

# Incidental Take Report

Vegetation • Birds • Invertebrates

Runway Safety Area Project

Igor I. Sikorsky Memorial Airport  
Stratford, CT



Prepared for:

Connecticut Department of Transportation  
2800 Berlin Turnpike  
Newington, Connecticut 06131-7546



Prepared by:

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# Executive Summary

The Connecticut Department of Transportation (CTDOT) and the City of Bridgeport are currently undertaking a runway safety area project at Igor I. Sikorsky Memorial Airport (BDR) in Stratford, Connecticut (State CTDOT Project No. 15-336) (see Figure ES-1 for airport location). The project involves safety improvements to the runway safety area (RSA) at Runway 6-24 and relocation of State Route 113 to facilitate these safety improvements (see Figure ES-2 for project overview). The purpose of the Sikorsky Runway Safety Project is, in part, to install an Emergency Materials Arresting System (EMAS) at the north end of Runway 6-24 to reduce the frequency and severity of aircraft incidents at the airport.

In 2012, biological surveys were conducted at Igor I. Sikorsky Memorial Airport (BDR) in conjunction with the Project. Two state-listed endangered plant species; two-state listed plant species of special concern; twenty-two bird species on the Connecticut list of endangered, threatened, or species of special concern; one moth species of special concern, and one tiger beetle species of special concern were found on airport property and are documented in this and supporting technical reports. Through avoidance, minimization, and best management practices, the majority of these species will not be adversely permanently impacted by the proposed project.

This report concludes that the Sikorsky Airport Runway Safety Project will have only minor temporary impacts to most of these species, with one exception. The project is anticipated to impact approximately 46 percent of the airport’s population of state-endangered saltpond grass (*Leptochloa fusca ssp. fascicularis*). The population on Sikorsky airport property is one of only three known populations in the state, and is therefore of high conservation importance. Impacts to subpopulations of *Leptochloa fusca ssp. fascicularis* are summarized in Table ES-1. Proposed mitigation is summarized in Table ES-2.

**Table ES-1: Summary of Sikorsky Runway Safety Area Project Impacts to Subpopulations of *Leptochloa fusca ssp. fascicularis***

Subpopulation No.	Estimated Subpopulation Size	Area (SF)	Area (Acres)	Area (SF) Impacted	Percent of Subpopulation Impacted	No. Plants Impacted
1	38*	97	0.00	97	100%	38
2	850	2,528	0.06	2,528	100%	850
3	21*	10,368	0.24	0	No direct impact	0
4	1,000	4,136	0.09	0	No direct impact	0
5	15	2,058	0.05	0	No direct impact	0
<b>TOTALS</b>	<b>1,924</b>	<b>19,187</b>	<b>0.44</b>	<b>2,630</b>	<b>46%</b>	<b>888</b>

Note: Subpopulation numbers correspond to Figure 3.

SF – square feet

\* Actual field count.

**Table ES-2: Sikorsky Runway Safety Area Project Mitigation for *Leptochloa fusca ssp. fascicularis***

Mitigation Site	Location	Activity	Proposed Timeframe	Area of Mitigation (acres)
Transplant Bed (Area A)	Adjacent to new tidal channel	Relocate soil within impacted sub-population areas to the transplant bed before start of construction	Fall/winter 2014; outside the growing season, when transplanting will result in the least disruption to plants	0.26
Seeding Bed (Area B)	Within Abandoned Route 113 Roadway Area	Plant collected seeds in constructed seed bed	Fall 2015, after new roadway is opened, to allow the seeds to overwinter	0.19
<b>Total</b>				<b>0.45</b>

## Saltpond Grass

Five sub-populations of saltpond grass (*Leptochloa fusca ssp. fascicularis*) were observed during a 2012 survey of Sikorsky airport. Two of the *Leptochloa fusca ssp. fascicularis* sub-populations are located along the shoulder of Route 113 and on the northeast side of Runway 11-29 (see Figure ES-3). The other three populations are located outside the project area, to the south of Runway 11-29. The total population at the airport is estimated to be approximately 1,920 individuals distributed over approximately 0.44 acres. Approximately 46 percent of the total population is expected to be directly and permanently impacted by the Sikorsky Runway Safety Project.

*Leptochloa fusca ssp. fascicularis* will be directly impacted because they are growing alongside the existing roadway and within the path of the proposed new alignment of Route 113. The path of the roadway is being shifted to the north to make room for the proposed runway EMAS. The plants would be impacted by pavement milling and removal of the existing roadway, installation of a new culvert, and sidewalk, bikeway and construction of the new roadway along a new alignment. Since the location of the EMAS bed cannot be relocated, the roadway relocation is also fixed. There is no feasible alternative roadway alignment which would completely avoid impacts to these *Leptochloa fusca ssp. fascicularis* populations and the impact is therefore considered unavoidable.

Project mitigation of impacts to *Leptochloa fusca ssp. fascicularis* consists of a two-phased approach involving both transplantation of existing sub-populations and planting of new seeding beds (see attached Plan Sheets MIT-7, MIT-11, and MIT-16). The first phase will consist of excavation of the existing soils supporting the two sub-populations of *Leptochloa fusca ssp. fascicularis* located along Route 113. Excavation of populations will take place prior to roadway construction. These populations will be relocated to a 11,468-square foot (0.26-acre) transplant bed situated along the north side of a proposed new drainage channel between Route 113 and Marine Basin. Since this plant is an annual,

these populations will be relocated outside the growing season when transplanting the population will result in the least disruption and damage to plants. Temporary orange construction fencing will be placed around the transplant bed and remain until the transplant bed is stabilized and *Leptochloa fusca* ssp. *fascicularis* becomes established. The transplant bed has been designed to mimic the conditions in which the plants currently grow, which will maximize success of the site. All work will be overseen by CTDOT Office of Environmental Planning and CTDEEP staff.

*Leptochloa fusca* ssp. *fascicularis* prefers brackish waters and is less tolerant of highly saline waters. The ponded area in which they are currently located is tending toward brackish water, caused, in part, by the existing non-functioning culvert which does not allow for regular tidal flushing to this area. The installation of a new culvert under Route 113 and a new channel to the Marine Basin, will again allow regular tidal flushing by saline water to this ponded area.

The new channel will be partially-constructed before the roadway is constructed (and activities occur in the vicinity of the existing population) to allow the population to be transplanted to final grade. As shown on the plans in Appendix B (Sheets MIT-7 and MIT-11; cross sections shown on Sheets MIT-21 and MIT-22), the eastern end of the culvert will not be connected to the Marine Basin when the populations are transplanted. The transplant bed will not, initially, receive tidal flows. Also, one section of culvert pipe and the new headwall at the western end of the channel near Route 113 will be installed prior to transplant of the populations. In this way, the portion of the channel where the *Leptochloa fusca* spp. *fascicularis* soil material will be placed will not be disturbed again. Later in the construction sequencing, the culvert will be completed under the realigned Route 113, and the last step will be to complete the hydraulic connection to the Marine Basin. This connection to Marine Basin will be established prior to the 2015 growing season to allow the transplant bed to receive tidal flow. This approach will minimize direct potential impacts to the species, and maximize success of the proposed mitigation site.

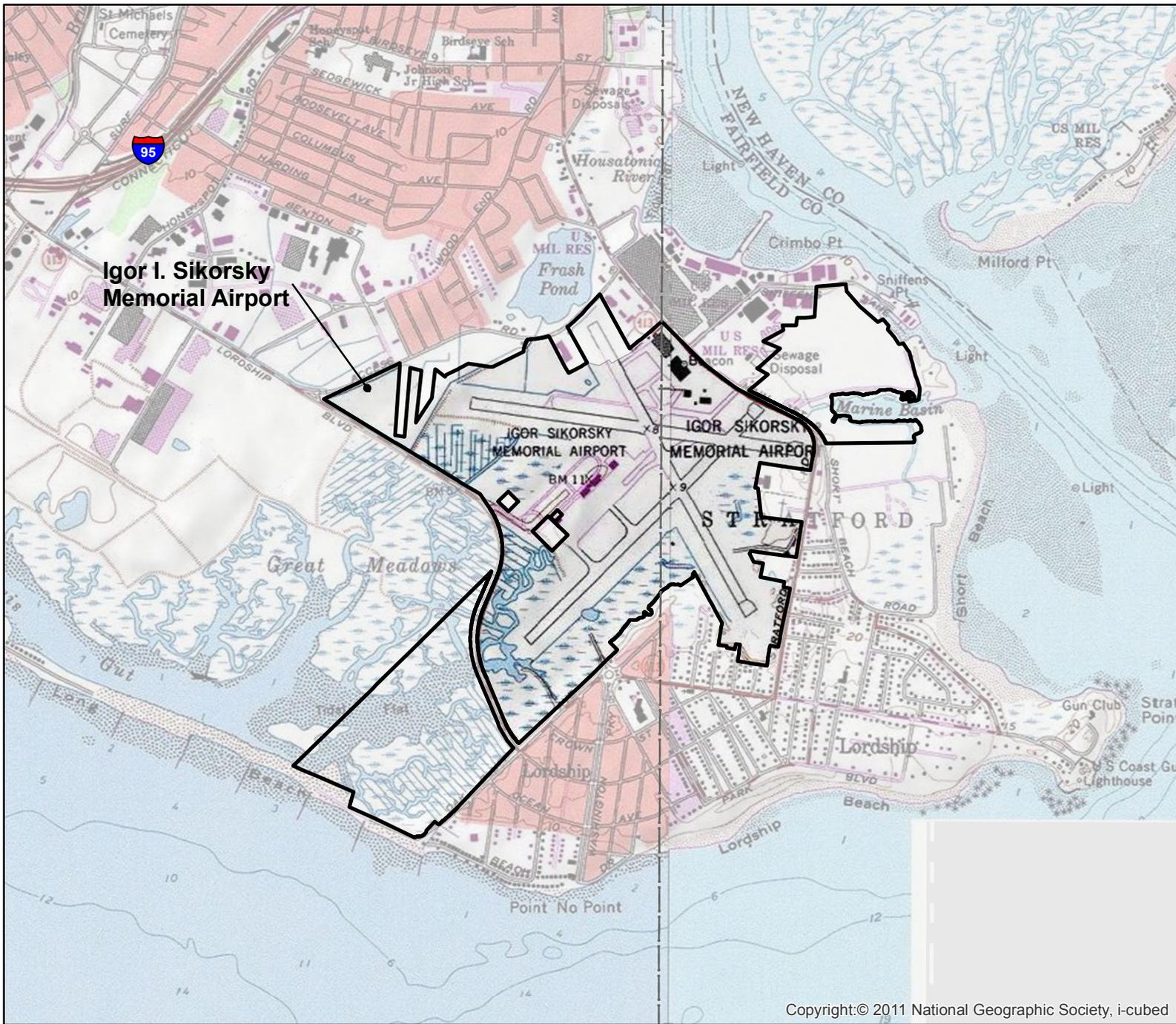
The second phase of proposed mitigation consists of preparation of a new 8,450-square foot seeding bed for this species within the footprint of the abandoned roadway. Once the new road is constructed and traffic diverted off the existing section of road, pavement will be removed from the abandoned roadway section, and a seeding bed prepared. The seeding bed has been designed to encompass a range of elevations similar to those at which current populations are found. Soil samples have been taken at the existing locations of this plant to determine the physical and chemical parameters under which it is currently growing. This data will be used to re-create the soil conditions (in regard to sieve size, pH, etc.) this species requires to successfully propagate and reproduce at the seeding bed area. Temporary orange construction fencing will be placed around the seeding bed and remain until the bed is stabilized and *Leptochloa fusca* spp. *fascicularis* is established, as determined by a qualified botanist approved by the CTDEEP.

In excess of 3,000 seeds were collected by CTDEEP on airport property during autumn 2012 and are being properly stored. Additional seeds will be collected during the 2013 season and added to the seed stock for planting within the proposed seeding bed. Half of the seeds will be planted in fall 2015 to allow the seeds to overwinter. The other half of the seeds will be properly stored for contingency, in case additional seeding is needed or amendments are determined to be needed to the seeding bed. All work will be overseen by CTDOT Office of Environmental Planning and CTDEEP staff.

Following construction, a qualified botanist, approved by CTDEEP, will monitor the mitigation area every September for five years. The program will monitor germination and plant growth. The approximate number of plants growing will be estimated and pictures taken to document the transplant and seed bed mitigation areas. A report will be submitted to CTDEEP annually in November, to allow for review and possible seeding of areas before winter. Once construction is completed, the City of Bridgeport will assume monitoring and stewardship of these beds and will allow CTDEEP access to the sites. The City of Bridgeport will take responsibility for monitoring and maintenance of all mitigation areas after construction of the project and will work with CTDEEP to ameliorate any problems found at the sites.

The monitoring program will have the added benefit of enhancing the overall understanding of the habitat needs of *Leptochloa fusca ssp. fascicularis*. The scientific data can be shared with other concerned parties, improving the long-range conservation, statewide, for the species.

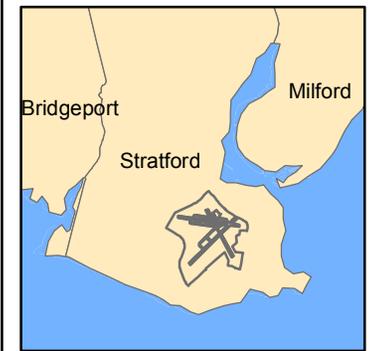
In summary, the purpose of the project is to reduce the frequency and severity of aircraft safety incidents at the airport by re-aligning Route 113 and installing an EMAS at the north end of Runway 6-24. The proposed project will result in unavoidable, direct, permanent impacts to two sub-populations of *Leptochloa fusca ssp. fascicularis*. These impacts are unavoidable due to the close proximity of these two populations to the existing roadway and the proposed work. An area of approximately 0.06 acres of *Leptochloa fusca ssp. fascicularis* will be impacted by the project. Approximately 0.45 acres of mitigation is provided to offset these impacts. To mitigate for project impacts to *Leptochloa fusca ssp. fascicularis*, a two phased approach is proposed involving both transplantation of two existing subpopulations and planting of a new seeding bed. The transplant bed and seeding bed have been carefully designed to best mimic existing conditions and ensure success of the mitigation areas. Oversight by CTDEEP and CTDOT's Office of Environmental Planning during construction will aid in likelihood of mitigation success, as well as the City of Bridgeport's commitment to the long term protection of the species.



**Legend**

-  Igor I. Sikorsky Memorial Airport Property Boundary
-  USGS Topographic Boundary

1:24,000  
USGS Quadrangles  
Milford, Bridgeport

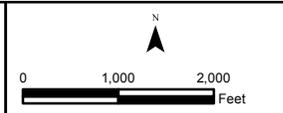


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Vicinity Map

Project No.  
15-336  
Date:  
March 2013

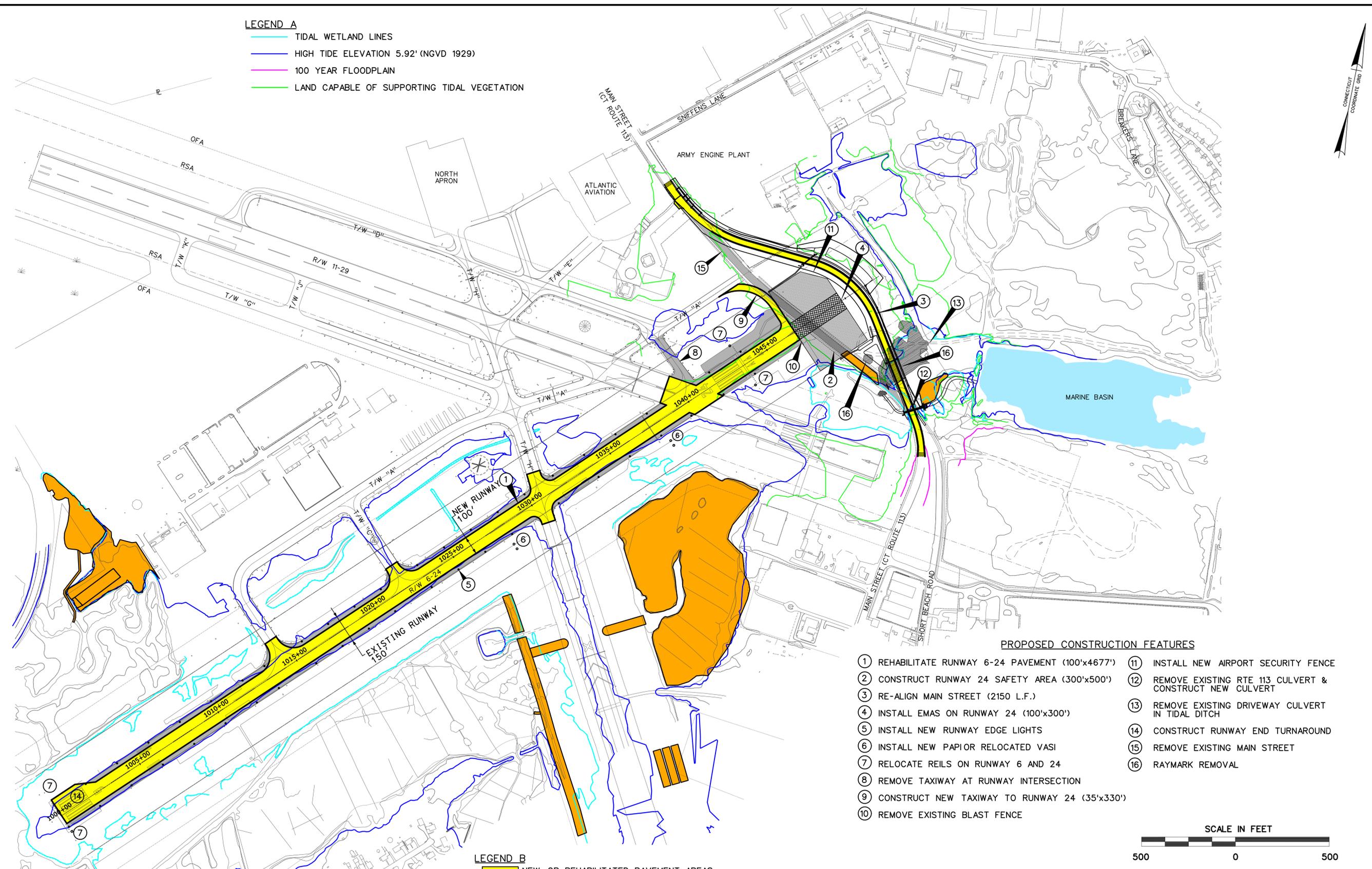
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**Runway Safety Area Project**  
**Igor I. Sikorsky Memorial Airport**  
**Stratford, Connecticut**



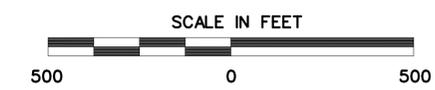
Town:  
Stratford, CT  
Figure ES-1



- LEGEND A**
- TIDAL WETLAND LINES
  - HIGH TIDE ELEVATION 5.92' (NGVD 1929)
  - 100 YEAR FLOODPLAIN
  - LAND CAPABLE OF SUPPORTING TIDAL VEGETATION



- PROPOSED CONSTRUCTION FEATURES**
- |  |   |
|--|---|
| ① REHABILITATE RUNWAY 6-24 PAVEMENT (100'x4677') | ⑪ INSTALL NEW AIRPORT SECURITY FENCE                      |
| ② CONSTRUCT RUNWAY 24 SAFETY AREA (300'x500')    | ⑫ REMOVE EXISTING RTE 113 CULVERT & CONSTRUCT NEW CULVERT |
| ③ RE-ALIGN MAIN STREET (2150 L.F.)               | ⑬ REMOVE EXISTING DRIVEWAY CULVERT IN TIDAL DITCH         |
| ④ INSTALL EMAS ON RUNWAY 24 (100'x300')          | ⑭ CONSTRUCT RUNWAY END TURNAROUND                         |
| ⑤ INSTALL NEW RUNWAY EDGE LIGHTS                 | ⑮ REMOVE EXISTING MAIN STREET                             |
| ⑥ INSTALL NEW PAPIOR RELOCATED VASI              | ⑯ RAYMARK REMOVAL   |
| ⑦ RELOCATE REILS ON RUNWAY 6 AND 24              |   |
| ⑧ REMOVE TAXIWAY AT RUNWAY INTERSECTION          |   |
| ⑨ CONSTRUCT NEW TAXIWAY TO RUNWAY 24 (35'x330')  |   |
| ⑩ REMOVE EXISTING BLAST FENCE                    |   |



- LEGEND B**
- NEW OR REHABILITATED PAVEMENT AREAS
  - PAVEMENT REMOVAL AREAS
  - RSA GRADING AREA
  - AIRPORT PERIMETER FENCING
  - EMAS
  - MITIGATION AREAS

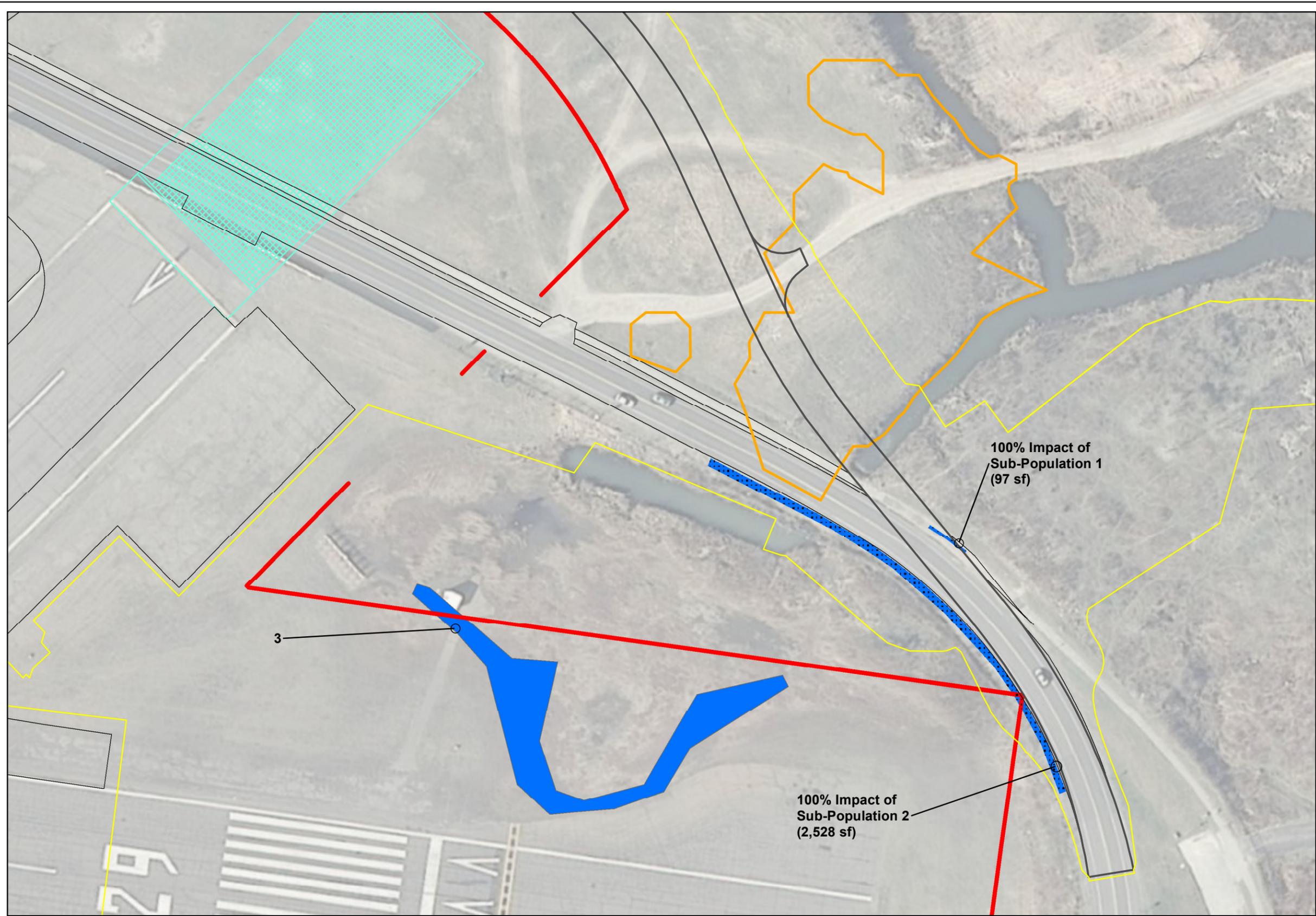


**IGOR I. SIKORSKY MEMORIAL AIRPORT  
STRATFORD, CONNECTICUT**

**URS**

**RUNWAY SAFETY AREA PROJECT  
DOT 15-336  
IGOR I. SIKORSKY MEMORIAL AIRPORT  
PROPOSED CONSTRUCTION FEATURES**

**FIGURE  
ES-2**



**Project Features**

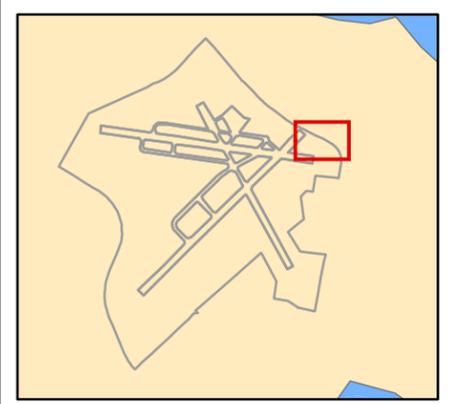
- Runway Safety Area
- ▨ Proposed Engineered Material Arresting System (EMAS)
- Limits of Project Disturbance
- Proposed Rte. 113 Alignment
- ▭ Limits of Raymark Waste Site (2013)

**Resources**

- ↗ Listed Species Sub-Population Identification Number
- ▭ *Leptochloa fusca* ssp. *Fascicularis* (Salt Pond Grass) (CT Endangered)

**Impacts**

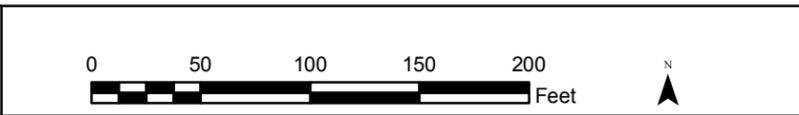
- ▨ Impacts from Route 113 Proposed Realignment
- Limits of Pavement Removal



Map Title: **ES-1: Saltpond Grass: Existing Populations and Anticipated Impacts**

