



PORT EVERGLADES MASTER PLAN

APPENDIX B

PRELIMINARY OBSTACLE CLEARANCE ANALYSIS BY JACOBS CONSULTANCY



Briefing

Broward County Administration Airport / Port Technical Working Group

Preliminary Obstacle Clearance Analysis

**Port Everglades Cranes and Transient Vessels
Fort Lauderdale – Hollywood International Airport**

November, 2006

Purpose of Study

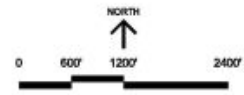
- **To evaluate obstacle clearance specifications associated with current and proposed future airfield operations at Fort Lauderdale – Hollywood International Airport.**
- **Focus on study area: Location of Cranes and movement of transient vessels at the Mid-Port and South-Port areas of Port Everglades**
- **To identify areas where port cranes and transient vessels may be operating that may require further coordination with airport operations, with respect to obstacle clearance standards**

Study Area: South Port and Mid Port, Current Airfield Configuration



- AIRPORT**
- Existing runway
 - Proposed new runway / runway extension (1)
 - Decommissioned runway
 - Extended runway centerline

- SEAPORT**
- Study area
 - Berth number
 - Crane envelope of operation, approximately 180 feet AMSL
 - Crane envelope of operation, approximately 280 feet AMSL
 - Cargo ships, up to 55m (180 feet) above waterline
 - Cruise ships, up to 62m (203 feet) above waterline

