource Impacts.**

Project Element	Aquatic Resources	
	(SF)	(acres)
<b>West End</b>	29,465	0.68
<b>East End</b>	28,110	0.65
<b>MALSF Access Road</b>	238	0.01
<b>Access Road to AWOS</b>	335	0.01
<b>Perimeter Fence</b>		
direct impacts	26,800	0.62
Indirect impacts	12,924	0.30
<b>TOTAL*</b>	<b>84,948</b>	<b>1.95</b>

\*direct alterations

A total of 1.95 acres (84,948 SF) of direct wetland alteration will occur as a result of these CIP project elements: Westerly Taxiway System Improvements (Wetland I); relocation of the East Entrance Taxiway (Wetland B), the construction of the service access road to the AWOS (Wetland H), and the perimeter fence (Wetland DM, Wetland BC/F, Wetland E/DD, Wetland DB/FG, Wetland L, and Wetland C).

Direct fill will occur within three areas of adjacent wetlands within the airfield (Wetlands B, H, and I) that are each characteristic of a transitional PEM-PSS community. These wetlands are dominated by a dense shrub community including winterberry, highbush blueberry, red maple, northern bayberry, and American cranberry. Herbaceous plants observed included sphagnum moss, sedges, rushes, ferns, cattails, and asters. These wetlands provide habitat for a variety of wildlife, including state-listed species. They also provide nesting, feeding, and breeding habitat for resident and migrating birds. Additional alterations within wetlands associated with the proposed fence will occur in various wetlands further away from the airfield. There, the range in vegetative community composition is from open sedge-dominated wetlands to areas of pitch pine dominated open forested communities with a dense cranberry understory.

Following extensive habitat assessments and rare species surveys, these wetlands have also been identified as providing habitat for the Eastern Box Turtle and important breeding habitat for the Eastern Spadefoot Toad as noted above (see Figure 8; Photo 6). From discussions with NHESP, it was determined that avoidance, and minimization of this habitat is critical to the protection of this species and its habitat, and where unavoidable, wetland mitigation would be critical to the habitat preservation.



**Photo 6. Portions of Wetland B providing breeding habitat for Eastern Spadefoot Toad. Restoration of this habitat is important to the preservation of the habitat for this state-listed Threatened species.**

Proposed improvement projects for the installation of the perimeter fence, installation of the run-up pad associated with the Westerly Taxiway System Improvements, and improvements to the MALSF access road will impact Wetland C/J/FK. It should be noted that while direct impacts associated with the proposed fence are included within the total impacts, that the alterations associated with the fence have been calculated somewhat differently: Direct fence impacts have been calculated based upon direct fill for the fence posts and conversion of forested and dense shrub areas to low growing communities as a result of vegetation management.

Indirect/secondary impacts are based upon areas where either 1) vegetation is already open and/or low-growing and will not require vegetation management, or else 2) consists of a monoculture of *Phragmites*. Indirect impacts associated with the proposed fence include wetland alterations of 0.30 ac (Figure 9; Table 3). Of the impacts associated with the fence, direct fill accounts for just 1,170 SF, calculated at 1 SF per post.

**Table 3. Breakdown of fence impacts to aquatic resources.**

FENCE IMPACTS BY VEGETATION COVER		
	Freshwater Wetlands	
Vegetation Community Type:	(SF)	(ac)
Open /Herbaceous (PEM)	6,556	0.15
Low Shrubs (PEM/PSS)	1,160	0.03
Dense Shrubs (PSS)	12,288	0.28
Pitch Pine w/o Understory (PFO)	13,784	0.32
Dense Pitch Pine & Shrubs (PFO)	728	0.02
<i>Phragmites</i>	5,208	0.12
<b>TOTAL TO BE CUT:</b>	<b>26,800</b>	<b>0.62</b>
Indirect/Secondary Impacts	12,924	0.30

Direct and indirect or temporary impacts associated with construction activities will be mitigated accordingly, so as to achieve no net loss of the functions and values of the affected wetlands as a result of the CIP projects.

## **6 THE JUSTIFICATION FOR ON-SITE WETLAND MITIGATION**

The Airport has discussed the alteration and subsequent need for mitigation for unavoidable alterations to these wetland areas with several regulatory agencies, each of which require, under their respective statutes and regulations, on-site wetland mitigation. These include the Massachusetts Department of Environmental Protection (DEP) under the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131 § 40) and its implementing Regulations (310 CMR 10.00), the Cape Cod Commission (CCC) implementing the Regional Policy Plan (RPP), and the Provincetown Conservation Commission, under the local Provincetown Wetlands Protection Bylaw (Chapter 12 of the Provincetown General Bylaws). Similarly, the NHESP is charged with the protection of state-listed rare species and their habitats, including the protection of wetland-dependent species under the Massachusetts Endangered Species Act (M.G.L. Ch. 131A; MESA). Preservation of wildlife habitat as well as wetlands functions and values is also a priority for the NPS in their management of the Cape Cod National Seashore (CCNS).

The NHESP publication, BioMap2, identifies the Province Lands dune system as supporting two very large examples of Maritime Dune Communities, one of which is noted to be the largest example of Maritime Dunes in New England, with limited human and vehicular access. The pristine condition is not just limited to the Province Lands. The entire Cape Cod National Seashore has had very little human disturbance or degradation and is well preserved, having been designated as a National Park since 1961.

Given the setting, the loss of wetland habitat would result in the loss of these important functions and values that are unique to this setting on outer Cape Cod. As noted, the Airport lands support a unique array of ecosystems, situated on 331 acres of land between two major coastal dune ridges and largely within the coastal flood zone. It contains diverse wetland resource areas, including adjacent freshwater wetland areas and salt marshes, interspersed within this expansive coastal dune system. There are few, if any, areas with these same ecological functions and values in this watershed or even Cape Cod-wide. As a result, restoring and enhancing the ecological value to this ecosystem is a priority for this project.

Other sites for mitigation were considered during the planning process for this Project and during the preparation of the FEIR/EA. However, all available mitigation options were off-site and out of kind and would not replace the unique characteristics or the functions and values of the lost aquatic resources that would be provided by the proposed in-kind on-site mitigation opportunities.

As noted above, it has been determined that freshwater wetlands were filled when the Airport was constructed in the early 1940s. It is anticipated that removal of the existing pavement

associated with the reconfiguration of the west end and east end-connector taxiways would constitute restoration (i.e., re-establishment or rehabilitation) of that previously existing (if not historic) habitat, rather than creation (establishment) or replication, which connotes the destruction of naturally occurring uplands to create the hydrology to support a wetland system. While it is recognize that a portion of the wetlands on which the Airport was originally constructed may have been tidally-influenced prior to the construction of the Hatches Harbor dike, it is logical to conclude that the wetlands within interior portions of the airfield would have had similar characteristics as other freshwater wetlands that are equidistant from the harbor.

The importance of mitigation in the appropriate location so as to regain wetland functionality cannot be stressed enough. Providing in-kind, on-site mitigation specifically at the Airport location through restoration of long-ago impaired wetlands will maintain functionally and geographically appropriate mitigation in this unique outer Cape watershed. Unlike wetland creation, where numerous factors have to be created, such as variable hydrologic conditions, soil geochemistry, and infaunal communities, on-site restoration at the Airport will enhance and restore wetlands previously in existence, on location, from which ecological value and effective ecological function will be quickly realized.

## **6.1 Proposed On-Site Wetland Restoration**

On-site mitigation, and in this case on-site restoration, is a form of compensatory mitigation that is justifiable for this project because of its unique setting and the biological need for maintaining wetlands in this location to preserve the habitat. In addition, restoration of these wetlands has a high likelihood of success. It has been determined that the Airport when originally constructed resulted in the filling of wetlands. Upon removal of this fill, it is anticipated that the underlying soils and hydrology will be intact, allowing for greater success of the wetland mitigation. Therefore, on-site restoration is appropriate for the location and is naturally situated in the most appropriate location within the landscape. According to the National Research Council (NRC), *“whenever possible, restoration of a natural wetland should be chosen over creation of a new one.”* Additionally, restoration increases the levels of function in existing wetlands.

The NRC guidelines encourage mitigation designers to: consider hydrogeomorphic and ecological landscape and climate; adopt a dynamic landscape perspective; restore or develop naturally variable hydrological conditions; avoid over-engineered structures; mimic native planting elevation, depth, soil type and seasonal timing; provide appropriate heterogeneous topography; note subsurface conditions, including soil and sediment geochemistry and physics, groundwater quantity and quality, and infaunal communities; consider complications associated with creation or restoration in seriously degraded or disturbed sites; conduct early monitoring as part of adaptive management.

Given that the wetlands at the Airport are primarily Palustrine Scrub-Shrub Wetlands (PSS), rather than mowed sedges and grasses, they lend themselves to on-site, in-kind restoration as a preferred scenario. Since ecologically functional wetlands take decades to establish once created, it makes ecological sense to conduct mitigation on-site where the function of existing wetlands can be maintained or improved with restoration.

The proposed Mitigation Plan will follow the U.S. Army Corps of Engineers New England District Compensatory Mitigation Guidance (July 2010, and to the extent practicable, as updated in 2015). The on-site Mitigation Plan will be comprehensive so as to result in effective compensatory mitigation for the loss of these specific aquatic resources and the habitat they provide. It will minimize project impacts, particularly by reducing impacts over time as the restored communities become established, and compensate for impacts by improving and expanding existing wetlands and reducing impervious surfaces. The plan will also address invasive species control associated with *Phragmites australis*.

The Army Corps of Engineers' goal of no net loss of acreage or ecological function will be met with on-site restoration. Although the mitigation ratio for on-site wetland restoration is approximately half of the recommended mitigation ratio for emergent wetlands/scrub-shrub habitats, the increased likelihood of success of the on-site wetland restoration will result in no net loss of wetland function at the Airport and within the CCNS. The wetlands located on the Airport already exist. The hydrogeomorphic and ecological landscape and climate are right for self-sustaining wetlands. Therefore it makes ecological sense to enhance and restore these existing wetlands on a location that clearly is capable of sustaining them.

In addition, there is no anticipation of any major change in FAA regulations or Advisory Circulars (ACs) that would require additional modification to the airfield near the restoration areas, especially the west end. It is highly unlikely that any major changes will happen at the Airport to jeopardize the success of the on-site restoration.

## **6.2 On-Site Wetland Enhancement**

At the suggestion of the Corps staff during an on-site, interagency meeting in April 2010 during the review of the Massachusetts Environmental Policy Act, M.G.L. c. 30 §§ 61 through 62H, inclusive (MEPA) documents and at the on-set of the development of the Environmental Assessment under National Environmental Policy Act (42 U.S.C. 4321-4347 or NEPA), the Corps staff suggested that on-site wetland enhancement may compensate for the lower mitigation ratio of on-site mitigation as compared to those ratios recommended in the Corps Guidance. As a result, in addition to providing on-site wetland restoration, wetland enhancement or rehabilitation is proposed within Wetland I, Wetland H, and Wetland B to restore the native plant communities at a greater than 7:1 ratio (overall wetland rehabilitation to overall wetland loss), as well as to provide restored habitat for state-listed species (Figure 10).

### 6.3 Overall Reduction of Impervious Cover

While the Project will impact wetlands, the project will result in a net reduction of impervious surfaces, implementation of an invasive plant management plan and subsequently a reduction in invasive plant species, and an increase of naturally vegetated wetlands and dune habitat at the Airport. Reconfiguration of parallel Taxiway (TW A) and the West End Taxiway (TW D) will decrease impervious surfaces by 34,111 SF. The areas formerly covered in pavement will be reverted back to naturally vegetated wetlands and coastal dune habitat. Additional mitigation proposed for the Airport includes:

- stormwater management (per the Massachusetts Stormwater Management Standards);
- implementation of an erosion and sedimentation control program;
- mitigation oversight (Environmental Monitor);
- implementation of rare species protection plans; and
- implementation of an invasive species removal plan.

The successful restoration of improved and enhanced ecosystem function is critical. To ensure stewardship of the restoration progress, an Environmental Manager will be engaged to monitor restoration progress and success. Monitoring will be established with a long term monitoring plan of five years. As part of the monitoring plan, invasive plant monitoring will be incorporated, particularly for *Phragmites australis* and purple loosestrife (*Lythrum salicaria*). Given that this is located on Cape Cod National Seashore property, there will be NPS-level scrutiny of the project and restoration success.

## 7 SUMMARY

In summary, we believe that restoring and maintaining habitat for state-listed listed species within aquatic resources that are located within the confines of the CCNS and are designated ORWs will result in more meaningful compensatory mitigation. The unique setting at the Airport is important to preserve; these wetlands provide habitat for a variety of wildlife, including state-listed species. There are no other areas within the outer Cape with the unique mosaic of interdunal swales that are in need of restoration that would otherwise replace this unique habitat. Off-site mitigation achieved through an In-Lieu Fee (ILF) Program will simply not replace the important habitat found at the Airport.

The Mitigation Plan will be designed to meet the NRC and Corps New England Guidelines for wetland restoration. It will include provisions for on-site restoration and wetland enhancement. Further, it is not anticipated that there would be any major change in FAA regulations or Advisory Circulars (ACs) that would require additional modification to the airfield near the restoration areas, particularly at the western end, thus further ensuring the long-term success of the mitigation area. For these reasons we believe it is appropriate to allow for on-site mitigation at the Airport, rather than require mitigation to be addressed through participation of the ILF Program.

## 8 REFERENCES

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Summary of Wetland Resource Areas, Provincetown Municipal Airport, Provincetown Massachusetts, April 2007, prepared by Horsley Witten Group, Inc.

Summary of Natural Resources and Rare Species Habitat Assessments, Provincetown Municipal Airport, Provincetown Massachusetts, April 2007, prepared by Horsley Witten Group, Inc.

Wetland Descriptions and Observations of Habitat Suitability Relative to the Eastern Spadefoot (*Scaphiopus h. holbrookii*), Provincetown Municipal Airport, Provincetown Massachusetts, June 2008; updated July 2009, prepared by Horsley Witten Group, Inc.



Prepared By:

**JACOBS**

**Notes:**

Data compiled from the following source:  
Office of Geographic Information (MassGIS), Commonwealth  
of Massachusetts, Information Technology Division

- USGS Color Ortho Imagery (2008/2009)

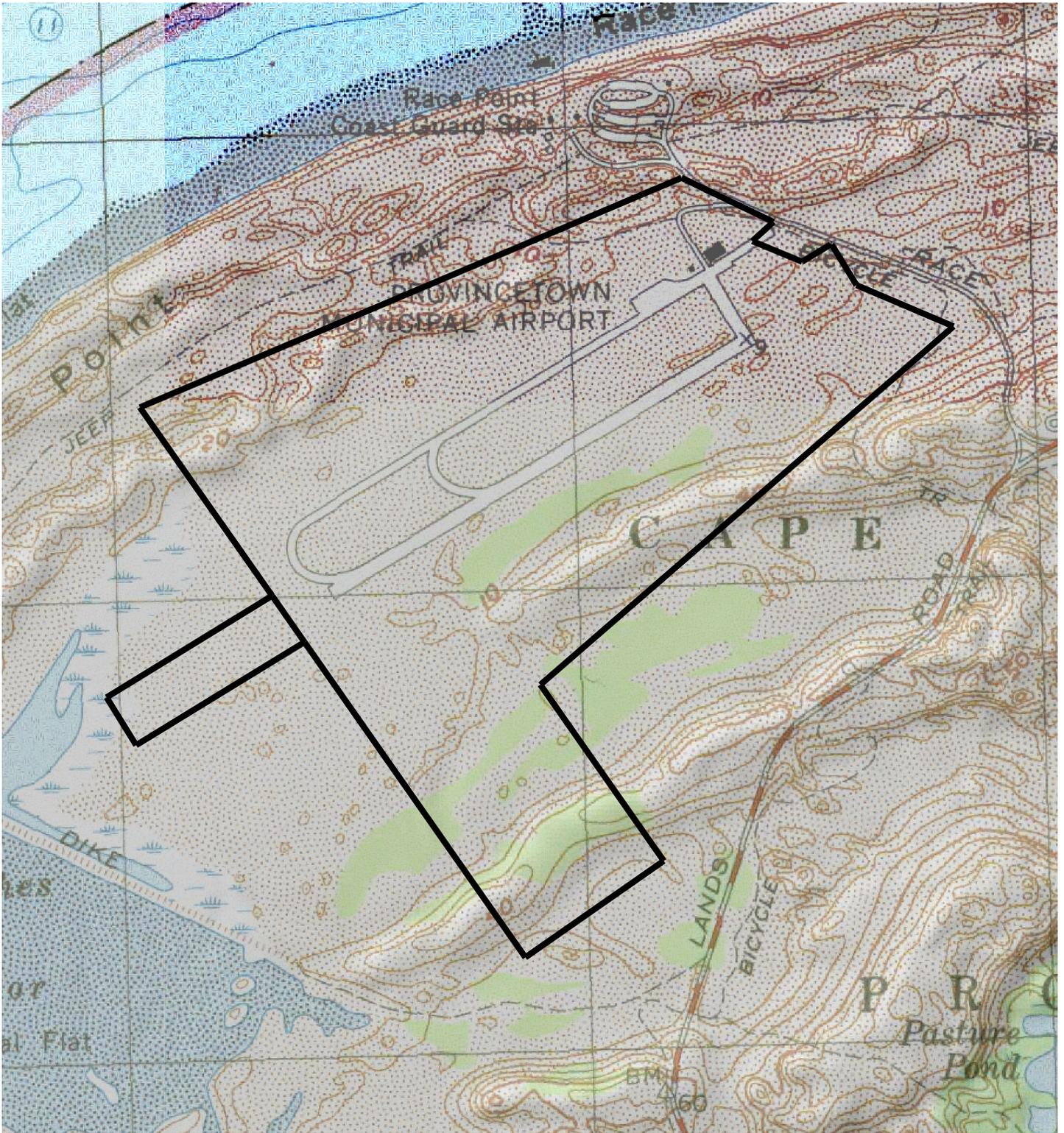


Not to Scale

**Provincetown Municipal Airport  
Capital Improvements Plan  
Location Map**

**Figure 1**





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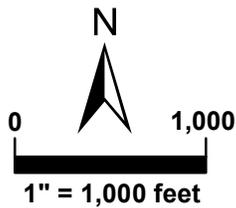
\*Provincetown Topographic Quadrangle