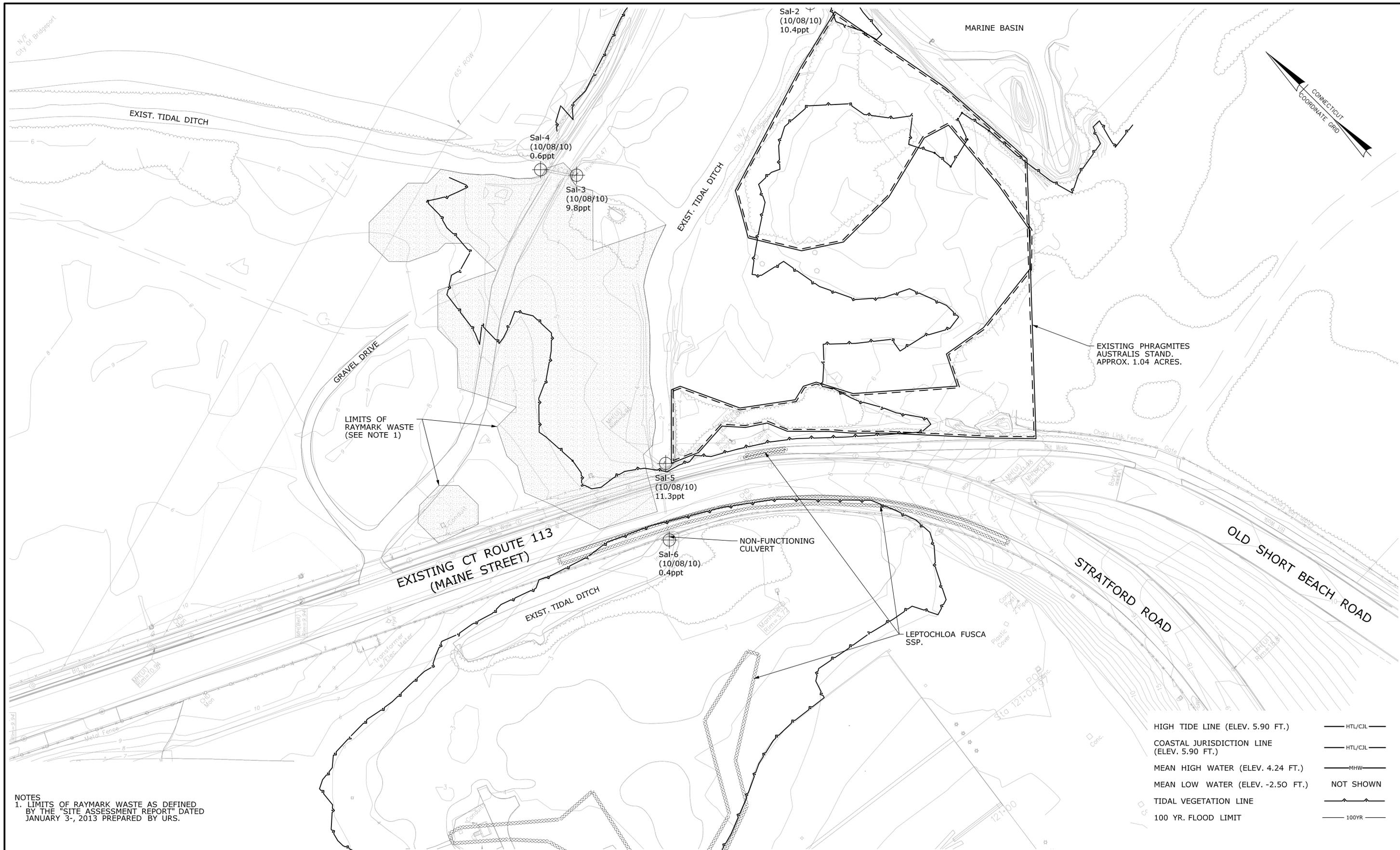
Project No. **15-336**  
Date: **March 2013**

Project Title: **Runway Safety Area Project  
Igor I. Sikorsky Memorial Airport  
Stratford, Connecticut**



Town: **Stratford, CT**  
**Figure ES-3**





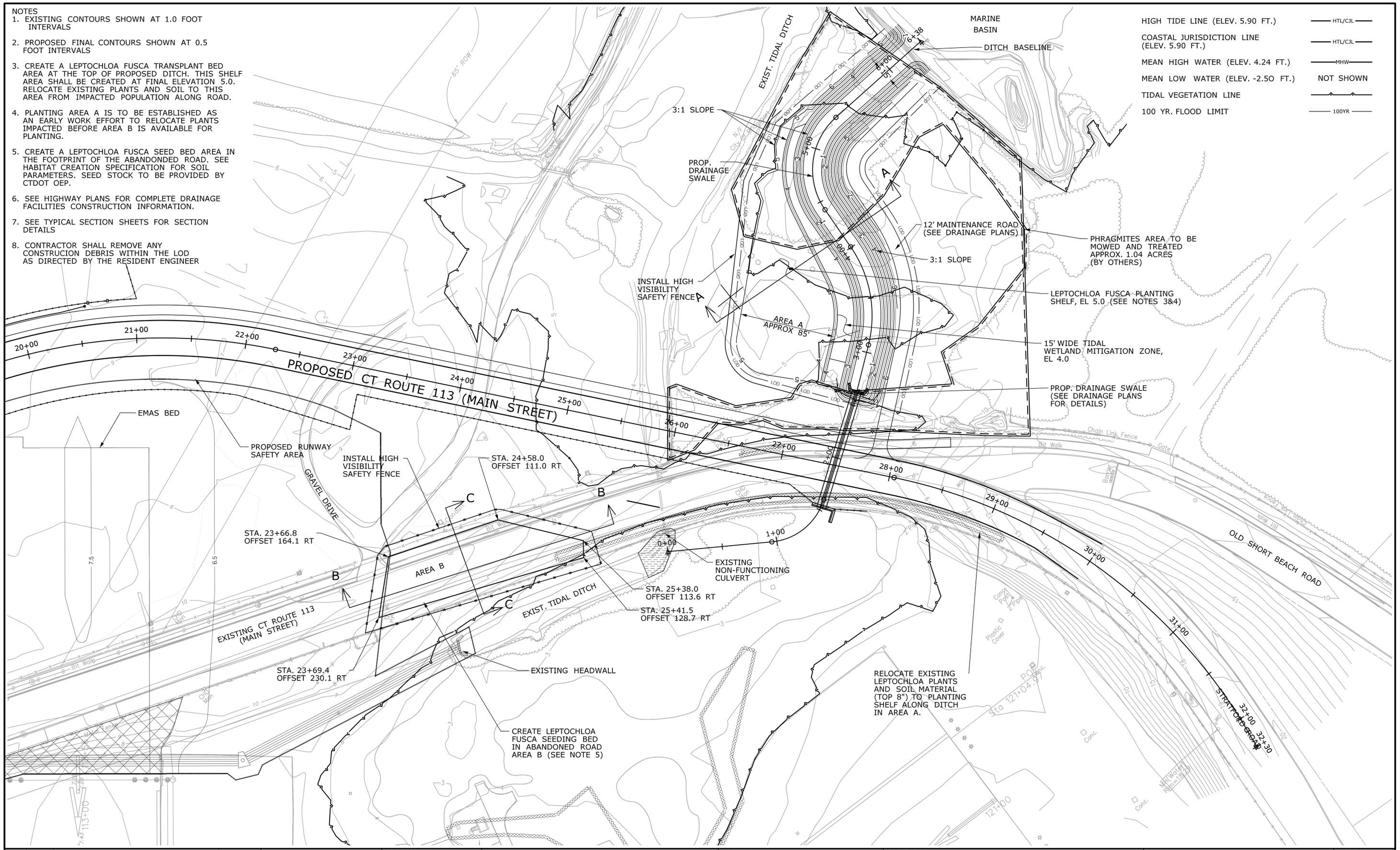
NOTES  
 1. LIMITS OF RAYMARK WASTE AS DEFINED BY THE "SITE ASSESSMENT REPORT" DATED JANUARY 3-, 2013 PREPARED BY URS.

HIGH TIDE LINE (ELEV. 5.90 FT.)	— HTL/CJL —
COASTAL JURISDICTION LINE (ELEV. 5.90 FT.)	— HTL/CJL —
MEAN HIGH WATER (ELEV. 4.24 FT.)	— MHW —
MEAN LOW WATER (ELEV. -2.50 FT.)	NOT SHOWN
TIDAL VEGETATION LINE	— TIDL —
100 YR. FLOOD LIMIT	— 100YR —

	THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.	DESIGNER/DRAFTER: CHECKED BY: SCALE IN FEET  SCALE 1"=40'	 <b>STATE OF CONNECTICUT</b> <b>DEPARTMENT OF TRANSPORTATION</b> <small>Filename: ...1114781MIT.04_EXCNDTN.dgn</small>	SIGNATURE/ BLOCK:  PROJECT TITLE: <b>RUNWAY SAFETY AREA PROJECT</b> <b>IGOR. I. SIKORSKY MEMORIAL AIRPORT</b>	TOWN: <b>STRATFORD</b> DRAWING TITLE: <b>EXISTING CONDITIONS</b> <b>ROUTE 113 ROADWAY</b> <b>MITIGATION SITE 4</b>	PROJECT NO. <b>15-336</b> DRAWING NO. <b>MIT-7</b> SHEET NO. <b>7.007</b>						
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REV.	DATE	REVISION DESCRIPTION										

- NOTES
- EXISTING CONTOURS SHOWN AT 1.0 FOOT INTERVALS
  - PROPOSED FINAL CONTOURS SHOWN AT 0.5 FOOT INTERVALS
  - CREATE A LEPTOCHLOA FUSCA TRANSPLANT BED AREA AT THE TOP OF PROPOSED DITCH. THIS SHELF AREA SHALL BE CREATED AT FINAL ELEVATION 5.0. RELOCATE EXISTING PLANTS AND SOIL TO THIS AREA FROM IMPACTED POPULATION ALONG ROAD.
  - PLANTING AREA A IS TO BE ESTABLISHED AS AN EARLY WORK EFFORT TO RELOCATE PLANTS IMPACTED BEFORE AREA B IS AVAILABLE FOR PLANTING.
  - CREATE A LEPTOCHLOA FUSCA SEED BED AREA IN THE FOOTPRINT OF THE ABANDONDED ROAD, SEE HABITAT CREATION SPECIFICATION FOR SOIL PARAMETERS. SEED STOCK TO BE PROVIDED BY CTDOT OEP.
  - SEE HIGHWAY PLANS FOR COMPLETE DRAINAGE FACILITIES CONSTRUCTION INFORMATION.
  - SEE TYPICAL SECTION SHEETS FOR SECTION DETAILS
  - CONTRACTOR SHALL REMOVE ANY CONSTRUCTION DEBRIS WITHIN THE LOD AS DIRECTED BY THE RESIDENT ENGINEER

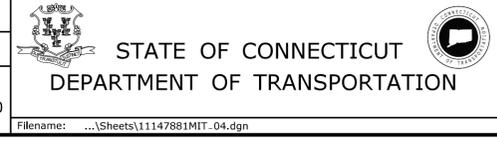
- HIGH TIDE LINE (ELEV. 5.90 FT.) 
- COASTAL JURISDICTION LINE (ELEV. 5.90 FT.) 
- MEAN HIGH WATER (ELEV. 4.24 FT.) 
- MEAN LOW WATER (ELEV. -2.50 FT.) 
- TIDAL VEGETATION LINE 
- 100 YR. FLOOD LIMIT 



REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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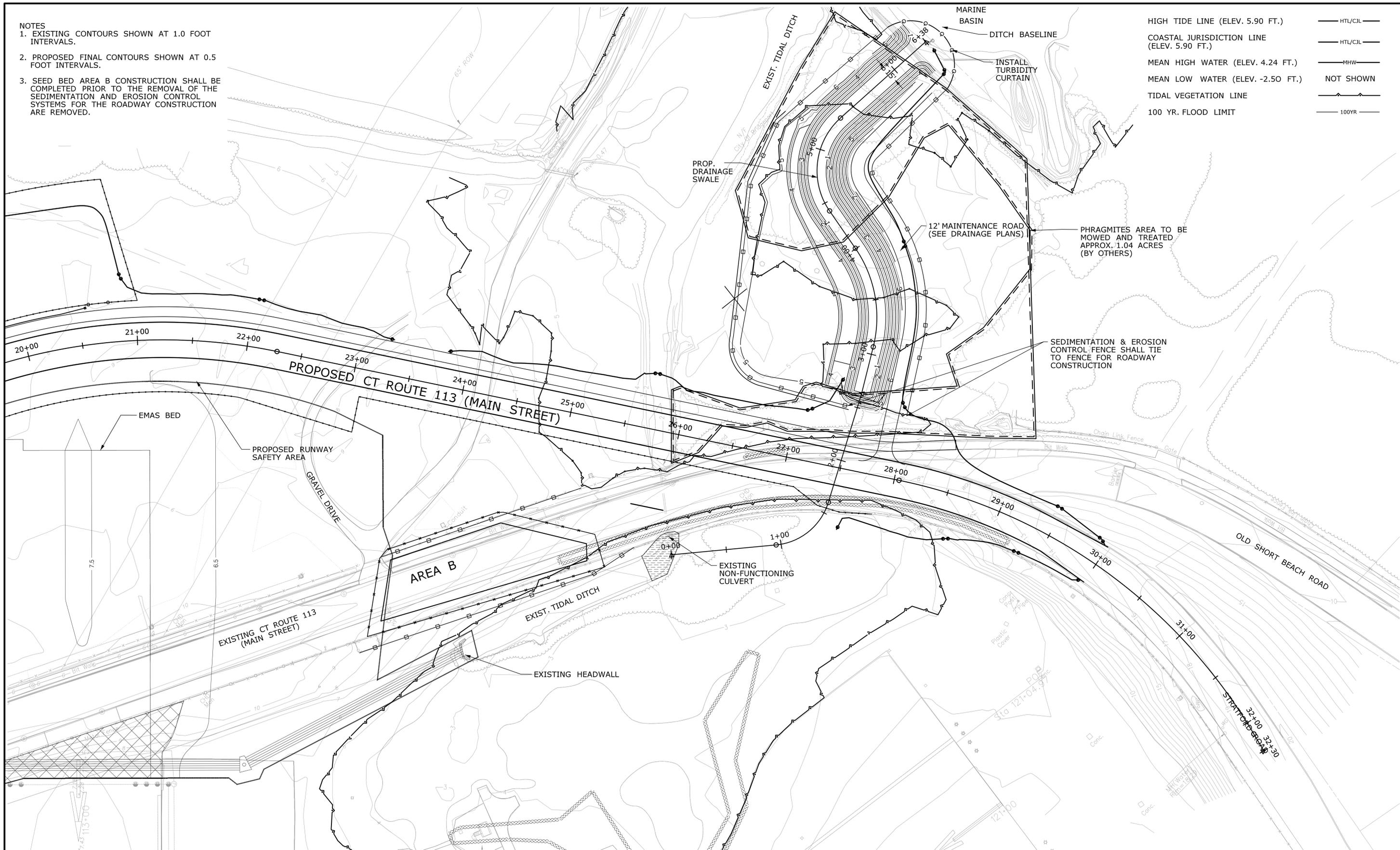
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 RUNWAY SAFETY AREA PROJECT  
 IGOR. I. SIKORSKY MEMORIAL AIRPORT

TOWN:  
 STRATFORD  
 DRAWING TITLE:  
 MITIGATION PLAN  
 ROUTE 113 ROADWAY  
 MITIGATION SITE 4

PROJECT NO.  
 15-336  
 DRAWING NO.  
 MIT-11  
 SHEET NO.  
 7.011

- NOTES
- EXISTING CONTOURS SHOWN AT 1.0 FOOT INTERVALS.
  - PROPOSED FINAL CONTOURS SHOWN AT 0.5 FOOT INTERVALS.
  - SEED BED AREA B CONSTRUCTION SHALL BE COMPLETED PRIOR TO THE REMOVAL OF THE SEDIMENTATION AND EROSION CONTROL SYSTEMS FOR THE ROADWAY CONSTRUCTION ARE REMOVED.

- HIGH TIDE LINE (ELEV. 5.90 FT.) — HTL/CIL —
- COASTAL JURISDICTION LINE (ELEV. 5.90 FT.) — HTL/CIL —
- MEAN HIGH WATER (ELEV. 4.24 FT.) — MHW —
- MEAN LOW WATER (ELEV. -2.50 FT.) — NOT SHOWN —
- TIDAL VEGETATION LINE —
- 100 YR. FLOOD LIMIT — 100YR —



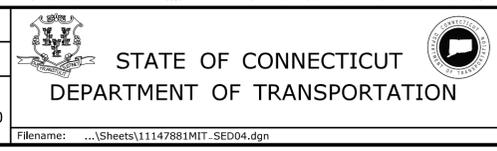
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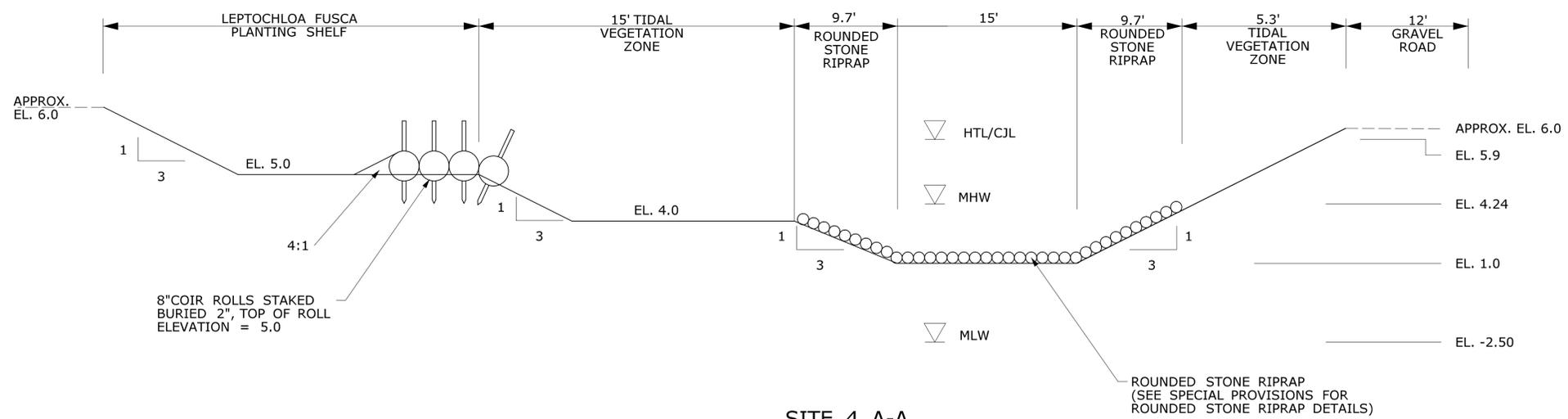
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PROJECT NO.  
**15-336**

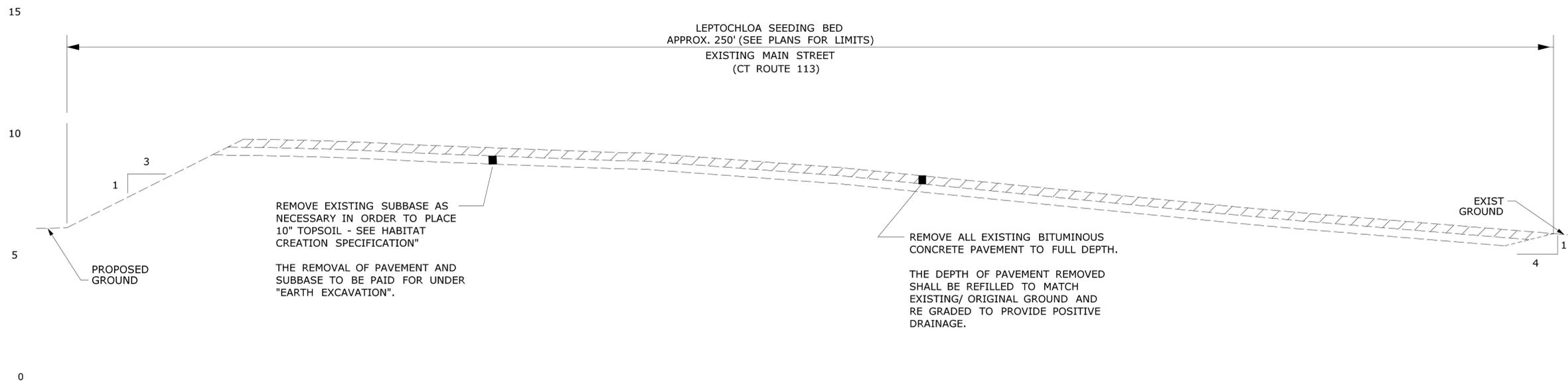
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SHEET NO.  
**7.016**

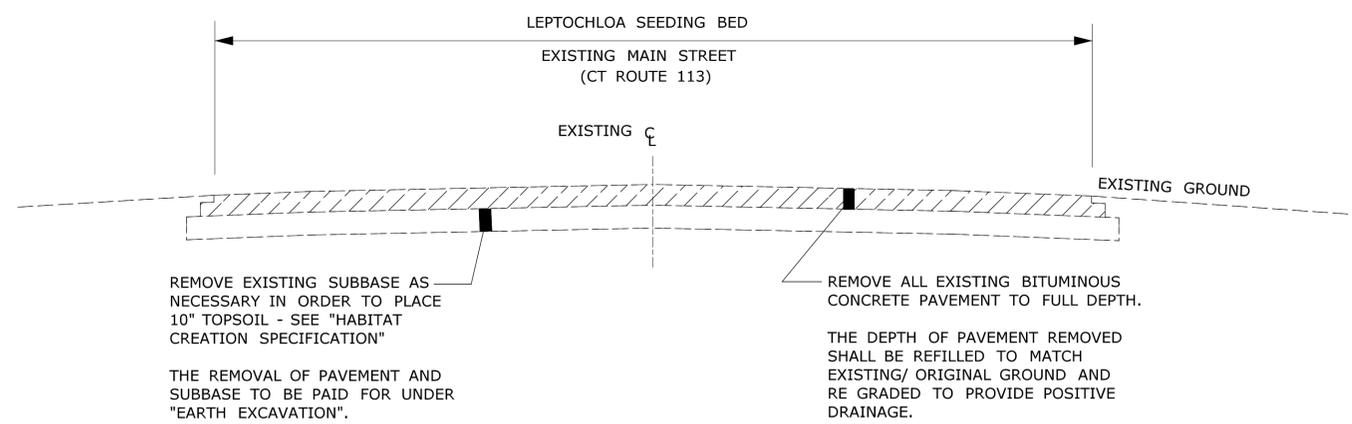


SITE 4 A-A  
TYPICAL CHANNEL  
N.T.S.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.			DESIGNER/DRAFTER: CHECKED BY:	 STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	SIGNATURE/ BLOCK:	PROJECT TITLE: RUNWAY SAFETY AREA PROJECT IGOR. I. SIKORSKY MEMORIAL AIRPORT	TOWN: STRATFORD	PROJECT NO. 15-336
REV. DATE REVISION DESCRIPTION SHEET NO.	Plotted: 2/7/2013	Filename: ...\\Sheets\\11147881MIT_TypSec3.dgn	DRAWING TITLE: TYPICAL SECTIONS MITIGATION SITE 3 & 4	SHEET NO. MIT-21 7.021				



**SITE 4 B-B  
PAVEMENT REMOVAL DETAIL  
N.T.S.**



**SITE 4 C-C  
PAVEMENT REMOVAL DETAIL  
N.T.S.**

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REV. DATE REVISION DESCRIPTION SHEET NO.	Plotted: 3/22/2013	FILENAME: ...\\Sheets\11147881MIT_TypSec4.dgn						DRAWING NO. <b>MIT-22</b>

# Project History & Existing Conditions

## Project Background

The Connecticut Department of Transportation (CTDOT) and the City of Bridgeport are currently undertaking a safety improvement project at Igor I. Sikorsky Memorial Airport (BDR) in Stratford, Connecticut (State CTDOT Project No. 15-336). The project involves safety improvements to the runway safety area (RSA) at Runway 6-24 and relocation of State Route 113 to facilitate these safety improvements. Sikorsky Airport is situated on a 600-acre site in the Town of Stratford in Fairfield County, Connecticut (see Figure 1 in Appendix A). It is located approximately four miles southeast of Bridgeport and approximately 20 miles southwest of New Haven, Connecticut. The airport occupies a peninsula bounded on the north by Route 113 and an access road, on the east by Lordship Boulevard and an access road, on the west by Route 113, and on the south by Prospect Drive and Oak Bluff Avenue. Sikorsky Airport is owned and operated by the City of Bridgeport.

On April 27, 1994, a twin-engine charter aircraft overshot Runway 6-24 and struck the blast fence at the northeast end. Eight passengers were killed. The National Transportation Safety Board (NTSB) investigated and issued NTSB Report AAR-94/08 in 1995. The agency recommended to the Federal Aviation Administration (FAA), CTDOT, the City of Bridgeport, and the Town of Stratford that the non-frangible blast fence be removed and safety improvements be constructed assuring an adequate runway safety area at the end of Runway 6-24. Relevant excerpts (paraphrased) of these recommendations are as follows:

- The FAA should require that substandard runway safety areas be upgraded to Advisory Circular 150/5300-13 minimum standards wherever it is feasible.
- Implement a plan to resolve environmental considerations, and proceed with the installation of an approach light system on Runway 6 as soon as possible.
- The CTDOT should relocate Route 113 away from the Runway 24 threshold to provide adequate distance between airplanes and Route 113 to protect vehicles and persons from jet blast.
- Following the relocation of Route 113, Sikorsky Memorial Airport should immediately establish an RSA at the approach end of Runway 24 in accordance with FAA Advisory Circular 150/5300-13 and remove the non-frangible blast fence.

A revised RSA Determination was then issued on February 5, 2009 by the FAA in accordance with FAA Order 5200.8. The FAA recognized that given the advancement in Engineered Materials Arresting Systems (EMAS) technology, such a system would now be warranted for study at BDR as it would enhance the safety for aircraft on approach to the runways. The revised RSA Determination recommended the construction of a 300-foot safety area with EMAS on the end of Runway 24 and the removal of the blast fence. The airport layout plan (ALP) was updated to reflect these changes; the ALP was conditionally approved on March 20, 2009.

On September 28, 2011, the FAA issued the *Record of Decision for the Written Re-evaluation Environmental Impact Statement for the Runway Safety Area Project at Igor I. Sikorsky Memorial Airport, Stratford, Connecticut*. The ROD approved the following actions:

- Implementation of the revised ALP under 49 USC Section 47107(a) (16) and determinations under 49 USC Section 47106 and 47107 pertaining to FAA funding of airport development;
- Approval for relocation, installation, and/or upgrade of various navigational aids.

To date, these improvements have not been constructed.

## PURPOSE & NEED

The purpose and need of the proposed project is to:

- **Provide, to the extent practicable, RSAs on Runway 6-24 which meet current FAA minimum safety standards:** The NTSB stated that "...the fatalities were caused by the presence of the non-frangible blast fence and the absence of a safety area at the end of the runway." FAA Order 5200.8 states that the RSAs at federally-obligated airports and all RSAs at airports certificated under 14 CFR Part 139 shall conform to the standards contained in FAA Advisory Circular 150/5300-13 to the maximum extent practicable.
- **Improve the runway pavement structure on Runway 6-24 in order to restore a 20-year pavement design:** The Airport does participate in a regular crack seal maintenance program and in 2007, the runway received a thermoplastic seal coat; however, no reconstruction or rehabilitation of the pavement of Runway 6-24 has taken place. Thus, the pavement is continuing to deteriorate as identified in the engineering investigations in 1996.

## PERMIT STATUS

The following permit applications are currently being prepared by the CTDOT and are scheduled to be submitted in the spring of 2013:

- A Structures, Dredging and Fill and Tidal Wetlands permit application (CGS 22a-359 through 22a-363f, 22a-28 through 22a-35) for the Connecticut Department of Energy and Environmental Protection's Office of Long Island Programs (CTDEEP OLISP).
- A Section 401 Water Quality Certification application for the CTDEEP OLISP.
- A U.S. Army Corps of Engineers (USACE) Individual Section 404 permit application for the USACE.
- A Flood Management Certification application [CGS Section 25-68(b) – (h)] for the CTDEEP Inland Water Resources Division (IWRD) and exemption request.
- U.S. Environmental Protection Agency (EPA) approval for removal and disposal of Raymark waste in the project area.

- General Permit for Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities.