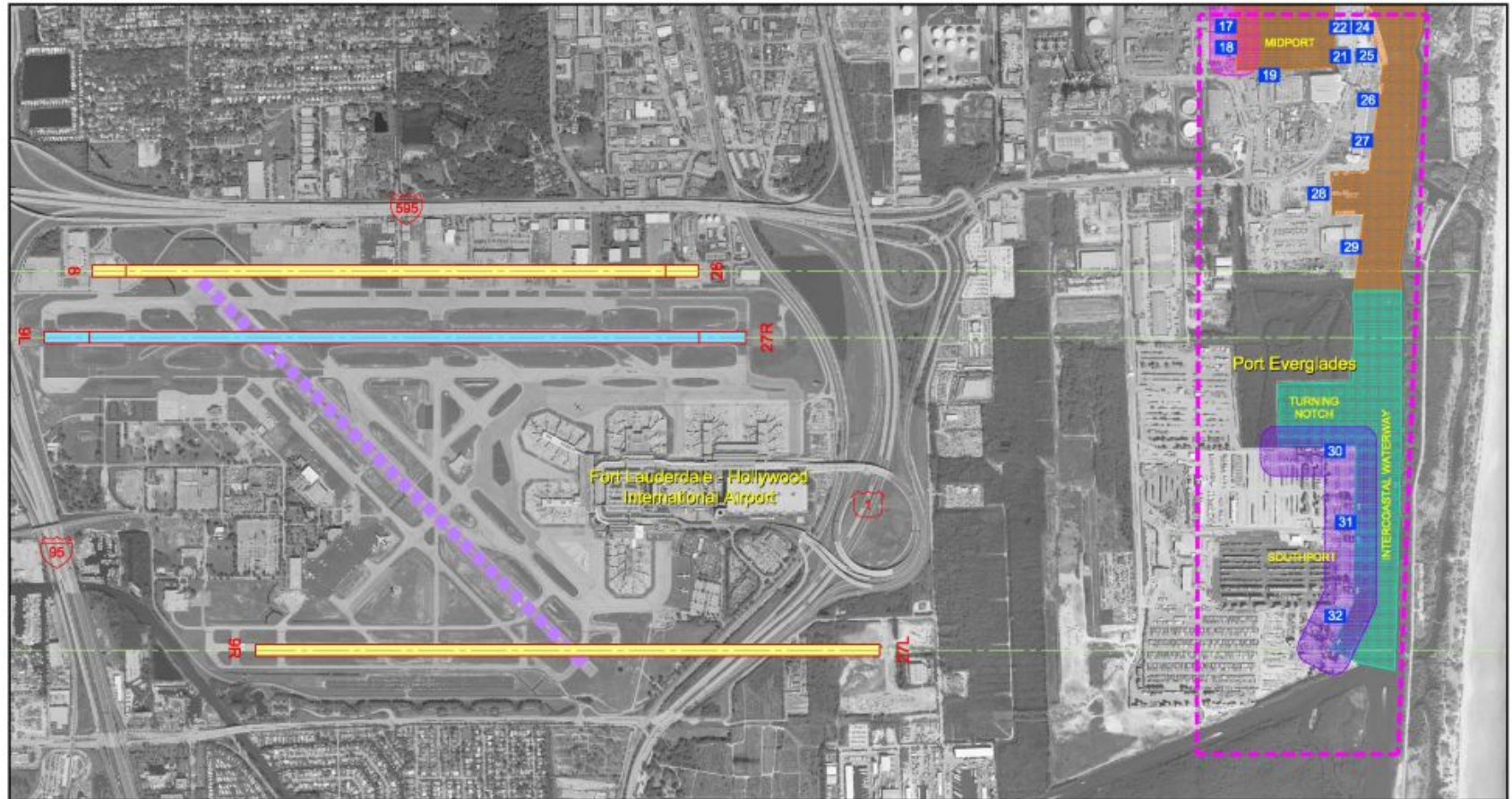


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Figure 1
**STUDY AREA
IN RELATION TO AIRPORT
EXISTING CONDITIONS**
Airspace Obstruction Study
Port Everglades Cranes and Ships
Fort Lauderdale-Hollywood International Airport
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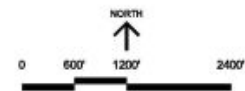
1. Extended South Runway (SR12); 2. New CR Runway Alternative #1; 3. New North Runway (NR1); 4. New CR Runway Alternative #2

Study Area: South Port and Mid Port, Future Airfield Alternatives



- AIRPORT**
- Existing runway
 - Proposed new runway / runway extension (1)
 - Decommissioned runway
 - Extended runway centerline

- SEAPORT**
- Study area
