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Memorandum

To: Mark Graczykowski, WBOA
Copies To: Aaron Jahncke, City of Portage
Portage Airport TAC
From: Marcus Watson, TKDA
Date: April 29, 2019

Reference: C47 Airport Master Plan
Design Standard Deficiencies
Technical Memo
Project No.: 17011
Routing: MSW:JEL

Introduction

The Portage Municipal Airport (C47) Airport Master Plan study includes identifying deficiencies to FAA airport design standards. These deficiencies were identified using available FAA obstacle data, visual inspections and aerial photography. This is not a comprehensive design-level assessment. These standards are defined in FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*. Specific design standards reviewed using available information as part of this analysis include:

- Runway Safety Area (RSA)
- Runway Obstacle Free Area (OFA)
- Runway Object Free Zone (OFZ)
- Runway Visibility Zone (RVZ)
- Runway Protection Zone (RPZ)
- FAA Approach/Departure Surfaces
- Taxiway/Taxilane Object Free Area (TOFA)
- Runway/Taxiway Design

The purpose of this review is to develop an action plan to correct design standard deficiencies to meet FAA airport design standards. All standards **must** be met except for the FAA Departure Surface and some taxiway design elements that *should* be met.

Runway and taxiway design standards reference the mid-term (10 years) critical design aircraft derived from the aviation activity forecasts of this master plan study.

Element	Design Standard(s)
Runway 18	FAA Runway Design Code B-I(S)-5000 (1 mile)
Runway 36	FAA Runway Design Code B-I(S)-VIS, Circling Approach
Runway 4	FAA Runway Design Code B-I(S)-VIS, Circling Approach
Runway 22	FAA Runway Design Code B-I(S)-VIS, Circling Approach
Taxiway	Airplane Design Group I, Taxiway Design Group 1A

Results

Table 1 itemizes each design standard deficiency noted during the planning-level review. Elements include location, design standard, deficiency, and mitigation options. The deficiencies are shown graphically in **Figure 1**.

Mitigation options listed are unique to correcting each individual design standard deficiency. The actions taken may trigger additional deficiencies. A comprehensive mitigation plan will be developed to provide a path to compliance.

Table 1: C47 Design Standard Deficiencies

Map ID	Airport Area	Design Standard(s)	Location	Deficiency	Mitigation Options
36-1	Runway 18-36	Runway Safety Area (RSA), Runway Object Free Area (OFA), Runway Obstacle Free Zone (OFZ)	Off-Airport, South of Runway 36 End	Silver Lake Drive and sidewalk within RSA/OFA/OFZ	<ul style="list-style-type: none"> • Shift RWY 36 end north by 215' • Implement 215' reduction in RWY 18 takeoff/landing distance
36-2	Runway 18-36	Runway Object Free Area (OFA), Runway Obstacle Free Zone (OFZ)	Off-Airport, South of Runway 36 End	Power Pole along Silver Lake Drive within OFA/OFZ	<ul style="list-style-type: none"> • Remove/Relocate Pole • Shift RWY 36 end north by 215' • Implement 215' reduction in RWY 18 takeoff/landing distance
36-3	Runway 18-36	Runway Object Free Area (OFA), Runway Obstacle Free Zone (OFZ)	West of Runway 36 End	Tree, sign, and parked aircraft are OFA/OFZ penetrations	<ul style="list-style-type: none"> • Remove tree, remove/relocate sign, relocate aircraft tie-downs
36-4	Runway 18-36	Runway 36 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	On-Airport, East of Runway 36 End	Aircraft tails and wind cone obstruct surface by up to 20'	<ul style="list-style-type: none"> • Shift RWY 36 landing threshold north by 400' • Reclassify RWY 36 for VFR landings and displace landing threshold north by 200' • Relocate fuel facility and wind cone
36-5	Runway 18-36	Runway 36 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, West of Runway 36 End	Building and antenna obstructs surface by up to 33'	<ul style="list-style-type: none"> • Shift RWY 36 landing threshold north by 660' • Reclassify RWY 36 for VFR landings and displace landing threshold north by 460' • Remove building
36-6	Runway 18-36	Runway 36 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, South of Runway 36 End	Several roads with mobile objects obstruct surface by up to 9' (Silver Lake Drive, Driveway, Parking Lot)	<ul style="list-style-type: none"> • Shift RWY 36 landing threshold north by 180' • Reclassify RWY 36 for VFR landings • Remove/Relocate Roads