## **PROPOSED WORK**

The proposed project includes the following activities within the airport proper:

- Construction of an RSA that is 500 feet in width (250 feet on either side of the runway centerline) by 300 feet in length beyond the 24 end of Runway 6-24, including installation of an EMAS (100 feet in width by 300 feet in length);
- Installation of new runway edge lights on Runway 6-24;
- Relocation of Runway End Identifier Lights (REILS);
- Construction of a new connector taxiway (35 feet in width by 300 feet in length) from Taxiway A to Runway 24 and demolition of the existing connector Taxiway D at the intersection of Runways 6-24 and 11-29;
- Removal of the existing blast fence located adjacent to Runway 24;
- Installation of new Airport Security Fence;
- Construction of a Turn Around for Runway 6;
- Rehabilitation of pavement on Runway 6-24; and
- Relocation of the Visual Approach Slope Indicator (VASI) and Precision Approach Path Indicator (PAPI) visual landing aids on Runways 6 and 24.

The proposed project includes the following activities within the vicinity of Route 113:

- Construction of a realigned segment of Route 113 including a stormwater drainage system and multi-use path (to accommodate the RSA);
- Relocation of all underground utilities from the existing Route 113 right-of-way to the proposed right-of-way;
- Closure and removal of the abandoned segment of Route 113;
- Delineation, removal and disposal of existing Raymark Superfund Site waste materials within the vicinity of the realigned Route 113;
- Construction of a new tidal channel to convey stormwater runoff and tidal flows.

The proposed project includes the following activities within the vicinity of Route 113 and within the airport proper:

- Construction of various wetland mitigation and listed species mitigation areas.

Raymark Superfund waste is located within the proposed project area. Delineation of the Raymark contamination zone was conducted in late 2012, early 2013. The Raymark contamination zone extends into the proposed project area north of Route 113 adjacent to an existing tidal ditch. The 2012-2013 Raymark zone is depicted on Figures 2 and 3 (State-Listed Plant Species, 2012 Biological Survey and Anticipated Improvement Impacts) in Appendix A, as well as Figure 8 (Conceptual Mitigation Plan). Raymark waste will be removed and disposed of in an approved manner as part of the project. Coordination is currently ongoing between FAA, CTDOT, US EPA, CTDEEP, the City of Bridgeport, and the Town of Stratford to finalize a plan for removal.

The runway safety improvements as well as the relocation of Route 113 will include permanent and temporary impacts to tidal wetlands; therefore compensatory wetland mitigation will be required. The mitigation proposed for the project will far outway the proposed tidal wetland impacts, and will be well above the mitigation ratio requirements set forth by the U.S. Army Corps of Engineers.

In anticipation of permit applications, surveys were conducted in 2012. Ornithologists, entomologists, and botanists conducted detailed surveys of the project area to determine the presence of known historic and existing endangered species and habitats, or those of high conservation concern. The results of these surveys are documented in reports including:

1. Avian Survey Report, Runway Safety Area Project, Igor I. Sikorsky Memorial Airport (2013)
2. Igor I. Sikorsky Memorial Airport Rare Moth Findings Report (2013)
3. Vegetation Report, Runway Safety Area Project, Igor I. Sikorsky Memorial Airport (2013)

A summary of the biological survey methodology and findings, direct and indirect impacts anticipated from the project, and proposed mitigation are described for listed vegetation, avian, and invertebrate species in the following sections of this report.

- **Vegetation:** In coordination with CTDEEP, an approved, qualified biologist investigated the project area in 2012 and found present populations of two state-listed endangered species: Coast Violet (*Viola brittoniana*) and Saltpond Grass (*Leptochloa fusca* ssp. *fascicularis*). The biologist also found present populations of two state-listed species of special concern: Needlegrass (*Aristida longespica*) and Orache (*Atriplex glabriuscula*).
- **Avian:** During the survey period, CTDEEP approved biologists observed 147 avian species. Out of the total 147 species observed, 20 are included on the Connecticut list of endangered, threatened or special concern species (CTDEEP, 2010) (these species are discussed in more detail in the *Background Information on Listed Species* section of this report)
- **Invertebrates:** During the survey period, CTDEEP approved biologists conclusively identified a total of 103 invertebrate species over the six two-night samples of blacklight trapping surveys in 2012. Of these only two state-listed species - one moth species of special concern [Dune Sympistis (*Sympistis riparia*)] and one tiger beetle species of special concern [Mudflat Tiger Beetle (*Cicindela marginata*)] were recorded from the traps.

## State Threatened, Endangered, and Species of Special Concern

### SURVEY METHODOLOGY

#### *Vegetation*

An approved, qualified botanist, William H. Moorhead III, performed an initial reconnaissance of the study/survey area (the entire airport property) early in the growing season in 2012, and assessed the potential for the area to host eight listed plant species identified by previous coordination with the CTDEEP Natural Diversity Database (NDDB). In addition, potential habitat for and any other rare, threatened, or endangered species was also identified. This assessment resulted in a draft list of survey

target species, which the botanist discussed early in the project (March to May 2012) with the CTDEEP. A list of survey target species was finalized, based on that early coordination, as follows in Table 1:

**Table 1: Initial List of Survey Target Species**

Common Name	Scientific Name	Status (state/federal)
Beach Needlegrass	<i>Aristida tuberculosa</i>	Special Concern /--
Orache	<i>Atriplex glabriuscula</i>	Special Concern/--
Saltpond Grass	<i>Leptochloa fusca</i> ssp. <i>Fascicularis</i>	Endangered/--
Sea-beach Sandwort	<i>Honckenya peploides</i>	Special Concern/--
Panic Grass	<i>Dichantherium ovale</i> var. <i>addisonii</i>	Special Concern /--
Yellow-fringe Orchid	<i>Platanthera ciliaris</i>	Threatened/--
Salt-marsh Bulrush	<i>Bolboschoenus novae</i> – <i>angliae</i>	Special Concern /--
Coast Violet	<i>Viola brittoniana</i>	Endangered /--

The geographic extent of this task encompassed the entire airport-owned property. The study included areas that are normally mowed repeatedly during the growing season; however, a normal mowing regime made it very difficult to detect certain rare, threatened, or endangered species in these mowed areas. Therefore, mowing of the study/survey area was minimized during the 2012 growing season to maximize the chances of detecting survey target species. The botanist worked with airport maintenance staff on a schedule of mowing and maintaining recommended minimum vegetation height (based on the ecological characteristics of the survey target species). Airport staff provided notification to the botanist well in advance of the next actual mowing to facilitate scheduling survey visits prior to mowings. Field work was conducted during the growing season from April through November 2012.

Field survey of listed species was documented with route-of-survey and area-surveyed maps, characterizations of plant communities encountered during the survey, and a taxa list of species observed during the survey. All occurrences of state-listed plant taxa was documented using standard CTDEEP Natural Diversity Database “Special Plant Survey Forms” which included a basic ecological description of the occurrence and a plot of the location of the occurrence on an aerial photo. All state-listed plants were identified and mapped. Population boundaries were documented with a GPS unit in the field.

Summary

Of the eight target species surveyed for, the botanist found two state-listed endangered species present in the study area:

- Coast Violet (*Viola brittoniana*)
- Saltpond Grass (*Leptochloa fusca* ssp. *fascicularis*)

In addition, two state Species of Concern were found:

- Needlegrass (*Aristida longespica*)
- Orache (*Atriplex glabriuscula*)

It should be noted that Needlegrass (*Aristida longespica*) had not previously been listed by CTDEEP or NDDDB as occurring at the site, therefore it is a new find.

Figures 2 through 7 in Appendix A depict the locations of these species as documented during the 2012 field survey.

### **Avian Species**

Structured field work for this study took place between 27th of April and 25th of October, 2012. Bird surveys were conducted by qualified biologists across the airport site, with particular attention to the proposed impacted sites. To do this, a series of point counts, wetland call back surveys, and other observations were conducted throughout the survey period. During this time period, 11 point count surveys, three call-back surveys, and one nocturnal survey were conducted. A Short-eared Owl survey was also conducted on February 16, 2012.

Additional noteworthy observations made outside specific survey times are indicated as such herein. The survey period overlaps with the active reproductive season of the target species and the majority of resident birds inhabiting the site, Stratford Great Meadows (SGM) and surrounding environs. Each of the survey methods are described in further detail below.

Preference was given to the detection and documentation of federal and Connecticut Endangered Species Act (ESA) listed species known or suspected as having potential to occur on site as a breeder or in some cases as a non-breeder where conservation status warranted. Therefore, the system of point counts, call back surveys, and other observations all together served to assess usage of site habitats by priority listed species. The target priority species for the site, their Connecticut and Federal ESA status and the methodology utilized to survey the site is provided in Table 2. This list was developed based on coordination with the CTDEEP Wildlife Division and other existing documentation and survey information of avian species on the airport.

**Table 2: Listed Species Targeted for Surveys on the Bridgeport-Sikorsky Airport Site**

Scientific Name	Common Name	Status (state / federal)	Survey Method*
<i>Accipiter striatus</i>	Sharp-shinned Hawk	E/--	Point count
<i>Ammodramus caudacutus</i>	Saltmarsh Sparrow	SC/--	Point count
<i>Ammodramus maritimus</i>	Seaside Sparrow	T/--	Point count
<i>Anas discors</i>	Blue-winged Teal	T (Nesting population only) / --	Point count
<i>Ardea alba</i>	Great Egret	T/--	Point count
<i>Asio flammeus</i>	Short-eared Owl	T/--	Transect survey
<i>Asio flammeus</i>	Short-eared Owl	T/--	Point count

Scientific Name	Common Name	Status (state / federal)	Survey Method*
	(winter populations)		
<i>Bartramia longicauda</i>	Upland Sandpiper	E/--	Point count
<i>Botaurus lentiginosus</i>	American Bittern	E/--	Call-back survey
<i>Charadrius melodus</i>	Piping Plover	T/T	Point count
<i>Circus cyaneus</i>	Northern Harrier	E/--	Point count
<i>Cordeiles minor</i>	Common Nighthawk	E/--	Point count
<i>Egretta caerulea</i>	Little Blue Heron	SC/--	Point count
<i>Egretta thula</i>	Snowy Egret	T/--	Point count
<i>Eremophila alpestris</i>	Horned Lark	E/--	Point count
<i>Falco peregrinis</i>	Peregrine Falcon	T/--	Point count
<i>Falco sparverius</i>	American Kestrel	T/--	Point count
<i>Gallinula chloropus</i>	Common Moorhen	E/--	Call-back survey
<i>Ixobrychus exilis</i>	Least Bittern	T/--	Call-back survey
<i>Passerculus sandwichensis</i>	Savannah Sparrow	SC/--	Point count
<i>Passerculus sandwichensis princeps</i>	Ipswich Sparrow	SC/--	Point count; transect
<i>Plegadis falcinellus</i>	Glossy Ibis	SC/--	Point count
<i>Podilymbus podiceps</i>	Pied-billed Grebe	E/--	Call-back survey
<i>Rallus elegans</i>	King Rail (Nesting Populations only)	E/--	Call-back survey
<i>Sternula antillarum</i>	Least Tern	T/--	Point count
<i>Sturnella magna</i>	Eastern Meadowlark	SC/--	Point count
<i>Toxostoma rufum</i>	Brown Thrasher	SC/--	Point count
<i>Tyto alba</i>	Common Barn Owl	E/--	Point count, structure inspection

### Summary

Of the 28 target species surveyed for, seven state-listed threatened, three state-listed endangered, and five Special Concern species were present on BDR property. One species, Piping Plover is on both the federal and state list of threatened species. Barn Owl, endangered in Connecticut, has, historically, been documented nesting on Sikorsky property. Although no individuals were observed during the 2012 survey, the barn owl is a known previous nester on airport property, as recently as 2009. Additionally, four state Special Concern species, not on the original target species list were observed; these species are presented in bold type below.

#### Federal and State Threatened

- Piping Plover (*Charadrius melodus*)

#### State Listed Threatened Species

- Blue-winged Teal (*Anas discors*)
- Great Egret (*Ardea alba*)
- Snowy Egret (*Egretta thula*)

- American Kestrel (*Falco sparverius*)
- Peregrine Falcon (*Falco peregrinus*)
- Least Tern (*Sternula antillarum*)
- Seaside Sparrow (*Ammodramus maritimus*)

State Listed Endangered Species

- Pied-billed Grebe (*Podilymbus podiceps*)
- American Bittern (*Botaurus lentiginosus*)
- Northern Harrier (*Circus cyaneus*)

State Special Concern Species

- Little Blue Heron (*Egretta caerulea*)
- **Yellow-crowned Night-Heron (*Nyctanassa violacea*)**
- Glossy Ibis (*Plegadis falcinellus*)
- **Common Tern (*Sterna hirundo*)**
- **American Oystercatcher (*Haematopus palliatus*)**
- Savannah Sparrow (*Passerculus sandwichensis*)
- Saltmarsh Sparrow (*Ammodramus caudacutus*)
- **Bobolink (*Dolichonyx oryzivorus*)**
- Eastern Meadowlark (*Sturnella magna*)

Figure 9 in Appendix A depicts the observed nesting locations of these species as documented during the 2012 field survey.

***Invertebrates***

Rare moth surveys of Sikorsky Airport were undertaken in 2012 to determine potential for impacts to rare populations due to the proposed Runway Safety Area Project. These surveys were targeted to observe the rare moths considered potentially present based on sightings in surrounding conservation areas (Table 3). Based on the potential state-listed species present, black light trap methods were proposed to survey for their presence since these species are all nocturnal and come to lights. For this reason, meander search methods were not deemed necessary. A limited amount of sheet beating was also conducted in late May, in an effort to capture a Dune Sympistis (*Sympistis [Oncoconemis] riparia*) caterpillar, since a potential host plant for this species was present. However, the black light trapping was the primarily methodology used to survey for the species targeted.

**Table 3: Rare Lepidoptera Reported from Milford Point, Milford and Great Meadows, Stratford, their CT Status, Habitat, and Special Habitat Attributes**

Scientific Name <sup>1</sup> (Common Name)	CT Status	Habitat
<i>Abagrotis nefascia benjamini</i> (Coastal heathland cutworm)	CT-T	Coastal heathland; mixed scrub oak; grassland
<i>Apamea inordinate</i> (Apamea moth sp. 1)	CT-SC	Sand prairie, savanna, and barrens openings

Scientific Name <sup>1</sup> (Common Name)	CT Status	Habitat
<i>Apamea lintneri</i> (Apamea moth sp. 2)	CT-SC	Dunes; sometimes grasslands on sandy soils
<i>Argyrostroma anilis</i> (Short-lined Chocolate moth)	CT-SC	Barrens, power line corridors, and coastal strand communities throughout range
<i>Eucosma morrisoni</i> (Morrison's mosaic moth)	CT-T	Ecology not yet assessed
<i>Eumacaria latiferrugata</i> (Brown-bordered Geometer)	CT-SC	Dunes and sandy grasslands
<i>Euxoa pleuritica</i> (Noctuid moth)	CT-SC	Sandplains and beaches
<i>Melitara prodenialis</i> (Eastern Cactus-boring Moth)	CT-SC	Sandy soil and rock out crops of hills, valleys, and shores
<i>Sympistis</i> (Oncocnemis) <i>riparia</i> (Dune Sympistis)	CT-SC	Sandplain grassland and dunes; sometimes oak woodlands
<i>Phaneta clavata</i> (Lanced phaneta)	CT-T	Dunes
<i>Schinia spinosae</i> (Noctuid moth)	CT-SC	Pitch Pine - scrub-oak woodlands

<sup>1</sup> Scientific names retrieved November 3, 2011 from the Integrated Taxonomic Information System (ITIS) (<http://www.itis.gov>).

KEY: CT-E - Connecticut Endangered, CT-T - Connecticut Threatened, CT-SC - Connecticut Special Concern

### Black-Light Trapping

Surveys for the rare moth species were conducted using black-light trapping during the flight periods of the rare moths reported from the adjacent or proximal conservation areas. Black light trapping surveys were conducted from late May to September 2012 to determine if these rare species are utilizing potential habitats within airport property, especially the proposed impact area of the runway expansion and road relocation.

Trap locations were selected in the field by Dr. David Wagner of the University of Connecticut (UConn) and FHI/GZA field biologists, who visited the site in late May to observe site conditions, potential access constraints, the existing vegetation associations, and relevant habitat attributes. Stations were chosen based upon the proposed impact area and availability of the species' preferred habitat attributes (e.g., larval host plants, etc.) Trap stations were spread out across the airport property in varied natural communities and were placed:

1. In vicinity to the impact area for the road project;
2. Northwest of the Runway 11 end;
3. East of the runway 6 end;
4. At the southern property limits near the beach; and
5. In the grasslands east of the eastern ramp and hangar area.

All captured Lepidoptera were frozen and brought to Dr. Wagner where all macrolepidoptera and some microlepidoptera were identified, counted and vouchered. Voucher specimens for rare species were kept in UConn’s reference library. A species list by family was composed and Element Occurrence forms prepared for the rare species observed during the survey.

### Sheet Beating

Sheet beating surveys involve laying a sheet or white cloth beneath a possible host plant and “beating” or shaking the vegetation vigorously, causing any caterpillars to fall from the plant to the cloth. Collected caterpillars were then identified. This survey was performed as a single event on May 29, 2012, targeting the Dune Sympistis caterpillar, a potential species that might exist in these habitats on-site. Since the black light trapping would target all the species potentially present, this method was only used early in the season to target the Dune Sympistis. The collected individual larvae were taken by Dr. Wagner for later identification in their larval stage or the maintenance of living individuals until metamorphosis and identification as adults.

### Summary

Two State listed Special Concern invertebrate species were found on BDR property:

- Dune Sympistis (*Sympistis riparia*)
- Mudflat Tiger Beetle (*Cicindela marginata*)

Figure 10 in Appendix A depicts the locations of these species as documented during the 2012 field survey.

## **BACKGROUND INFORMATION ON LISTED SPECIES**

### ***Vegetation***

#### Coastal Violet (*Viola brittoniana*)

In the course of the airport-wide study completed by botanist William H. Moorhead III in 2012, 10 subpopulations of state-endangered Coast Violet (*Viola brittoniana*) plants were documented. The *V. brittoniana* population at Sikorsky Airport was surveyed, and the extent of the individual subpopulations was mapped using a GPS receiver and then overlaid on plans of the proposed EMAS and runway safety project.

The plants are located in the vicinity of the abandoned South Ramp, the existing wind sock and the northeast side of Runway 6-24. The population at BDR has been estimated to be approximately 820 individuals over approximately 0.38 acres. Subpopulations are identified, by number, on Figures 2, 4, and 6 (in Appendix A of this report) and detailed in Table 4 below. The population on the airport is one of only two populations known to still



**COAST VIOLET (*VIOLA BRITTONIANA*) ADJACENT TO SOUTH RAMP**

exist in the state, and comprises about 98 percent of all the known individuals in the state; it is, therefore, of high conservation importance.

**Table 4: Existing *Viola brittoniana* Subpopulations at BDR**

Subpopulation No.	Actual Plant Field Count	Area (square feet)	Area (acres)
1	152	6,330	0.15
2	22	2,48	0.06
3	133*	399	0.01
4	19	227	0.01
5	150	2,249	0.05
6	120	2,081	0.05
7	125	1,043	0.02
8	15	82	0.00
9	1	99	0.00
10	81	1,472	0.03
<b>TOTALS</b>	<b>818</b>	<b>16,468</b>	<b>0.38</b>

Note: Subpopulation numbers correspond to Figure 2, 4, 6.

\*Estimated size of subpopulation 3.

The other population of *Viola brittoniana* in Connecticut occurs in Fairfield. According to CTDEEP field records, this population was first observed in 1906, and was last surveyed in a rigorous manner in 2006, when 457 plants were counted in a subsample of one square-meter plots; at that time, the total population size was estimated to be approximately 4,500 individuals (Norris, pers. comm.). This population may have been subject to polyhaline storm surge flooding historically, but it is not believed to have been flooded by either Tropical Storm Irene in 2011 or Hurricane Sandy in 2012, due to flood control dikes and management of tide gates (Steinke, pers. comm.). Over the last several years, CTDEEP has been working closely with the Town of Fairfield on a mowing schedule so that seeds are allowed to fully develop and disperse.

All subpopulations at BDR were found in areas currently mowed by the airport, and it is thought that mowing is an important element supporting these plants' occurrence. During recent flooding at BDR during Hurricane Sandy, all of the known subpopulations of this plant on the airport were inundated by marine-strength saline water of approximately 26 parts per thousand (ppt). For most of the metapopulation, this flooding lasted approximately two days, but some portions of the population were inundated for six to eight days. Since these plants are thought to be intolerant of saline water, it remains to be seen if the plants on the airport, or their seeds, will regenerate during the 2013 growing season and if so, to what extent. For the purposes of this report, it is assumed that all subpopulations identified will remain intact in the 2013 growing season.

*Viola brittoniana* is a native herbaceous perennial with a low-growing habit. *Viola brittoniana* typically grows between five and ten inches tall and has variably dissected leaves. This species also has basal leaves that arise directly from a rhizome. Purple, closed, cleistogamous (self-fertilizing) flowers form on this plant above the ground's surface and below its taller leaves from the middle of May to July. *Viola brittoniana* produces dark tan fruits that are oval to round and split into three parts when they reach

maturity. Other violet species often occur within or nearby to *V. brittoniana* populations. Leaves of other violets have different morphology and do not have deeply dissected leaves, with the exception of bird's foot violet (*Viola pedata*). *Viola pedata* has leaves that are divided into many more narrow segments (often as many as 15) than *V. brittoniana*. *Viola brittoniana* occurs in Connecticut only along the coast, on coastal plains, and prefers full sun. Ejection of seeds has been documented up to nine feet from the plant and ants are known to aid in seed dispersion.

Saltpond Grass (*Leptochloa fusca ssp. Fascicularis*)

In the course of the airport-wide study completed by Mr. Moorhead in 2012, five subpopulations of the state-endangered Saltpond Grass (*Leptochloa fusca ssp. fascicularis*) were observed. The *L. fusca ssp. fascicularis* population was surveyed, and the extent of the individual colonies was mapped using a GPS receiver and then overlaid on plans of the proposed safety EMAS and runway improvement project. The plants are located along the shoulder of Route 113 within the project area, within the ponded area to the south of the proposed roadway realignment, and on the northeast side of Runway 11-29. The population at the airport is estimated to be approximately 1,920 individuals over approximately 0.44 acres. Subpopulations are identified, by number, on Figures 2 and 3 (in Appendix A) and detailed in Table 5 below.

**Table 5: Existing *Leptochloa fusca ssp. Fascicularis* Subpopulations**

Subpopulation No.	Estimated Subpopulation Size	Area (Square Feet)	Area (Acres)
1	38*	97	0.00
2	850	2,528	0.06
3	21*	10,369	0.24
4	1,000	4,136	0.09
5	15	2,059	0.05
<b>TOTALS</b>	<b>1,924</b>	<b>17,546</b>	<b>0.44</b>

Note: Subpopulation numbers correspond to Figures 2 and 3.

\*Actual field counts.

The population at BDR is one of only three known populations to still exist in the state. The other two populations in Connecticut occur in the following areas:

- Old Lyme, New London County: This population was first observed in 1988, with the last observation/survey taking place in October, 2002. According to CTDEEP field records, this population is located on a sandbar at the outlet of a pond; at the time of the last observation in 2002, the presence of Phragmites was noted as being a problem at the pond and for this population. The last observations estimated the population to be approximately 100 genets, or colonies of plants, while in 1993 field observations estimated this population to be approximately 10,000 genets.
- Milford, New Haven County: This population was last observed in 2010. According to CTDEEP field records, this population consists of hundreds of plants among several subpopulations; the size and areal extent of the population was not fully assessed during the 2010 survey. Most of the plants were observed in shallow, standing water. CTDEEP field records also indicate that in

2010 this population was in relatively good condition; however the long-term prospects were uncertain due to potential threats from Phragmites, changes in hydrology (i.e., water levels and salinity), and erosion.

The population on Sikorsky airport property is the largest known population in the state, and is therefore of high conservation importance.

Approximately half of the population at BDR occurs in what may be termed a man-made coastal salt pond. This is the large depression that exists between the east ends of Runways 11-29 and 6-24. Due to a blocked culvert under SR 113 and a no-longer-functional tide gate in the berm at the west end of the marine basin to the east of SR 113, this depression evidently fills with fresh water during intense precipitation events, and receives irregular influxes of polyhaline water during storm surges and the occasional exceptionally high spring tide. The ponded water in the depression then gradually draws down via evaporation and, presumably, movement of water through the sandy gravelly soils. When the water level in the depression is at its maximum, water covers a section of SR 113 and the adjacent roadside. Because the depression is subject to both a fresh water drainage basin and subject to occasional polyhaline inputs, the salinity varies widely over the year. At intervals over the past growing season, measured salinities in the depression were: 0, 3, 5, and 11 ppt, and 26 ppt just after Hurricane Sandy in late October. For much of the summer, the salinities were in the mesohaline brackish range. Subpopulation 1 is on the northeast side of SR 113, comprised of 38 relatively depauperate plants growing in a thinly vegetated 0.75-meter wide zone immediately adjacent to an almost 11-meter section of sidewalk pavement. This appears to be marginal habitat for *Leptochloa*, and it is unclear whether it is periodically flooded.



**SALTPOND GRASS (*LEPTOCHLOA FUSCA* SSP. *FASCICULARIS*) ALONG ROUTE 113**

The vast majority of the plants associated with the salt pond depression are found on the southwest shoulder of SR 113, in a two-meter-wide thinly vegetated zone on a sandy-gravelly substrate; this is Subpopulation 2, with between 750 and 850 individuals. Plants are densest in the lowest segment of the roadside (i.e., the portion that periodically floods), but the subpopulation extends upslope in both directions along the roadside for some distance to elevations that probably are never flooded by seawater or standing fresh water (but doubtless subject to influence of flowing road run-off water). The presumption that part of the population is never flooded by seawater is based on the observation that these areas were not flooded during Hurricane Sandy. The total length of the roadside segment occupied by the plants is approximately 128 meters (420 feet). Subpopulation 2 is clearly the most productive of all the subpopulations, with a large portion of the subpopulation being robust plants that produce large numbers of seeds.

The lowest part of the depression is occupied by a *Phragmites* stand and a permanently or semi-permanently flooded ditch. Vegetation is zoned on the side slopes of the depression, with the next higher elevations above the *Phragmites* stand occupied by a mosaic of brackish marsh vegetation and mud flat, and above that a sparsely vegetated zone with a mixture of some tidal wetland species and species not typically associated with tidal wetlands. Twenty-one robust *Leptochloa fusca* ssp. *fascicularis* are scattered in this sparsely vegetated zone (this is Subpopulation 3).

Subpopulations 4 and 5 are on the south side of Runway 11-29, at sites that experienced polyhaline flooding during Tropical Storm Irene and Hurricane Sandy. It is unclear whether these sites ever experience polyhaline flooding during storm surges of similar magnitude to those events. Both of these subpopulations are in shallow depressions that are obviously seasonally and/or temporarily shallowly flooded by fresh water, and then exposed by gradual drawdown. Subpopulation 4 is positioned almost entirely over old, cracked bituminous pavement, and is estimated to be comprised of between 500 and 1,000 individuals, which is approximately equal in size to Subpopulation 2. However, the majority of these individuals are small plants growing within the RSA out of cracks in the pavement, and the majority have been and must be frequently mowed (the subpopulation is in the RSA very close to a runway sign). This subpopulation is doubtless much less productive than Subpopulation 2. Subpopulation 5 occupies a shallow depression on unpaved substrate and is comprised of 14 to 15 moderately robust individuals.