 - 25 Berth number
 - Crane envelope of operation, approximately 180 feet AMSL
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 - Cargo ships, up to 55m (180 feet) above waterline
 - Cruise ships, up to 62m (203 feet) above waterline



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Figure 2
**STUDY AREA
IN RELATION TO AIRPORT
PROPOSED AIRFIELD DEVELOPMENT**
Airspace Obstruction Study
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Study Scope: Three Types of Obstacle Clearance Standards

- **Obstruction Standards:** “Land use Planning Guidelines”

As defined by 14 CFR Part 77 – Objects Affecting Navigable Airspace

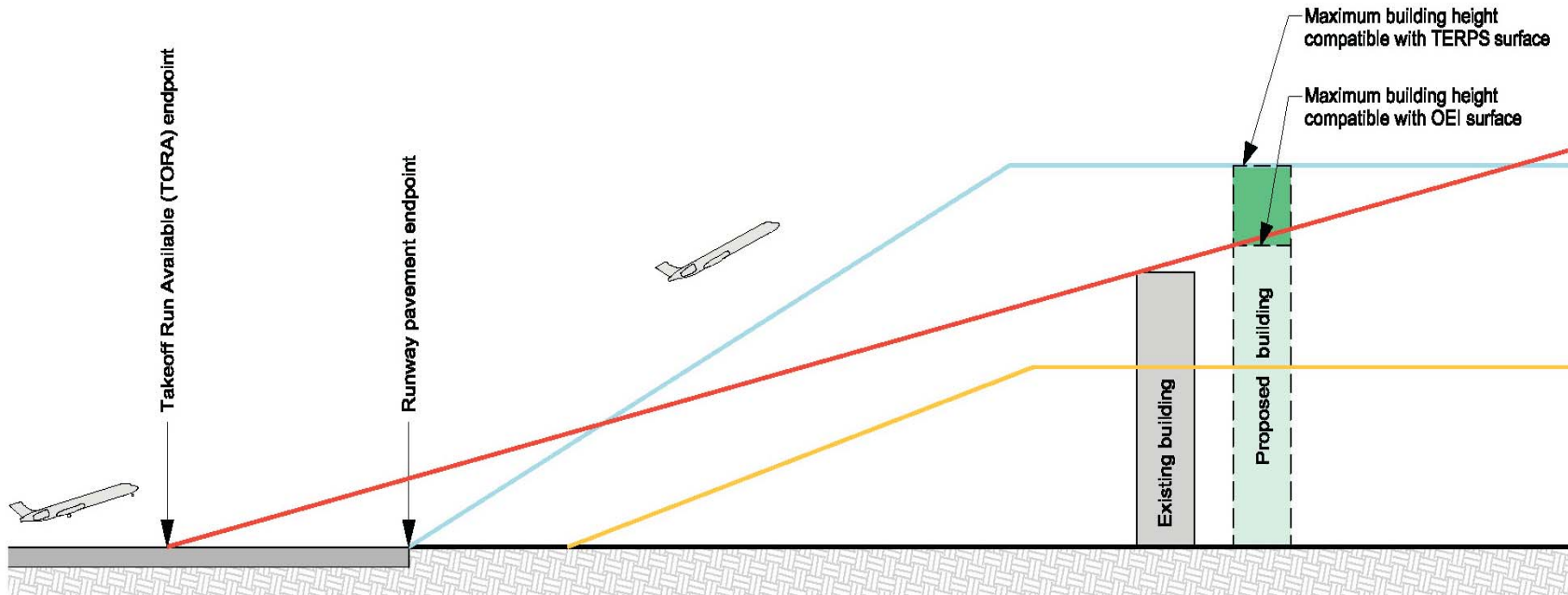
- **Hazard Standards:** “Safety Guidelines”