**Legend**

 Lease Line

**Horsley Witten Group**  
Sustainable Environmental Solutions

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USGS Topographic Quadrangles  
Provincetown Municipal Airport  
Provincetown, MA

Date: 4/30/2015

Figure 2

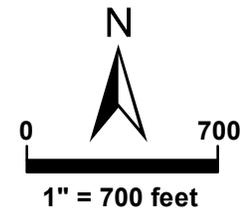




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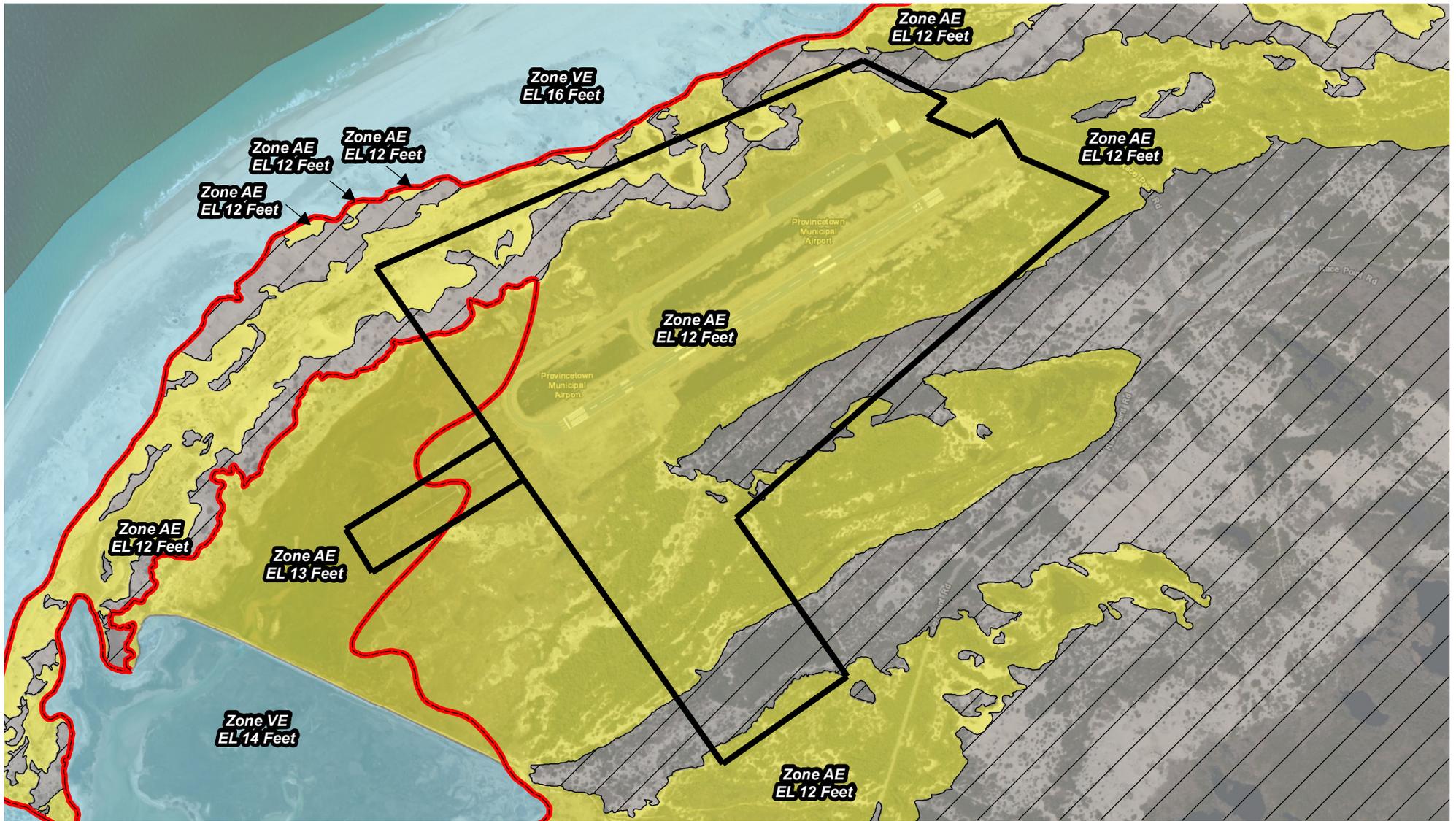


Aerial Photo  
Provincetown Municipal Airport  
Provincetown, MA

Date: 4/30/2015

Figure 3





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\*FEMA's National Flood Hazard Layer, July 2014

**Legend**

Lease Line

Limit of Moderate Wave Action (LIMWA)

Area of Minimal Flood Hazard

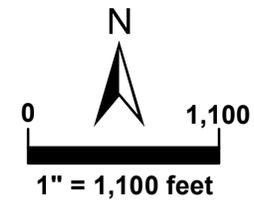
5ft. Contours

**Flood Zones**

100-year Flood Zone - Zone AE

100-year Flood Zone - Zone VE

Zone X



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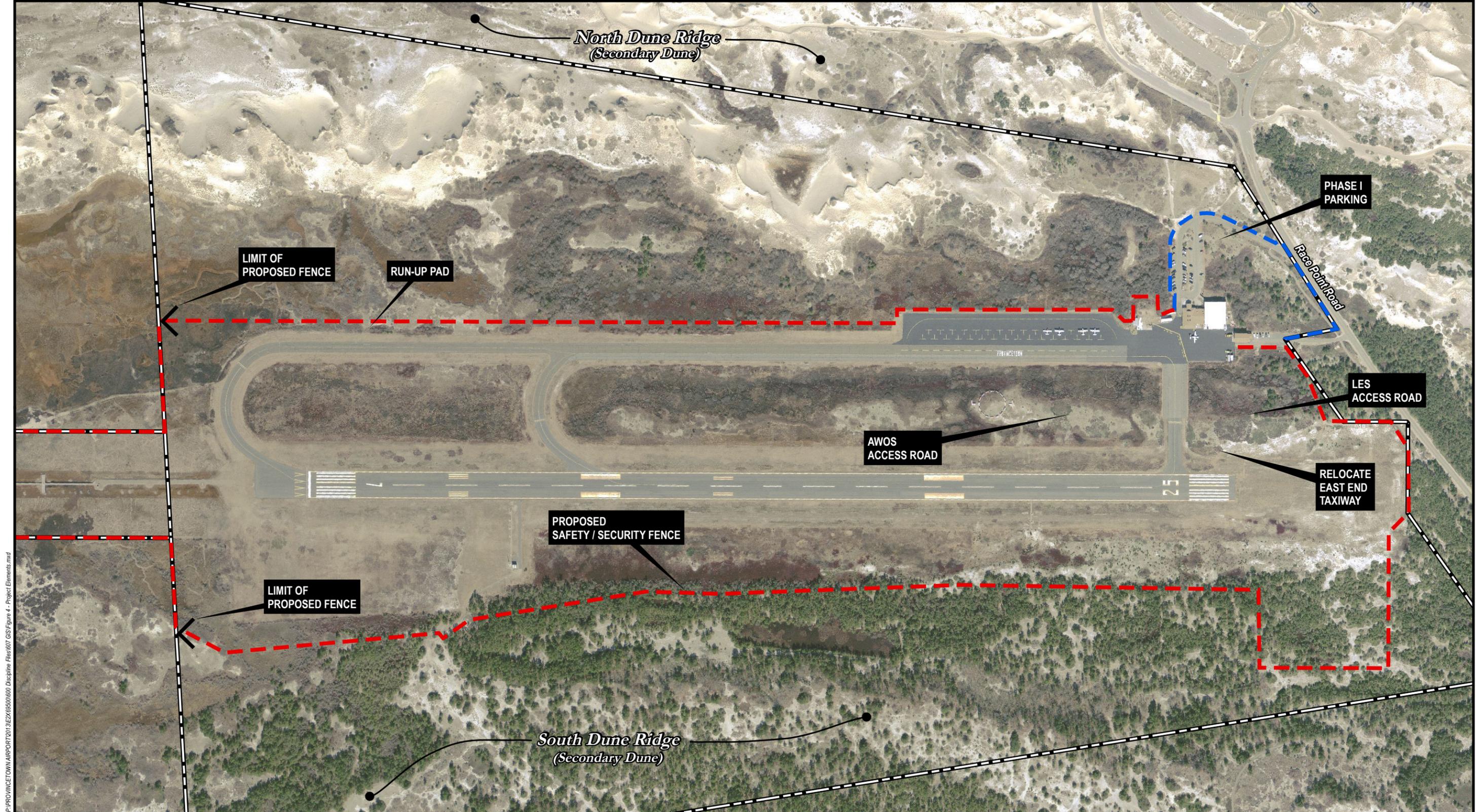


FEMA's National Flood Hazard Layer  
Provincetown Airport  
Provincetown, MA

Date: 4/30/2015

Figure 4



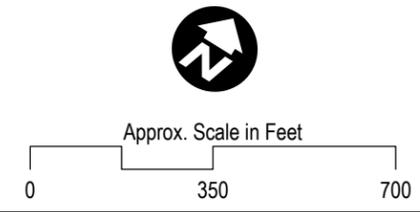


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Prepared By:  
**JACOBS**

**Notes:**  
 Data compiled from the following source:  
 Office of Geographic Information (MassGIS), Commonwealth  
 of Massachusetts, Information Technology Division  
 - USGS Color Ortho Imagery (2008/2009)

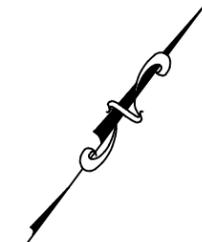
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 - - - - - Airport Lease Line  
 - - - - - Airside Limits  
 - - - - - Landside Limits



Provincetown Municipal Airport  
 Capital Improvements Plan  
**Airport Area and  
 Coastal Dune Project Elements**  
 Figure 4

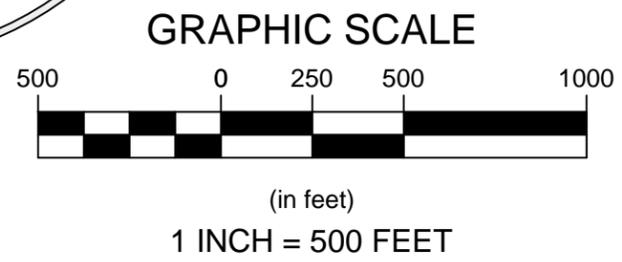
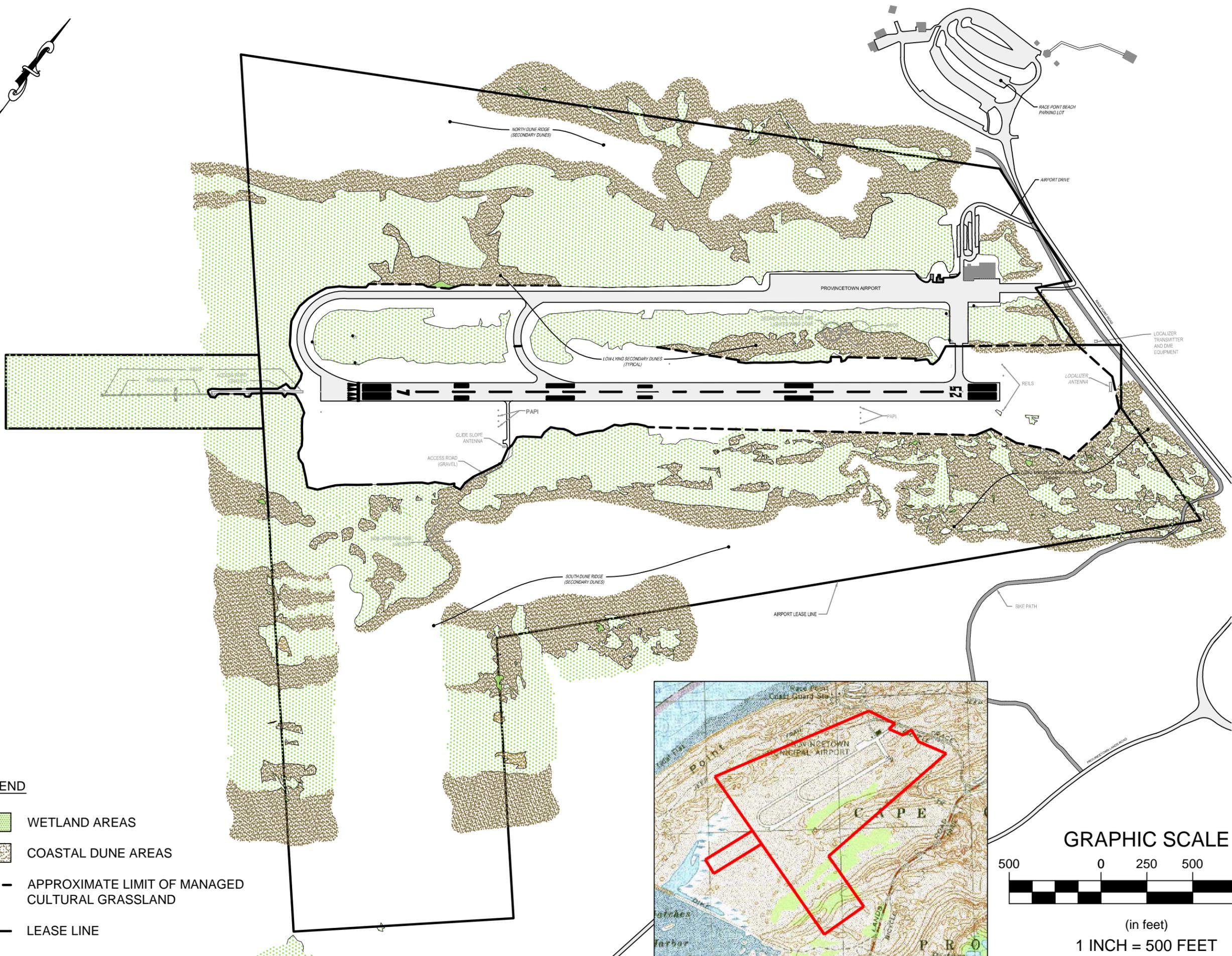


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**LEGEND**

-  WETLAND AREAS
-  COASTAL DUNE AREAS
-  APPROXIMATE LIMIT OF MANAGED CULTURAL GRASSLAND
-  LEASE LINE



Revisions

Rev.	Date	By	Description

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Checked By: AB  
 Drawn By: TW  
 Design By: TW  
 Date: FEBRUARY 2015

**PROVINCETOWN MUNICIPAL AIRPORT  
 PROVINCETOWN, MA**

**FIGURE 3  
 AIRPORT LEASE AREA AND COSTAL DUNE RECOURSES  
 FEBRUARY, 2015**

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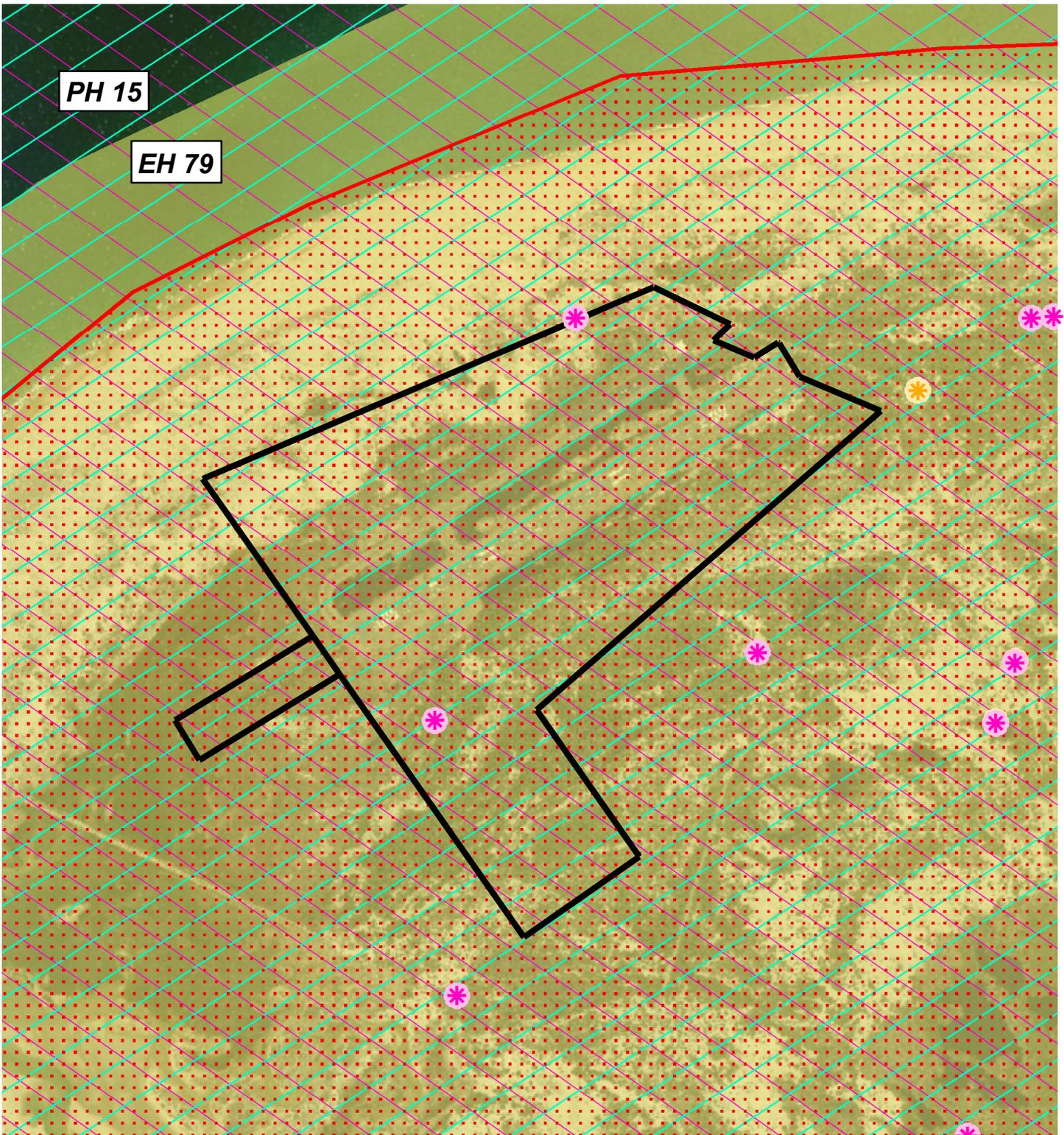
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Registration:

Project Number: 4027

Sheet Number: FIGURE 6



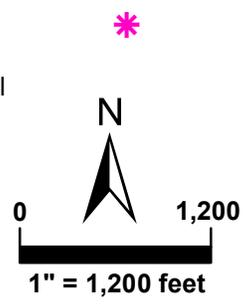


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**Legend**

-  Lease Line
-  Potential Vernal Pools
-  NHESP Certified Vernal Pools
-  NHESP Priority Habitats of Rare Species
-  NHESP Estimated Habitats of Rare Wildlife
-  BioMap2 Core Habitat
-  BioMap2 Critical Natural Landscape

\*Data Source: MassGIS



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Natural Heritage &  
 Endangered Species Program  
 (NHESP)  
 Provincetown Municipal Airport  
 Provincetown, MA

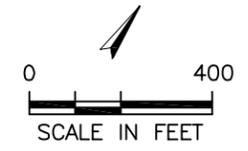
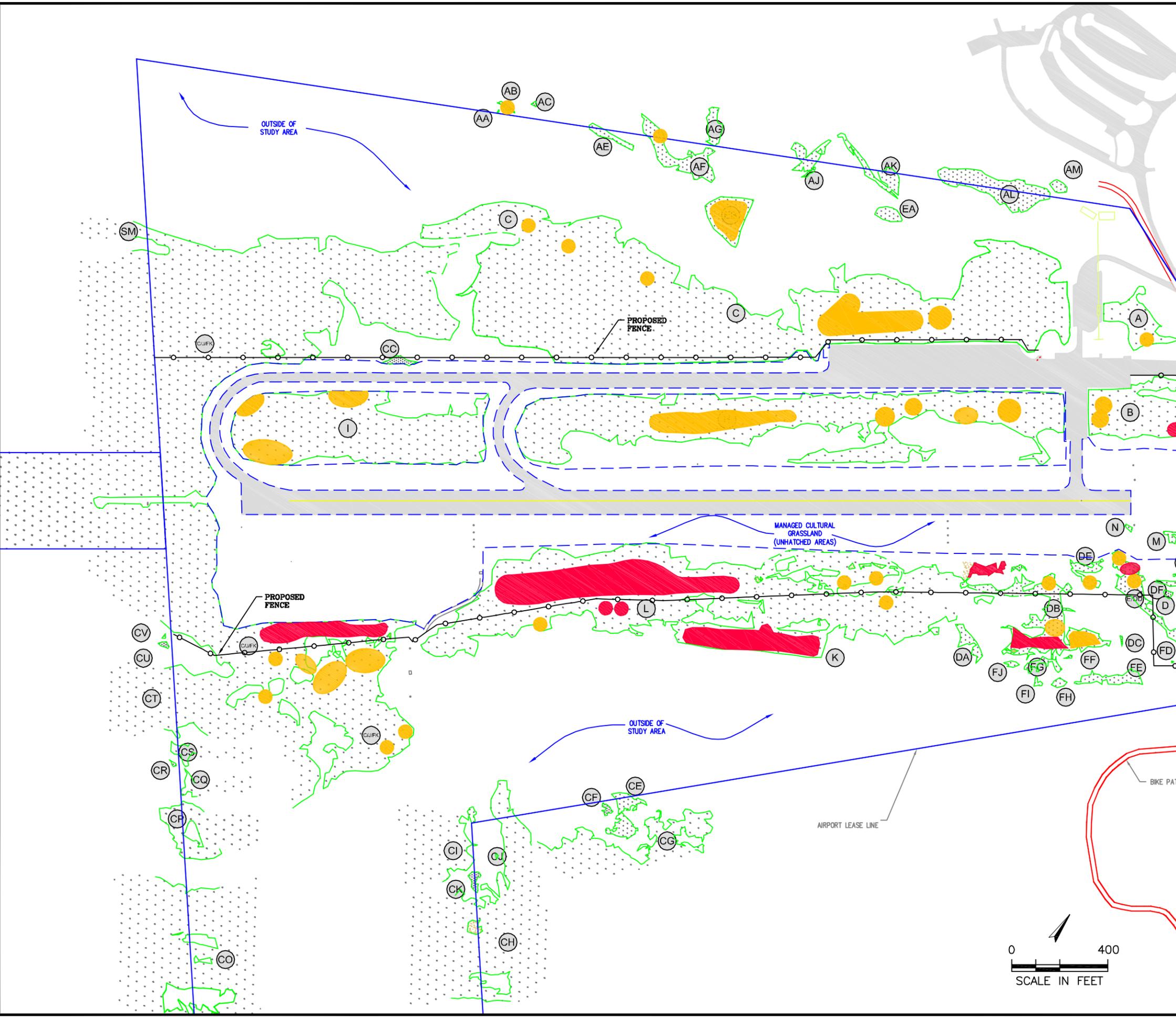
Date: 6/19/2015 Figure 7



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Notes and Legend:

	Eastern Spadefoot Toad (Breeding) Prime		Area not in Assessment
	Eastern Spadefoot Toad (Breeding) Potential less than 1000 S.F. (less than 10m X 10m)		Wetland Areas
	Eastern Spadefoot Toad (Breeding) Potential more than 1000 S.F. more than (10m X 10m)		Lease Line
			Proposed Fence

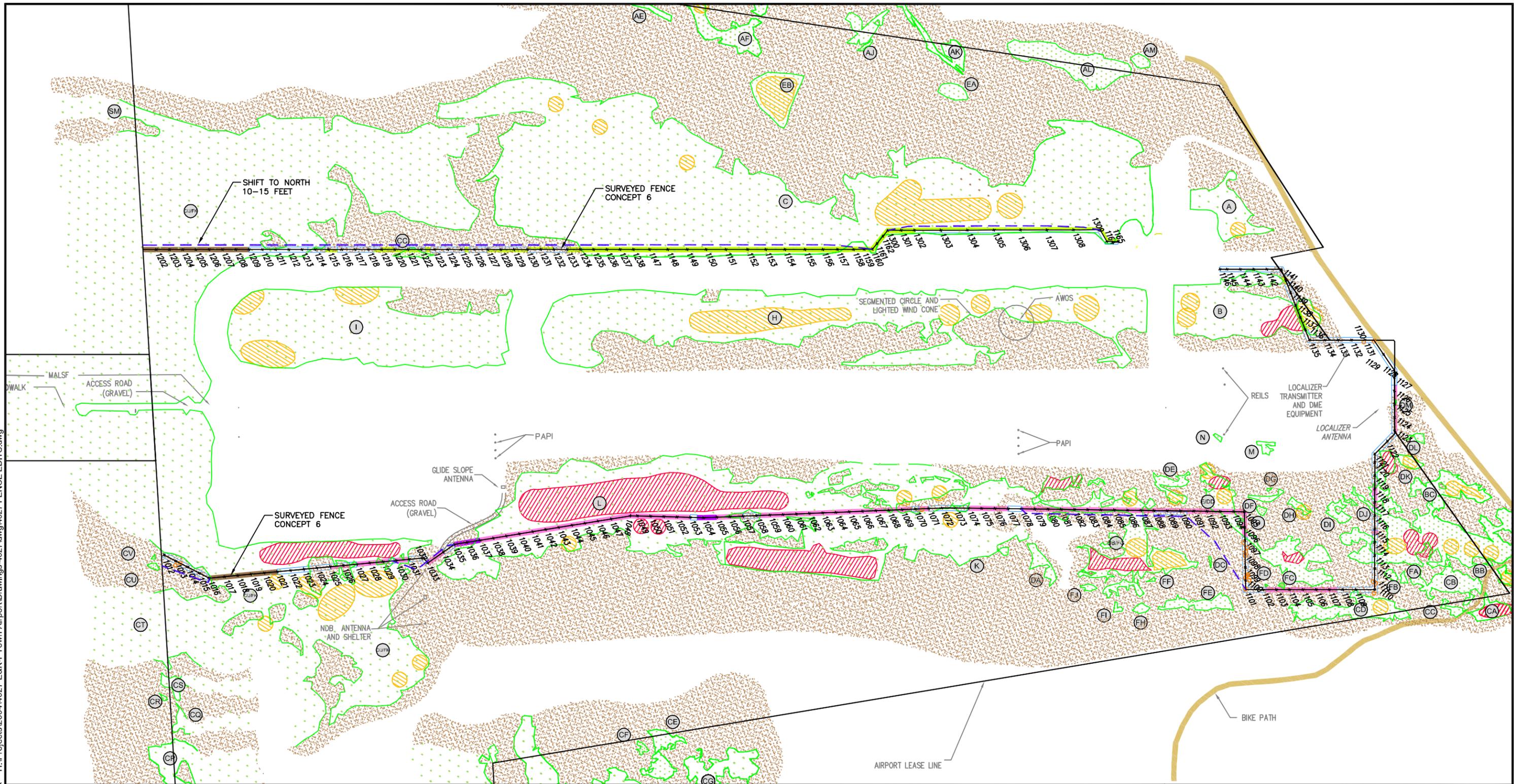


Title: <b>FIGURE 8</b>				
Project: <b>PROVINCETOWN MUNICIPAL AIRPORT CAPITAL IMPROVEMENTS PLAN PROVINCETOWN, MASSACHUSETTS</b>				
Sheet: 1	Date: 05/05/10	Design By: AMB/ACS	Drawn By: DWM/ERK	Checked By: JL
Prepared For: Provincetown Municipal Airport Race Point Road, P.O. Box 657 Provincetown, Massachusetts Phone: (508) 487-0241 Fax: (508) 487-4110		Design By: <b>Horsley Witten Group Environmental Services</b> 90 Route 6A Sandwich, MA 02563 508-833-6600 voice 508-833-3150 fax		





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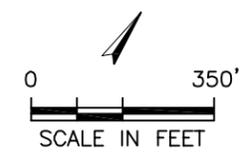


**LEGEND**

- OPEN/UNVEG DUNE, OPEN HERBACEOUS, OR LOW SHRUBS
- DENSE SHRUBS
- PITCH PINE W/O UNDERSTORY
- DENSE PITCH PINE & SHRUBS
- PHRAGMITES
- ▨ EASTERN SPADEFOOT TOAD (BREEDING) PRIME
- ▨ EASTERN SPADEFOOT TOAD (BREEDING) POTENTIAL
- WETLAND AREAS
- DUNE AREAS
- POTENTIAL AREAS TO FURTHER MINIMIZE FENCE IMPACTS

**FENCE IMPACTS BY VEGETATION COVER**

	B/W	I/W	DUNE	Grassland	Gravel
Vegetation Community Type:	Area (sq)	Area (sq)	Area (sq)	Area (sq)	Area (sq)
<span style="color: blue;">○</span> Open/Unveg Dune or Open Herbaceous	3,812	3,744	22,204	1,852	708
<span style="color: green;">●</span> Low shrubs	952	208	1,704		
<span style="color: green;">●</span> Dense Shrubs		12,288	2,180		
<span style="color: pink;">●</span> Pitch Pine w/o understory	1,152	12,622	5,216		
<span style="color: purple;">●</span> Dense Pitch Pine & Shrubs		728	884		
<span style="color: brown;">●</span> Phragmites	5,208				
<b>TOTAL TO BE CUT:</b>	<b>1,152</b>	<b>25,648</b>	<b>8,088</b>		



**FIGURE 9**

**FENCE IMPACTS  
PROVINCETOWN MUNICIPAL AIRPORT  
PROVINCETOWN, MASSACHUSETTS**

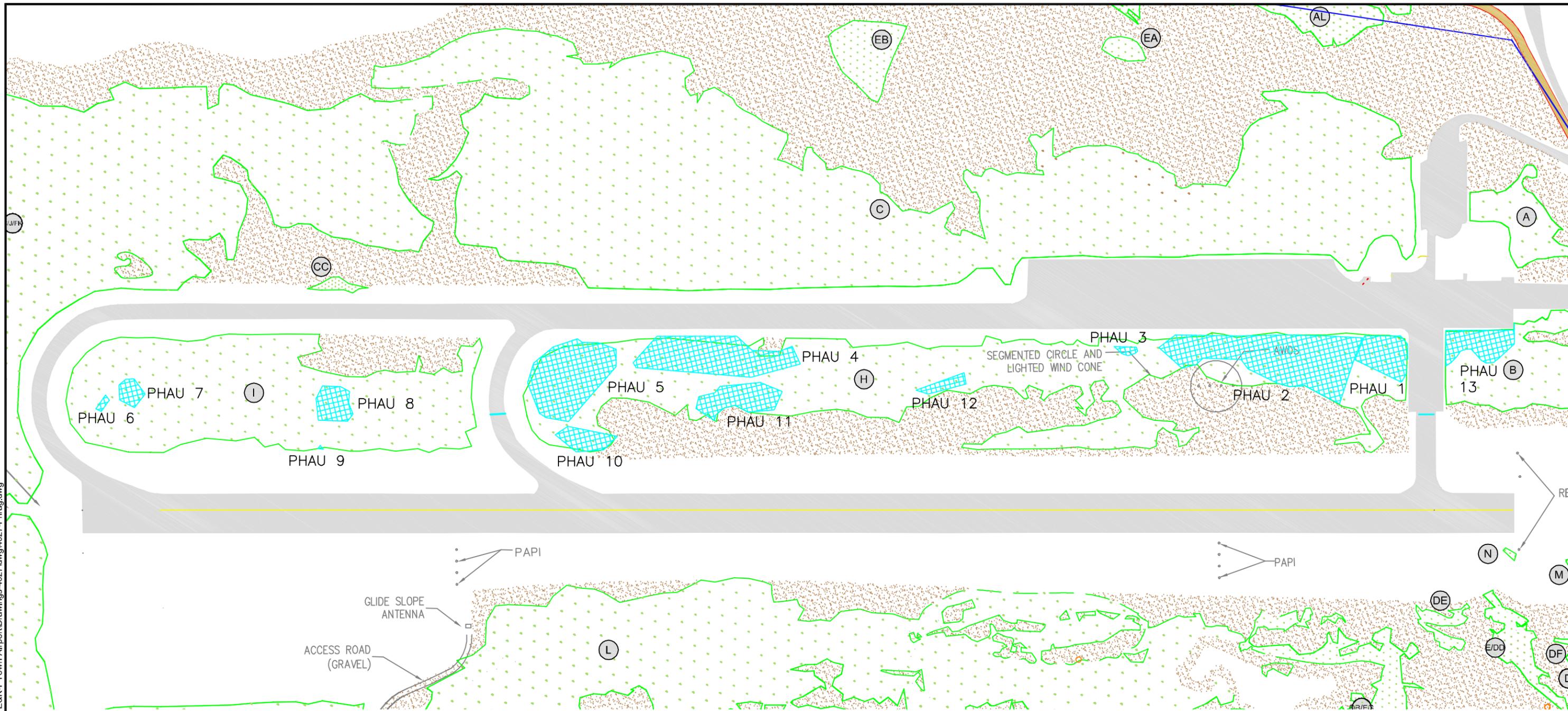
Project: 4027	Sheet: 1	Date: 05/15/2015	Design By:	Drawn By: ERK	Checked By: AMB
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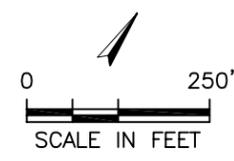
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**LEGEND**

-  PHRAGMITES
-  WETLAND AREAS
-  DUNE AREAS

Phragmites australis	Area (sf)
Phau 1	11,400
Phau 2	49,965
Phau 3	918
Phau 4	31,906
Phau 5	32,387
Phau 6	603
Phau 7	3,337
Phau 8	7,173
Phau 9	60
Phau 10	6,375
Phau 11	12,728
Phau 12	2,858
Phau 13	11,757
<b>TOTAL:</b>	<b>171,467</b>



Title: <b>FIGURE 10</b>					
Project: <b>PROVINCETOWN MUNICIPAL AIRPORT PROVINCETOWN, MASSACHUSETTS</b>					
Project: 4027D	Sheet: 1	Date: 04/22/10	Design By:	Drawn By: ERK	Checked By: AMB
Prepared For: Provincetown Municipal Airport Race Point Road, P.O. Box 657 Provincetown, Massachusetts Phone: (508) 487-0241 Fax: (508) 487-4110			Prepared By: <b>Horsley Witten Group, Inc.</b> Sustainable Environmental Solutions 90 Route 6A Sandwich, MA 02563 508-833-6600 voice 508-833-3150 fax		



**DISTRICT OFFICE:** New England District  
**FILE NUMBER & APPLICANT:** Provincetown Airport Commission, NAE-2006-4281

**PROJECT LOCATION INFORMATION:**

State: Massachusetts  
County: Barnstable  
Center coordinates of site (latitude/longitude):  
Approximate size of area (parcel) reviewed, including uplands: acres.  
Name of nearest waterway: Cape Cod Bay  
Name of watershed: Cape Cod Bay

**JURISDICTIONAL DETERMINATION**

**Completed:** Desktop determination  Date:  
Site visit(s)  Date(s): January 8, 2007

**Jurisdictional Determination (JD):**

- Preliminary JD - Based on available information,  *there appear to be* (or)  *there appear to be no* "waters of the United States" and/or "navigable waters of the United States" on the project site. A preliminary JD is not appealable (Reference 33 CFR part 331).
- Approved JD – An approved JD is an appealable action (Reference 33 CFR part 331).  
Check all that apply:
- There are* "navigable waters of the United States" (as defined by 33 CFR part 329 and associated guidance) within the reviewed area. Approximate size of jurisdictional area: .
- There are* "waters of the United States" (as defined by 33 CFR part 328 and associated guidance) within the reviewed area. Approximate size of jurisdictional area: .
- There are* "isolated, non-navigable, intra-state waters or wetlands" within the reviewed area.  
 Decision supported by SWANCC/Migratory Bird Rule Information Sheet for Determination of No Jurisdiction.