*Leptochloa fusca* ssp. *fascicularis* is a low-growing, weakly erect to spreading grass in the family Poaceae. *Leptochloa fusca* ssp. *fascicularis* typically grows to a height of between four and 20 inches in coastal, brackish salt pond areas. It has been known to grow in exposed sandy or muddy substrate as well as in standing water. Characteristics of this grass include very narrow leaves, with blades that are rough to the touch but smooth where the leaf attaches to the stem. There is dense branching from the base and an unorganized, open inflorescence or a cluster of flowers that together form one larger, showy blossom. Successful identification of this species often requires the inspection of its flowering parts under magnification. This plant has five to 12 millimeter (mm) spikelets that bear six to 12 flowers each. The aforementioned inflorescence is partially enclosed within a leaf sheath. Leaf blades are observed to be two to seven mm wide and the uppermost ones extend beyond the inflorescence. This annual grass is a native species with a rapid growth rate that seeds itself from year to year. *L. fusca* ssp. *fascicularis* has a slow seed spread rate and the alternate common name Salty or bearded Sprangletop. Field sampling conducted in 2012 has shown root depths to vary from seven to nine inches in depth.

#### Needlegrass (*Aristida longespica*)

*Aristida longespica*, classified as a Species of Special Concern in Connecticut, is fairly ubiquitous on airport property, making identification of individual subpopulations of the species challenging. Nevertheless, in the course of the airport-wide study completed by Mr. Moorhead in 2012, 50 subpopulations of Needlegrass (*Aristida longespica*) were noted (see Figures 2 through 7 in Appendix A for locations of subpopulations). The extent of the individual colonies was mapped using a GPS receiver and then overlaid on plans of the proposed safety project. Larger subpopulations are depicted as polygons; smaller subpopulations are depicted as points. The plants are mostly located in the vicinity of the abandoned South Ramp, the existing wind sock, and the northeast and northwest sides of Runway 6-24, but, again, exist throughout the airport property. The population at the airport is estimated to be approximately 156,585 individuals. Approximately 67 percent of subpopulation 1 (about 500 plants) lies

within the Raymark waste area, which is less than 1 percent of the total *Aristida longespica* population in the overall project area.

*Aristida longespica* is found in several habitat types at the airport: in grasslands and grass and forb communities on sandy and sandy-gravelly substrates, and on old cracked bituminous pavement. It occurs on xeric, thinly vegetated sites, where plants are relatively depauperate, and in shallow depressions which are seasonally and/or temporarily inundated, or which have

a seasonally and/or temporarily high water table (these plants are more robust). All subpopulations occur in regularly mowed parts of the airport, and it is common over a large portion of the airport. It does not occur where there is a well-developed ground cover of cool-season grasses, with or without high legume cover (i.e., it is absent from mesic soil sites).



NEEDLEGRASS (*ARISTIDA LONGESPICA*) IN ROUTE  
113 REALIGNMENT AREA

*Aristida longespica* is a native grass species in the family Poaceae. This annual plant has stems that are 20 to 40 centimeters (cm) tall and flat blades that are about 1 millimeters wide. *Aristida longespica* grows in small, loosely tufted bunches that branch out from the lower nodes of the plant. This grass produces seed each year and is often located in areas of sandy or sterile soil, both in wet and dry conditions. Another common name for this grass is Slimspike Threeawn.

Although a state species of special concern, *A. longespica* is found throughout the state.

#### Orache (*Atriplex glabriuscula*)

The botanist spent 37 hours conducting field searches at BDR for *Atriplex glabriuscula*. During the field searches, the botanist documented two small subpopulations of Orache (*Atriplex glabriuscula*) in the uppermost, thinly vegetated zone of the salt pond habitat between the east ends of Runways 6-24 and 11-29 (see Figures 2 and 3 in Appendix A for locations of subpopulations). *Atriplex glabriuscula* shares this habitat and associate species with state-endangered *Leptochloa fusca* ssp. *fascicularis*. *Atriplex glabriuscula* is classified as a species of Special Concern in Connecticut. Only two plants were found in the one of the subpopulations. The botanist has documented a number of other populations of this relatively cryptic plant along coastal Connecticut.

Based on the relatively high rate of discovery by the botanist of previously undocumented populations of *A. glabriuscula* along the Connecticut coast over the last 16 years, the botanist suspects this species has been overlooked in Connecticut and is not rare, and perhaps not even uncommon, at least in terms of numbers of populations. Based on the botanist's experience, however, population sizes do tend to be small.

*Atriplex glabriuscula* is a native saltbush in the Goosefoot family. Members of the *A. glabriuscula* complex occupy saline or brackish marshes and saline



ORACHE (*ATRIPLEX*  
*GLABRIUSCULA*)

coastal strands. This annual monoecious herb is found prostrate or sprawling, or sometimes erect. Branches are opposite or subopposite. Stems are green and striped, often blue-green when fresh, weakly ridged, sparsely scurfy to glabrous. Leaves are very fleshy and triangular to ovate. Flowers are found in loose glomerules, arranged in foliose, interrupted spikes or axillary, terminating stems and branches. Bracteoles are green, becoming black or reddish to yellow brown, sessile or some short stipitate, venation obscure, ovate-triangular to rhombic-triangular, five to 13 millimeters. Seeds are dimorphic, brown, and 2.5 to four millimeters wide.

### Avian Species

During the 2012 survey period, 147 avian species were observed on BDR. Out of the total 147 species observed, 20 are included on the Connecticut list of endangered, threatened or special concern species (CTDEEP, 2010) and one species, Piping Plover, is also federally listed. These species are summarized in Table 6. The locations (zones) on airport property in which they were recorded are also depicted on Figure 11 in Appendix A, with corresponding zones numbers provided in Table 6. With the exception of the Savannah Sparrow, none of these species were recorded nesting or feeding within proposed work areas, which do not provide suitable nesting or feeding habitats for these species. However, there are suitable nesting and feeding habitat areas located *adjacent* to some of the work areas.

**Table 6: CT-ESA Listed Species Observed at BDR**

Common Name ( <i>Scientific name</i> )	CT / Federal ESA Status	Preferred Habitat/Habitat Attributes	Locations on site where recorded
Blue-winged Teal <i>Anas discors</i>	T (nesting pop.) / --	Shallow areas of estuarine marshes provide migratory stopover habitat	Zones 1, 2, 3
Pied-billed Grebe <i>Podilymbus podiceps</i>	E / --	Open water areas underlain by submerged aquatic vegetation provide potential winter foraging habitat	Zone 2
American Bittern <i>Botaurus lentiginosus</i>	E / --	Salt and Brackish Marsh/ Secluded marshes with little to no human disturbance	Zone 2
Great Egret <i>Ardea alba</i>	T/ --	Streams, ponds, lakes, rice fields, freshwater and saltwater marshes, mud flats	Zones 1, 2, 3, 4
Snowy Egret <i>Egretta thula</i>	T/ --	Lives around fresh, brackish, and salt water, sometimes dry agricultural fields in association with cattle	Zones 1, 2, 3, 4
Little Blue Heron <i>Egretta caerulea</i>	SC / --	Prefers freshwater marshes, ponds, lakes and marshy borders of streams; also frequents salt or brackish water marshes	Zones 1, 2
Yellow-crowned Night-Heron <i>Nyctanassa violacea</i>	SC / --	Lush riverine swamps and marshes the tidal creeks within the IBA are important foraging areas for this species.	Zones 1, 2, 3, 4
Glossy Ibis <i>Plegadis falcinellus</i>	SC / --	Salt Marsh/ Salt Pannes and grassy areas of high marsh for feeding	Zones 1, 2, 4
Northern Harrier <i>Circus cyaneus</i>	E / --	Salt marshes and other extensive grasslands. Other open areas provide foraging habitat during migration	Zones 1, 2

Common Name ( <i>Scientific name</i> )	CT / Federal ESA Status	Preferred Habitat/Habitat Attributes	Locations on site where recorded
American Kestrel <i>Falco sparverius</i>	T/ --	Wide variety of open to semi-open habitats, including meadows, grasslands, and early successional communities	Zones 2, 3
Peregrine Falcon <i>Falco peregrinus</i>	T/ --	Flat, open, sandy, coastal beaches and associated bays, estuaries, and ocean	Zones 1, 2
Piping Plover <i>Charadrius melodus</i>	T/ T	Barrier Beach Strand ( <i>Crepidula midden</i> ) helps to disguise and camouflage eggs, Wrack lines contain an abundance of marine amphipods and other invertebrates that are important prey items for Piping Plovers	Zone 1
Least Tern <i>Sterna antillarum</i>	T/ --	Flat, open, sandy, coastal beaches and associated bays, estuaries, and ocean	Zone 1
Common Tern <i>Sterna hirundo</i>	SC / --	Nests in colonies near extremity of some beach sandpits, isolated islands of sand and oyster shells, dredge spoil bank, or ledges.	Zones 1, 2
American Oystercatcher <i>Haematopus palliatus</i>	SC / --	Barrier beach and sandy shoals/jetties. Sand spits in IBA used for roosting and foraging	Zone 1
Savannah Sparrow <i>Passerculus sandwichensis</i>	SC / --	Open grassy areas; field margins provide migration foraging habitat and cover	Zones 2, 3
Saltmarsh Sparrow <i>Ammodramus caudacutus</i>	SC / --	Salt Marsh/ High marsh zones dominated by Salt Meadow Cordgrass, Spike Grass, and Black Grass for nesting and cover, tidal mudflats for foraging	Zones 1, 2, 3
Seaside Sparrow <i>Ammodramus savannarum</i>	T/ --	Salt Marsh/use low marsh zones for breeding	Zones 1, 2, 3
Bobolink <i>Dolichonyx oryzivorus</i>	SC / --	Mixed, tall grass fields and meadows with some forbs	Zones 3, 4
Eastern Meadowlark <i>Sturnella magna</i>	SC / --	Open grassy areas of airport and salt marsh provide potential migration foraging habitat	Zone 3

### ***Invertebrates***

The surveys conducted in 2012 were targeted to observe the rare moths considered potentially present based on NDDB records of previous sightings by others in surrounding conservation areas. The Dune Sympistis (*Sympistis riparia*) was found to be present on the airport. The Mudflat Tiger Beetle (*Cicindela marginata*), a special concern species, which is both diurnal and nocturnal and attracted to lights at night, was observed within the black light traps as an incidental finding in association with the Rare Moth survey.

Dune Sympistis (*Sympistis riparia*)

The Dune Sympistis has been observed in sandplain grassland and dunes and sometimes oak woodlands. This species generally flies in late June-July in Nantucket. It is expected to have similar flight times in coastal Connecticut. This species was observed flying at Sikorsky on June 20, 2012. Based on the habitat associations, Trap 4 in the dune/shrub habitat was the most likely site for an observation, and the 14 individuals indicate a breeding population in the area. Dr. Wagner indicated that beach plum may be a potential host plant for this species, and beach plum shrubs were observed in the small dune/shrub habitat between the beach and the estuary. No beach plum was observed by GZA or by the project botanist in other areas of the airport, and no Dune Sympistis were observed in any other traps. See Figure 10 in Appendix A for surveyed locations where the species was observed.



**DUNE SYMPISTIS COLLECTED AT THE AIRPORT AND PINNED FOR THE UCONN COLLECTION.**

Mudflat Tiger Beetle (*Cicindela marginata*)

Mudflat Tiger Beetles are summer fliers with peak flight times in late June-early July. This species prefers saline mudflat habitats including the fine sediments and organics that are deposited at rivermouths. They are often associated with the salt marsh mudflats on the bay side of barrier beaches. Based on the salt marsh/mudflat habitat preference, the large areas of intertidal salt marsh adjacent to the approach of Runway 6 likely provide Mudflat Tiger Beetle habitat. See Figure 10 in Appendix A for surveyed locations where the species was observed.



**MUDFLAT TIGER BEETLE**

# Potential Impacts to Listed Species

## Vegetation

### SALTPOND GRASS (*LEPTOCHLOA FUSCA* SSP. *FASCICULARIS*)

Two areas currently supporting *Leptochloa fusca* ssp. *fascicularis* will be impacted by the re-alignment of Route 113. Subpopulations 1 and 2 will be impacted by the new roadway alignment and the installation of a culvert. The culvert will connect the drainage ditch on the southwest side of Route 113 to a planned channel discharging to the Marine Basin on the northeast side of Route 113. These impacts are unavoidable because subpopulation 1 is within the new roadway alignment, the placement of which is dictated by the required length of the EMAS system. Subpopulation 2 is directly adjacent to the existing roadway and sidewalk. The subpopulations will be impacted by milling and removal of the existing roadway and sidewalk, construction of the new roadway (which will be relocated along a new alignment), and installation of the new culvert. Because of the existing locations of the *Leptochloa* populations, there is no feasible alternative roadway alignment which would completely avoid impacts to the species.

Impacts to subpopulations are identified on Figure 3 (in Appendix A of this report) and detailed in Table 7 below. A total of 888 plants (estimated) will be impacted. This is 46 percent of the total population within the airport project area. To compensate for these impacts, mitigation measures are proposed in the Project Mitigation section of this report.

**Table 7: Direct Impacts to *Leptochloa fusca* spp. *fascicularis* Subpopulations at BDR**

Subpopulation No.	Estimated Subpopulation Size	Area (SF)	Area (Acres)	Area (SF) Impacted	Percent of Subpopulation Impacted	No. Plants Impacted
1	38*	97	0.00	97	100%	38
2	850	2,528	0.06	2,528	100%	850
3	21*	10,368	0.24	0	No direct impact	0
4	1,000	4,136	0.09	0	No direct impact	0
5	15	2,058	0.05	0	No direct impact	0
<b>TOTALS</b>	<b>1,924</b>	<b>19,187</b>	<b>0.44</b>	<b>2,630</b>	<b>46%</b>	<b>888</b>

Note: Subpopulation numbers correspond to Figure 3.

SF – square feet

\* Actual field count.

Indirect impacts are possible to subpopulation 3 (21 plants), found in the ponded area south of Route 113. *Leptochloa fusca* ssp. *fascicularis* prefers brackish waters and is less tolerant of saline waters. The ponded area in which they are currently located is tending toward brackish water, caused, in part, by the existing non-functioning culvert which does not allow for regular tidal flushing to this area. The installation of a new culvert under Route 113, connecting directly to the Marine Basin, will again allow regular tidal flushing to this ponded area. The regular tidal flushing to this area will raise the salinity, and may result in indirect adverse impacts to this species. Since this plant is an annual, it is anticipated that

subpopulation No. 3 of *Leptochloa fusca* ssp. *fascicularis* will shift to the upper limits of the new tidal flushing elevation, where salinities are lower and fresh water influence is greater.

### **NEEDLEGRASS (*ARISTIDA LONGESPICA*)**

All of the impacted *Aristida longespica* subpopulations are identified, by number on Figures 3 and 4 (in Appendix A of this report). It is estimated 12,987 of the 156,585 plants on BDR property will be impacted by the project. This is equivalent to approximately eight (8) percent of the total population of *Aristida longespica* on BDR property.

It should be noted, however, that permanent impacts are anticipated to approximately 3,288 plants, which is equivalent to approximately two (2) percent of the *Aristida longespica* population on BDR property.

Permanent impacts are expected to the following subpopulations:

- Subpopulation 1, located within Raymark zone, will be permanently impacted during Raymark Waste removal; and the top soil in this area must be removed and properly disposed of due to contamination, and cannot be re-used as top soil.
- A portion (1,829 square feet) of Subpopulation 2 will be permanently impacted due to its location in the path of the EMAS.
- All of Subpopulation 6 and a portion (616 square feet) of Subpopulation 7 will be permanently impacted due to their location in the path of the new Route 113 alignment.
- Subpopulations 5 and 29 will be permanently impacted by the development of a detention basin associated with the new, re-aligned Route 113.

With the exception of the above permanent impacts, almost all of the impacts to the *Aristida longespica* subpopulations are expected to be temporary. Top soil within these sub-populations will be scraped and stockpiled before construction begins. Once construction has been completed, this stockpiled soil will be replaced (in most cases to the same location), stabilized, and protected by temporary fencing until it becomes re-established. Where the stockpiled soil cannot be returned to its original location, such as in the vicinity of the detention basin north of the new roadway alignment, the soil will be moved to the runway pavement removal area. Temporary impacts are anticipated to the following subpopulations:

- Subpopulations 3, 4, 5, a portion of 7, 27, 28, 29, and 39 will be temporarily impacted by the Route 113 re-alignment. These subpopulations will be impacted by milling and removal of the existing roadway and sidewalk, construction of the new roadway (which will be relocated along a new alignment), and installation of a new culvert. Because of the existing locations of *Aristida longespica* subpopulations, there is no feasible alternative roadway alignment which would completely avoid impacts to the species.
- A portion of subpopulation 2 and subpopulation 3 will be temporarily impacted by the Runway 6-24 safety improvements and the placement of the EMAS system, which cannot be installed in any other location to be effective for its intended safety purpose.

- Temporary Impacts to subpopulations 45, 46, and 50 are from proposed runway pavement removal, which is anticipated to have a net beneficial impact on *Aristida longespica*, as it will ultimately create additional habitat for the species. Following pavement removal, the soil will be replaced, and seeds embedded in the soil may germinate and develop into new plants.

Mitigation measures for affected subpopulations is described in the Project Mitigation section of this report.

### **COAST VIOLET (*VIOLA BRITTONIANA*)**

In 2012, ten subpopulations of *Viola brittoniana* were observed by a qualified botanist. During a final site visit in November 2012, no plants were observed, possibly as a result of inundation of salt water from Hurricane Sandy, which likely top-killed the plants and washed the leaves away. The viability of the 10 subpopulations, post-Hurricane Sandy, is currently unknown. The airport will be surveyed in the spring of 2013 to determine whether or not *Viola brittoniana* plants and the 10 subpopulations on BDR are still viable. For the purposes of the impacts analysis presented in this report, it is assumed that all 10 subpopulations are still viable.

No direct impacts are anticipated to the Coast Violet (*V. brittoniana*) from the BDR Safety Project.

There is a small population of the violet (subpopulation 2) in the vicinity of the proposed tidal wetland mitigation site located, adjacent to the South Ramp of the airport. This subpopulation is 2 percent of the total population of *V. brittoniana* located on BDR property. Project impacts to this subpopulation will be avoided. Construction of the tidal wetland mitigation area, to be located adjacent to this subpopulation, will involve creation of an open trench with a gentle 3:1 slope, except in the area surrounding *Viola brittoniana*. In the area surrounding subpopulation 10, the trench slopes will be maintained in their existing condition to avoid impacts to any *Viola brittoniana* plants. Indirect impacts could occur to these plants due to alterations in adjacent soil conditions and replanting of a ground cover on the side slopes. Also, slight alterations in hydrology could occur from grading. Although there may be slight changes in soil conditions and hydrology near this subpopulation, it is not anticipated the population will be negatively impacted, or lost. At most, there may be a slight shift in population location.

Sub-populations 4 and 10 are adjacent to proposed pavement removal. Indirect impacts to these subpopulations of *Viola brittoniana* are possible due to the removal of pavement and subsequent alterations in adjacent soil conditions and hydrology. During the construction period, subpopulations No. 4 and No. 10 will be cordoned-off by flagging and identified as restricted areas on plans to avoid temporary construction period impacts.

### **ORACHE (*ATRIPLEX GLABRIUSCULA*)**

No direct impacts are anticipated to *A. glabriuscula*, which is located close to the high tide line around the periphery of the existing wetland area south of Route 113.

This species is capable of growing under a variety of conditions. It grows in brackish conditions, such as those found in the wetland area today. It is also capable of growing under conditions with greater tidal flushing, which is anticipated after the installation of the new culvert, which will reconnect the wetland area to the Marine Basin. This new connection will allow regular tidal flushing in the wetland area. Post construction, it is expected that *A. glabriuscula* will persist, although it may migrate to higher elevations

along the periphery of the wetland area where salinities will be lower and fresh water influence greater. Therefore, no negative impacts to *A. glabriuscula* are anticipated; therefore no mitigation is proposed.

## Avian Species

The majority of listed avian species found on BDR property are wetland-dependent, and these species were documented at BDR where no project activity is proposed. No work is proposed in listed bird habitat, with the exception of potential habitat for nesting Savannah Sparrows within and adjacent to the RSA. To avoid potential direct impacts to Savannah Sparrows, construction will start in early- to mid-April along the runway, before Savannah Sparrows establish territories and begin nesting. Alternatively, construction will start after August 15<sup>th</sup>, after fledging has occurred. In this way, the Sparrows will avoid setting territories and nesting in work areas, and utilize another portion of the airport, or an off-site location.

It is anticipated that runway rehabilitation would be completed during a single breeding season, therefore, post-construction conditions are likely to return to normal. In addition, the project will have a positive overall benefit to grassland-nesting birds through the removal of approximately 16.7 acres of pavement, and establishment of new lawn/grassland area in its place. This will ultimately create more habitat for these species in the post-construction condition. A new mowing regime, discussed in the Project Mitigation section of this report, is also proposed for maintaining this lawn/grassland habitat.



SAVANNAH SPARROW in Sikorsky Airport's grassland habitat

Since the majority of listed avian species are wetland-dependent, and were documented where no activity is proposed, no impacts to these species are anticipated. However, through the extensive wetland mitigation package for this project, including approximately 13 acres of Phragmites removal, a large amount of additional habitat will be restored and enhanced for these wetland-dependent listed species. See the *Long-term Mitigation* section of this report for details.

## Invertebrates

### DUNE SYMPISTIS (*SYMPISTIS RIPARIA*)

There will be no impact to this species, either direct or indirect, as a result of project activities. This species and its habitat was documented on the dunes of Long Beach, which is not near the project activities.

### **MUDFLAT TIGER BEETLE (*CICINDELA MARGINATA*)**

The Mudflat Tiger Beetle prefers mudflat/salt marsh areas close to the high tide line. While the infrastructure work does not extend close to muddy banks of the channel which the Mudflat Tiger Beetles would prefer, the development of the proposed wetland mitigation areas will include minor work within existing tidal marsh and channels.

To avoid impacts to the Mudflat Tiger Beetle, wetland mitigation work affecting tidal marsh or channels should be conducted during the flight time of the beetle (June-August), when larval burrows do not exist. This timing restriction would allow the adult beetles to move to other unaffected habitat and would avoid impacts to the larval stage, which rarely leave their burrows and therefore could not avoid impacts if the sediments are affected.

To avoid construction period impacts, areas of habitat will not be available to the contractor for construction staging, storage, or access. Limit of work erosion controls and orange construction fencing will be in place to protect down-gradient Mudflat Tiger Beetle habitat areas from siltation or incidental equipment access.

Ultimately, the wetland mitigation will increase the potential habitat for this species on the airport.

# Construction Methodology for Protected Species

Runway 6-24 will be closed during portions of the construction period (2014-2017), including during installation of the EMAS in 2015 and for runway improvements in 2016 and 2017. Route 113 will remain open during construction operations, with the exception of the period required for Raymark waste removal in 2014. Route 113 will also be closed late summer-early autumn 2015 during construction of the tie-in of the realigned roadway at the north project limit and during construction of the cross culvert and roadway tie-in at the south project limit.

Construction sequencing is an important aspect of the project to ensure avoidance and minimization of impacts to natural resources, while meeting the project schedule for environmental compliance and construction completion.

## Vegetation

During the construction period, direct, indirect, and cumulative impacts to listed plant species will be avoided and minimized to the extent practicable during the construction period. Where avoidance of construction impacts is not feasible, impacts will be mitigated for, as discussed in the Project Mitigation section of this report. Avoidance and minimization measures during the construction period will include the following:

- Prior to any construction activity, a qualified botanist will identify and mark boundary of listed plant species in areas where project activity is about to take place. Orange protective fencing will be placed around the subpopulations.
- Water handling structures will be sited to avoid impacts to existing populations of listed vegetation species. Water handling structures will be located outside the runway safety areas and outside of known mapped areas of *Viola brittoniana*, *Leptochloa fusca* spp. *fascicularis*, *Aristida longespica*, and *Atriplex glabriuscula* sub-populations.
- Topsoil from within the known *Aristida longespica* sub-populations will be scraped, stockpiled and re-used within the re-graded areas (accounting for 33,585 sf. temporary impact to the population) to ensure the topsoil conditions remain constant, and a seed source is maintained. The stockpile areas will be located away from listed species.
- The *Leptochloa fusca* spp. *fascicularis* transplant bed will be constructed before the construction of the Route 113 roadway work occurs within sub-populations 1 and 2 (see Appendix A for population location).
- Construction sequencing will be carried out in a such as way that once listed vegetation species have been transplanted or seeded, no other disturbance will occur in these areas.

- In order to minimize impact to the existing plants, orange construction fencing will be placed around listed plants or sub-populations that are in close proximity to the proposed work. Construction plans will show the proposed locations of this fencing and non-access areas, and survey will be used to accurately locate these areas in the field prior to construction. A survey sweep by a qualified botanist will be done again just prior to construction to confirm the proper placement of protective fencing and locations of access/haul routes.
- Access / haul routes for heavy equipment will be limited to one route in areas adjacent to listed species subpopulations. Subpopulations and access/haul routes will be specifically called out on the plans and maintained in order to further protect existing individuals.

The CTDOT Office of Environmental Planning (OEP) will provide oversight for specifications which will be developed to cover all work during construction.

## Avian Species

No work is proposed in listed bird habitat, other than potential habitat for nesting Savannah Sparrows within and adjacent to the RSA. To avoid potential construction impacts to Savannah Sparrows, construction along the runway will end by April 15<sup>th</sup> or wait to begin until after August 15<sup>th</sup>. Savannah Sparrows establish territories and begin nesting in mid-April and fledge by mid-August. In this way, the Sparrows will avoid setting territories and nesting in work areas, and utilize another portion of the airport, or an off-site location, such as adjacent tidal marshes.

## Invertebrates

### **DUNE SYMPISTIS (*SYMPISTIS RIPARIA*)**

This species and its habitat were documented on the dunes of Long Beach, which is not near the project activities. Construction activities will avoid impacts to this species.

### **MUDFLAT TIGER BEETLE (*CICINDELA MARGINATA*)**

Habitat for this species is located near the approach of Runway 6. During construction, orange construction fence will be placed in the field to exclude construction vehicles from habitat areas. If possible, work should be conducted from the pavement in the vicinity of these habitat areas. Work taking place off the pavement in the vicinity of these habitat areas should be limited to the flight time of the beetle, June through August, so that the larval stage of this species is avoided in habitat areas.

# Project Mitigation

## Long Term Mitigation

Tidal wetland mitigation proposed as part of the BDR Sikorsky Runway Safety Area project is summarized in Table 8 below and detailed in the following report section. Note that Mitigation Site numbers correspond to Site Numbers depicted on Figure 8 in Appendix A.

**Table 8: Sikorsky Runway Safety Area Project Wetland Mitigation**

Mitigation Site	Activities	Area of Mitigation (acres)	Type of Mitigation
1	Enhancement of existing tidal marsh near the airport driveway through the construction of a new tidal channel to restore daily tidal flushing and passively remove invasive Phragmites vegetation	2.4	Enhancement
1	Restoration of tidal marsh in a former area of fill material, currently dominated by invasive vegetation species.	0.3	Restoration
2	Enhancement of the existing tidal channel along the west side of Taxiway H by removal of Phragmites.	0.3	Enhancement
2	Enhancement of existing tidal marsh on the east side of Taxiway H	13.2	Enhancement
<b>Total</b>		<b>16.2</b>	<b>Varies</b>

CTDOT is responsible for the project during the construction period. The City of Bridgeport is responsible for all long-term monitoring, as well as the stewardship and success of the long-term mitigation plan.