As defined by FAA Order 7400.2E “Procedures for Handling Airspace Matters”
IFR Procedures as defined by FAA Order 8260. series (TERPS)
VFR Procedures & Clearances

- **Air Service Capability Standards:** “Air Service Guidelines”

14 CFR Part 25.121 – One Engine Inoperative Climb Procedures
14 CFR 121.189 – Airplanes – Takeoff Limitations

Study Scope: Three Types of Obstacle Clearance Standards



NOTES

- FAR Part 77 Civil Airport Imaginary Surfaces - Used by FAA to determine obstruction status. If obstruction standards are exceeded, FAA performs further aeronautical study to determine hazard status.
- TERPS - Obstacle Clearance Surfaces (OCSs) protecting published instrument procedures as defined in FAA order 8260.3B, *US Standard for Terminal Instrument Procedures*. In FAA studies, this is the most common factor for determining hazard status.
- Obstacle Accountability Area (OAA) for One-Engine Inoperative (OEI) - An emergency procedure developed by individual airlines to establish air service capability. When performing obstruction evaluation studies, FAA does not recognize OEI as a factor for determining obstruction status or hazard status.

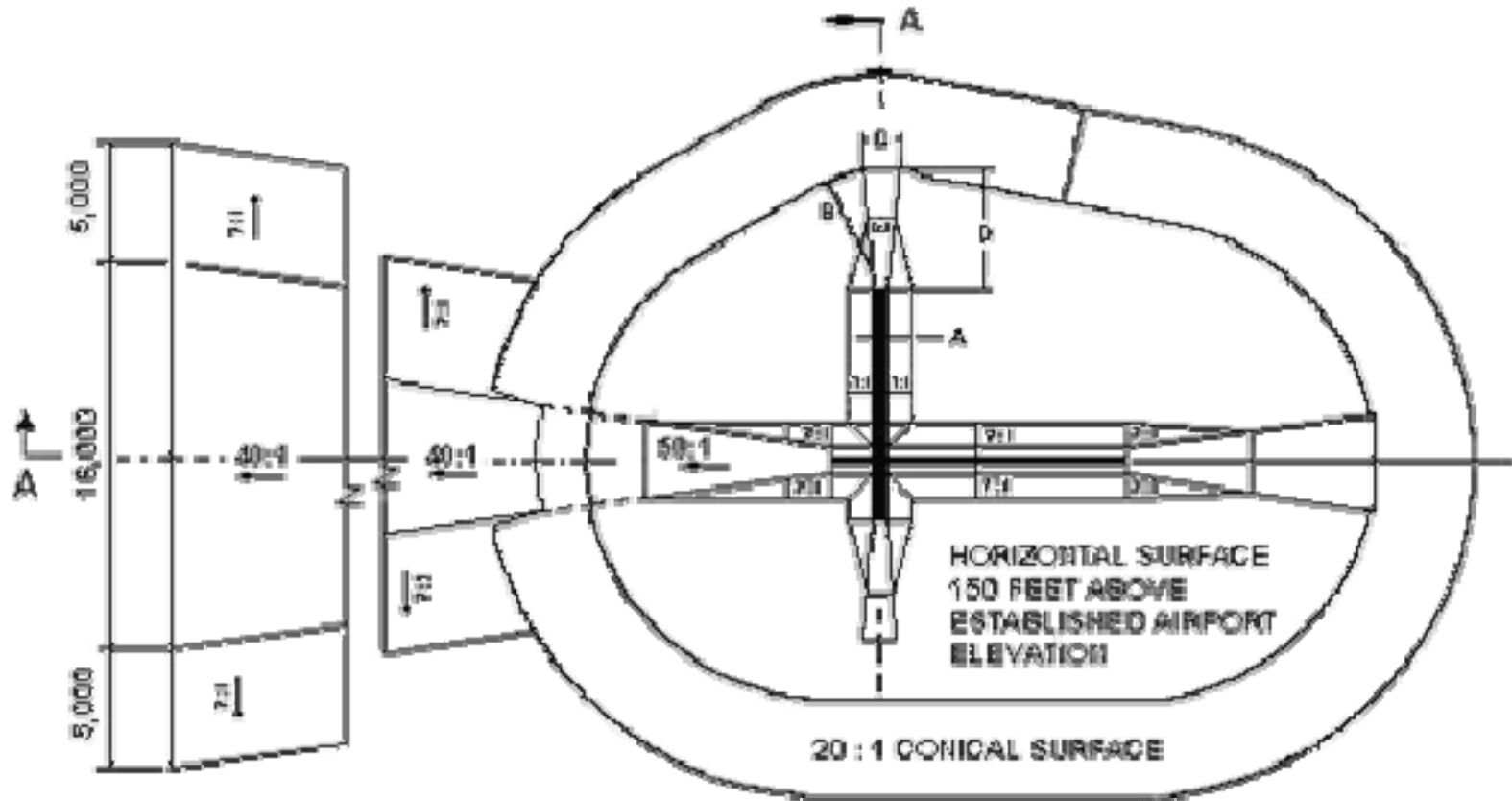
Note: The relationship between Part 77 obstruction standards, TERPS and OEI surfaces are different at different locations. At some areas, TERPS and/or OEI surfaces can be lower than Part 77 obstruction standards.