**BASIS OF JURISDICTIONAL DETERMINATION:**

**A. Waters defined under 33 CFR part 329 as "navigable waters of the United States":**

- The presence of waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

**B. Waters defined under 33 CFR part 328.3(a) as "waters of the United States":**

- (1) The presence of waters, which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide.
- (2) The presence of interstate waters including interstate wetlands<sup>1</sup>.
- (3) The presence of other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate commerce including any such waters (check all that apply):
- (i) which are or could be used by interstate or foreign travelers for recreational or other purposes.
- (ii) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- (iii) which are or could be used for industrial purposes by industries in interstate commerce.
- (4) Impoundments of waters otherwise defined as waters of the US.
- (5) The presence of a tributary to a water identified in (1) – (4) above.
- (6) The presence of territorial seas.
- (7) The presence of wetlands adjacent<sup>2</sup> to other waters of the US, except for those wetlands adjacent to other wetlands.

**Rationale for the Basis of Jurisdictional Determination (applies to any boxes checked above).** *If the jurisdictional water or wetland is not itself a navigable water of the United States, describe connection(s) to the downstream navigable waters. If B(1) or B(3) is used as the Basis of Jurisdiction, document navigability and/or interstate commerce connection (i.e., discuss site conditions, including why the waterbody is navigable and/or how the destruction of the waterbody could affect interstate or foreign commerce). If B(2, 4, 5 or 6) is used as the Basis of Jurisdiction, document the rationale used to make the determination. If B(7) is used as the Basis of Jurisdiction, document the rationale used to make adjacency determination:*

**Lateral Extent of Jurisdiction:** (Reference: 33 CFR parts 328 and 329)

- Ordinary High Water Mark indicated by:
- clear, natural line impressed on the bank
  - the presence of litter and debris
  - changes in the character of soil
  - destruction of terrestrial vegetation
  - shelving
  - other:
- High Tide Line indicated by:
- oil or scum line along shore objects
  - fine shell or debris deposits (foreshore)
  - physical markings/characteristics
  - tidal gages
  - other:
- Mean High Water Mark indicated by:
- survey to available datum;  physical markings;  vegetation lines/changes in vegetation types.
- Wetland boundaries, as shown on the attached wetland delineation map and/or in a delineation report prepared by:

**Basis For Not Asserting Jurisdiction:**

- The reviewed area consists entirely of uplands.
- Unable to confirm the presence of waters in 33 CFR part 328(a)(1, 2, or 4-7).
- Headquarters declined to approve jurisdiction on the basis of 33 CFR part 328.3(a)(3).
- The Corps has made a case-specific determination that the following waters present on the site are not Waters of the United States:
- Waste treatment systems, including treatment ponds or lagoons, pursuant to 33 CFR part 328.3.
  - Artificially irrigated areas, which would revert to upland if the irrigation ceased.
  - Artificial lakes and ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.
  - Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.
  - Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States found at 33 CFR 328.3(a).
  - Isolated, intrastate wetland with no nexus to interstate commerce.
  - Prior converted cropland, as determined by the Natural Resources Conservation Service. Explain rationale:
  - Non-tidal drainage or irrigation ditches excavated on dry land. Explain rationale:
  - Other (explain):

**DATA REVIEWED FOR JURISDICTIONAL DETERMINATION (mark all that apply):**

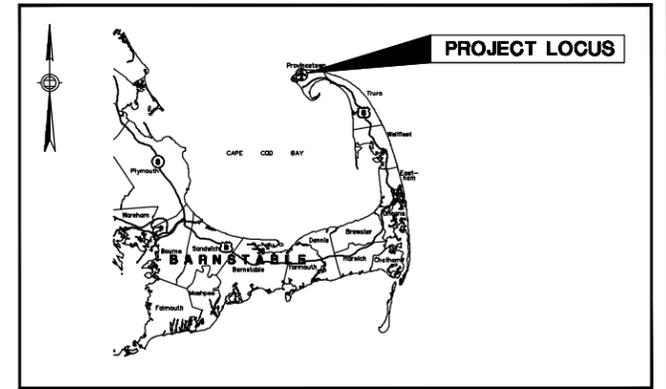
- Maps, plans, plots or plat submitted by or on behalf of the applicant.
- Data sheets prepared/submitted by or on behalf of the applicant.
- This office concurs with the delineation report, dated \_\_\_\_\_, prepared by (company):
  - This office does not concur with the delineation report, dated \_\_\_\_\_, prepared by (company):
- Data sheets prepared by the Corps.
- Corps' navigable waters' studies:
- U.S. Geological Survey Hydrologic Atlas:
  - U.S. Geological Survey 7.5 Minute Topographic maps:
  - U.S. Geological Survey 7.5 Minute Historic quadrangles:
  - U.S. Geological Survey 15 Minute Historic quadrangles:
  - USDA Natural Resources Conservation Service Soil Survey:
  - National wetlands inventory maps:
  - State/Local wetland inventory maps:
  - FEMA/FIRM maps (Map Name & Date):
  - 100-year Floodplain Elevation is: \_\_\_\_\_ (NGVD)
  - Aerial Photographs (Name & Date):
  - Other photographs (Date):
  - Advanced Identification Wetland maps:
  - Site visit/determination conducted on: January 8, 2007
  - Applicable/supporting case law:
  - Other information (please specify):

<sup>1</sup>Wetlands are identified and delineated using the methods and criteria established in the Corps Wetland Delineation Manual (87 Manual) (i.e., occurrence of hydrophytic vegetation, hydric soils and wetland hydrology).

<sup>2</sup>The term "adjacent" means bordering, contiguous, or neighboring. Wetlands separated from other waters of the U.S. by man-made dikes or barriers, natural river berms, beach dunes, and the like are also adjacent.

# TOWN OF PROVINCETOWN MASSACHUSETTS

PERMITTING PLANS  
NOT FOR CONSTRUCTION



VICINITY PLAN

## PROVINCETOWN MUNICIPAL AIRPORT

AIP NO. 3-25-0043-36-2013

INDEX OF DRAWINGS	
SHEET NUMBER	TITLE
1	TITLE SHEET
2	ENVIRONMENTAL DELINEATION PLAN
3	PROPOSED AIRFIELD IMPROVEMENT PLAN
4	PROPOSED AIRFIELD IMPROVEMENT PLAN, SHEET 1 OF 4
5	PROPOSED AIRFIELD IMPROVEMENT PLAN, SHEET 2 OF 4
6	PROPOSED AIRFIELD IMPROVEMENT PLAN, SHEET 3 OF 4
7	PROPOSED AIRFIELD IMPROVEMENT PLAN, SHEET 4 OF 4
8	PROPOSED FENCE PLAN
9	WETLAND MITIGATION - WEST END TAXIWAY
10	WETLAND MITIGATION - EAST END TAXIWAY
11	MITIGATION AREA DETAILS
12	EROSION CONTROL AND SEDIMENTATION DETAILS

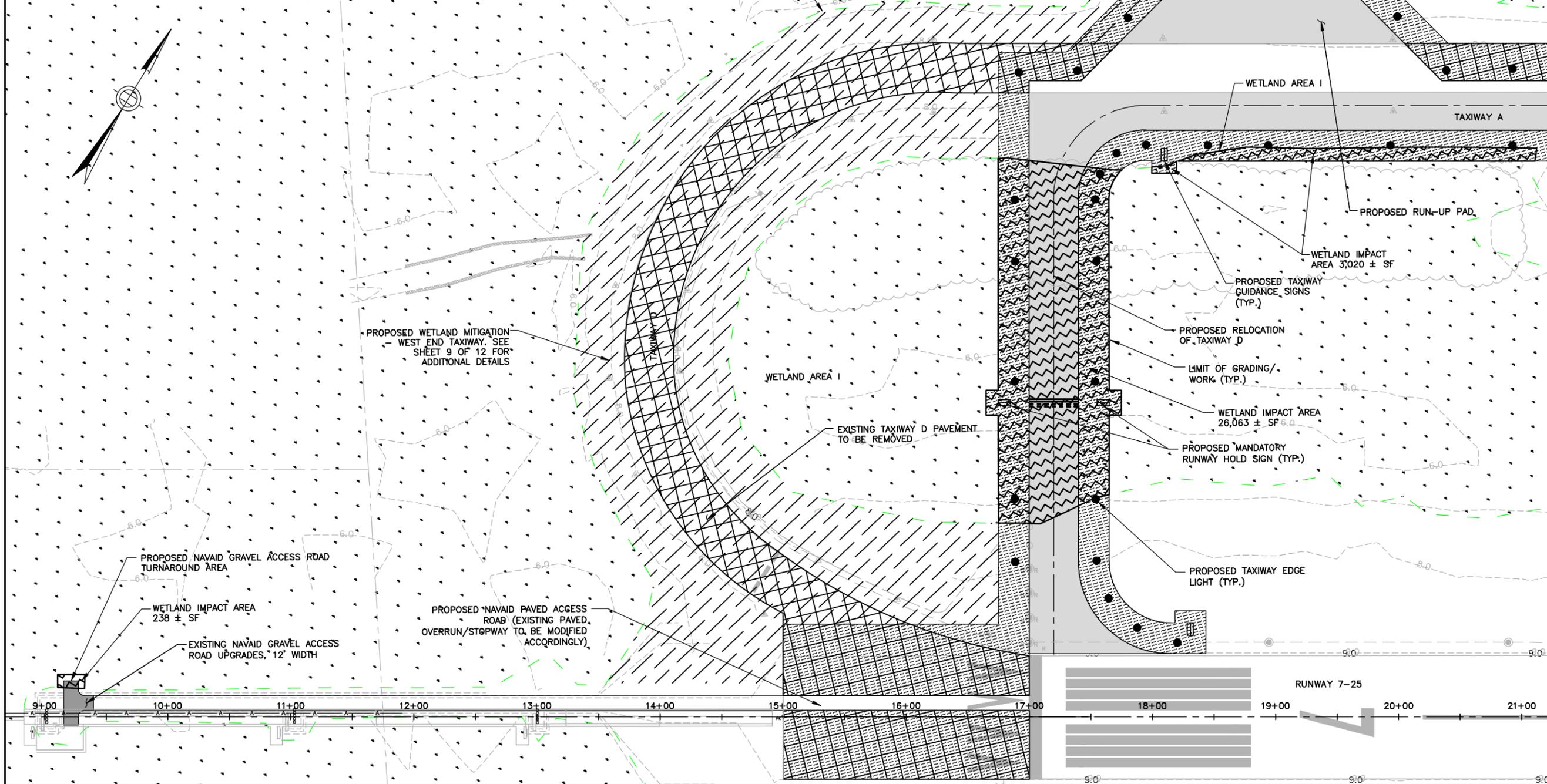
## PROVINCETOWN MUNICIPAL AIRPORT CAPITAL IMPROVEMENT PLAN

JUNE 2015



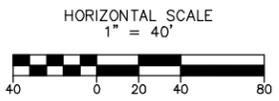
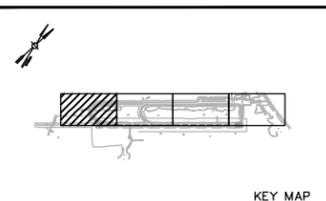


PROPOSED ALTERATIONS	CIP PROJECT ELEMENT							
	Proposed NAVAID Gravel Sheet 4 of 14		Proposed Run-Up Area Sheet 4 of 14		Proposed Relocation of Sheet 4 of 14		Proposed Realignment of Sheet 4 of 14	
Wetland	(SF)	(ac)	(SF)	(ac)	(SF)	(ac)	(SF)	(ac)
TOTAL DIRECT ALTERATION:	238	0.01	274	0.01	26,063	0.60	3,020	0.07
	(SF)	(ac)	(SF)	(ac)	(SF)	(ac)	(SF)	(ac)



PROPOSED AIRFIELD IMPROVEMENT PLAN  
SHEET 1 OF 4

PROPOSED		EXISTING		LEGEND	
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	EXISTING WETLAND AREA
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	EXISTING DUNE AREA
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	WETLAND BOUNDARY
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PROPOSED EROSION CONTROL - STRAW FIBER ROLLS ONLY
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	CONTOUR
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	EXISTING IMPERVIOUS AREA TO BE REMOVED
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PROPOSED IMPERVIOUS PAVED AREA
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PROPOSED NAVAIID GRAVEL ACCESS ROAD UPGRADES
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	EXISTING NAVAIID CRITICAL AREA
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	EXISTING LEASE LIMITS
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PROPOSED SECURITY FENCE
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PROPOSED TAXIWAY EDGE LIGHT
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	TAXIWAY STAKE MOUNTED LIGHT
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	BASE MOUNTED HIGH INTENSITY ELEVATED RUNWAY EDGE LIGHT (WHITE/AMBER LENS)
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	MISCELLANEOUS SIGN
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PROPOSED WETLAND IMPACT AREA
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PROPOSED COSTAL DUNE IMPACT AREA
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PROPOSED CULTURAL GRASSLAND
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PROPOSED WETLAND RESTORATION AREA
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PROPOSED COASTAL DUNE RESTORATION AREA



PROVINCETOWN MUNICIPAL AIRPORT  
PROVINCETOWN, MASSACHUSETTS

**PROPOSED AIRFIELD IMPROVEMENT PLAN**  
**SHEET 1 OF 4**

JACOBS PROJ. NO.:  
AIP No. 3-25-0043-36-2013

DRAWING NO.  
SHEET 4 OF 12

DATE: JUNE 2015

SCALE: AS NOTED

DESIGNED BY: SNA

DRAWN BY: SNA

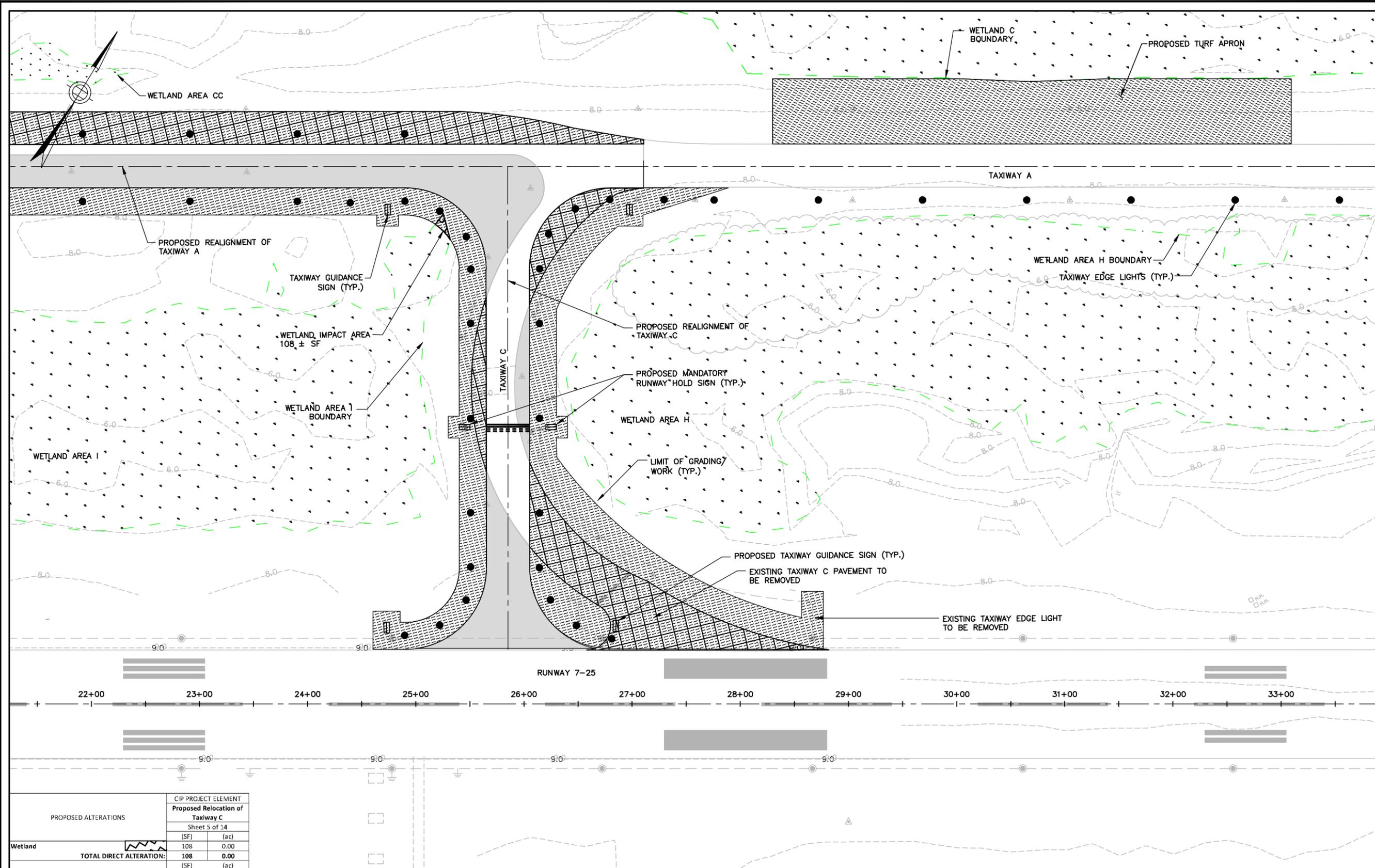
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REVISIONS