### VEGETATION

Due to unavoidable direct and potential indirect impacts to two of the four listed plant species within the project area, *L. fusca* spp. *fascicularis* and *A. longespica*, compensatory mitigation is proposed for these two species as described below and depicted on Figure 8 located in Appendix A. As there are no direct or indirect negative impacts anticipated, no mitigation is proposed for *A. glabriuscula*. Although no impacts to *V. brittoniana* are anticipated, maintenance and expansion of this species on BDR property is recommended as part of an overall mitigation package for the proposed project, as described below.

## ***Coast Violet (Viola brittoniana)***

Impacts to *Viola brittoniana* are not anticipated as a result of this project. However, in recognition of the importance of conserving this species in Connecticut, maintenance and even expansion of this species at BDR is desirable and is proposed as part of an overall mitigation package for the proposed project. As previously mentioned, Sikorsky Airport is one of only two locations in the state where the species is known to exist.

Proposed mitigation for this species consists of: 1) expansion of the population by creating new seeding beds, 2) monitoring the new seeding beds, as well as the existing subpopulations for their growth, 3) proper maintenance of the existing subpopulations, and 4) continued seed collection (if possible) and proper storage.

### *New Seeding Beds*

As shown on Sheet MIT-10 in Appendix B, a 0.7-acre (30,800 square foot) seeding bed is proposed for *Viola brittoniana* mitigation adjacent to the South Ramp, north of Taxiway H (Site 3). This site is located adjacent to the existing *Viola brittoniana* areas on the South Ramp. The mitigation site will consist of three seeding beds, created using a dethatcher, which rips-up the grass and exposes the soil. This area was chosen since it reflects the range of elevations in which *V. brittoniana* currently grows on the airport.

*Viola brittoniana* seeds collected by the CTDEEP in the fall of 2012 are currently in storage and will be used to seed these seeding beds in an effort to establish plants. The seeding of these seeds will occur in autumn 2014 to allow the seeds to overwinter. Additional seeds will also be collected from any viable plants during 2013 growing season. Only half of the seeds collected will be planted. The other half will be saved in the event that some of the plants die and additional seeding is necessary.

Signs, reading "Maintenance Area," will be posted at each *Viola brittoniana* subpopulation area to alert maintenance staff of their locations. Each bed will be mowed on a regular regime consistent with the entire airport (5-11 inches grass height). The current mowing regime has proven beneficial for this species, as BDR has one of only two known populations in the state.

### *Monitoring*

A five-year monitoring program will be established and carried out by a qualified botanist. A qualified botanist will survey existing populations and mitigation areas in May for flowering (i.e., mature) violets and again in September for the first season violets. The program will monitor germination and plant growth. The monitoring program will seek to determine if differences in elevation affect *V. brittoniana* success. The monitoring program will add to the overall scientific knowledge base of this species. Reports will be submitted, annually in November, to CTDEEP.

In addition to the *V. brittoniana* mitigation areas, subpopulations 7 and 8 in the vicinity of the wind sock will be monitored as control subpopulations. In the area where subpopulations 7 and 8 are located, mowing and other management will continue as it does under existing conditions. Subpopulations 7 and 8 were chosen to be the control group because no direct or indirect impacts are anticipated to these two subpopulations.

### Maintenance

Sikorsky Airport maintenance staff will receive training on how to mow and maintain the areas currently populated by *V. brittoniana* and in the *V. brittoniana* mitigation areas. As part of the training, Sikorsky Airport maintenance staff will be provided with detailed maps showing the locations of existing populations of *V. brittoniana* and the mitigation areas. The *V. brittoniana* mitigation sites and existing sub-population sites will be mowed on the same schedule as the RSA. These areas will be clearly marked in the field with signage. Additional maintenance information for the *V. brittoniana* is provided in the section on Long-Term Maintenance Requirements, which appears later in this report.

### ***Saltpond Grass (Leptochloa fusca spp. Fascicularis)***

Two sub-populations of this species, comprising 46 percent of the total population of *Leptochloa fusca* spp. *fascicularis* on BDR property, will be directly impacted as a result of the proposed project. These impacts are unavoidable due to the close proximity of these two populations to the existing roadway. To mitigate for project impacts to *L. fusca* spp. *fascicularis*, the project proposes a two phased approach involving both translocation of soil materials and planting of new seeding beds.

### Transplant Bed

The first phase will consist of excavation of the existing soils supporting subpopulation Nos. 1 and 2 along Route 113 prior to roadway construction. The soil will be excavated to a depth of 10 inches. This soil material, which likely contains an unknown quantity of seed stock for this annual plant, will be relocated to an 11,468-square foot (0.26-acre) area along the north side of the proposed new drainage channel between Route 113 and the Marine Basin. Specifications will be developed for the translocation of soil material and seeding of new transplant beds (see Plan Sheet MIT-11 in Appendix B). Since this plant is an annual, there will not be any live plants to disturb, and no existing root masses to damage, since the soil will be relocated outside the growing season. The translocation of the soil will occur during the dormant season to avoid injuring plants. Relocation of this seed bed soil will be coordinated with the project schedule to ensure soil material is excavated before road construction begins. Orange fencing will be placed around the transplant bed and remain until the transplant bed is stabilized and *Leptochloa fusca* spp. *fascicularis* is established, as determined by a qualified botanist approved by the CTDEEP.

The transplant bed is proposed at an elevation of 5.0 feet NGVD, so that it is flooded on an irregular basis by tidal water. Also, a 6-inch berm will be constructed on the channel side (south side) of the transplant bed, to retain a small volume of freshwater rainfall for short periods of time. This hydraulic regime is meant to mimic the hydraulic regime where the plants currently grow in the greatest abundance along the edge of Route 113. It also will mimic the plant's natural brackish saltpond habitat.

The ditch will be partially-constructed before the roadway is constructed (and activities occur in the vicinity of the existing population) to allow this soil material to be placed at final grade. As shown on the plans in Appendix B (Sheets MIT-7, MIT-11 and MIT 21), the eastern end of the culvert will not be connected to the Marine Basin when the soil material is placed. The transplant bed will not, initially, receive tidal flows. Also, one section of culvert pipe and the new headwall at the western end of the ditch near Route 113 will be installed prior to placement of the soil materials. In this way, the portion of the ditch where the *L. fusca* spp. *fascicularis* soil will be placed will not be disturbed again. Later in the

construction sequencing, the culvert will be completed under the realigned Route 113, and the last step will be to complete the hydraulic connection to the Marine Basin. This connection to Marine Basin will be established prior to the 2014 growing season to allow the transplant bed to receive tidal flow. This approach will minimize direct potential impacts to the species, and maximize success of the proposed mitigation site.

Seeding Bed

The second phase of proposed mitigation consists of preparation of a new 8,450-square foot (0.19 acre) seeding bed for this species within the footprint of the abandoned road bed to the south of the realigned road and east of the new EMAS area (see MIT-11 and MIT-22). Once the new road is constructed and traffic diverted off the existing section of road, pavement will be removed from the abandoned roadway section, and a seeding bed prepared. Soil samples have been taken at the existing locations of this plant to determine the physical and chemical parameters under which it is currently growing. This data will be used to re-create the soil conditions (in regard to sieve size, pH, etc.) this species requires to successfully propagate and reproduce at the seeding bed area. (A unique specification will be developed for contract bidding.) Orange fencing will be placed around the seeding bed and remain until the bed is stabilized and *Leptochloa fusca* spp. *Fascicularis* is established, as determined by a qualified botanist approved by the CTDEEP.

In excess of 3,000 seeds were collected by CTDEEP on airport property during autumn 2012 and properly stored. The viability and germination rate of the collections have not yet been tested; however, they are available for seeding. Additional seeds will be collected during the 2013 season and added to the seed stock for seeding at the mitigation site. Only half of the seeds collected during the 2012 and 2013 growing season will be planted. The seeds will be planted in the fall of 2014 in order to allow for overwintering of the seed increasing likelihood of germination. The other half of the seeds will be properly stored, in case, during the five-year monitoring period, some of the mitigation areas fail and adjustments to the mitigation plan are required and a seed source is needed. Table 9 shows the proposed mitigation for *Leptochloa fusca* spp. *Fascicularis*.

**Table 9: Sikorsky Runway Safety Area Project Mitigation for *Leptochloa fusca* ssp. *fascicularis***

Mitigation Site	Location	Activity	Proposed Timeframe	Area of Mitigation (acres)
Transplant Bed (Area A)	Adjacent to new tidal channel	Relocate soil within impacted sub-population areas to the transplant bed before start of construction	Fall/winter 2014; outside the growing season, when transplanting will result in the least disruption to plants	0.26
Seeding Bed (Area B)	Within Abandoned Route 113 Roadway Area	Plant collected seeds in constructed seed bed	Fall 2015, after new roadway is opened, to allow the seeds to overwinter	0.19
<b>Total</b>				<b>0.45</b>

As discussed in the Post Construction Long Term Monitoring Requirements section, a five-year monitoring program will be established and carried out by a qualified botanist, who will survey existing populations and mitigation areas in September. Reports will be submitted, annually in November, to CTDEEP.

### ***Needlegrass (Aristida longespica)***

Twelve subpopulations and up to 12,935 plants of *Aristida longespica* will be adversely impacted by the project. This represents approximately eight percent of the population of this species on airport property. To mitigate for these adverse impacts, topsoil from the impacted *Aristida longespica* areas will be scraped, saved, and returned to the re-graded portions of the work site once construction has been completed.

It is expected that *Aristida longespica* plants will grow and recolonize the re-graded portions of the work-site following construction, since habitat conditions will be returned close to their present state. It is also expected *Aristida longespica* will colonize the abandoned roadway area, which will be re-established with respect to soil type, approximate elevation, and disturbance regime as the impact areas of *Aristida longespica*.

The exception will be the relocated road area and detention basin, which will be rendered unsuitable for the re-colonization by this plant. Upon completion of the new roadway and EMAS system, the existing roadway will be removed and the pavement excavated. The remaining soil materials will be regraded and seeded with a non-invasive ground cover.

As part of the project, approximately 16.7 acres of pavement will be removed along Runway 6-24 and its Taxiways (see plan sheets in Appendix B). All but 0.6 acres will be replaced with soil material and maintained as lawn area within the RSA. Although not counted as mitigation for this species, this pavement removal will effectively create about 16.7 acres of potential new habitat for this species on the airport. Approximately 5 acres of this pavement removal area is located adjacent to existing populations of *Aristida longespica*, with a seed source in close proximity to this newly created habitat.

The proposed new mowing regime for the airport is also expected to have benefits to the *Aristida longespica* population on the airport. This mowing regime is further discussed under the Long Term Maintenance Requirements section of this report.

### **AVIAN SPECIES**

Although it is anticipated there will be no direct permanent adverse impacts to listed avian species on BDR, CTDOT and City of Bridgeport are proposing to establish a revised mowing regime for the airport which will benefit grassland-nesting avian species. Several elements of the project will also have a beneficial impact on other avian species, especially those utilizing wetland habitats. Further, the existing runway 6-24 will be narrowed by removal of old pavement along each side of the runway. This will ultimately provide a net increase of grassland on the airport of approximately 16.7 acres, which will benefit grassland bird species.

The mowing regime will consist of various mowing zones, with more frequent mowing in the RSA areas, and less frequent mowing moving further from RSAs and taxiways. Zones have been created to facilitate reproductive success of grassland bird species, as well as for *Aristida longespica* and *Viola brittoniana*.

This mowing regime is further discussed under the Long Term Maintenance Requirements section below.

Through the extensive wetland mitigation package for this project, approximately 16.2 acres of habitat will be restored and/or enhanced for wetland-dependent listed avian species (see Table 10). The proposed mitigation package will improve tidal flushing into existing wetlands on the airport which have been overtaken by Phragmites, an invasive wetland species. Phragmites is a highly aggressive brackish water tolerant wetland species, which forms dense monocultures in tidal wetlands with altered hydrology. Phragmites-dominated wetlands provide low value habitat for few avian species. The proposed wetland mitigation package will include the improvement of high-salinity tidal flushing within two Phragmites-dominated wetland areas, totaling approximately 16.0 acres in size, to convert these wetlands back to high-value *spartina*-dominated wetlands. *Spartina* wetlands provide high-value habitat for many of the listed avian species documented on the airport. Therefore, the project will greatly improve habitat for these listed avian species. Another benefit of conversion of Phragmites wetlands to *spartina* wetlands, is a transition from avian species with high incidence of Bird-Airplane Strike Hazard (BASH) issues, to species with low probability of BASH incidents. Furthermore, a barn owl box is proposed to be located in Mitigation Site No.1 (see Figure 8).

## **INVERTEBRATES**

### ***Dune Sympistis (Sympistis riparia)***

No long-term mitigation is proposed for this species, since it will not be impacted by the project.

### ***Mudflat Tiger Beetle (Cicindela marginata)***

No long-term mitigation is proposed for this species, since there will be no negative impact as a result of the project activities. However, as a result of the removal of pavement along existing Runway 6-24 and associated taxiways, the potential habitat for this species will potentially increase. It is estimated that approximately 16.7 acres of existing pavement will be removed and converted to vegetated lawn area.

# Long Term Maintenance Requirements

## VEGETATION

Existing populations of listed species and mitigation areas will be preserved by Sikorsky Airport by implementing a long-term protection and maintenance program. On airport property, signs reading “Maintenance Area” will be posted at listed vegetative species locations. Airport staff will be trained in how to properly maintain these mitigation areas.

The airport runway areas have been maintained for many years, with a mowing regime that is determined largely in part by FAA safety regulations. The typical mowing schedule over the years has been to mow approximately twice a month starting in April, continuing until at least November 1<sup>st</sup> of a given year. The frequency of mowing may vary slightly depending on rainfall amounts, and thus, growth rates of vegetation within the area. The airport currently maintains grass height from 4 to 8 inches. This is done to allow visual sighting of birds and mammals within the airfield. It also does not allow most grass species to go to seed, which is a further deterrent for seed-eating birds. The airport’s runway safety area (RSA) is depicted on Figure 12 in Appendix A. It is necessary to mow the RSA’s at the airport for 3 reasons:

1. **Federal Aviation Regulations Part 139 Subpart D Operations 139.309 Safety Areas** references: “the runway or taxiway and the surrounding surfaces that is prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from a runway or the unintentional departure from a taxiway.” Further: “Each safety area shall be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations.” Therefore, the vegetation maintenance regime in the runway and taxiway safety areas must allow for rolling, filling, mowing and weedwacking so as to ensure an even surface at all times. Some of the areas where *V. brittoniana*, *L. fusca* spp. *fascicularis*, *A. longespica*, and *A. glabriuscula* are growing are in the RSA at Sikorsky Airport.
2. **FAR Part 139 Subpart D Operations 139.337 Wildlife Hazard Management** references the airport’s wildlife hazard management plan that addresses actions to reduce wildlife hazards to aircraft including habitat modification and other wildlife hazard control measures. At Sikorsky Airport, there is a vegetation management regime for each season to reduce the attraction to various wildlife. Mowing the grass to certain heights in the RSA is necessary to minimize populations of birds, mammals and insects there.
3. **Personnel safety.** Runway, taxiway and approach lights, bird-scare devices, FAA navigational aids, and other items necessary to the airfield activity are located in the RSA. These items are inspected, repaired and accessed daily by airport staff. It is necessary to mow these areas routinely and consistently and clear any debris from them to maintain a safe working environment for personnel and minimize the potential for injury to workers.

The proposed mowing regime will be as follows:

1. RSA areas will continue to be mowed on a regular schedule maintained at 4 to 8 inches in height.

2. Areas outside of the RSA, but within taxiways will be mowed on a regular schedule and height, except from April 15th to mid-June of each year. Between April 15th and mid-June, areas outside of the RSA, but within taxiways, will NOT be mowed to allow listed species to grow and develop fruits and seeds.
3. Areas outside of the RSA and outside of taxiways will be maintained at 5-11 inches during regular mowing periods, except from April 15<sup>th</sup> to August 15<sup>th</sup>. Between April 15th and August 15<sup>th</sup>, areas outside of the RSA, and outside taxiways, will NOT be mowed.
4. No mowing outside the RSA will take place after October 1<sup>st</sup> of each year.

This mowing regime will allow the *Aristida longespica* to mature and produce seed. It will also allow for improved management of potential habitat for the Savannah Sparrow, the only listed grassland avian species confirmed to be nesting on airport property. See Figure 9 in Appendix A for locations of observed nesting Savannah Sparrow.

### **AVIAN SPECIES**

The mowing regime outlined above will facilitate reproductive success of grassland bird species, as well as listed vegetation species. This mowing regime will allow for improved management of potential habitat for the Savannah Sparrow, the only listed grassland avian species confirmed to be nesting on airport property. Although the area inside the RSA will not provide nesting habitat, only feeding habitat, there are suitable areas outside the RSA for nesting and feeding habitat. By avoiding mowing during the nesting period of this species in areas outside the RSA, the breeding success of this species will be improved since no nests will be destroyed by mowing equipment.

Furthermore, barn owl nesting boxes will be manually cleaned on an annual basis.

### **INVERTEBRATES**

#### ***Dune Sympistis (Sympistis riparia)***

No long-term maintenance is proposed for this species, since it will not be impacted by the project.

#### ***Mudflat Tiger Beetle (Cicindela marginata)***

No long-term maintenance is proposed for this species, since it will not be impacted by the project.

# Post-Construction Long Term Monitoring Requirements

## VEGETATION

Once construction of the project is complete, the CTDOT will transfer the all permits to the City of Bridgeport for all monitoring and maintenance responsibilities associated with said permits. The City of Bridgeport will be responsible for the stewardship of the mitigation plan. Following construction, a qualified consultant hired by the City of Bridgeport will visually inspect the mitigation sites for the *Viola brittoniana*, *Leptochloa fusca* spp. *fascicularis*, and *Aristida longespica*. The botanist will also inspect and monitor the existing subpopulations of these species, as well as *Atriplex glabriuscula*, which is not anticipated to be impacted by the project. Monitoring of the existing subpopulations and mitigation areas will be conducted annually in May for flowering (i.e., mature) *Viola brittoniana*, and again in September for *Leptochloa fusca* spp. *fascicularis*, *Atriplex*, and the first season violets. The approximate number of plants growing will be estimated and pictures taken to document the site. A general report will be provided to CTDEEP for their review, annually each November, for five years, beginning in the first growing season following construction. November report submittals will allow for review and possible seeding of areas, if necessary, before winter.

The long-term monitoring program implemented for this project will enhance the CTDEEP's understanding of these listed species, particularly the range of conditions under which these plants grow. This scientific data can be shared with other regulatory agencies, such as the U.S. Fish and Wildlife Service, improving the long-range prospects, statewide, for these species.

## AVIAN SPECIES

No specific long-term monitoring is proposed for avian species, however, through the standard wetland monitoring required by the USACE and CTDEEP OLISP, wildlife observations will be an important factor to document the success of the wetland enhancement areas. Monitoring will occur during the growing season within wetland mitigation areas to monitor their success. Monitoring of these areas during the growing season will provide a good indication of avian species use, especially if conducted during the breeding season.

## INVERTEBRATES

### ***Dune Sympistis (Sympistis riparia)***

No long-term monitoring is proposed for this species, since there will be no impact to the population as a result of the project.

### ***Mudflat Tiger Beetle (Cicindela marginata)***

There is no long-term monitoring proposed for this species on BDR. The project will avoid any impact to this species during construction. Post-construction habitat conditions will be the same, or better due to increased lawn area adjacent to the tidal marsh. It is expected that the population of tiger beetles on the airport will continue to thrive, or potentially increase as a result of the project. Long-term monitoring of this species is not warranted.

# Impact Summary

## Vegetation

### Saltpond Grass

The re-alignment of Route 113 will result in direct impacts to two of the five subpopulations of State listed Endangered Saltpond Grass (*Leptochloa fusca* ssp. *fascicularis*) found on the airport. Impacts total approximately 46% (888 plants) of all the *L. fusca* ssp. *fascicularis* found in the project area. Indirect impacts are also anticipated to plants found in the wetland south of Route 113 which are not directly impacted by the project. *Leptochloa fusca* ssp. *fascicularis* prefers brackish waters; therefore, indirect impacts may occur when regular tidal flushing is introduced by the installation of a new culvert with a connection to Marine Basin. However, it is anticipated that this species, being an annual, will migrate to the upper limits of the wetland where salinity is less and fresh water influence is greater.

### Needlegrass

It is estimated 12,987 of the 156,585 Needlegrass (*Aristida longespica*) plants on BDR property will be impacted by the project. This is equivalent to approximately eight (8) percent of the total population of *Aristida longespica* on BDR property. However, most of the impacts to the *Aristida longespica* subpopulations are expected to be temporary, as once construction has been completed, the stockpiled soil will be replaced, stabilized, and protected by temporary fencing until it becomes re-established. Permanent impacts to approximately 3,288 plants are anticipated, approximately 2% of the *Aristida longespica* population on airport property.

### Coast Violet

There will be no direct impacts to subpopulations of the Coast Violet (*Viola brittoniana*). Direct impacts to sub-population 2, which is located adjacent to a tidal wetland mitigation area (see Figure 8, Site #2, will be avoided. Indirect impacts to *Viola brittoniana* (subpopulations #4 and #10) are possible due to the removal of existing pavement by machinery along Runway 6-24 to narrow the runway. Pavement removal activities will take place in close proximity to existing plants. Indirect impacts could occur to these plants due to alterations in adjacent soil conditions and replanting of a ground cover. Also, slight alterations in hydrology could occur, such once pavement is removed and replaced with natural soil materials and vegetation, less water could potential reach the plants from runway runoff.

### Orache

No direct impacts are anticipated to Orache (*Atriplex glabriuscula*), located in the existing wetland area south of Route 113. Indirect impacts are possible, as post construction the *Atriplex glabriuscula* plants may migrate to higher elevations along the periphery of the wetland area where salinities will be lower and fresh water influence greater. Greater tidal flushing, which could indirectly impact *Atriplex glabriuscula* plants, is anticipated after the installation of a new culvert reconnecting the wetland area to Marine Basin.

## Avian Species

There will be no direct permanent adverse impacts to any listed avian species as a result of the proposed project activities. Since the majority of listed avian species are wetland-dependent, and were documented nesting and feeding where no activity is proposed, no impacts to these species are anticipated. Potential indirect impacts, although temporary, could occur to grassland avian species as a result of construction activities. These impacts are considered minimal for the following reasons:

- The proposed construction activity is planned for existing developed portions of the airport (e.g., existing runway footprints) or intensely managed or ruderal habitats (e.g., lawns and artificial fill areas) in both upland and wetland settings that are sparsely vegetated or vegetated with non-native and invasive plant species. These areas of the site were found to have little habitat value to avian species of conservation concern, compared to other areas of the airport property.
- The rehabilitation of Runway 6-24 would result in a net reduction of approximately 16.7 acres of paved surface area on the airport, thereby creating a net increase of open, vegetated land cover and reduce impervious surface and improve the overall quality of stormwater runoff.
- The proposed project would result in impact to approximately 2 acres of tidal marsh habitat, as a conservative estimate (Refer to Igor I. Sikorsky Memorial Airport Wetland Field Investigation and Delineation, March 2013). The anticipated impacts to wetlands, however, will be addressed via on-site mitigation/ enhancement efforts which will serve to generate substantially higher habitat value wetlands than those impacted by project activities.
- The majority of breeding avifaunal species of conservation concern were found to occur inside existing, high-value tidally influenced salt marsh habitats dominated by native flora. These areas lie outside of proposed impact zones.
- Potential temporary impacts to avian species of conservation concern found nesting near work areas (e.g., Savannah Sparrow) can and will be avoided by construction sequencing / phasing. Construction along the runway will end by April 15<sup>th</sup> or wait to begin until after August 15<sup>th</sup>. Savannah Sparrows establish territories and begin nesting in mid-April and fledge by mid-August. In this way, the sparrows will avoid setting territories and nesting in active work areas, and utilize another portion of the airport, or an off-site location.

As outlined in the previous sections, various mitigation elements, both during and post-construction, will compensate for any temporary impacts to avian species. In fact, the project will have a positive impact to both grassland and wetland-dependent listed and non-listed avian species.

Through construction sequencing and scheduling, construction related temporary impacts will be avoided and/or minimized. Long-term mitigation will provide 16.2 acres of additional high-value wetland habitat for wetland-dependent species and an increase of approximately 16.7 acres of grassland habitat for grassland species. Improved maintenance procedures, through a modified mowing regime, will provide for potential increased success rate for nesting grassland species outside the RSA on the property.

## Invertebrates

### **DUNE SYMPISTIS (*SYMPISTIS RIPARIA*)**

There will be no impact to this species, either direct or indirect, as a result of project activities. This species and its habitat were documented on the dunes of Long Beach, which is not near the project activities.

### **MUDFLAT TIGER BEETLE (*CICINDELA MARGINATA*)**

To avoid impacts to the Mudflat Tiger Beetle, wetland mitigation work affecting tidal marsh or channels should be conducted during the flight time of the beetle (June-August), when larval burrows do not exist. This timing restriction would allow the adult beetles to move to other unaffected habitat and would avoid impacts to the larval stage, which rarely leave their burrows and therefore could not avoid impacts if the sediments are affected.

Ultimately, the wetland mitigation will greatly increase the potential habitat for this species on the airport.