Map ID	Airport Area	Design Standard(s)	Location	Deficiency	Mitigation Options
36-7	Runway 18-36	Runway 36 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, South of Runway 36 End	Trees obstruct surface by up to 20'	<ul style="list-style-type: none"> • Acquire Rights and Trim/Remove Trees • Shift RWY 36 landing threshold north by 400' • Reclassify RWY 36 for VFR landings and shift RWY 36 landing threshold by 200'
36-8	Runway 18-36	Runway 36 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, South of Runway 36 End	Building vent obstructs surface by 16'	<ul style="list-style-type: none"> • Acquire Rights and Remove Building • Shift RWY 36 landing threshold north by 320' • Reclassify RWY 36 for VFR landings and shift RWY 36 landing threshold by 120'
36-9	Runway 18-36	Runway 36 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, South of Runway 36 End	Power Lines/Poles obstruct surface by up to 37'	<ul style="list-style-type: none"> • Shift RWY 36 landing threshold north by 740' • Reclassify RWY 36 for VFR landings and shift RWY 36 landing threshold by 540' • Bury High-Voltage Power Line Through Approach
36-10	Runway 18-36	Runway 36 FAA Runway Protection Zone (RPZ)	Off-Airport, South of Runway 36 End	Two (2) commercial structures are within RPZ and require further evaluation	<ul style="list-style-type: none"> • Implement FAA-approved mitigation plan which may include removing structures if opportunity arises • Shift RWY 36 end north by 720' or reduce usable length
36-11	Runway 18-36	Runway 18 FAA Departure Surface (40:1 Slope)	South of Runway 36 Arrival End	Over 240 objects (e.g. buildings, poles, vehicles on roads, trees) penetrating surface by up to 87'	<ul style="list-style-type: none"> • Remove obstructions as opportunities arise and prevent the establishment of new obstructions • Do not allow instrument departures to RWY 18



Map ID	Airport Area	Design Standard(s)	Location	Deficiency	Mitigation Options
18-1	Runway 18-36	Runway Safety Area (RSA), Runway Object Free Area (OFA), Runway Obstacle Free Zone (OFZ)	Off-Airport, North of Runway 18 End	Interstate 39 and County Highway CX within RSA/OFA/OFZ, RSA does not meet gradient standards	<ul style="list-style-type: none"> Shift RWY 18 end south by 260' Implement 240' reduction in RWY 36 takeoff/landing distance, re-grade RSA corners Implement 260' reduction in RWY 36 takeoff/landing distance
18-2	Runway 18-36	Runway Object Free Area (OFA), Runway Obstacle Free Zone (OFZ)	On- and Off-Airport, North of Runway 18 End	Numerous trees within OFA/OFZ beyond runway end and alongside of runway	<ul style="list-style-type: none"> Acquire Rights and Trim/Remove Trees Shift RWY 18 end south by 438'
18-3	Runway 18-36	Runway 18 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, North of Runway 18 End	Interstate 39 and County Highway CX with mobile objects obstruct surface by up to 9' and 7', respectively	<ul style="list-style-type: none"> Shift RWY 18 landing threshold south an estimated 280' Reclassify RWY 18 for VFR landings and displace landing threshold south an estimated 20' Remove/Relocate Roads
18-4	Runway 18-36	Runway 36 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, North of Runway 18 End	Trees obstruct surface by up to 34' (may have been removed since FAA survey)	<ul style="list-style-type: none"> Acquire Rights and Trim/Remove Trees Shift RWY 18 landing threshold south by 680' Reclassify RWY 18 for VFR landings and shift RWY 18 landing threshold by 480'
18-5	Runway 18-36	Runway 36 FAA Departure Surface (40:1 Slope)	North of Runway 18 Arrival End	Over 90 objects (e.g. pole, vehicles on roads, trees) penetrating surface by up to 58'	<ul style="list-style-type: none"> Remove obstructions as opportunities arise and prevent the establishment of new obstructions Do not allow instrument departures to RWY 36
18-6	Runway 18-36	Runway Visibility Zone (RVZ)	Off-Airport, 400' West of Runway Intersection	Several trees penetrate intersecting runway RVZ	<ul style="list-style-type: none"> Acquire rights and trim/remove trees within RVZ Close Runway 4-22