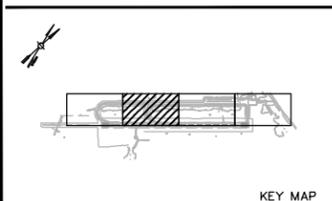
REV. NO.	DATE	DESCRIPTION

343 CONGRESS STREET  
BOSTON, MA 02210  
Tel 617-242-9222  
Fax 617-242-9624  
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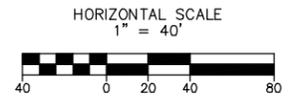


CIP PROJECT ELEMENT	
Proposed Relocation of Taxiway C	
Sheet 5 of 14	
Wetland	108 (SF) 0.00 (ac)
<b>TOTAL DIRECT ALTERATION:</b>	<b>108 (SF) 0.00 (ac)</b>



**PROPOSED AIRFIELD IMPROVEMENT PLAN  
SHEET 2 OF 4**

**NOTE:**  
1. FOR LEGEND, SEE SHEET 4 OF 12 - PROPOSED AIRFIELD IMPROVEMENT PLAN; SHEET 1 OF 4.



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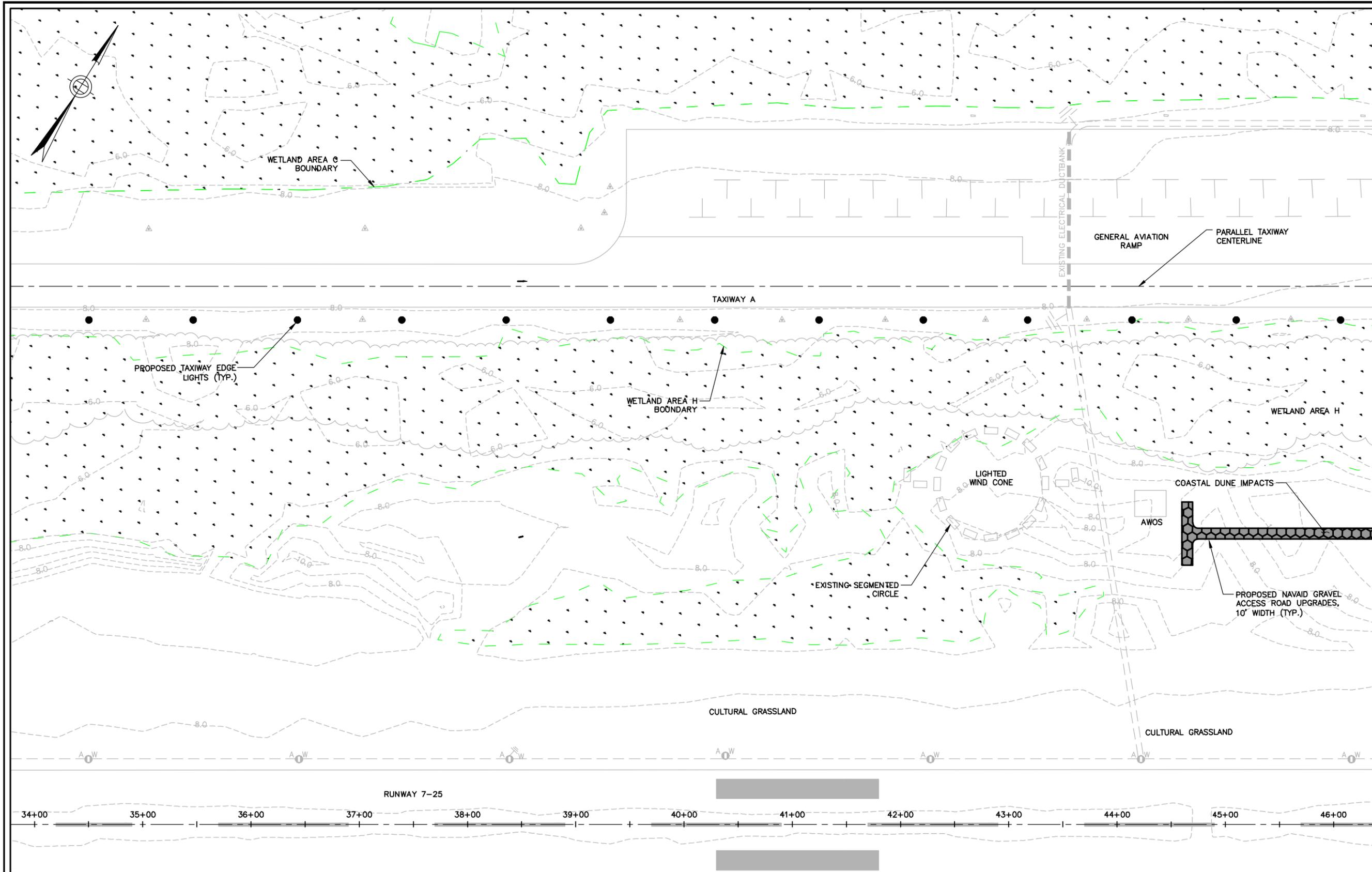
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**PROPOSED AIRFIELD IMPROVEMENT PLAN  
SHEET 2 OF 4**

PROVINCETOWN MUNICIPAL AIRPORT  
PROVINCETOWN, MASSACHUSETTS

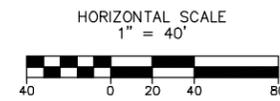
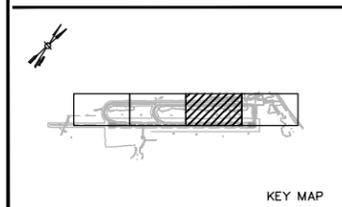
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AIP NO. 3-25-0043-36-2013

DRAWING NO.  
SHEET 5 OF 12



**PROPOSED AIRFIELD IMPROVEMENT PLAN  
SHEET 3 OF 4**

**NOTE:**  
1. FOR LEGEND, SEE SHEET 4 OF 12 - PROPOSED AIRFIELD IMPROVEMENT PLAN; SHEET 1 OF 4.



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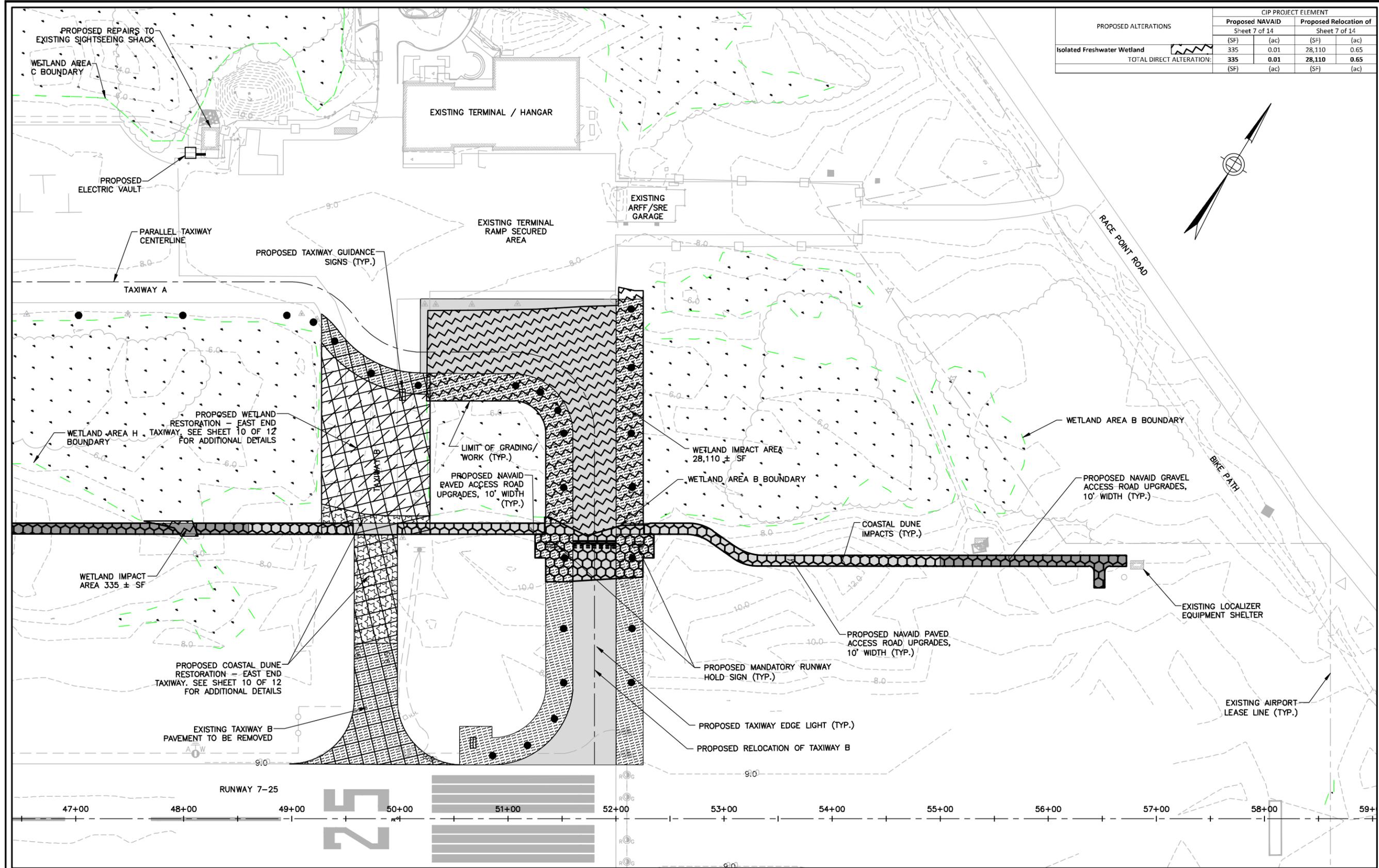
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PROVINCETOWN MUNICIPAL AIRPORT  
PROVINCETOWN, MASSACHUSETTS

**PROPOSED AIRFIELD IMPROVEMENT PLAN  
SHEET 3 OF 4**

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AIP NO. 3-25-0043-36-2013

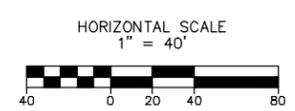
DRAWING NO.  
SHEET 6 OF 12



PROPOSED ALTERATIONS	CIP PROJECT ELEMENT			
	Proposed NAVAID Sheet 7 of 14		Proposed Relocation of Sheet 7 of 14	
Isolated Freshwater Wetland	(SF)	(ac)	(SF)	(ac)
TOTAL DIRECT ALTERATION:	335	0.01	28,110	0.65
	(SF)	(ac)	(SF)	(ac)

**PROPOSED AIRFIELD IMPROVEMENT PLAN  
SHEET 4 OF 4**

**NOTE:**  
1. FOR LEGEND, SEE SHEET 4 OF 12 - PROPOSED AIRFIELD IMPROVEMENT PLAN; SHEET 1 OF 4.



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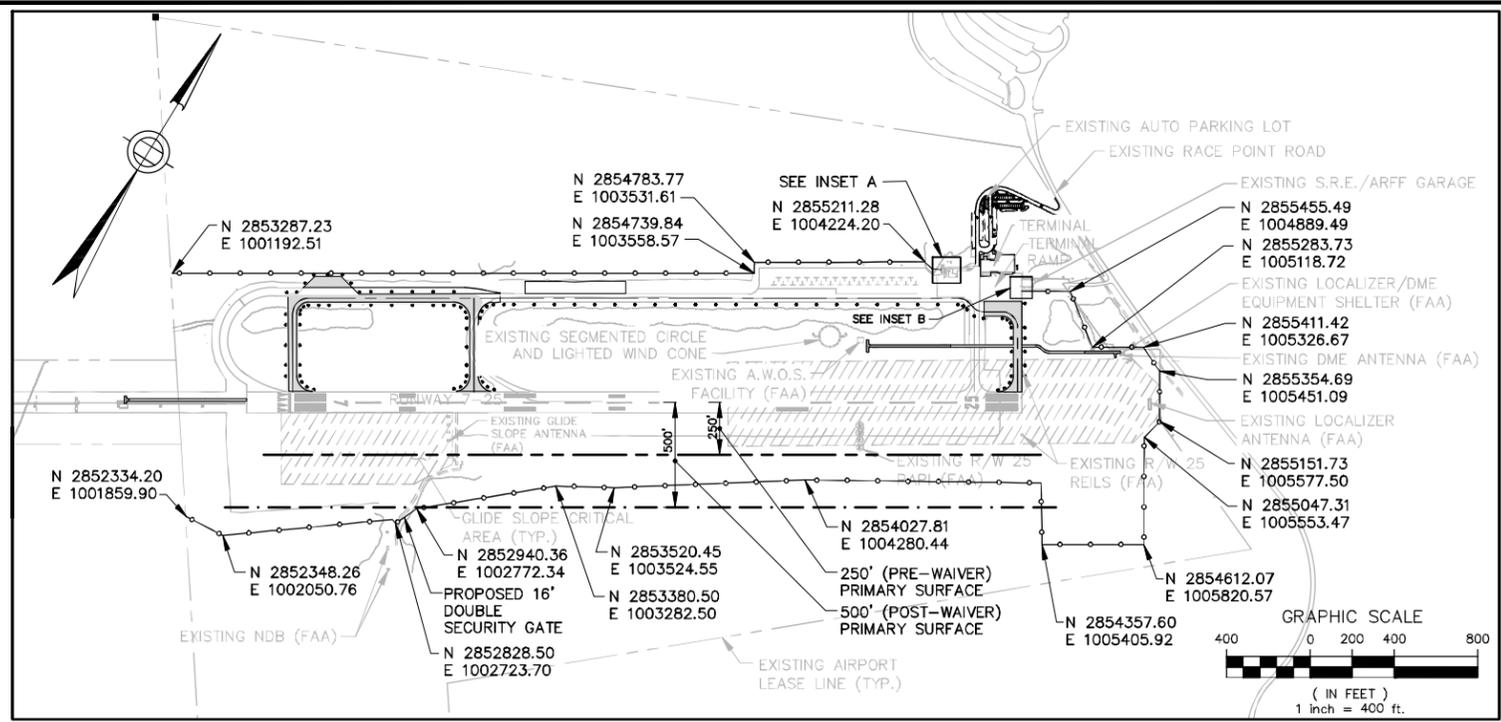
DATE: JUNE 2015  
SCALE: AS NOTED

**PROVINCETOWN MUNICIPAL AIRPORT  
PROVINCETOWN, MASSACHUSETTS**

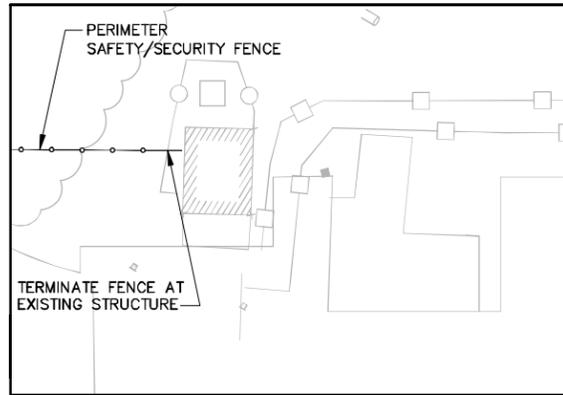
**PROPOSED AIRFIELD IMPROVEMENT PLAN  
SHEET 4 OF 4**