LEGEND

- FAR Part 77 obstruction surface
 - TERPS surfaces
 - OEI surfaces
- See below for further explanation

Obstruction Standards: 14 CFR Part 77: Objects Affecting Navigable Airspace

Regulation used to determine if an object is or is not an “obstruction to air navigation” based on “imaginary surfaces”

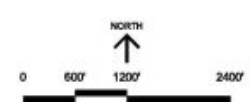


Obstruction Standards: 14 CFR Part 77 - Current Airfield Configuration



- AIRPORT**
- Existing runway
 - Proposed new runway / runway extension (1)
 - Decommissioned runway
 - Extended runway centerline
 - FAR Part 77 surface
 - 150 Elevation contour of above-named surface, feet AMSL

- SEAPORT**
- Study area
 - 26 Berth number
 - Crane envelope of operation, approximately 160 feet AMSL
 - Crane envelope of operation, approximately 280 feet AMSL
 - Cargo ships, up to 55m (180 feet) above waterline
 - Cruise ships, up to 62m (203 feet) above waterline

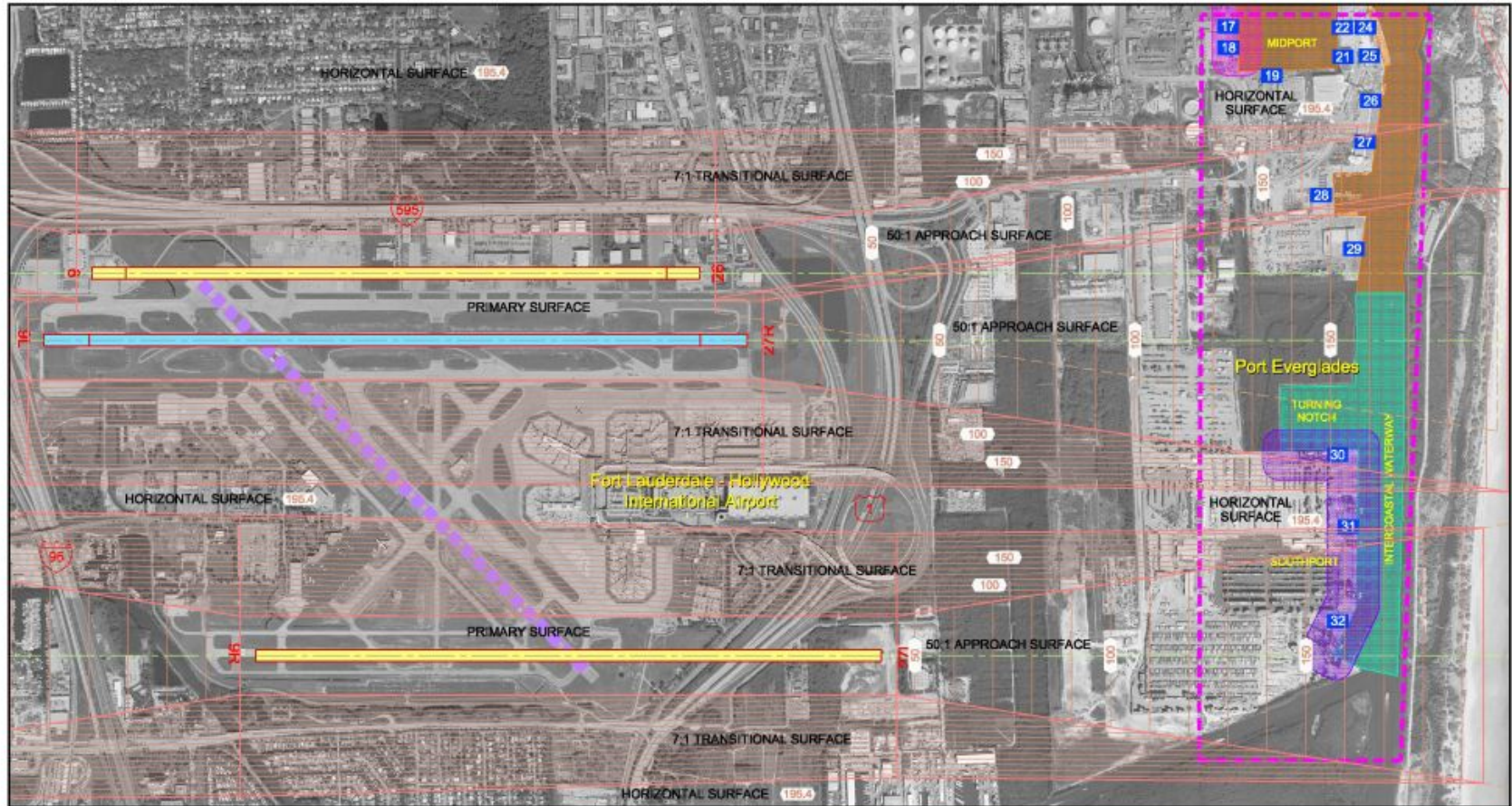


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Figure 3
**FAR PART 77 SURFACES
OVER STUDY AREA
EXISTING CONDITIONS**
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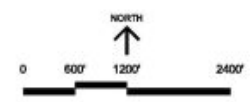
(C) Grandd South Turnway (SR 27) from E3 form, November 8/06 New North Peace Turnway (SR 26) from E3 form, November 06

Obstruction Standards: 14 CFR Part 77 – Future Airfield Alternatives



- AIRPORT**
- Existing runway
 - Proposed new runway / runway extension (1)
 - Decommissioned runway
 - Extended runway centerline
 - FAR Part 77 surface
 - 150 Elevation contour of above-named surface, feet AMSL

- SEAPORT**
- Study area
 - 26 Berth number
 - Crane envelope of operation, approximately 180 feet AMSL
 - Crane envelope of operation, approximately 280 feet AMSL
 - Cargo ships, up to 55m (180 feet) above waterline
 - Cruise ships, up to 62m (203 feet) above waterline



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Figure 4
**FAR PART 77 SURFACES
 OVER STUDY AREA**
PROPOSED AIRFIELD DEVELOPMENT
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© General South Turnway (SR 27) from EIS Year 1 Alternative B19 - New North Pacific Turnway (SR 26) from EIS Year 1 Alternative D8