Map ID	Airport Area	Design Standard(s)	Location	Deficiency	Mitigation Options
22-1	Runway 4-22	Runway Safety Area (RSA), Runway Object Free Area (OFA), Runway Obstacle Free Zone (OFZ)	Off-Airport, Northeast of Runway 22 End	Field Road and Trees within RSA/OFA/OFZ, Terrain in OFA/OFZ	<ul style="list-style-type: none"> Shift RWY 22 end south by 240', acquire land, re-grade terrain Shift RWY 22 end south by 310' Remove/relocate field road, remove trees, acquire land, re-grade terrain
22-2	Runway 4-22	Runway 22 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, Northeast of Runway 22 End	Mulch pile, nearby trees and power poles obstruct surface by up to 15', 22', and 3' respectively. Field road also obstructs airspace by 10'. (Many trees removed since FAA survey)	<ul style="list-style-type: none"> Acquire rights and remove trees, bury/relocate power pole, remove/relocate field road Shift RWY 4 end or landing threshold southwest by 60' to clear pole, acquire rights and remove trees, remove/relocate field road Reclassify RWY 22 for VFR landings, remove trees, remove/relocate field road
22-3	Runway 4-22	Runway 22 FAA Runway Protection Zone (RPZ)	Off-Airport, Northeast of Runway 22 End	Four (4) residential structures within RPZ and require further evaluation	<ul style="list-style-type: none"> Implement FAA-approved mitigation plan which may include removing structures if opportunity arises Shift RWY 22 end southwest by 540' or reduce usable length
22-4	Runway 4-22	Runway 22 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, Northeast of Runway 22 End	80' tall trees in residential properties penetrate by up to 57'	<ul style="list-style-type: none"> Acquire rights and remove trees Shift RWY 22 end or landing threshold southwest by 1,140' Reclassify RWY 22 for VFR landings and shift landing threshold southwest by 940'
22-5	Runway 4-22	Runway Object Free Area (OFA), Runway Obstacle Free Zone (OFZ)	On-Airport, 380' Northeast of Runway Intersection	Segmented circle pylons penetrate OFA/OFZ	<ul style="list-style-type: none"> Relocate wind cone and segmented circle



Map ID	Airport Area	Design Standard(s)	Location	Deficiency	Mitigation Options
22-6	Runway 4-22	Runway Markings	Runway 4 End	Runway designation markings not at runway end for visual runway	<ul style="list-style-type: none"> • Remark Runway 4-22
22-7	Runway 4-22	Runway 22 FAA Departure Surface (40:1 Slope)	Northeast of Runway 4 Arrival End	Over 40 objects (e.g. buildings, poles, vehicles on roads, trees) penetrating surface by up to 79'	<ul style="list-style-type: none"> • Remove obstructions as opportunities arise and prevent the establishment of new obstructions • Do not allow instrument departures to RWY 22
4-1	Runway 4-22	Runway Width	Along Runway 4-22	Runway is 40' wide and the design standard is 60'	<ul style="list-style-type: none"> • Widen runway by 20' to 60' width
4-2	Runway 4-22	Runway Safety Area (RSA), Runway Object Free Area (OFA), Runway Obstacle Free Zone (OFZ)	On and Off-Airport, Near of Runway 4 End	Numerous trees within OFA/OFZ northwest of Runway 4-22, tree within RSA	<ul style="list-style-type: none"> • Acquire OFA/OFZ land, remove trees
4-3	Runway 4-22	Runway 4 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, Southwest of Runway 4 End	County Highway CX and parking lot with mobile objects obstruct surface by up to 10'	<ul style="list-style-type: none"> • Shift RWY 4 landing threshold northeast by 200' • Reclassify RWY 4 for VFR landings • Remove/relocate road and parking lot
4-4	Runway 4-22	Runway 4 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, Southwest of Runway 4 End	Building obstructs surface by up to 5'	<ul style="list-style-type: none"> • Shift RWY 4 landing threshold northeast by 100' • Reclassify RWY 4 for VFR landings • Remove building
4-5	Runway 4-22	Runway 4 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, Southwest of Runway 4 End	Trees obstruct surface by up to 51'	<ul style="list-style-type: none"> • Acquire rights and remove trees • Shift RWY 4 end or landing threshold northeast by 1,020' • Reclassify RWY 22 for VFR landings and shift landing threshold northeast by 820'