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# Appendix A: Figures

## List of Figures

---

Figure 1: Vicinity Map

Figure 2-7: State-Listed Plant Species, 2012 Biological Survey and Anticipated Improvement Impacts

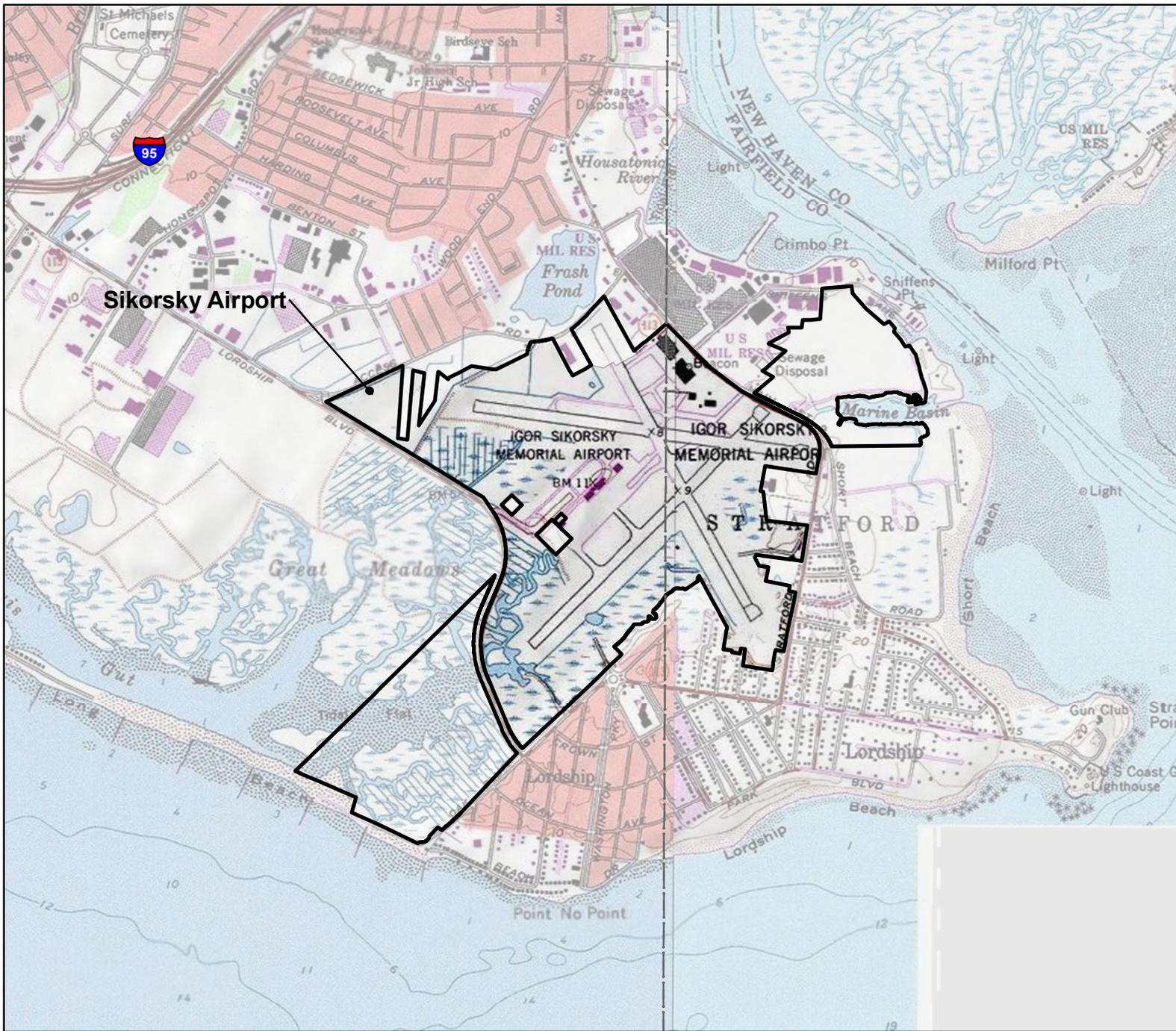
Figure 8: Conceptual Mitigation Plan

Figure 9: Avian Nesting Areas

Figure 10: Observed Locations of Listed Invertebrate Species

Figure 11: Avian Habitat Zones

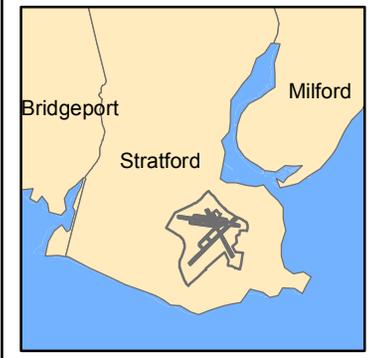
Figure 12: Long-Term Maintenance, Proposed Mowing Regime



Legend

-  Sikorsky Airport Property Boundary
-  USGS Topographic Boundary

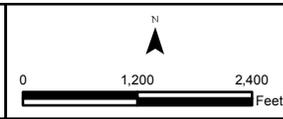
1:24,000  
USGS Quadrangles  
Milford, Bridgeport



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Vicinity Map

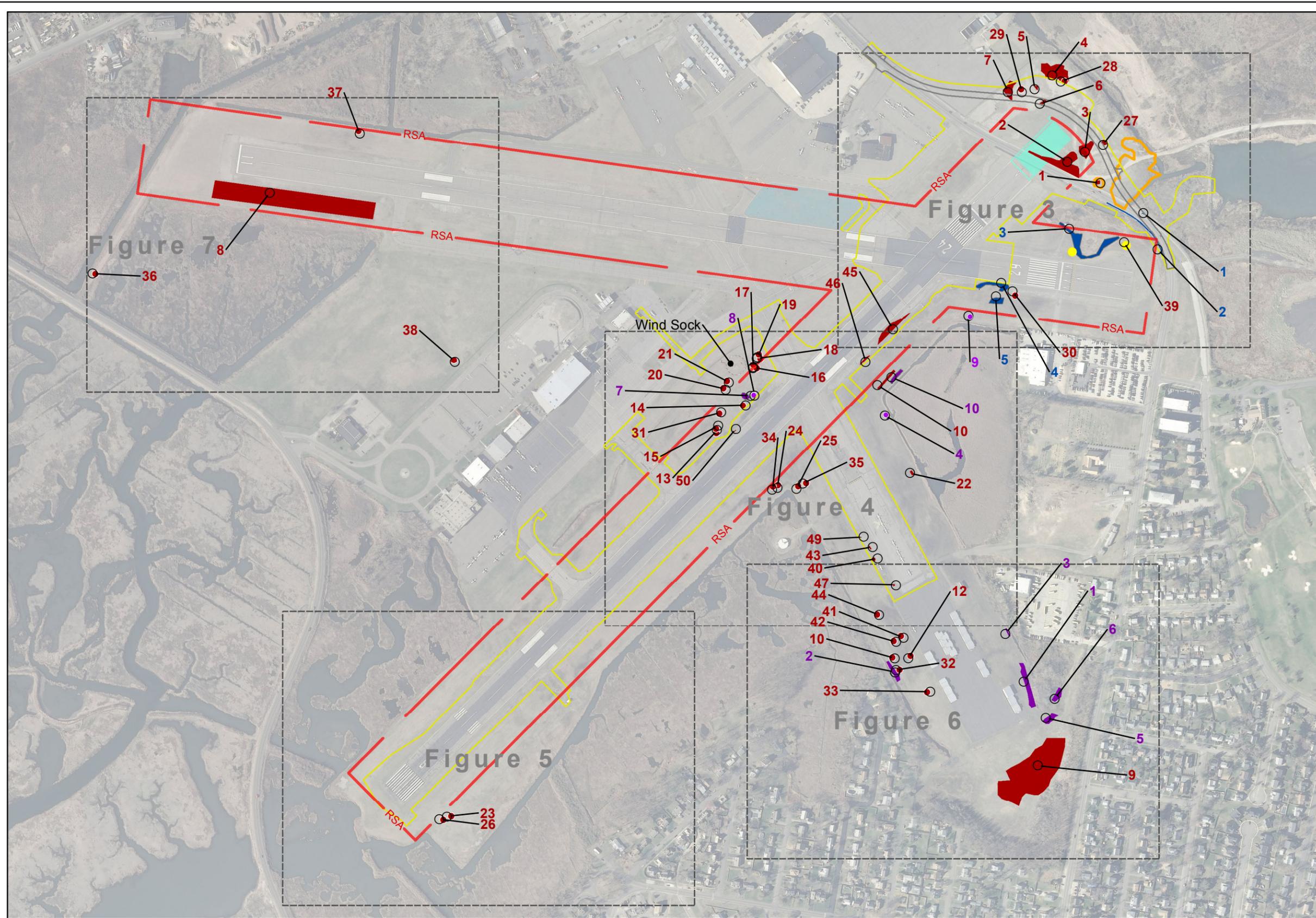
Project No.  
15-336  
Date:  
Nov. 2012

Project Title:  
Runway Safety Area Project  
Igor I. Sikorsky Memorial Airport  
Stratford, Connecticut



Town:  
Stratford, CT  
Figure 1



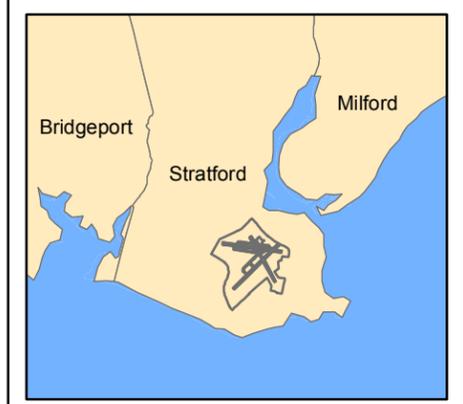


**Project Features**

- Runway Safety Area
- Proposed Engineered Material Arresting System (EMAS)
- Limits of Project Disturbance
- Proposed Rte. 113 Alignment
- Limits of Raymark Waste Site (2013)

**Resources**

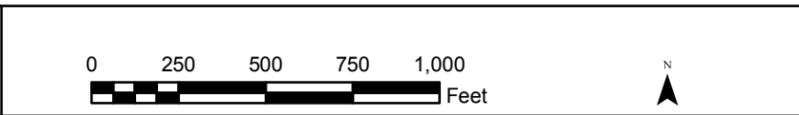
- 7 Listed Species Sub-Population Identification Number
- *Atriplex glabriuscula* (Scotland Orache) (CT Special Concern)
- Additional Locations *Aristida longespica* (Needlegrass) (CT Special Concern)
- *Aristida longespica* (Needlegrass) (CT Special Concern)
- *Leptochloa fusca* ssp. *Fascicularis* (Salt Pond Grass) (CT Endangered)
- *Viola brittoniana* (coast violet) (CT Endangered)
- Map Index



Map Title: State Listed Plant Species  
2012 Biological Survey and  
Anticipated Improvement Impacts

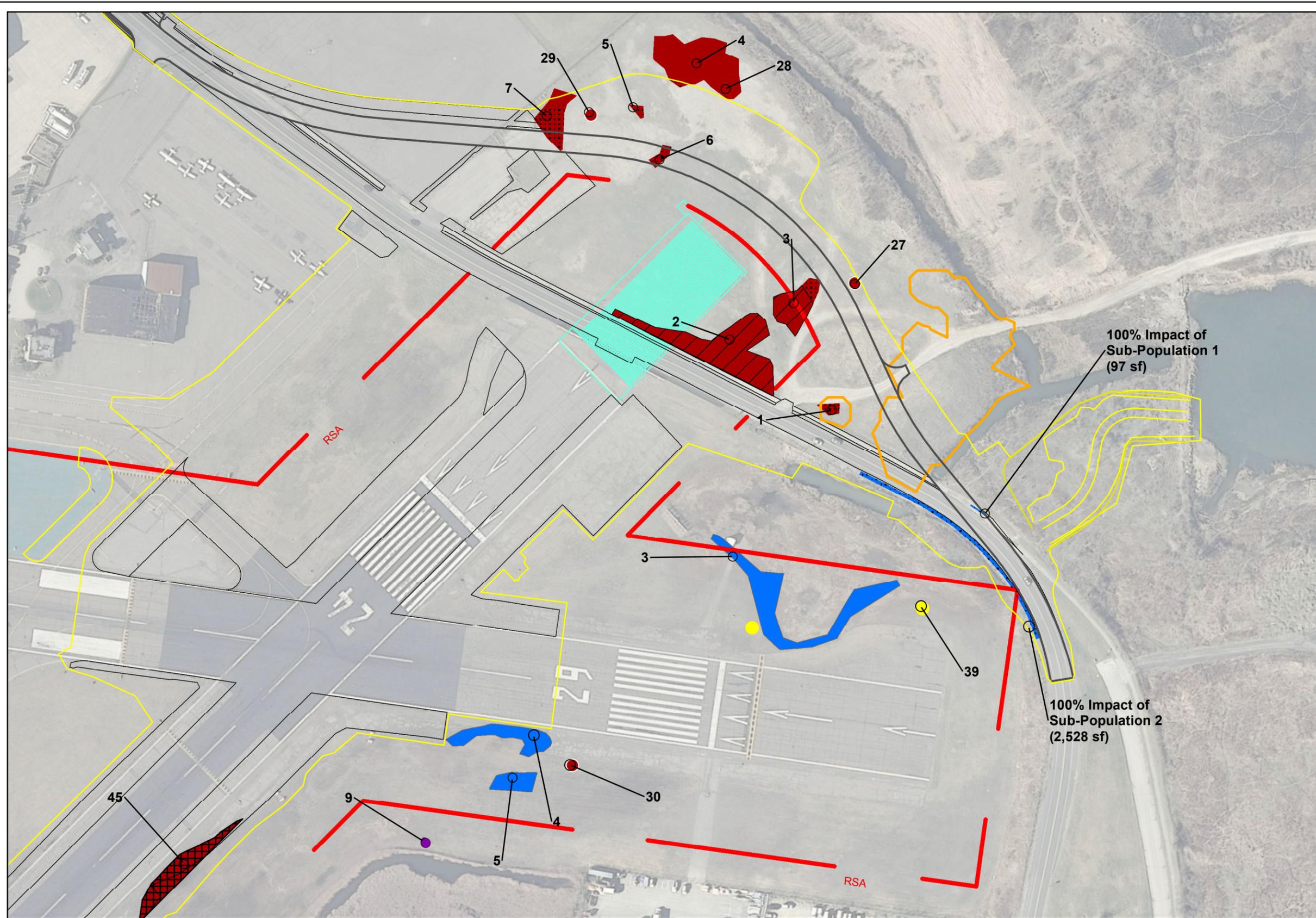
Project No.  
15-336  
Date:  
Feb. 2013

Project Title: Runway Safety Area Project  
Igor I. Sikorsky Memorial Airport  
Stratford, Connecticut



Town:  
Stratford, CT  
Figure 2





**Project Features**

- Runway Safety Area
- Proposed Engineered Material Arresting System (EMAS)
- Limits of Project Disturbance
- Proposed Rte. 113 Alignment

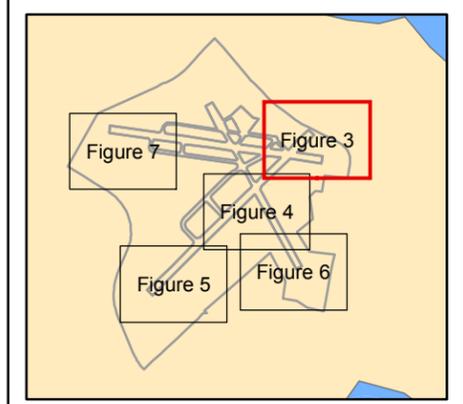
- Limits of Raymark Waste Site (2013)

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- Viola brittoniana* (coast violet) (CT Endangered)

**Impacts**

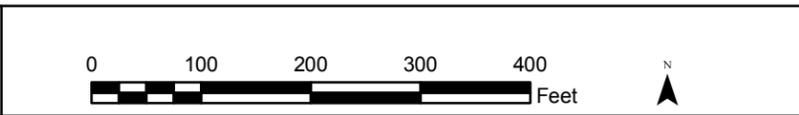
- Impacts from EMAS Installation
- Impacts from Route 113 Proposed Realignment
- Impacts from Runway 6-24 Project Improvements
- Limits of Pavement Removal



Map Title: State Listed Plant Species  
2012 Biological Survey and  
Anticipated Improvement Impacts

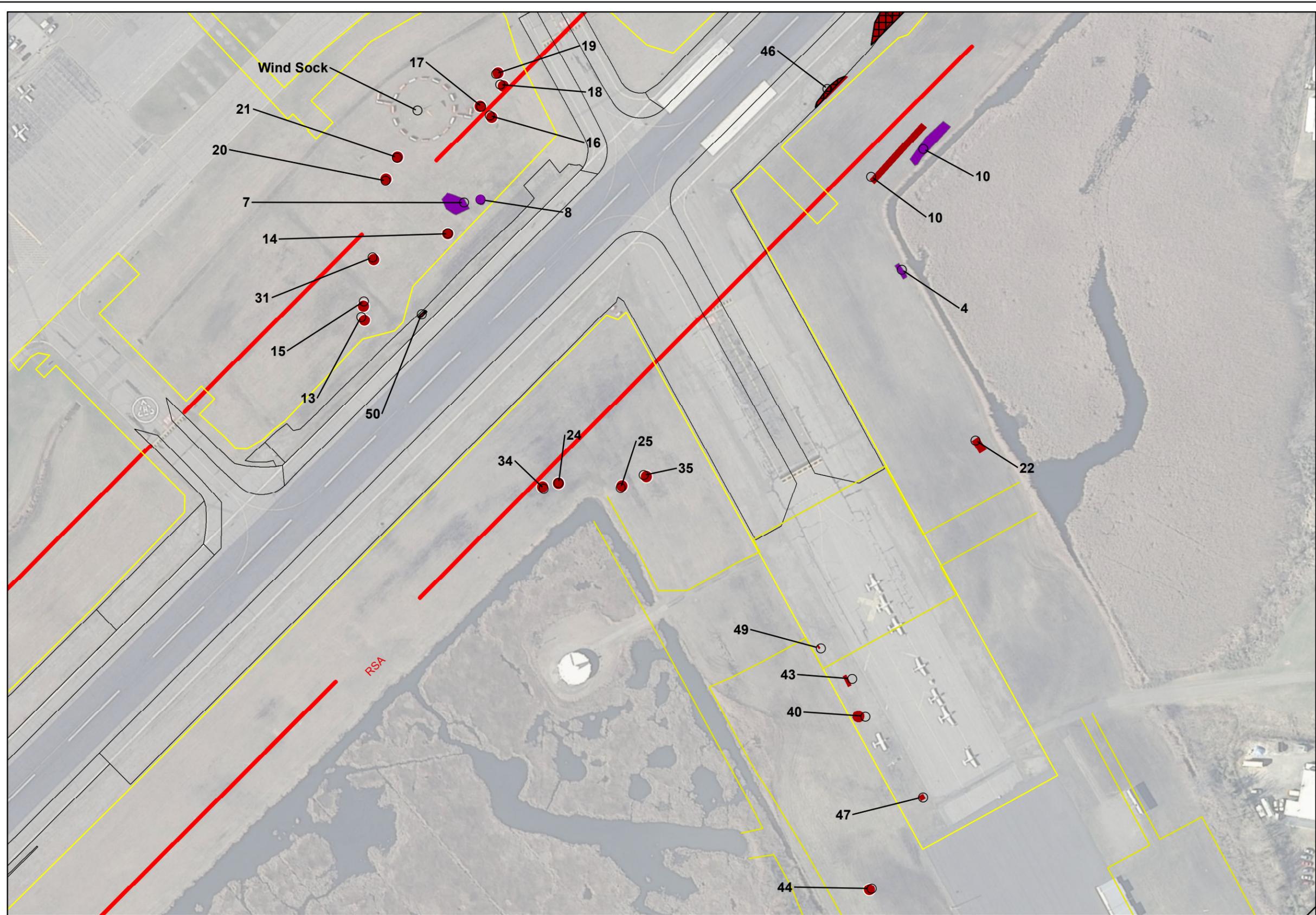
Project No. 15-336  
Date: March 2013

Project Title: Runway Safety Area Project  
Igor I. Sikorsky Memorial Airport  
Stratford, Connecticut



Town: Stratford, CT  
Figure 3





**Project Features**

- Runway Safety Area
- Proposed Engineered Material Arresting System (EMAS)
- Limits of Project Disturbance
- Proposed Rte. 113 Alignment

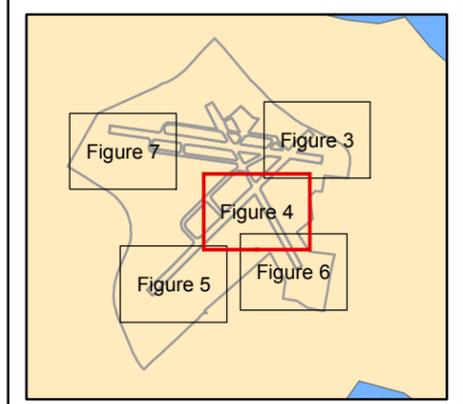
- Limits of Raymark Waste Site (2013)

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- *Atriplex glabriuscula* (Scotland Orache) (CT Special Concern)
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- *Viola brittoniana* (coast violet) (CT Endangered)

**Impacts**

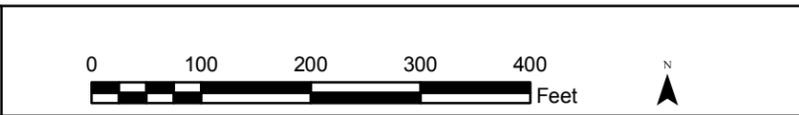
- Impacts from EMAS Installation
- Impacts from Route 113 Proposed Realignment
- Impacts from Runway 6-24 Project Improvements
- Limits of Pavement Removal



Map Title: State Listed Plant Species 2012 Biological Survey and Anticipated Improvement Impacts

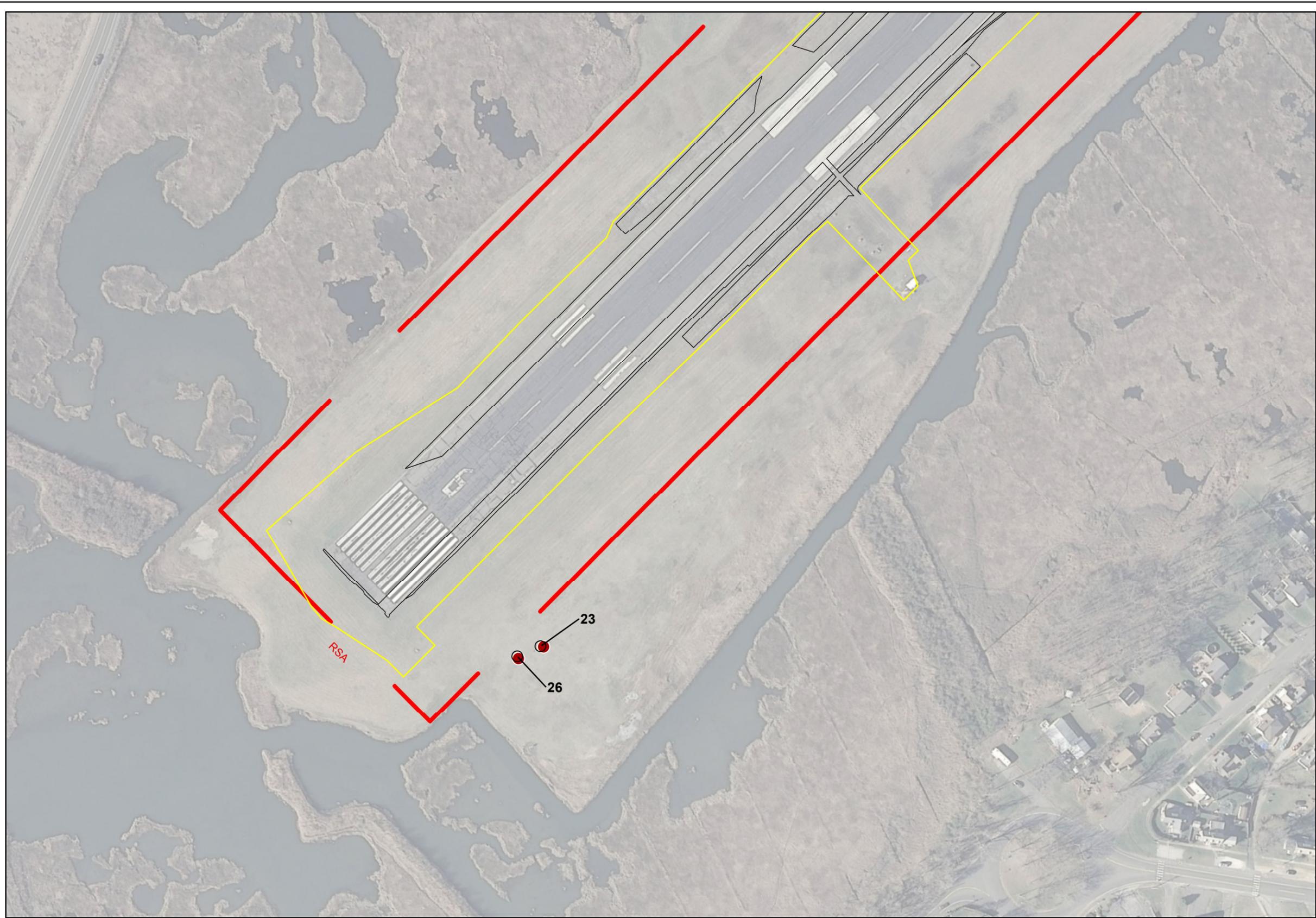
Project No. 15-336  
Date: March 2013

Project Title: Runway Safety Area Project Igor I. Sikorsky Memorial Airport Stratford, Connecticut



Town: Stratford, CT  
Figure 4





**Project Features**

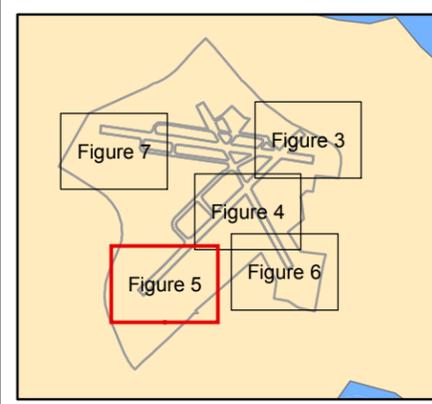
- Runway Safety Area
- Proposed Engineered Material Arresting System (EMAS)
- Limits of Project Disturbance
- Proposed Rte. 113 Alignment
- Limits of Raymark Waste Site (2013)

**Resources**

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- *Viola brittoniana* (coast violet) (CT Endangered)

**Impacts**

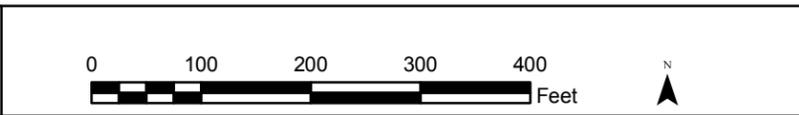
- Impacts from EMAS Installation
- Impacts from Route 113 Proposed Realignment
- Impacts from Runway 6-24 Project Improvements
- Limits of Pavement Removal



Map Title: State Listed Plant Species 2012 Biological Survey and Anticipated Improvement Impacts

Project No. 15-336  
Date: March 2013

Project Title: Runway Safety Area Project Igor I. Sikorsky Memorial Airport Stratford, Connecticut



Town: Stratford, CT  
Figure 5





**Project Features**

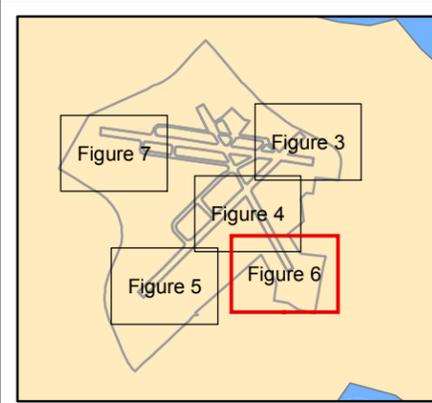
-  Runway Safety Area
-  Proposed Engineered Material Arresting System (EMAS)
-  Limits of Project Disturbance
-  Proposed Rte. 113 Alignment
-  Limits of Raymark Waste Site (2013)

**Resources**

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-  *Viola brittoniana* (coast violet) (CT Endangered)

**Impacts**

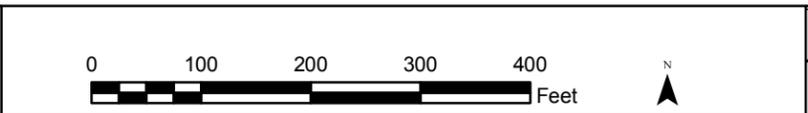
-  Impacts from EMAS Installation
-  Impacts from Route 113 Proposed Realignment
-  Impacts from Runway 6-24 Project Improvements
-  Limits of Pavement Removal



Map Title: State Listed Plant Species 2012 Biological Survey and Anticipated Improvement Impacts

Project No. 15-336  
Date: March 2013

Project Title: Runway Safety Area Project Igor I. Sikorsky Memorial Airport Stratford, Connecticut