JACOBS PROJ. NO.:  
AIP NO. 3-25-0043-36-2013

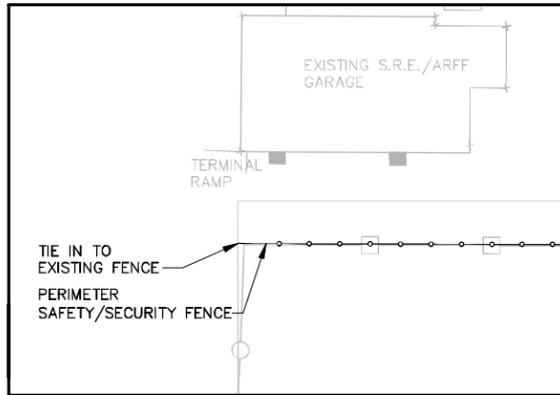
DRAWING NO.  
SHEET 7 OF 12



**PROPOSED FENCE PLAN**  
SCALE = 1"=400'

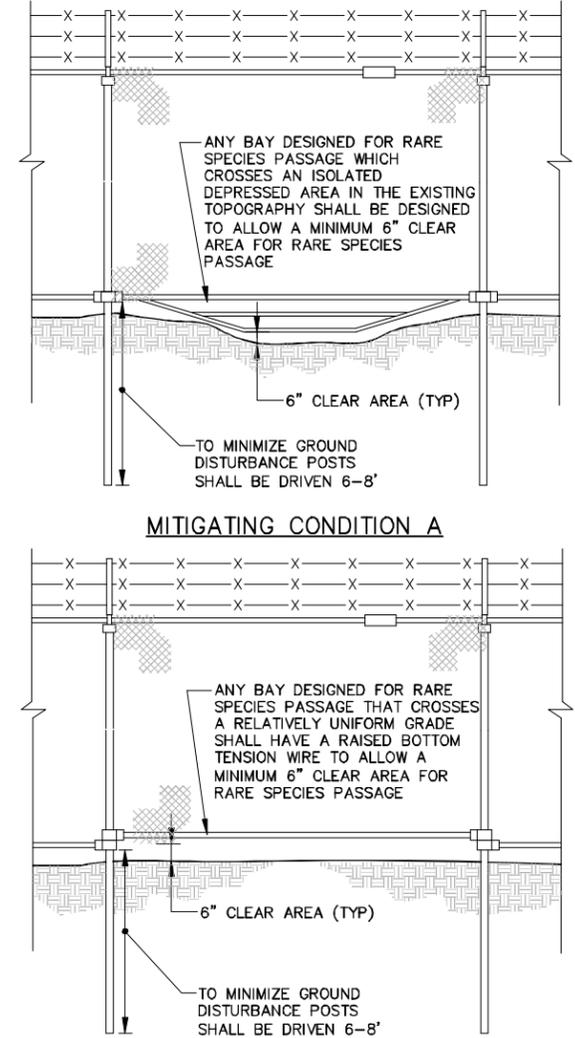


**INSET A**  
SCALE = 1"=20'

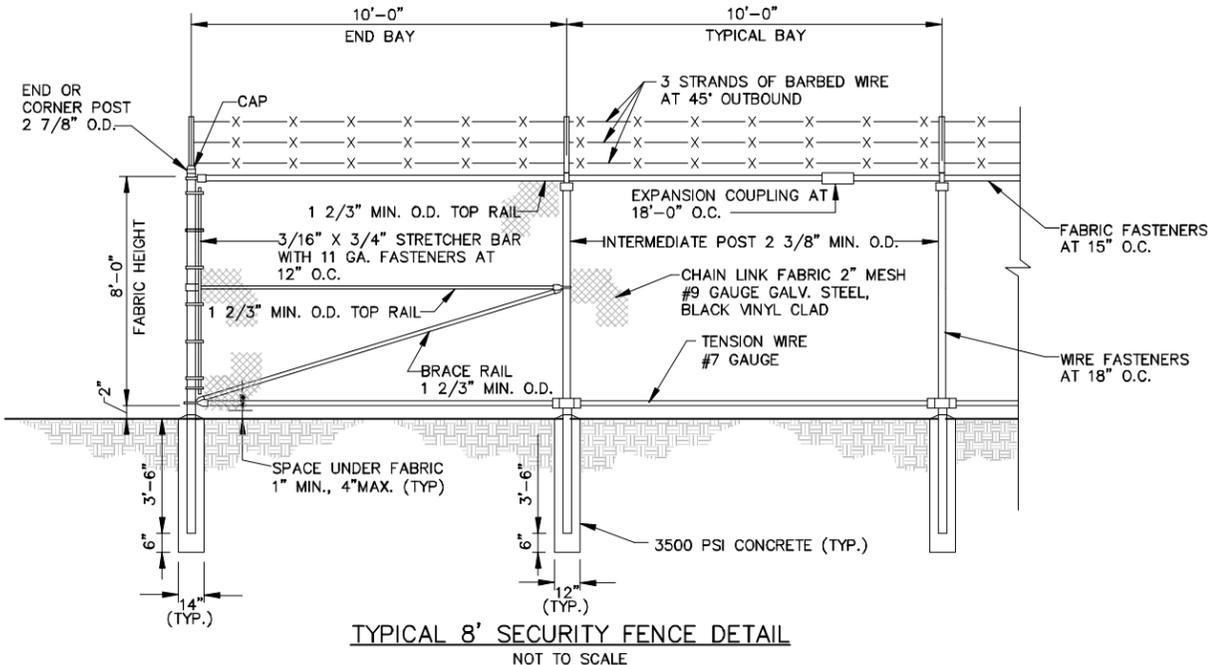


**INSET B**  
SCALE = 1"=20'

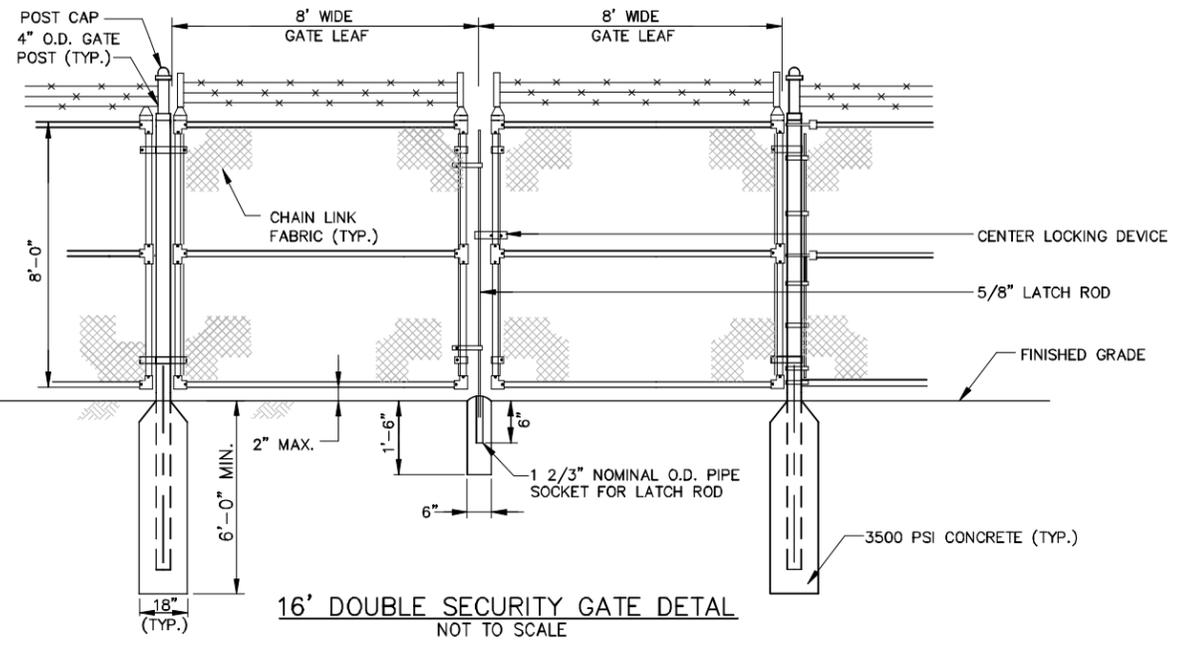
**NOTE:**  
1. FOR LEGEND, SEE SHEET 4 OF 12, PROPOSED AIRFIELD IMPROVEMENT PLAN.



**SECURITY FENCE ENVIRONMENTAL MITIGATION DETAILS**  
(EVERY 100 LINEAR FEET IN BOX TURTLE HABITAT)  
NOT TO SCALE



**TYPICAL 8' SECURITY FENCE DETAIL**  
NOT TO SCALE



**16' DOUBLE SECURITY GATE DETAIL**  
NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY

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DRAWN BY: SNA

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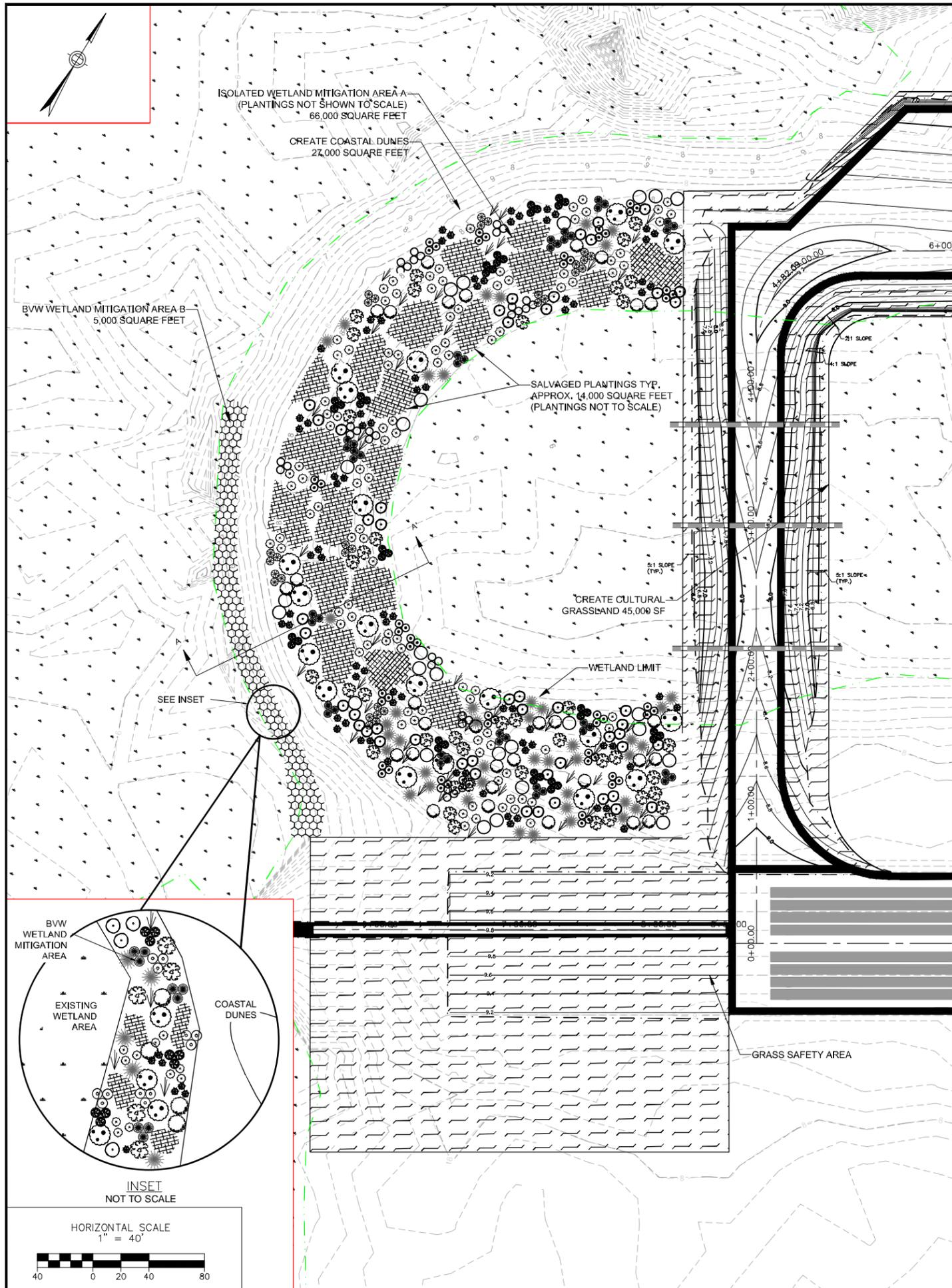
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PROVINCETOWN MUNICIPAL AIRPORT  
PROVINCETOWN, MASSACHUSETTS

**PROPOSED FENCE PLAN**

JACOBS PROJ. NO.:  
AIP NO. 3-25-0043-36-2013

DRAWING NO.



**MITIGATION AREA PLANTINGS**

**Mitigation Area A - Isolated Vegetated Wetland**

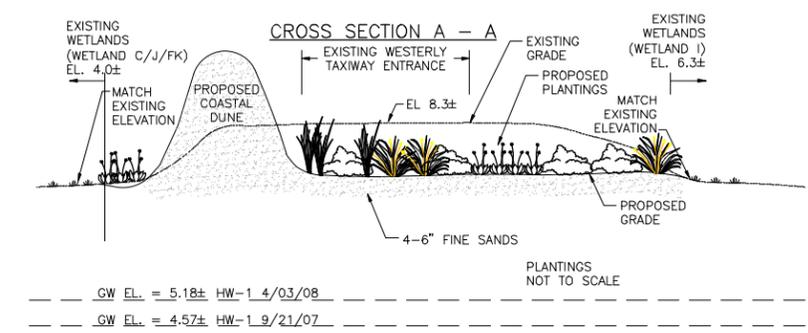
Symbol	No.	Species and Indicator Status	Size & Form	Size	Root	Planting Specifications
<b>Shrub Species</b>						
⊙	36	Highbush Blueberry ( <i>Vaccinium corymbosum</i> ) — FACW	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-6 ft. apart
⊙	48	Maleberry ( <i>Lyonia ligustrina</i> ) — FACW	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-6 ft. apart
⊙	28	Arrowwood ( <i>Viburnum dentatum</i> ) — FAC	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-6 ft. apart
⊙	44	Meadowsweet ( <i>Spiraea latifolia</i> ) — FAC+	Small Deciduous Shrub (2-4 ft)	18-24 inches tall (min.)	CG	Planted in clusters; spaced approx. 3-5 ft. apart
⊙	48	Steeplebush ( <i>Spiraea tomentosa</i> ) — FACW	Small Deciduous Shrub (2-4 ft)	18-24 inches tall (min.)	CG	Planted in clusters; spaced approx. 3-5 ft. apart
⊙	40	Bayberry ( <i>Myrica pensylvanica</i> ) — FAC	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-10 ft. O.C.; Along upper elevations
⊙	52	Dwarf Huckleberry ( <i>Gaylussacia dumosa</i> ) — FAC	Small Deciduous Shrub (1-2 ft)	1 gal. container	CG	Planted in clusters; spaced approx. 5-6 ft. apart
⊙	38	sea myrtle ( <i>Baccharis halimifolia</i> ) — FACW	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-6 ft. apart
<b>Herbaceous Species</b>						
⊙	80	Cinnamon Fern ( <i>Osmunda cinnamomea</i> ) — FACW	Tall Perennial Fern (up to 5 ft)	1 gal. container	CG	Planted in clusters; spaced approx. 18-24 in. O.C.; Along lower-mid elevations
⊙	40	Sensitive Fern ( <i>Onoclea sensibilis</i> ) — FACW	Perennial Fern (up to 3.5 ft)	1 gal. container	CG	Planted in clusters; spaced approx. 18-24 in. O.C.; Along lower-mid elevations
⊙	80	Royal Fern ( <i>Osmunda regalis</i> ) — OBL	Tall Perennial Fern (up to 5 ft)	1 gal. container	CG	Planted in clusters; spaced approx. 18-24 in. O.C.; Along lower-mid elevations
⊙	48	Switchgrass ( <i>Panicum virgatum</i> ) — FAC	bunch-forming grass	1 gal. container	CG	Planted in clusters; spaced approx. 18 in. O.C.; planted along upper reaches
⊙	300	Woolgrass ( <i>Scirpus cyperinus</i> ) — OBL	bunch-forming grass	2-inch plugs	tubes	planted in masses, 12-18 inches O.C. (3x3 ft <sup>2</sup> patches)
⊙	260	Soft Rush ( <i>Juncus effusus</i> ) — OBL	bunch-forming rush	2-inch plugs	tubes	planted in masses, 12-18 inches O.C. (3x3 ft <sup>2</sup> patches)

**MITIGATION AREA PLANTINGS**

**Mitigation Area B - Bordering Vegetated Wetland**

Symbol	No.	Species and Indicator Status	Size & Form	Size	Root	Planting Specifications
<b>Shrub Species</b>						
⊙	6	Maleberry ( <i>Lyonia ligustrina</i> ) — FACW	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-6 ft. apart
⊙	6	Meadowsweet ( <i>Spiraea latifolia</i> ) — FAC+	Small Deciduous Shrub (2-4 ft)	18-24 inches tall (min.)	CG	Planted in clusters; spaced approx. 3-5 ft. apart
⊙	8	Bayberry ( <i>Myrica pensylvanica</i> ) — FAC	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-10 ft. O.C.; Along upper elevations
⊙	6	Sea Myrtle ( <i>Baccharis halimifolia</i> ) — FACW	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-6 ft. apart
<b>Herbaceous Species</b>						
⊙	30	Switchgrass ( <i>Panicum virgatum</i> ) — FAC	bunch-forming grass	1 gal. container	CG	Planted in clusters; spaced approx. 18 in. O.C.; planted along upper reaches
⊙	36	Woolgrass ( <i>Scirpus cyperinus</i> ) — OBL	bunch-forming grass	2-inch plugs	tubes	planted in masses, 12-18 inches O.C. (3x3 ft <sup>2</sup> patches)
⊙	36	Soft Rush ( <i>Juncus effusus</i> ) — OBL	bunch-forming rush	2-inch plugs	tubes	planted in masses, 12-18 inches O.C. (3x3 ft <sup>2</sup> patches)