Map ID	Airport Area	Design Standard(s)	Location	Deficiency	Mitigation Options
4-6	Runway 4-22	Runway 4 FAA Approach Surface (Circling, $\geq \frac{3}{4}$ mi. approach; 20:1 Slope)	Off-Airport, Southwest of Runway 4 End	Power poles obstruct surface by up to 3'	<ul style="list-style-type: none"> • Lower/remove power pole • Shift RWY 4 end or landing threshold southwest by 60' • Reclassify RWY 22 for VFR landings
4-7	Runway 4-22	Runway 4 FAA Runway Protection Zone (RPZ)	Off-Airport, Southwest of Runway 4 End	One (1) industrial structures within RPZ and require further evaluation	<ul style="list-style-type: none"> • Implement FAA-approved mitigation plan which may include removing structures if opportunity arises • Shift RWY 4 end northeast by 290' or reduce usable length
4-8	Runway 4-22	Runway Design	Runway 4 End	Additional 108' of pavement beyond Runway 4 end results in in-line taxiway	<ul style="list-style-type: none"> • Remark extra pavement as unusable • Remove extra pavement
4-9	Runway 4-22	Runway 4 FAA Departure Surface (40:1 Slope)	Southwest of Runway 22 Arrival End	Over 80 objects (e.g. buildings, poles, vehicles on roads, trees) penetrating surface by up to 74'	<ul style="list-style-type: none"> • Remove obstructions as opportunities arise and prevent the establishment of new obstructions • Do not allow instrument departures to RWY 4
T-1	Terminal/Hangar Area	Taxiway Design, Holding Position	West of Runway 18-36	Private taxiways have direct access to Runway 18-36 without holding positions	<ul style="list-style-type: none"> • Install runway hold position markings and signs • Consider relocating entrance taxiway to Runway 36 end
T-2	Terminal/Hangar Area	Taxiway Design, Holding Position	Taxiway at Runway 36 Entrance	Wide expanse of pavement near Runway 36 end	<ul style="list-style-type: none"> • Restripe runway holding position markings, install signs, remove excess pavement
T-3	Terminal/Hangar Area	Taxilane Object Free Area (TOFA)	Taxilane East of Paved Tie-Downs	Parked aircraft 30' from taxilane centerline, 39.5' required to meet TOFA standards	<ul style="list-style-type: none"> • Relocate striped taxiway centerline to the east to provide 25' wide taxilane and 39.5' clearance, remove tie-down position