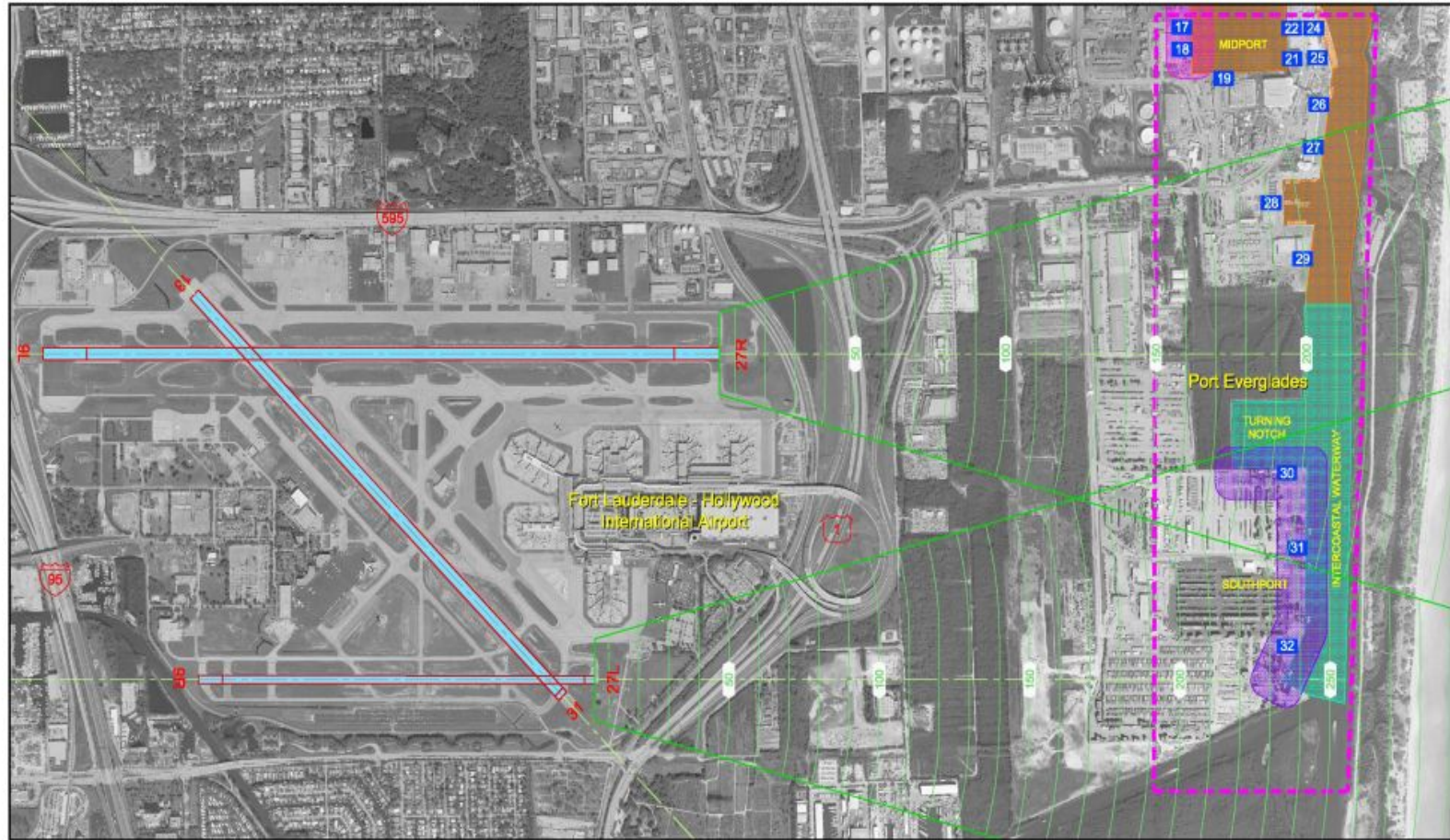
Hazard Standards: FAA Order 8260.3: TERPS

Determines:

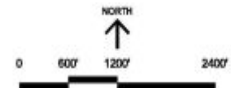
1. Approach and Departure procedures for aircraft using Instrument approach technology (ILS, GPS, etc.) for navigation.
2. Establishes minimum climb gradients for departures. (200 ft/nm)
3. Establishes minimum safety surface to evaluate obstructions (40:1 slope)

Presence of obstacles penetrating 40:1 surface implies need to re-design instrument procedures, modify runway usage, or to declare a hazard to air navigation.