Town: Stratford, CT  
Figure 6





**Project Features**

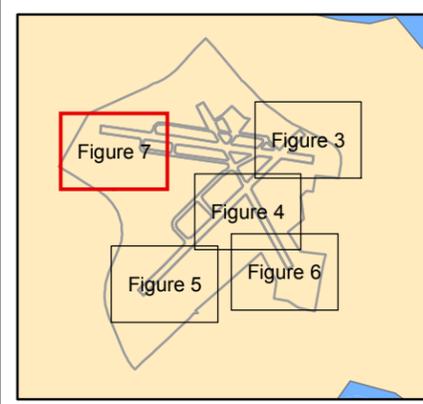
- Runway Safety Area
- Proposed Engineered Material Arresting System (EMAS)
- Limits of Project Disturbance
- Proposed Rte. 113 Alignment
- Limits of Raymark Waste Site (2013)

**Resources**

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**Impacts**

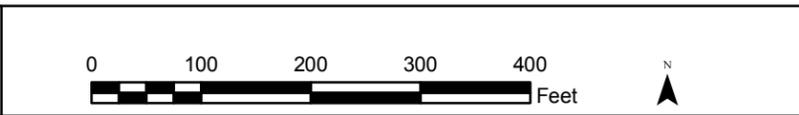
- Impacts from EMAS Installation
- Impacts from Route 113 Proposed Realignment
- Impacts from Runway 6-24 Project Improvements
- Limits of Pavement Removal



Map Title: State Listed Plant Species 2012 Biological Survey and Anticipated Improvement Impacts

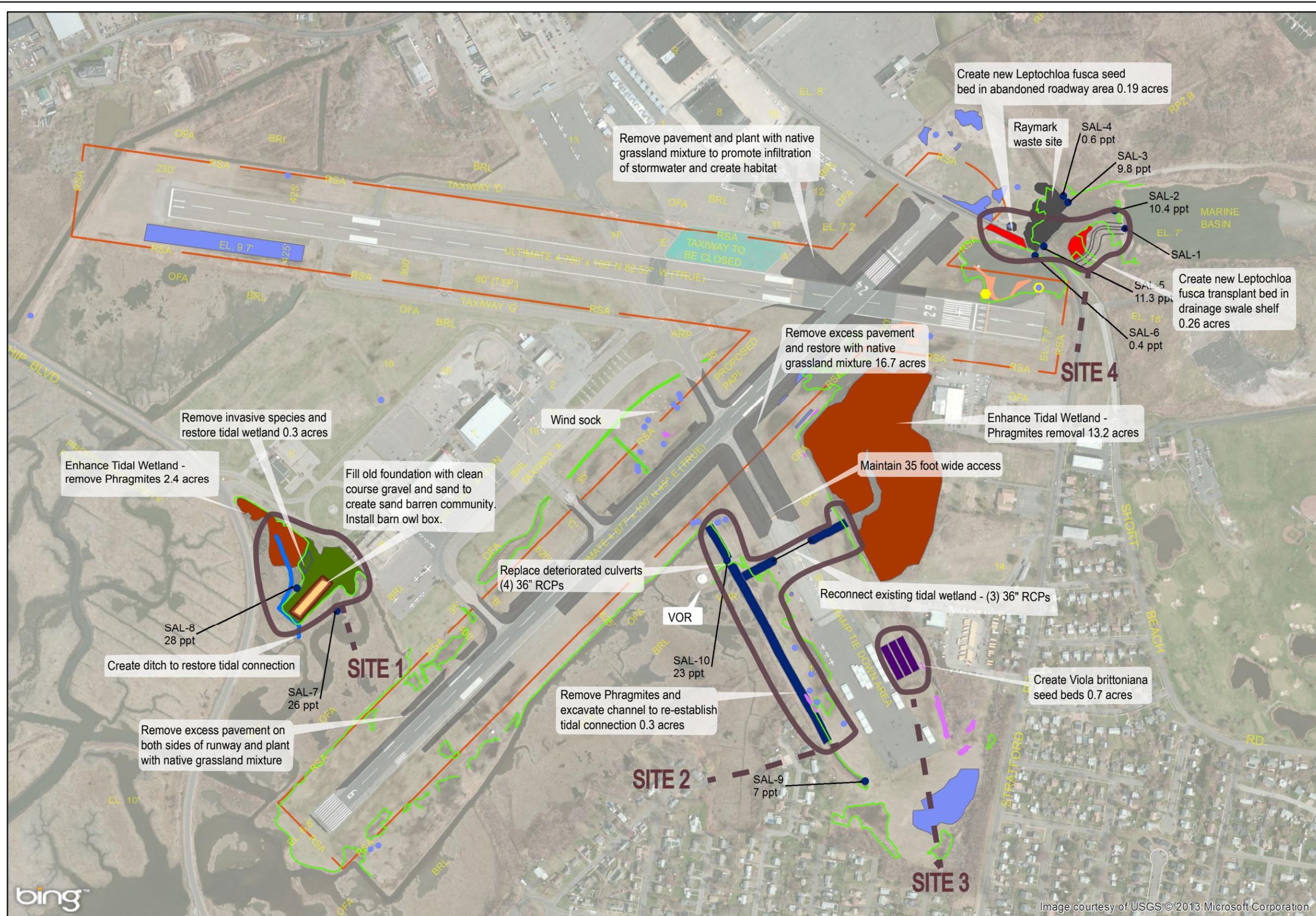
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Date: March 2013

Project Title: Runway Safety Area Project  
Igor I. Sikorsky Memorial Airport  
Stratford, Connecticut



Town: Stratford, CT  
Figure 7





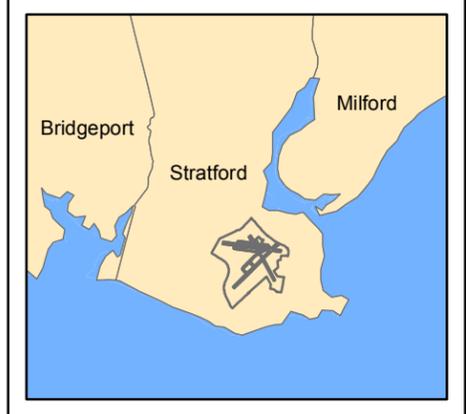
Listed Species	
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<span style="color: orange;">■</span>	Leptochloa fusca ssp. Fascicularis
<span style="color: purple;">■</span>	Viola brittoniana
<span style="color: blue;">■</span>	Aristida longispira
<span style="color: red;">■</span>	Leptochloa fusca Mitigation
<span style="color: purple;">■</span>	Viola brittoniana Mitigation

Wetlands	
<span style="color: green;">—</span>	Tidal Vegetation Line
<span style="color: brown;">■</span>	Phragmites australis Area
<span style="color: darkgreen;">■</span>	Low-Growing Native Species
<span style="color: orange;">■</span>	Sand Barren Community
<span style="color: blue;">●</span>	Salinity Test Point

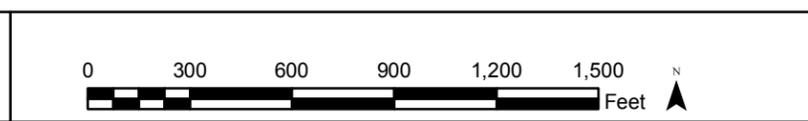
  

Project Improvements	
<span style="color: blue;">■</span>	Deepen Channel
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<span style="color: blue;">—</span>	Connection Ditch
<span style="color: gray;">—</span>	Proposed Drainage Swale
<span style="color: orange;">—</span>	Runway Safety Area



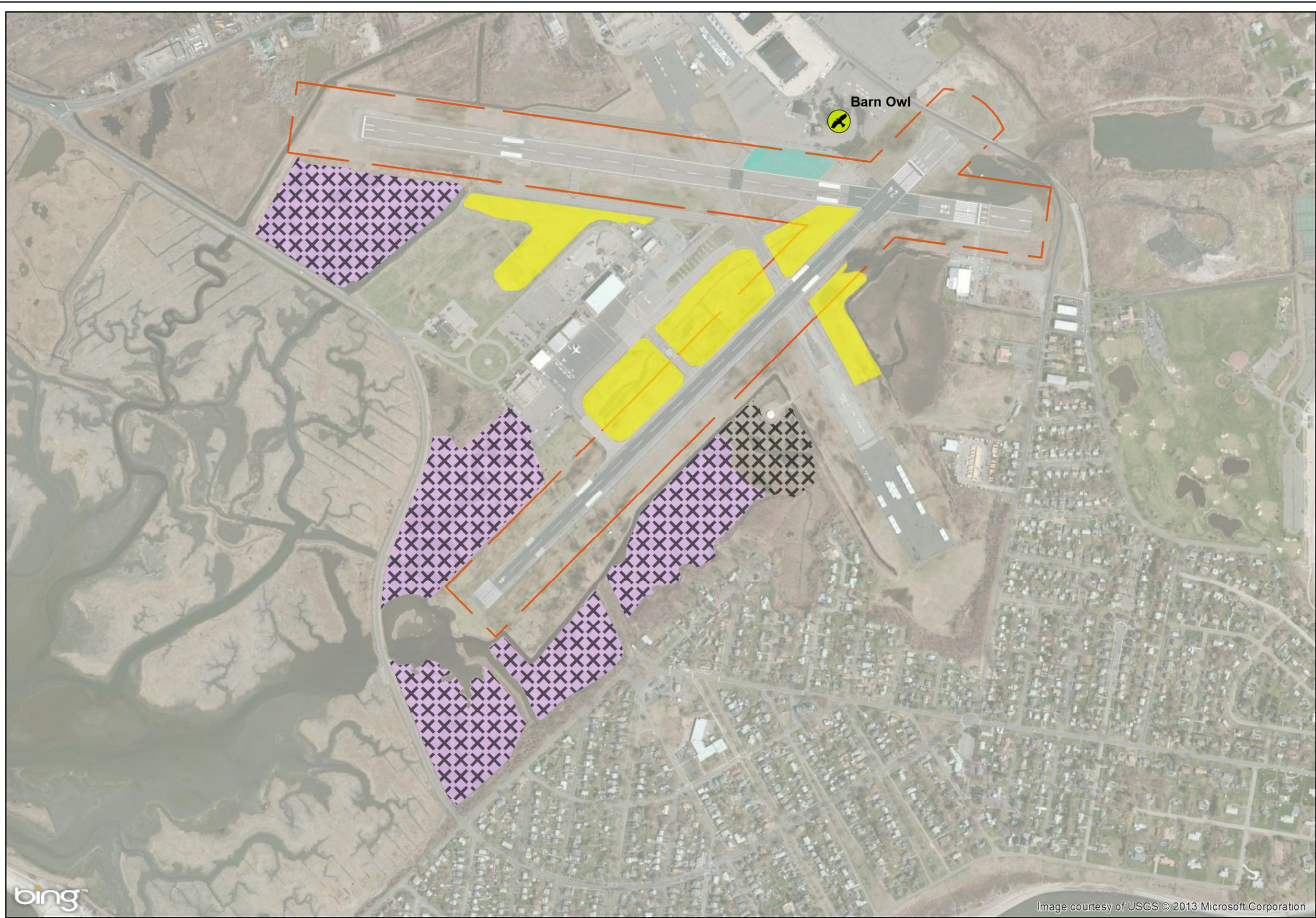
Map Title: Conceptual Mitigation Plan

Project No. 15-336  
 Date: Feb. 2013  
 Project Title: Runway Safety Area Project  
 Igor I. Sikorsky Memorial Airport  
 Stratford, Connecticut



Town: Stratford, CT  
 Figure 8





**State Listed Bird  
Observed Nesting Areas**

Listed Species:

**Saltmarsh Sharp-tail Sparrow**

*Ammodramus caudacutus*

CT Special Concern



Observed Nesting Area

**Savannah Sparrow**

*Passerculus sandwichensis*

CT Special Concern



Observed Nesting Area

**Seaside Sparrow**

*Ammodramus maritimus*

CT Threatened



Observed Nesting Area

**Common Barn Owl**

*Tyto alba*

CT Endangered



Historic Nesting Area



Runway Safety Area

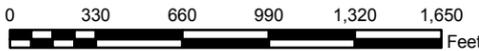


Map Title:  
Avian Survey  
Nesting Locations

Project No.  
15-336

Date:  
Feb. 2013

Project Title:  
Runway Safety Area Project  
Igor I. Sikorsky Memorial Airport  
Stratford, Connecticut



Town:  
Stratford, CT

Figure 9



**URS**

bing™

Image courtesy of USGS © 2013 Microsoft Corporation



**Legend**

- Sheet Beating Location
- ★ Moth Traps
- Tidal Vegetation Line
- Proposed Limit of Disturbance
- Proposed Pavement Removal
- Proposed Edge of Pavement
- Tiger Beetle Exclusion Barrier
- Estimated Property Line

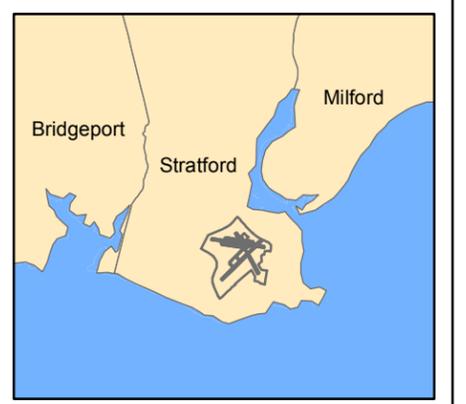
**Natural Community**

- Cordgrass Tidally Flooded Grasslands
- Grasslands: Cultural Grassland/Wet Meadow
- Northern Bayberry/Beach Plum
- Phragmites Dominated Grassland
- Shrub/Scrub Wetland

**Summary of State-Listed Invertebrate Findings for 2012**

Species and State Status*	Dates Observed	Total	Trap Station				
			1	2	3	4	5
			41.167N -73.117W	41.167N -73.135W	41.157N -73.130W	41.150N -73.139W	41.157N -73.120W
Dune Oncocnemis ( <i>Sympistis (Oncocnemis) riparia</i> ) SC	6/20/2012	14				14	
	7/7/2012	2		1	1		
Mudflat Tiger Beetle ( <i>Cicindela marginata</i> ) SC	7/13/2012	4	0			4	0
	7/24/2012	2	0	2	0		0
<b>Total Lepidoptera Observed/Trap</b>	<b>2012</b>	<b>1146</b>	<b>185</b>	<b>125</b>	<b>383</b>	<b>126</b>	<b>327</b>

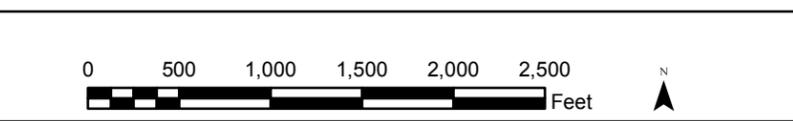
\*SC=Special Concern



Map Title: **Locations of Observed Listed Invertebrate Species**

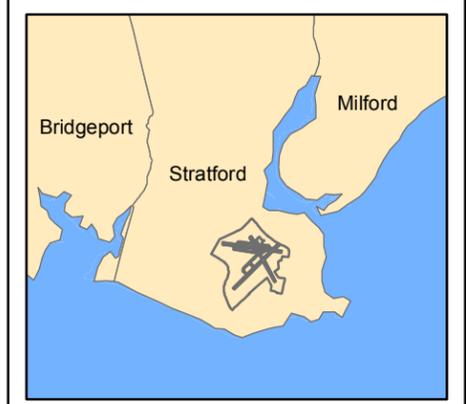
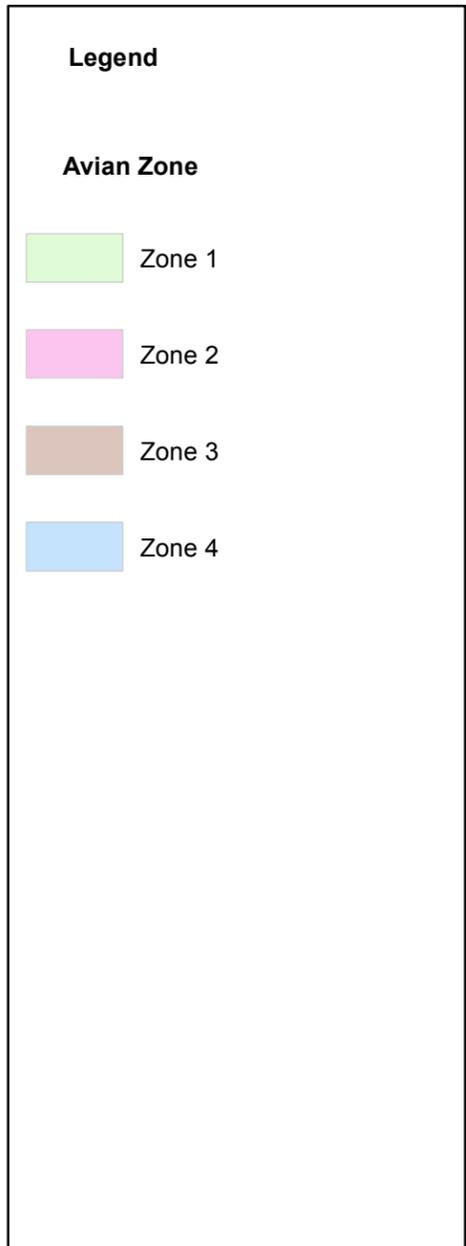
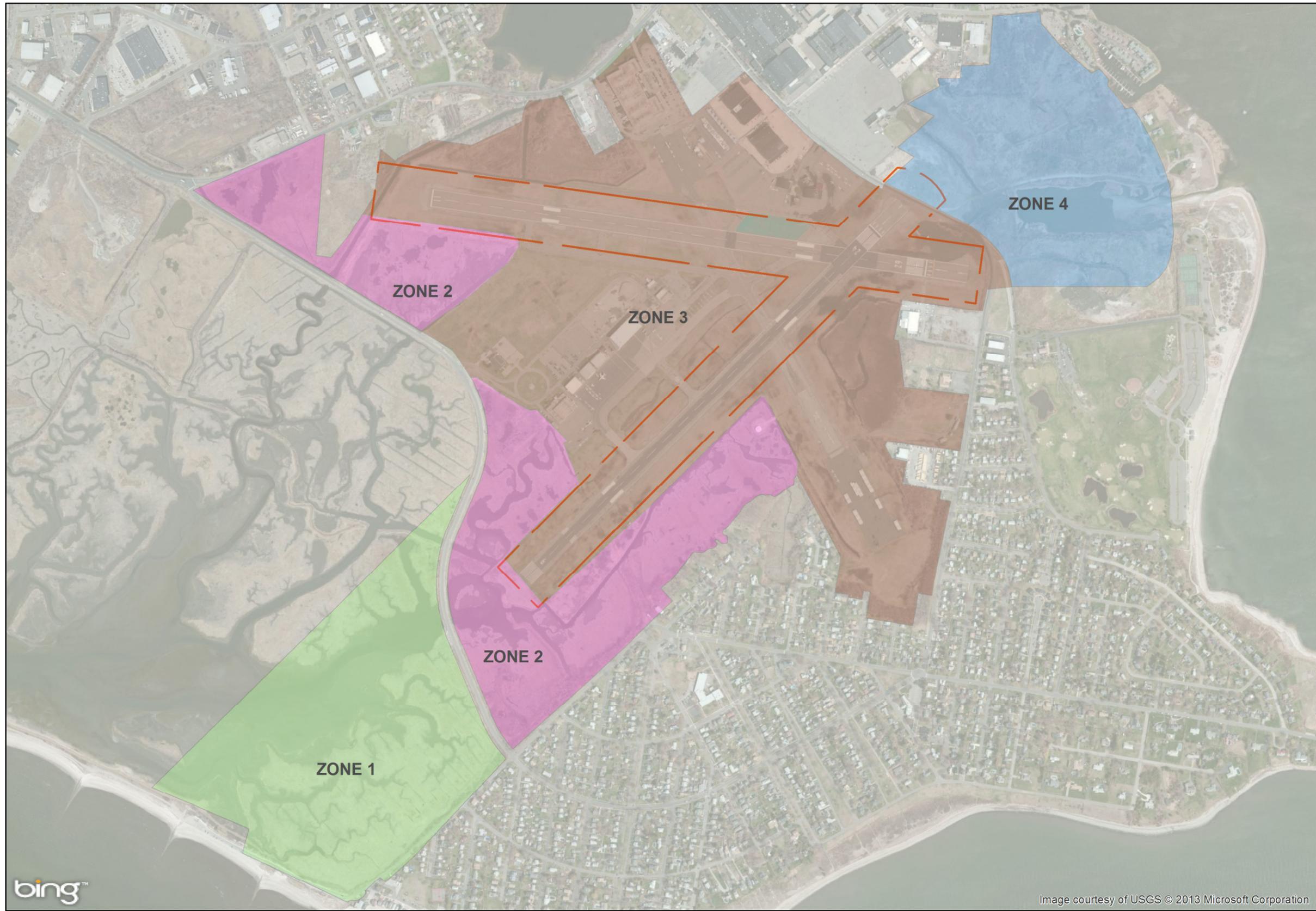
Project No. **15-336**  
Date: **Jan. 2013**

Project Title: **Runway Safety Area Project  
Igor I. Sikorsky Memorial Airport  
Stratford, Connecticut**



Town: **Stratford, CT**  
**Figure 10**

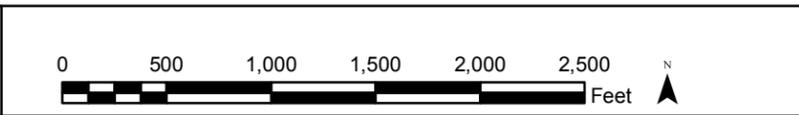




Map Title: Avian Habitat Zones

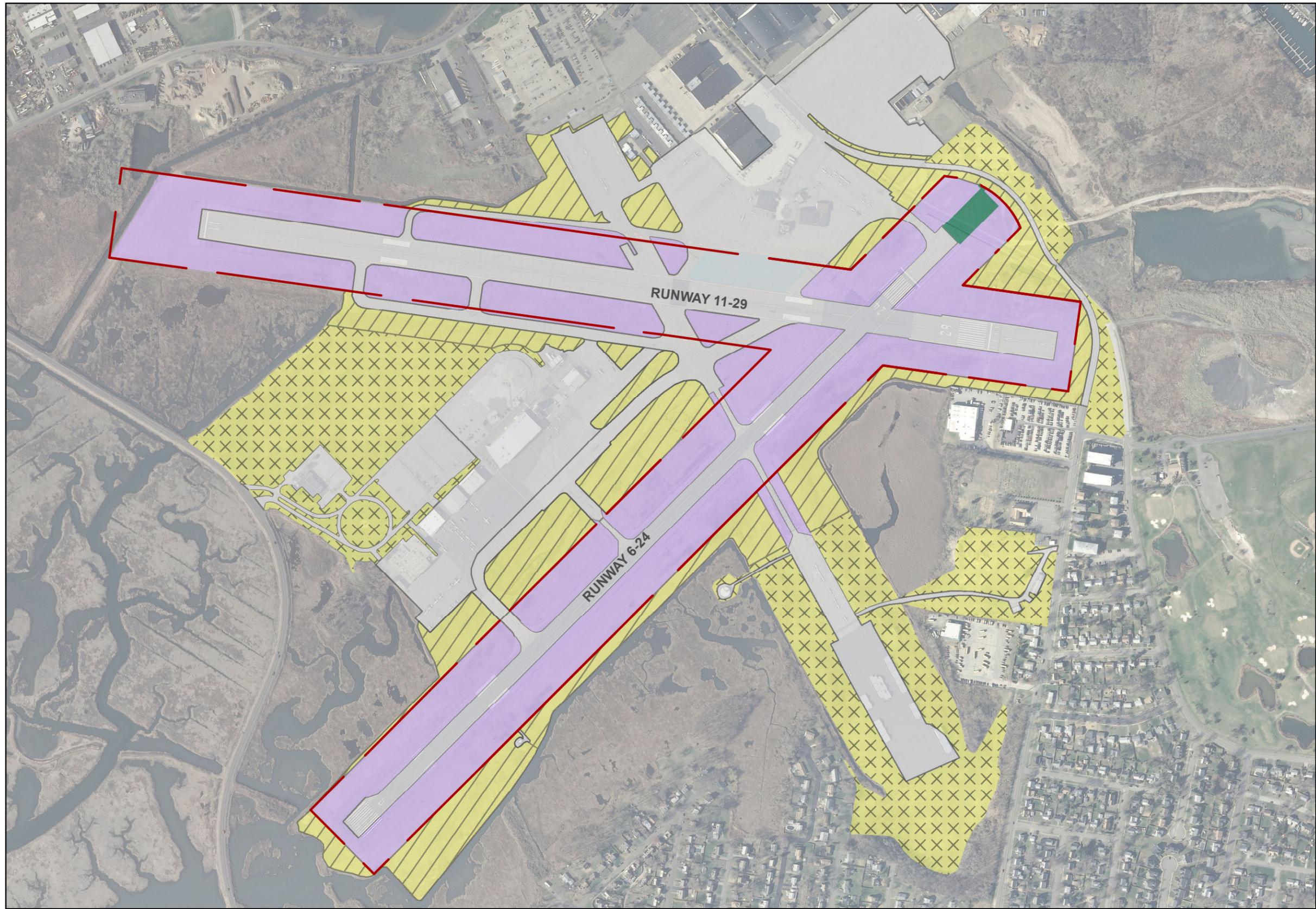
Project No. 15-336  
Date: Feb. 2013

Project Title: Runway Safety Area Project  
Igor I. Sikorsky Memorial Airport  
Stratford, Connecticut



Town: Stratford, CT  
Figure 11





**Legend**

-  Runway Safety Area
-  No Mowing from April 15th - August 15th
-  No Mowing from April 15th - June 15th
-  4-8 Inch Mowing
-  5-11 Inch Mowing
-  Engineered Material Arresting System (EMAS)
-  Paved Surface



Map Title:  
**Mowing Schedule  
 Post Project Completion**

Project No.  
**15-336**  
 Date:  
**Feb. 2013**

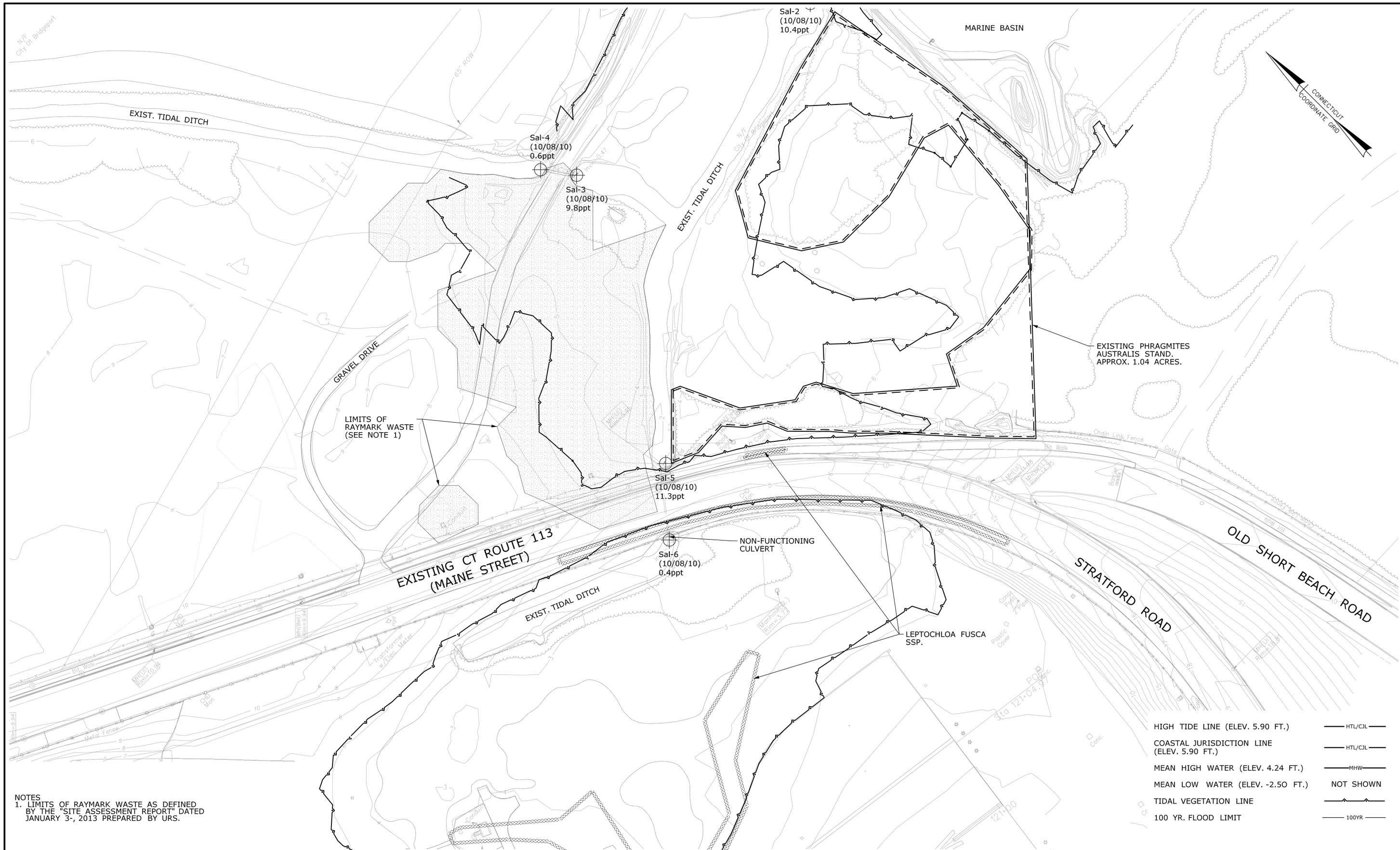
Project Title:  
**Runway Safety Area Project  
 Igor I. Sikorsky Memorial Airport  
 Stratford, Connecticut**



Town:  
**Stratford, CT**  
**Figure 12**



# Appendix B: Plan Sheets

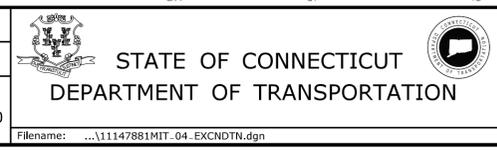


NOTES  
 1. LIMITS OF RAYMARK WASTE AS DEFINED BY THE "SITE ASSESSMENT REPORT" DATED JANUARY 3-, 2013 PREPARED BY URS.