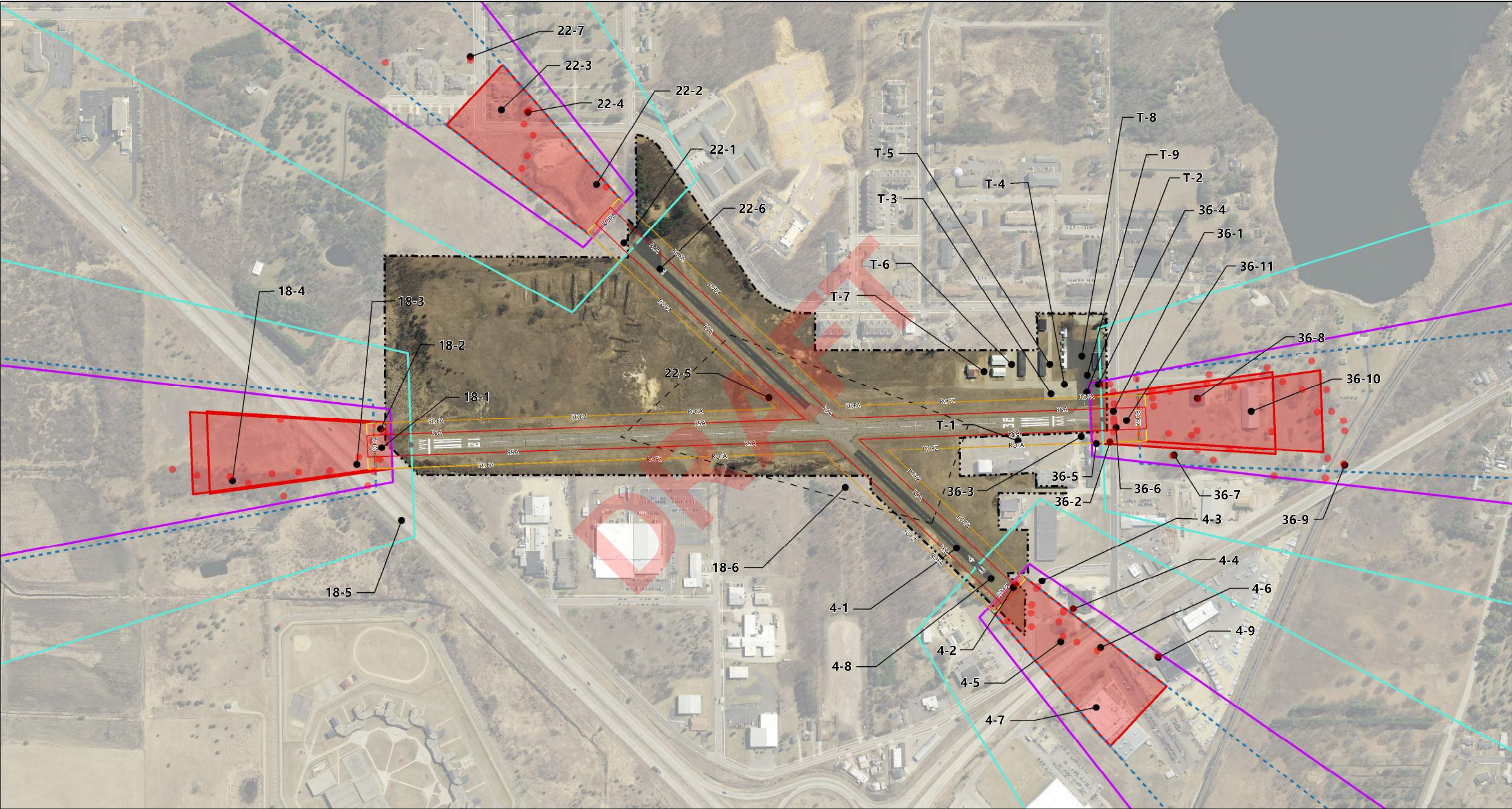


Map ID	Airport Area	Design Standard(s)	Location	Deficiency	Mitigation Options
T-4	Terminal/Hangar Area	Taxiway Object Free Area (TOFA)	Taxilane between Hangar #7 and Tie-Downs	Total actual TOFA width is 75' between objects, 89' required to meet TOFA standards	<ul style="list-style-type: none"> Relocate aircraft tie-downs to meet design standards
T-5	Terminal/Hangar Area	Taxilane Object Free Area (TOFA)	Taxilane south of Hangar #7	Hangar 25' from taxilane centerline, 39.5' required to meet TOFA standards	<ul style="list-style-type: none"> Construct additional taxilane pavement to the south, relocate centerline to provide 25' wide taxilane and 39.5' clearance
T-6	Terminal/Hangar Area	Taxilane Object Free Area (TOFA)	Taxilane between of Hangar #7 and #9	Total actual TOFA width is 72' between hangars, 79' required to meet TOFA standards	<ul style="list-style-type: none"> Document 43' wingspan restriction to meet acceptable level of safety per FAA Engineering Brief 78
T-7	Terminal/Hangar Area	Taxilane Object Free Area (TOFA)	Taxilane between of Hangar #12 and #10	Hangar 25' from taxilane centerline, 39.5' required to meet TOFA standards. 75' between hangar buildings.	<ul style="list-style-type: none"> Relocate taxilane to maximize clearance Document 45' wingspan restriction to meet acceptable level of safety per FAA Engineering Brief 78
T-8	Terminal/Hangar Area	Taxilane Object Free Area (TOFA)	South of Hangar #5	No taxilane centerlines for maneuvering clearance from fixed objects	<ul style="list-style-type: none"> Stripe taxilane centerlines meeting FAA standards for object clearance
T-9	Terminal/Hangar Area	Taxiway Design	North of Hangar #1	Direct access taxiway to Runway 18-36, wide expanse of pavement	<ul style="list-style-type: none"> Relocate Runway 36 entrance taxiway Remove excess pavement or reutilize as aircraft parking (if needed)

Source: TKDA Analysis (2019)