NOTE: SEE SHEET 13 FOR COASTAL DUNE PLANTING SCHEDULE



REV. NO.	DATE	DESCRIPTION

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Sustainable Environmental Solutions  
www.horsleywitten.com  
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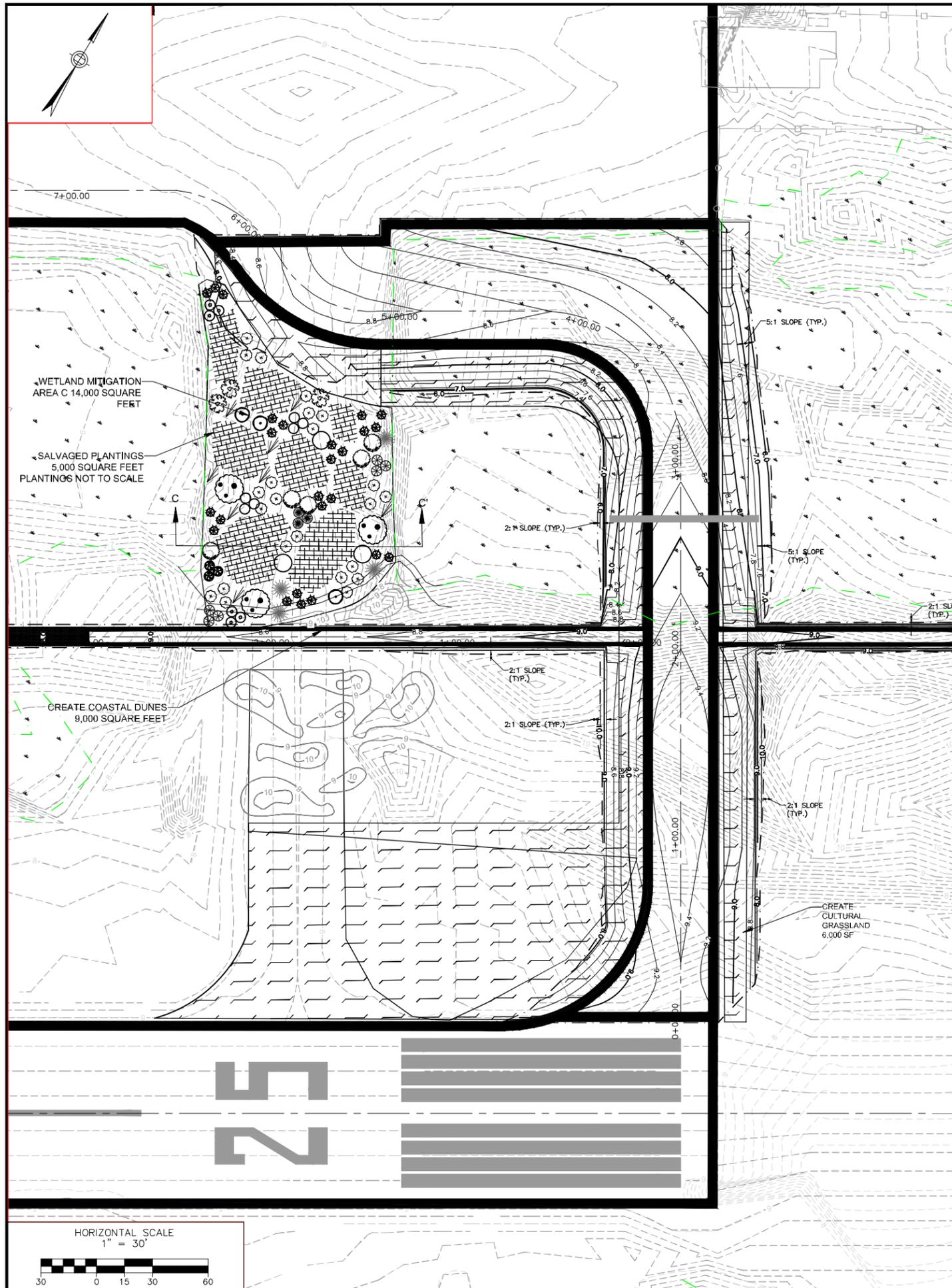
**JACOBS**  
343 CONGRESS STREET  
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PROVINCETOWN MUNICIPAL AIRPORT  
PROVINCETOWN, MASSACHUSETTS

WETLAND MITIGATION - WEST END TAXIWAY

JACOBS PROJ. NO.:  
AIP No. 3-25-0043-XX-2015

DRAWING NO.  
SHEET 9 OF 12



**MITIGATION AREA PLANTINGS**

**Mitigation Area C - Isolated Vegetated Wetland**

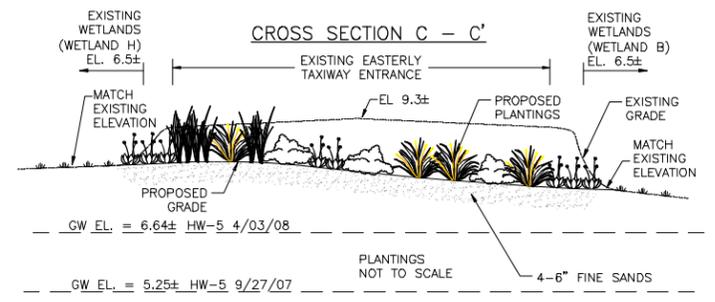
Symbol	No.	Species and Indicator Status	Size & Form	Size	Root	Planting Specifications
<b>Shrub Species</b>						
⊙	12	Highbush Blueberry ( <i>Vaccinium corymbosum</i> ) — FACW-	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-6 ft. apart
⊙	8	Maleberry ( <i>Lycium hirsutum</i> ) — FACW	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-6 ft. apart
⊙	12	Meadowsweet ( <i>Spiraea latifolia</i> ) — FAC+	Small Deciduous Shrub (2-4 ft)	18-24 inches tall (min.)	CG	Planted in clusters; spaced approx. 3-5 ft. apart
⊙	12	Steeplebush ( <i>Spiraea tomentosa</i> ) — FACW	Small Deciduous Shrub (2-4 ft)	18-24 inches tall (min.)	CG	Planted in clusters; spaced approx. 3-5 ft. apart
⊙	12	Rayberry ( <i>Myrica pensylvanica</i> ) — FAC	Med Sized Decid. Shrub (6-12 ft)	2-3 feet tall (min.)	CG	Planted in clusters; spaced approx. 5-10 ft. O.C.; Along upper elevations
⊙	6	Pussy Willow ( <i>Salix discolor</i> ) — FACW	Med Sized Decid. Shrub (6-12 ft)	3-4 feet tall (min.)	CG	Planted singly; spaced approx. 10-12 ft. apart; Along lower slopes
<b>Herbaceous Species</b>						
⊙	24	Cinnamon Fern ( <i>Osmunda cinnamomea</i> ) — FACW	Tall Perennial Fern (up to 5 ft)	1 gal. container	CG	Planted in clusters; spaced approx. 18-24 in. O.C.; Along lower-mid elevations
⊙	20	Sensitive Fern ( <i>Onoclea sensibilis</i> ) — FACW	Perennial Fern (up to 3.5 ft)	1 gal. container	CG	Planted in clusters; spaced approx. 18-24 in. O.C.; Along lower-mid elevations
⊙	36	Switchgrass ( <i>Panicum virgatum</i> ) — FAC	bunch-forming grass	1 gal. container	CG	Planted in clusters; spaced approx. 18 in. O.C.; planted along upper reaches
⊙	80	Woolgrass ( <i>Scirpus cyperinus</i> ) — OBL	bunch-forming grass	2-inch plugs		planted in masses, 12-18 inches O.C. (3x3 ft <sup>2</sup> patches)
⊙	96	Soft Rush ( <i>Juncus effusus</i> ) — OBL	bunch-forming rush	2-inch plugs		planted in masses, 12-18 inches O.C. (3x3 ft <sup>2</sup> patches)

**MITIGATION AREA PLANTINGS**

**Coastal Dune Mitigation Areas**

No.	Species and Indicator Status	Size & Form	Size	Root	Planting Specifications
<b>Shrub Species</b>					
36	Bayberry ( <i>Myrica pensylvanica</i> ) — FAC	Med Sized Decid. Shrub (6-12 ft)	18-24 inches tall (min.)	CG	Planted in clusters; spaced approx. 5-10 ft. O.C.; Along lower reaches to mid slope of dune
36	Beach Plum ( <i>Prunus maritima</i> ) — UPL	small-med Decid. Shrub (4-6 ft)	18-24 inches tall (min.)	CG	Planted in clusters; spaced approx. 5-10 ft. O.C.; Along lower reaches to mid-slope of dune
<b>Herbaceous Species</b>					
15,000	American beachgrass ( <i>Ammophila breviflata</i> ) — FACU-	grass	bare root plugs	CG	Planted in clusters; Spaced approx. 12-18 in. O.C. in grid pattern
120	Beach Pea ( <i>Lathyrus japonicus</i> ) — FACU-	perennial herb	1 gal. container	CG	planted in clusters of 3-5, 18-24 inches O.C.
60	Beach Heather ( <i>Hudsonia tomentosa</i> ) — NI	low-growing subshrub, perennial	1 gal. container	CG	planted in clusters of 3-5, 18-24 inches O.C.

NOTE: MEASURED GROUND WATER ELEVATIONS HAVE BEEN ADJUSTED TO BE CONSISTENT WITH AND RELATIVE TO THE ASSUMED BENCHMARK ELEVATIONS FOR THE AIRPORT.



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REV. NO.	DATE	DESCRIPTION

**Horsley Witten Group, Inc.**  
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**JACOBS**

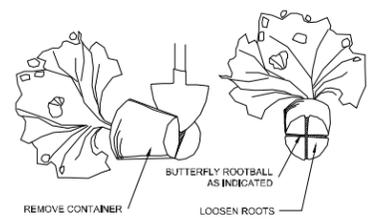
PROVINCETOWN MUNICIPAL AIRPORT  
PROVINCETOWN, MASSACHUSETTS

DESIGNED BY: [Signature]  
CHECKED BY: [Signature]  
DRAWN BY: [Signature]  
DATE: MAY 2015  
SCALE: AS NOTED

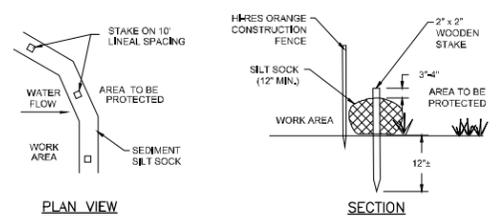
WETLAND MITIGATION - EAST END TAXIWAY

JACOBS PROJ. NO.:  
AIP NO. 3-25-0043-XX-2015

DRAWING NO.



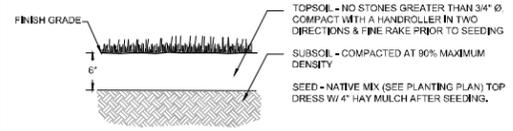
**CONTAINER PLANT ROOTBALL TREATMENT**  
NOT TO SCALE



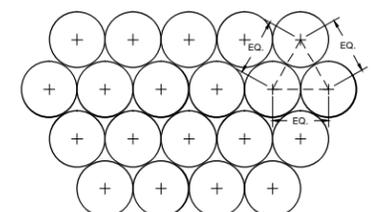
**PLAN VIEW**  
**SECTION**

NOTES:  
1. NO DISTURBANCE BEYOND SILT SOCK.  
2. ALL MATERIAL TO MEET MANUFACTURER'S SPECIFICATIONS.  
3. SEDIMENT SILT SOCK TO BE FILLED WITH COMPOST AND MEET APPLICATION REQUIREMENTS.  
4. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY THE ENGINEER.

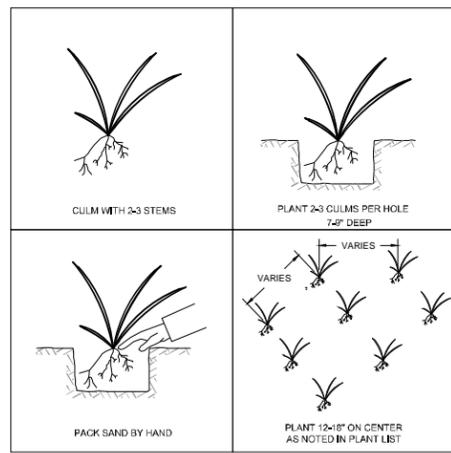
**TYPICAL SEDIMENT SILT SOCK DETAIL**  
NOT TO SCALE



**LOAM AND SEED DETAIL**  
NOT TO SCALE

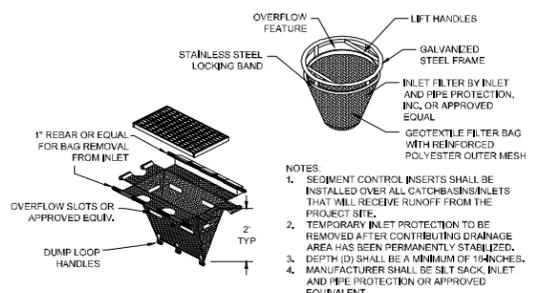


**PLANTING SPACING DETAIL**  
NOT TO SCALE



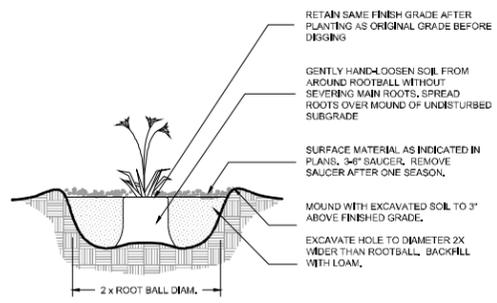
NOTES:  
1. ONLY PLANT FROM OCTOBER 1 TO APRIL 30 WHICH BEACH GRASS IS DORMANT  
2. STORE CULMS IN MOIST SHADE

**BEACH GRASS PLANTING DETAIL**  
NOT TO SCALE



NOTES:  
1. SEDIMENT CONTROL INSERTS SHALL BE INSTALLED OVER ALL CATCHBASIN INLETS THAT WILL RECEIVE RUNOFF FROM THE PROJECT SITE.  
2. TEMPORARY INLET PROTECTION TO BE REMOVED AFTER CONTRIBUTING DRAINAGE AREA HAS BEEN PERMANENTLY STABILIZED.  
3. DEPTH (D) SHALL BE A MINIMUM OF 18 INCHES.  
4. MANUFACTURER SHALL BE SILT SOCK, INLET AND PIPE PROTECTION OR APPROVED EQUIVALENT.

**TEMPORARY CATCHBASIN INSERT**  
NOT TO SCALE



**PERENNIAL PLANTING DETAIL**  
NOT TO SCALE

**GENERAL PLANTING NOTES:**

- THE FOLLOWING NOTES ARE PROVIDED AS GENERAL PLANTING GUIDELINES ONLY. THOROUGHLY REVIEW THE PROJECT SPECIFICATIONS FOR ALL LANDSCAPE REQUIREMENTS PRIOR TO THE COMMENCEMENT OF ANY LANDSCAPE WORK. SUBMIT IN WRITING TO THE LANDSCAPE ARCHITECT ANY QUESTIONS OR CLARIFICATIONS REQUIRED AT A MINIMUM OF 30 DAYS PRIOR TO ORDERING ANY MATERIALS OR BEGINNING ANY LANDSCAPE CONSTRUCTION.
  - SUBMIT TO THE LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL ALL REQUIRED LANDSCAPE SUBMITTALS AS DESCRIBED IN THE SPECIFICATIONS INCLUDING A PLANT LIST WITH PLANT SIZE AND QUANTITIES TO BE ORDERED PRIOR TO DELIVERY TO THE PROJECT SITE.
  - FURNISH AND INSTALL ALL PLANTS AS SHOWN ON THE DRAWINGS AND IN THE SIZE AND QUANTITIES SPECIFIED ON THE PLANTING SCHEDULE. PLANT SUBSTITUTION SELECTION MUST BE APPROVED BY BIOLOGIST OR LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
  - ALL PLANTS TO COMPLY WITH APPLICABLE REQUIREMENTS OF ANSI Z60.1 "AMERICAN STANDARD FOR NURSERY STOCK," LATEST EDITION, PUBLISHED BY THE AMERICAN NURSERY AND LANDSCAPE ASSOCIATION INC.
  - PLANTS TO BE GROWN UNDER CLIMATIC CONDITIONS SIMILAR TO THOSE IN THE LOCALITY OF THE PROJECT FOR AT LEAST TWO (2) YEARS. USE HEALTHY NURSERY GROWN PLANTS, FREE OF DISEASE, INSECTS, AND PESTS. EGGS OR LARVAE, AND HAVE A WELL DEVELOPED ROOT SYSTEM.
  - INSTALL PLANTS WITHIN ONE (1) WEEK OF PURCHASE. IF PLANTS ARE TO BE STORED AT THE SITE PRIOR TO PLANTING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THEY ARE PROPERLY MAINTAINED, WATERED, AND REMAIN HEALTHY.
  - PROCEED WITH PLANTING ONLY WHEN EXISTING AND FORECASTED WEATHER CONDITIONS PERMIT. SUBMIT TO THE LANDSCAPE ARCHITECT IN WRITING THE PROPOSED PLANTING SCHEDULE. OBTAIN APPROVAL OF PLANTING SCHEDULE FROM THE LANDSCAPE ARCHITECT PRIOR TO PERFORMING ANY WORK.
- SEASONS FOR PLANTING:
- |         |               |                             |
|---------|---------------|-----------------------------|
| SPRING: | DECIDUOUS:    | APRIL 1 TO JUNE 15          |
|         | EVERGREEN:    | APRIL 1 TO JUNE 15          |
|         | PERENNIALS:   | APRIL 15 TO JUNE 1          |
|         | GROUNDCOVERS: | APRIL 15 TO JUNE 1          |
| FALL:   | DECIDUOUS:    | SEPTEMBER 15 TO NOVEMBER 15 |
|         | EVERGREEN:    | SEPTEMBER 15 TO NOVEMBER 15 |
|         | PERENNIALS:   | SEPTEMBER 15 TO NOVEMBER 15 |
|         | GROUNDCOVERS: | SEPTEMBER 15 TO NOVEMBER 15 |
- BEACH GRASS CULMS:  
PLANTS WHILE DORMANT FROM OCTOBER 1ST THROUGH APRIL 30TH

**GENERAL SEEDING NOTES:**

- SEND A REPRESENTATIVE SAMPLE OF THE TOPSOIL TO A TESTING LABORATORY FOR STANDARD SOIL ANALYSIS AS DESCRIBED IN THE SPECIFICATIONS. SUBMIT TO THE LANDSCAPE ARCHITECT AND ENGINEER TEST RESULTS WITH RECOMMENDED SOIL TREATMENTS TO PROMOTE PLANT AND GRASS GROWTH. CORRECT DEFICIENCIES IN THE LOAM AND STOCKPILED TOPSOIL AS DIRECTED BY THE TESTING AGENCY.
- ALL AREAS THAT ARE DISTURBED AND/OR GRADED DURING CONSTRUCTION ARE TO BE BROUGHT TO FINISHED GRADE WITH AT LEAST 6" MINIMUM DEPTH OF GOOD QUALITY LOAM AND SEEDED WITH A QUICK GERMINATING GRASS SEED SUCH AS NEW ENGLAND EROSION CONTROL RESTORATION MIX OR AS SPECIFIED ON THE PLANS.
- PRIOR TO THE PLACEMENT OF TOP SOIL, LOOSEN THE SUBGRADE OF ALL PROPOSED SEEDED AREAS TO A DEPTH OF 6" AND RAKE TO REMOVE STONES LARGER THAN 1 INCH, STICKS, ROOTS, RUBBISH AND OTHER EXTRANEIOUS MATTER AND LEGALLY DISPOSE TO AN OFF SITE LOCATION.
- DO NOT SPREAD TOPSOIL IF THE SUBGRADE IS FROZEN, EXCESSIVELY WET, COMPACTED OR NOT PROPERLY PREPARED PER THE NOTES AND SPECIFICATIONS.