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

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 CHECKED BY:  
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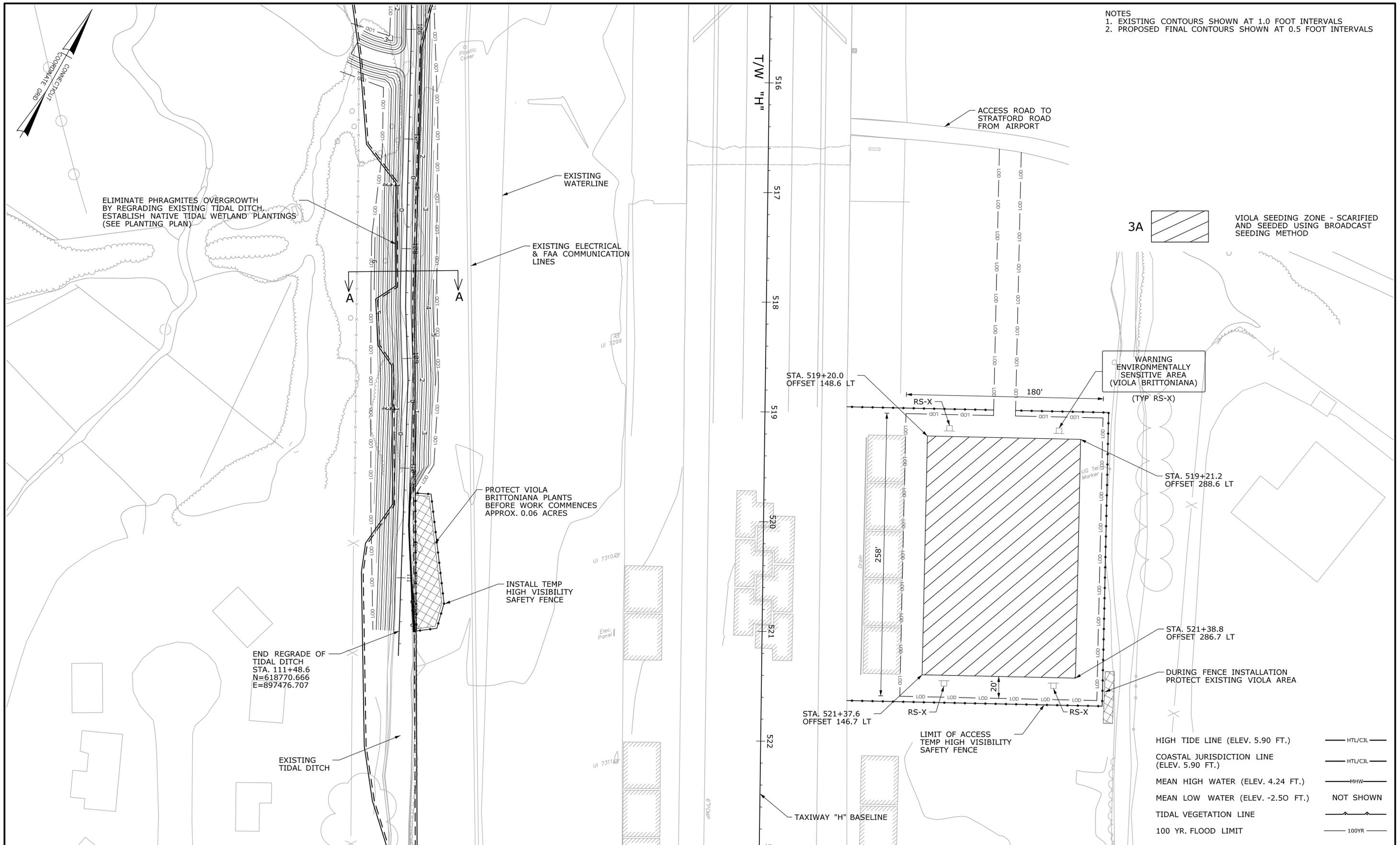
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 BLOCK:

PROJECT TITLE:  
 RUNWAY SAFETY AREA PROJECT  
 IGOR. I. SIKORSKY MEMORIAL AIRPORT

TOWN:  
 STRATFORD  
 DRAWING TITLE:  
 EXISTING CONDITIONS  
 ROUTE 113 ROADWAY  
 MITIGATION SITE 4

PROJECT NO.  
 15-336  
 DRAWING NO.  
 MIT-7  
 SHEET NO.  
 7.007

- NOTES  
 1. EXISTING CONTOURS SHOWN AT 1.0 FOOT INTERVALS  
 2. PROPOSED FINAL CONTOURS SHOWN AT 0.5 FOOT INTERVALS

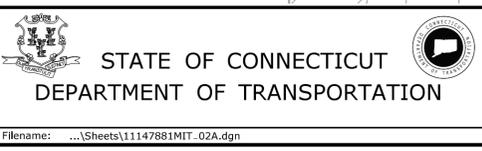


REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted: 2/7/2013

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 CHECKED BY:  
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 SCALE 1"=40'



SIGNATURE/  
 BLOCK:  
 PROJECT TITLE:

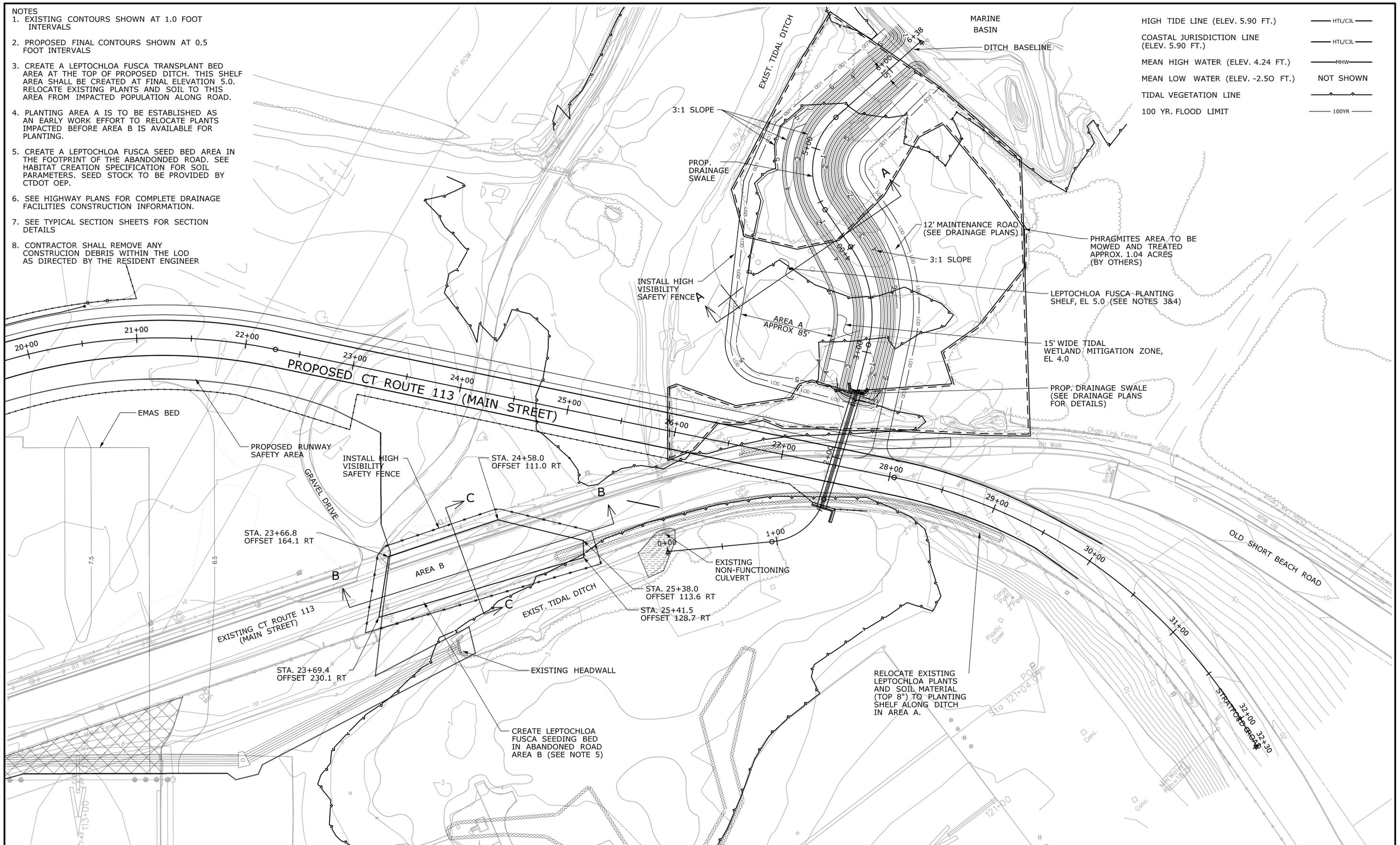
RUNWAY SAFETY AREA PROJECT  
 IGOR. I. SIKORSKY MEMORIAL AIRPORT

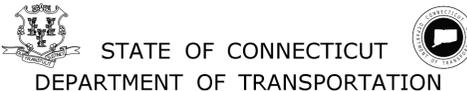
TOWN:  
 STRATFORD  
 DRAWING TITLE:  
 MITIGATION PLAN  
 WEST OF SOUTH RAMP  
 MITIGATION SITE 2 & 3

PROJECT NO.  
 15-336  
 DRAWING NO.  
 MIT-10  
 SHEET NO.  
 7.010

- NOTES
- EXISTING CONTOURS SHOWN AT 1.0 FOOT INTERVALS
  - PROPOSED FINAL CONTOURS SHOWN AT 0.5 FOOT INTERVALS
  - CREATE A LEPTOCHLOA FUSCA TRANSPLANT BED AREA AT THE TOP OF PROPOSED DITCH. THIS SHELF AREA SHALL BE CREATED AT FINAL ELEVATION 5.0. RELOCATE EXISTING PLANTS AND SOIL TO THIS AREA FROM IMPACTED POPULATION ALONG ROAD.
  - PLANTING AREA A IS TO BE ESTABLISHED AS AN EARLY WORK EFFORT TO RELOCATE PLANTS IMPACTED BEFORE AREA B IS AVAILABLE FOR PLANTING.
  - CREATE A LEPTOCHLOA FUSCA SEED BED AREA IN THE FOOTPRINT OF THE ABANDONDED ROAD. SEE HABITAT CREATION SPECIFICATION FOR SOIL PARAMETERS. SEED STOCK TO BE PROVIDED BY CTDOT OEP.
  - SEE HIGHWAY PLANS FOR COMPLETE DRAINAGE FACILITIES CONSTRUCTION INFORMATION.
  - SEE TYPICAL SECTION SHEETS FOR SECTION DETAILS
  - CONTRACTOR SHALL REMOVE ANY CONSTRUCTION DEBRIS WITHIN THE LOD AS DIRECTED BY THE RESIDENT ENGINEER

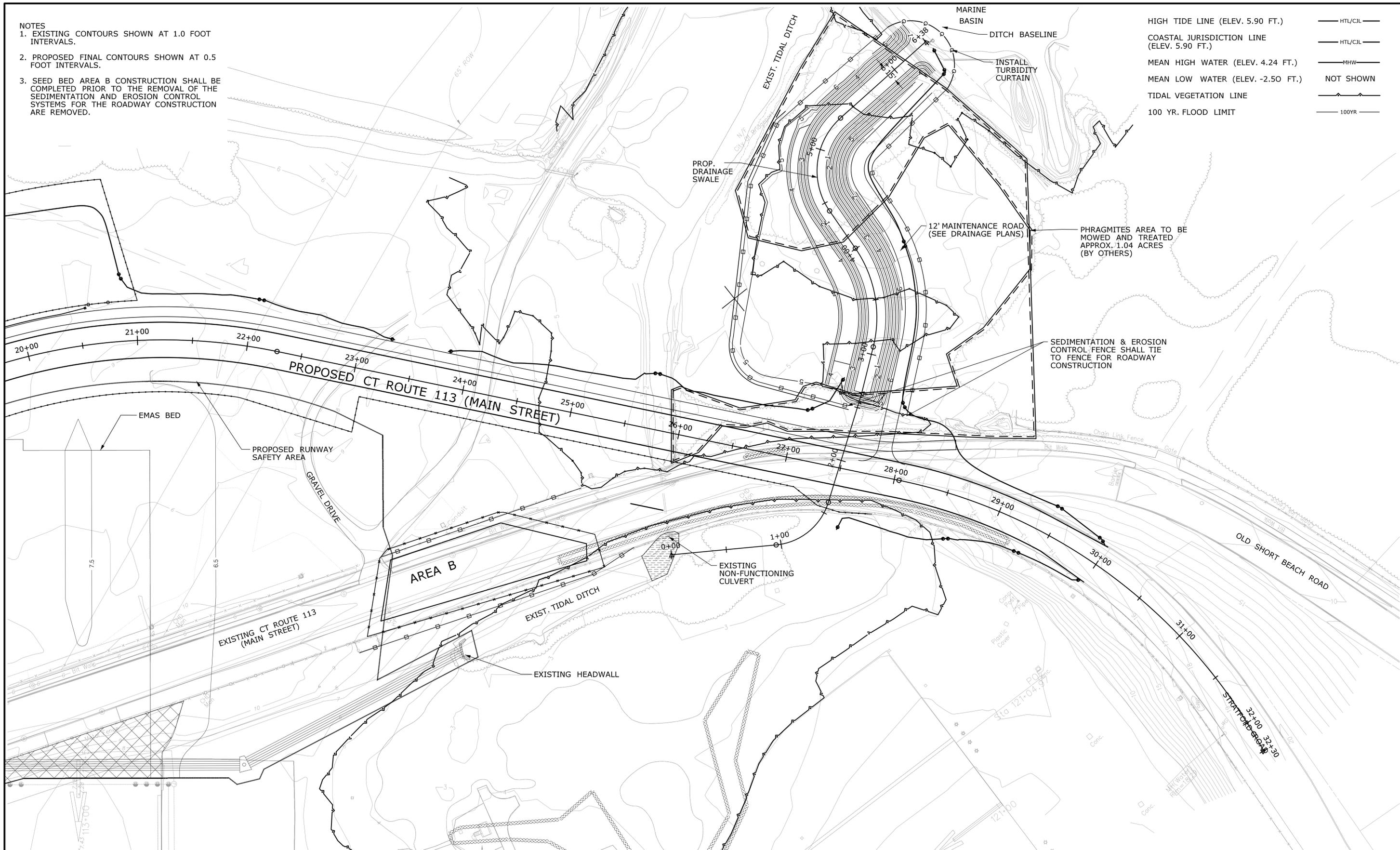
- HIGH TIDE LINE (ELEV. 5.90 FT.) 
- COASTAL JURISDICTION LINE (ELEV. 5.90 FT.) 
- MEAN HIGH WATER (ELEV. 4.24 FT.) 
- MEAN LOW WATER (ELEV. -2.50 FT.) 
- TIDAL VEGETATION LINE 
- 100 YR. FLOOD LIMIT 



<p>REV. DATE REVISION DESCRIPTION SHEET NO.</p>	<p>Plotted: 3/26/2013</p>	<p>DESIGNER/DRAFTER: CHECKED BY:</p> <p>SCALE IN FEET 0 40 80 SCALE 1"=40'</p>	 <p>STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION</p> <p>Filename: ...Sheets\11147881MIT_04.dgn</p>	<p>SIGNATURE/ BLOCK:</p>	<p>PROJECT TITLE: <b>RUNWAY SAFETY AREA PROJECT IGOR. I. SIKORSKY MEMORIAL AIRPORT</b></p>	<p>TOWN: <b>STRATFORD</b></p> <p>DRAWING TITLE: <b>MITIGATION PLAN ROUTE 113 ROADWAY MITIGATION SITE 4</b></p>	<p>PROJECT NO. <b>15-336</b></p> <p>DRAWING NO. <b>MIT-11</b></p> <p>SHEET NO. <b>7.011</b></p>
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- NOTES
- EXISTING CONTOURS SHOWN AT 1.0 FOOT INTERVALS.
  - PROPOSED FINAL CONTOURS SHOWN AT 0.5 FOOT INTERVALS.
  - SEED BED AREA B CONSTRUCTION SHALL BE COMPLETED PRIOR TO THE REMOVAL OF THE SEDIMENTATION AND EROSION CONTROL SYSTEMS FOR THE ROADWAY CONSTRUCTION ARE REMOVED.

- HIGH TIDE LINE (ELEV. 5.90 FT.) 
- COASTAL JURISDICTION LINE (ELEV. 5.90 FT.) 
- MEAN HIGH WATER (ELEV. 4.24 FT.) 
- MEAN LOW WATER (ELEV. -2.50 FT.) 
- TIDAL VEGETATION LINE 
- 100 YR. FLOOD LIMIT 



REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Plotted: 3/22/2013

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

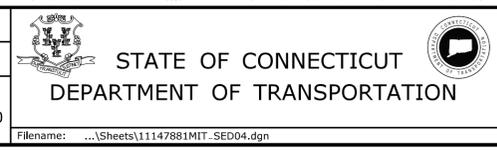
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CHECKED BY:

SCALE IN FEET

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SCALE 1"=40'



SIGNATURE/  
BLOCK:

PROJECT TITLE:

RUNWAY SAFETY AREA PROJECT  
IGOR. I. SIKORSKY MEMORIAL AIRPORT

TOWN:

STRATFORD

DRAWING TITLE:

SEDIMENTATION & EROSION CONTROL  
SITE 4

PROJECT NO.

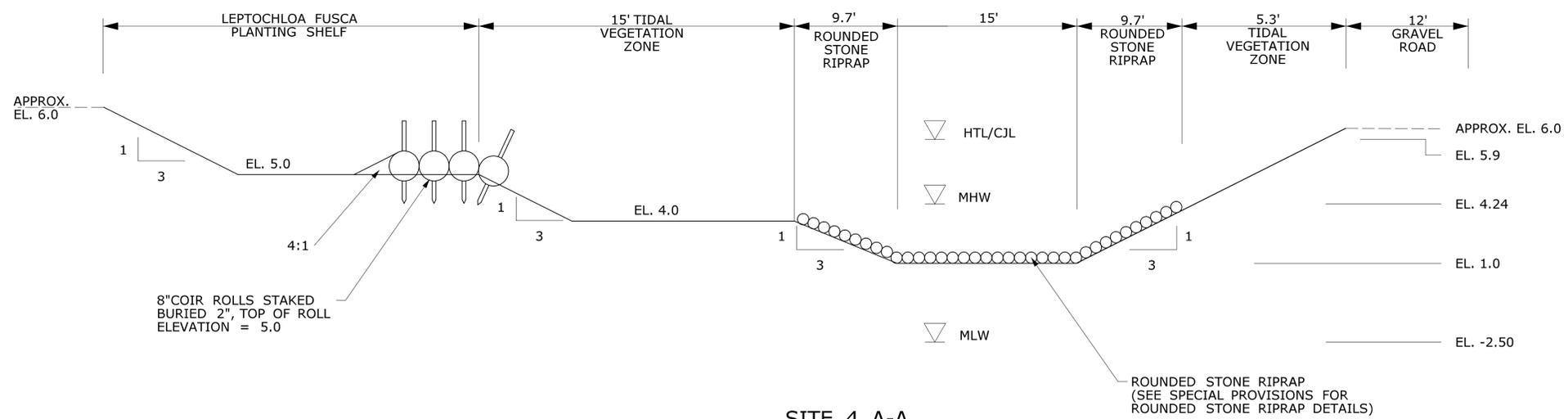
15-336

DRAWING NO.

MIT-16

SHEET NO.

7.016

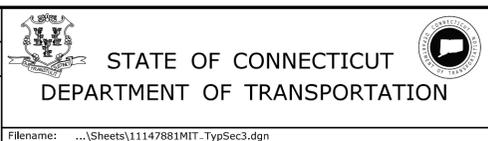


SITE 4 A-A  
TYPICAL CHANNEL  
N.T.S.

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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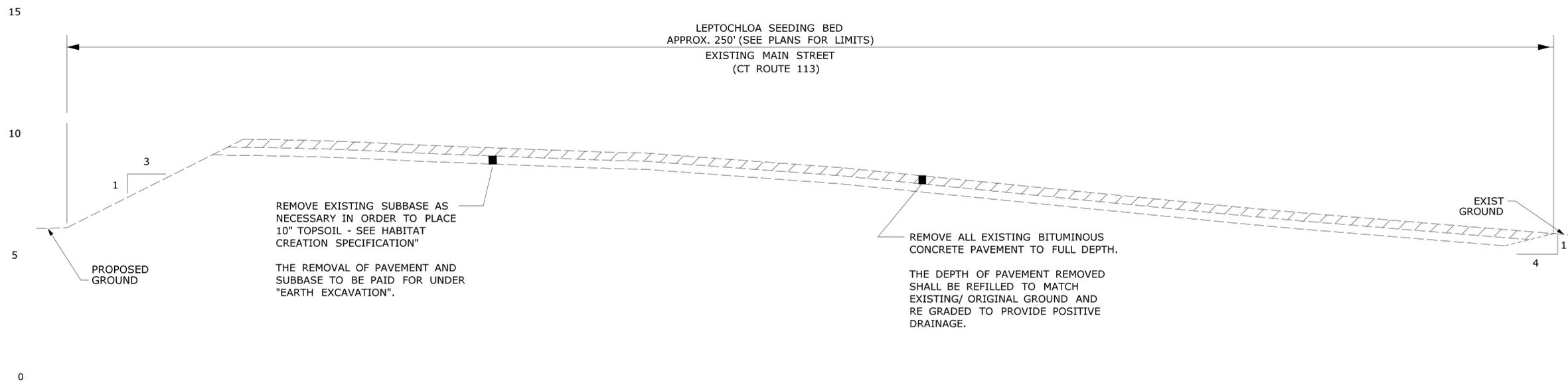


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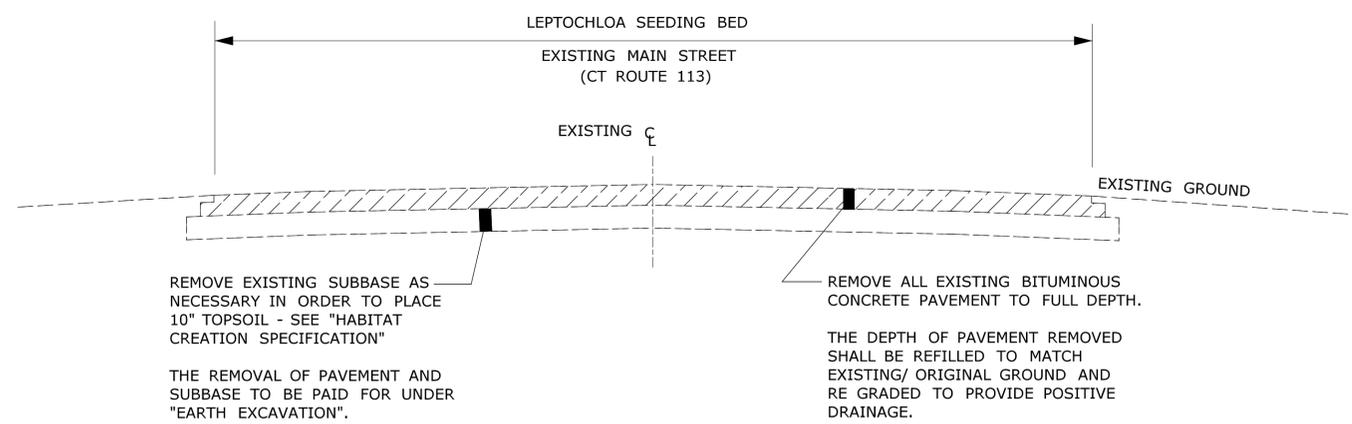
PROJECT TITLE:  
RUNWAY SAFETY AREA PROJECT  
IGOR. I. SIKORSKY MEMORIAL AIRPORT

TOWN:  
STRATFORD  
DRAWING TITLE:  
TYPICAL SECTIONS  
MITIGATION SITE 3 & 4

PROJECT NO.  
15-336  
DRAWING NO.  
MIT-21  
SHEET NO.  
7.021



**SITE 4 B-B  
PAVEMENT REMOVAL DETAIL  
N.T.S.**



**SITE 4 C-C  
PAVEMENT REMOVAL DETAIL  
N.T.S.**

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.		DESIGNER/DRAFTER: CHECKED BY:	 <p>STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION</p>	SIGNATURE/ BLOCK:	PROJECT TITLE: RUNWAY SAFETY AREA PROJECT IGOR. I. SIKORSKY MEMORIAL AIRPORT	TOWN: STRATFORD	PROJECT NO. 15-336
REV. DATE REVISION DESCRIPTION SHEET NO.	Plotted: 3/22/2013	FILENAME: ...\\Sheets\11147881MIT_TypSec4.dgn		DRAWING TITLE: TYPICAL SECTIONS MITIGATION SITE 4	SHEET NO. 7.022		