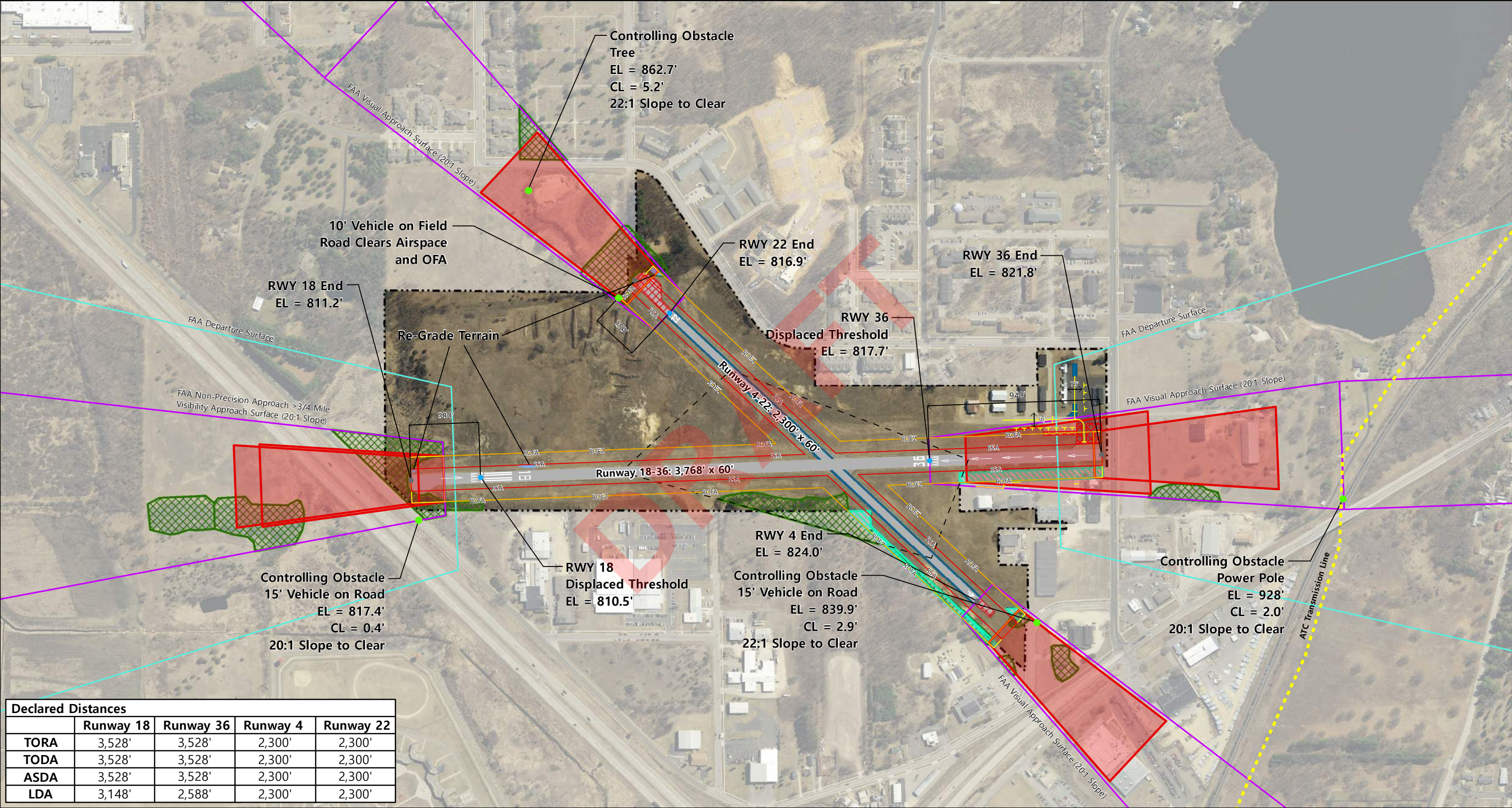
FIGURE 1: AIRPORT DESIGN DEFICIENCIES
PORTAGE MUNICIPAL AIRPORT



- | | | |
|----------------------------------|------------------------------|-----------------------------------|
| × — Fence | Runway Protection Zone (RPZ) | FAA Departure Surfaces |
| Runway Safety Area (RSA) | Runway Visibility Zone (RVZ) | Airport Boundary |
| Runway Object Free Area (ROFA) | P77 Surfaces | FAA Approach Surface Obstructions |
| Runway Obstacle Free Zone (ROFZ) | FAA Approach Surfaces | |

0 250 500 1,000 Feet

DATA SOURCE: COLUMBIA COUNTY LAND INFORMATION DEPARTMENT



- Existing Runway End
 - Future Runway End
 - Runway Object Free Area (ROFA)
 - Runway Obstacle Free Zone (ROFZ)
- Runway Safety Area (RSA)
 - Runway Visibility Zone (RVZ)
 - Runway Protection Zone (RPZ)
 - Terrain Grading
- Tree Removal
 - Land Acquisition
 - FAA Approach Surface
 - FAA Departure Surface
- New Pavement
 - Pavement Removal
 - Existing Pavement
 - Airport Boundary
- Transmission Line

0 250 500 1,000 Feet