**WATERING NOTES:**

- PROVIDE PROPER PLANT CARE, MAINTENANCE AND WATERING ON SITE UNTIL SUCH TIME AS THE LANDSCAPING IS ACCEPTED BY THE PROPERTY OWNER AS SATISFACTORY PER THE SPECIFICATIONS OR AS DETERMINED BY ANY WRITTEN AGREEMENTS BETWEEN THE CONTRACTOR AND PROPERTY OWNER.
- ESTABLISH AN APPROPRIATE WATERING SCHEDULE FOR ALL PLANT MATERIAL BASED UPON PLANT SPECIES REQUIREMENTS AND PROVIDE IN WRITING TO THE LANDSCAPE ARCHITECT AND OWNER FOR REVIEW AND APPROVAL. ADHERE TO THE APPROVED SCHEDULE UNTIL PLANTS ARE FULLY ESTABLISHED.

- PLANTING UNDER FROZEN CONDITIONS IN EITHER THE SPRING OR FALL WILL NOT BE PERMITTED. PLANTING BEFORE OR AFTER THE ABOVE REFERENCED PLANTING DATES WILL INCREASE THE LIKELIHOOD OF PLANT OR GRASS SEED ESTABLISHMENT FAILURE. ANY DEVIATION FROM THE ABOVE REFERENCED PLANTING DATES IS UNDERTAKEN AT SOLE RISK OF THE CONTRACTOR AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ANY ADDITIONAL MAINTENANCE AND WATERING WHICH MAY BE REQUIRED TO ENSURE SATISFACTORY PLANT AND SEED ESTABLISHMENT.

- FURNISH ONE YEAR MANUFACTURER WARRANTY FOR TREES, PLANTS, AND GROUND COVER AGAINST DEFECTS INCLUDING DEATH AND UNSATISFACTORY GROWTH, EXCEPT FOR DEFECTS RESULTING FROM LACK OF ADEQUATE MAINTENANCE, NEGLIGENCE, OR ABUSE BY OWNER, OR ABNORMAL WEATHER CONDITIONS UNUSUAL FOR WARRANTY PERIOD. THE DATE OF FINAL ACCEPTANCE OF ALL COMPLETED PLANTING WORK ESTABLISHES THE END OF INSTALLATION AND INITIAL MAINTENANCE PERIOD AND THE COMMENCEMENT OF THE GUARANTEE PERIOD.

- INSPECT ALL AREAS TO BE PLANTED OR SEEDED PRIOR TO STARTING ANY LANDSCAPE WORK. REPORT ANY DEFECTS SUCH AS INCORRECT GRADING, INCORRECT SUBGRADE ELEVATIONS OR DRAINAGE PROBLEMS, ETC. TO THE LANDSCAPE ARCHITECT AND ENGINEER PRIOR TO BEGINNING WORK. COMMENCEMENT OF WORK INDICATES ACCEPTANCE OF SUBGRADE AREAS TO BE PLANTED, AND THE LANDSCAPE CONTRACTOR ASSUMES RESPONSIBILITY FOR ALL LANDSCAPE WORK.

- PROVIDE PROPER PREPARATION OF ALL PROPOSED PLANTED AREAS PER THE NOTES AND SPECIFICATIONS.

- ALL PLANT LAYOUT AND ACTUAL PLANTING LOCATIONS ARE TO BE FIELD VERIFIED BY LANDSCAPE ARCHITECT PRIOR TO PLANTING. NOTIFY THE LANDSCAPE ARCHITECT AT A MINIMUM OF 48 HOURS IN ADVANCE PRIOR TO SCHEDULING ANY FIELD INSPECTIONS.

- POTTED PLANTS: REMOVE THE PLANT FROM THE POT AND LOOSEN OR SCORE THE ROOTS BEFORE PLANTING TO PROMOTE OUTWARDS ROOT GROWTH INTO THE SOIL.

- PLUGS: PLANT UPRIGHT AND NOT AT AN ANGLE. DIG PLANTING HOLES LARGE ENOUGH AND DEEP ENOUGH TO ACCOMMODATE THE ENTIRE ROOT MASS. PLANT PLUGS WITH NO TWISTED OR BALLED ROOTS AND WITH NO ROOTS EXPOSED ABOVE THE GRADE LINE. HAND PACK THE SOIL AROUND THE ENTIRE PLUG ROOT MASS.

- DIG THE THE PLANTING HOLE TO THE SAME DEPTH AS THE ROOT BALL AND TWO TO THREE TIMES WIDER. SCORE ALL SIDES OF THE HOLE, PLACE THE PLANT IN THE HOLE SO THE TOP OF ROOT BALL IS EVEN WITH SOIL SURFACE. FILL THE HOLE HALFWAY AND THEN ADD WATER ALLOWING IT TO SEEP INTO BACK FILLED MATERIAL. BE SURE TO REMOVE ALL AIR POCKETS FROM BACK FILLED SOIL. DO NOT SPREAD SOIL ON TOP OF THE ROOTBALL. IF SOIL IS EXTREMELY POOR, REPLACE BACK FILL WITH GOOD QUALITY TOP SOIL. AMEND THE SOIL, AS NECESSARY.

- CREATE A 2" TO 4" BERM AROUND THE EDGE OF PLANTING HOLE WITH REMAINING SOIL TO RETAIN WATER.

- REMOVE ALL PLANT TAGS AND FLAGS FROM THE PLANTS.

REV. NO.	DATE	DESCRIPTION	BY

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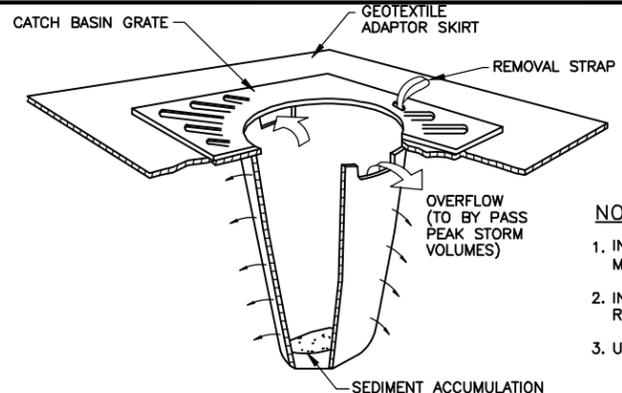
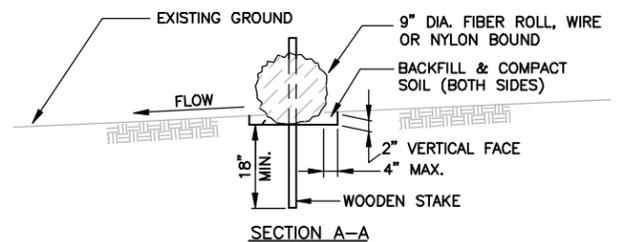
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PROVINCETOWN MUNICIPAL AIRPORT  
PROVINCETOWN, MASSACHUSETTS

MITIGATION AREA DETAILS

JACOBS PROJ. NO.:  
AIP NO. 3-25-0043-XX-2015

DRAWING NO.

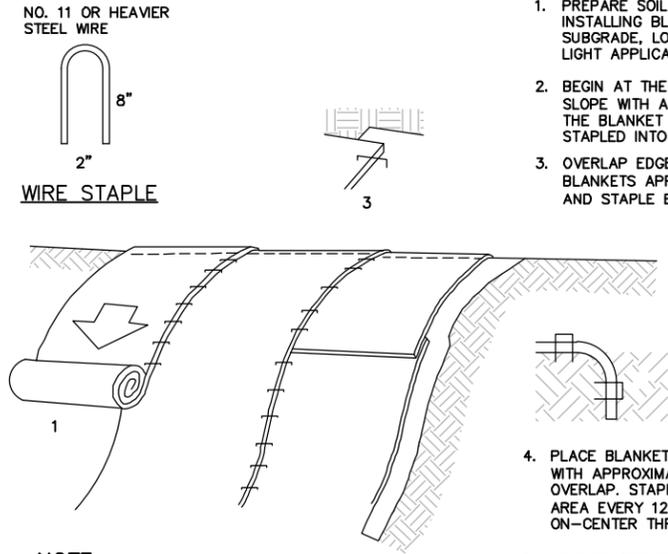


**DRAIN INLET PROTECTION**  
NOT TO SCALE

**DEWATERING SEDIMENT CONTROL NOTES:**

1. ALL DISCHARGE DEWATERING SHALL BE IN ACCORDANCE WITH CONSERVATION ORDER OF CONDITION, OR AS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER, INSTALL CATCH BASIN PROTECTION AND FIBER ROLL EROSION CONTROL MEASURES.
2. THE CONTRACTOR SHALL ANTICIPATE DEWATERING ALL TRENCHES AND EXCAVATIONS. CONTRACTOR SHALL FURNISH ALL LABOR, EQUIPMENT, EROSION CONTROL, MATERIAL AND INCIDENTALS NECESSARY FOR DEWATERING. DEWATERING SHALL NOT BE SEPARATELY MEASURED, BUT SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.
3. ADVISE THE OWNER IF ANY CONTAMINATED WATER IS FOUND. PROCESS CONTAMINATED WATER IN ACCORDANCE WITH GROUNDWATER MANAGEMENT AND HEALTH AND SAFETY PLAN.

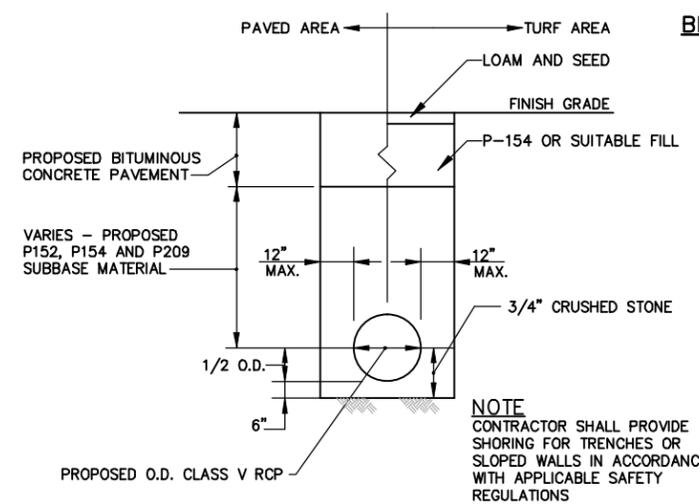
- NOTES**
1. INSERT TO BE EMPTIED IN AN APPROVED MANNER WHEN IT IS 1/2 FULL OF SEDIMENT.
  2. INSPECT INSERT AFTER ALL RAINFALL EVENTS, REPAIR AND MAINTAIN AS REQUIRED.
  3. USE AT ALL EXISTING CATCH BASINS.



1. PREPARE SOIL BEFORE INSTALLING BLANKET, INCLUDING SUBGRADE, LOAM SEED AND A LIGHT APPLICATION OF MULCH
2. BEGIN AT THE TOP OF THE SLOPE WITH A 6" EDGE OF THE BLANKET TUCKED AND STAPLED INTO THE LOAM
3. OVERLAP EDGE OF PARALLEL BLANKETS APPROXIMATELY 2" AND STAPLE EVERY 12"
4. PLACE BLANKETS END-OVER-END WITH APPROXIMATELY 6" OF OVERLAP. STAPLE OVERLAPPED AREA EVERY 12" AND 18-24" ON-CENTER THROUGHOUT
5. ANCHOR TERMINAL END OF BLANKET IN 6" TRENCH, STAPLE AND BACKFILL

**NOTE:**  
INDIVIDUAL MATERIALS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

**EROSION CONTROL BLANKET - ON SLOPES**  
NOT TO SCALE



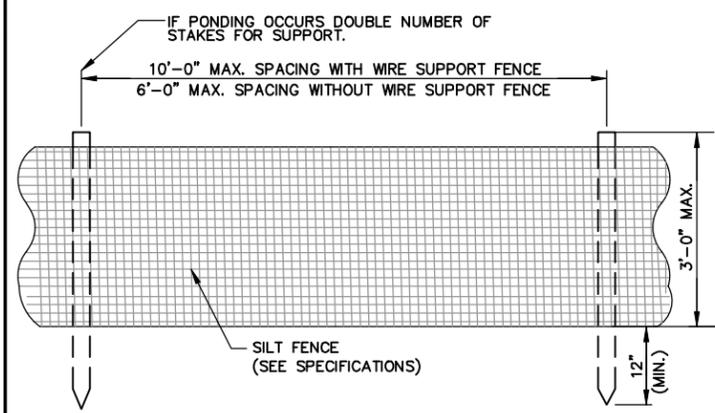
**NOTE**  
CONTRACTOR SHALL PROVIDE SHORING FOR TRENCHES OR SLOPED WALLS IN ACCORDANCE WITH APPLICABLE SAFETY REGULATIONS

**DRAIN PIPE TRENCH DETAIL**  
NOT TO SCALE

**NOTE**

1. AREAS DISTURBED BY EROSION BARRIERS SHALL BE RESTORED AND STABILIZED AFTER REMOVAL TO THE SATISFACTION OF THE ENGINEER AND AIRPORT.

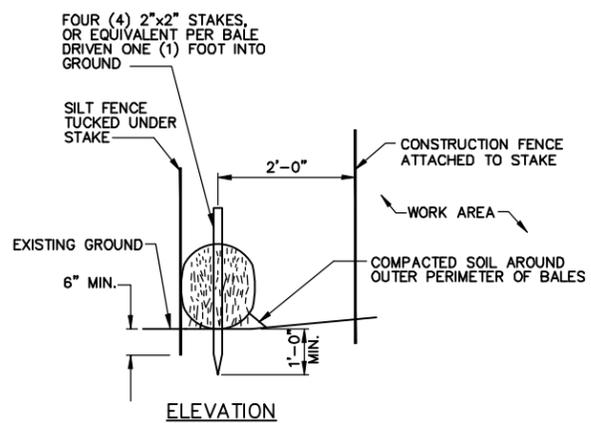
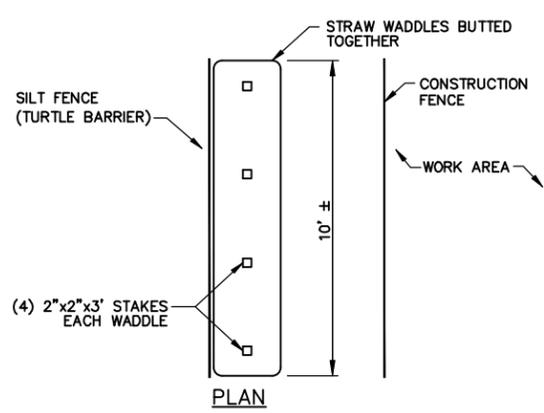
**STRAW FIBER ROLL DETAIL**  
NOT TO SCALE



**SILT FENCE NOTES:**

1. SILT FENCE SHALL BE INSTALLED BEFORE ANY EXCAVATION OR OTHER WORK BEGINS. SILT FENCE SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON DRAWINGS.
2. PRE-FABRICATED SILT FENCE MUST BE ASSEMBLED IN THE FIELD ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS. WIRE MESH REINFORCEMENT AND/OR CLOSER POST SPACING MAY BE ORDERED BY THE ENGINEER IN AREAS WHERE HIGH RUNOFF VOLUMES ARE ANTICIPATED, OR IN LOW SPOTS WHERE SEDIMENT WILL COLLECT.
3. INSPECT AND REPAIR FENCE WEEKLY AND AFTER EACH STORM EVENT OF 1/2" OR GREATER OF PRECIPITATION AND REMOVE SEDIMENT WHEN NECESSARY. (9" MAXIMUM STORAGE HEIGHT)
4. IN ADDITION, MAINTENANCE OF SILT FENCE SHALL BE AS ORDERED AND AS ORDERED BY THE ENGINEER. MATERIALS WILL BE REMOVED WHEN BULGES DEVELOP AND THE FENCE REPLACED AS NECESSARY. REMOVED MATERIALS SHALL NOT BE DISCARDED NEAR WETLANDS OR WATERCOURSES AND SHALL BE REMOVED FROM THE JOB SITE. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT CAN BE PERMANENTLY STABILIZED.
5. WOVEN WIRE FENCE SHALL BE SECURELY FASTENED TO SEPARATELY BUT RATHER WILL BE CONSIDERED INCIDENTAL TO THE INITIAL INSTALLATION.
6. MAINTENANCE AND REMOVAL SHALL NOT BE PAID FOR SEPARATELY BUT RATHER WILL BE CONSIDERED INCIDENTAL TO THE INITIAL INSTALLATION.

**SILT FENCE DETAIL**  
NOT TO SCALE



**SILT FENCE, STRAW WADDLE & CONSTRUCTION FENCE DETAIL (EROSION CONTROL AND TURTLE BARRIER FENCE)**  
NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY

CHECKED BY	SUF
DRAWN BY	SHD

343 CONGRESS STREET  
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**JACOBS**

DESIGNED BY: SHD  
DATE: JUNE 2015  
SCALE: AS NOTED

PROVINCETOWN MUNICIPAL AIRPORT  
PROVINCETOWN, MASSACHUSETTS

**EROSION CONTROL AND SEDIMENTATION DETAILS**

JACOBS PROJ. NO.:  
AIP NO. 3-25-0043-36-2013

DRAWING NO.