Hazard Standards: FAA Order 8260.3: TERPS – Current Airfield Configuration



- | | |
|--|--|
| AIRPORT | SEAPORT |
| Existing runway | Study area |
| Proposed new runway / runway extension (1) | Berth number |
| Decommissioned runway | Crane envelope of operation, approximately 160 feet AMSL |
| Extended runway centerline | Crane envelope of operation, approximately 280 feet AMSL |
| IFR departure obstacle clearance surface (TERPS) | Cargo ships, up to 55m (180 feet) above waterline |
| 150 - Elevation contour of above-named surface, feet AMSL | Cruise ships, up to 62m (203 feet) above waterline |
| Note: where overlap occurs, contours are for lowest surface. | |



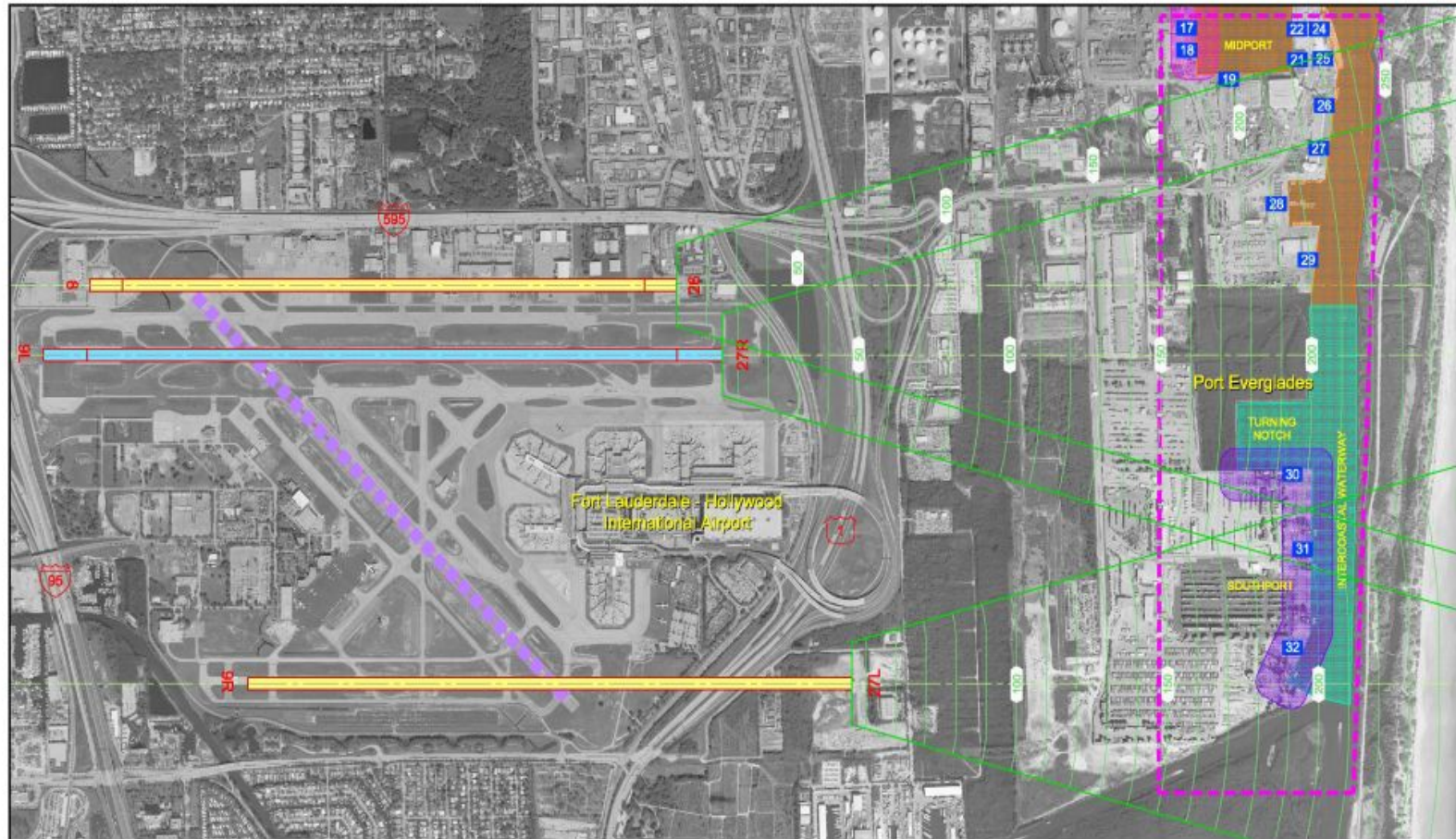
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Figure 5
CRITICAL TERPS DEPARTURE SURFACES OVER STUDY AREA EXISTING CONDITIONS
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Port Everglades Cranes and Ships
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© (Granted South Runway (R27L)) from EIS Study, Alternative B-19. North Pacific Runway (R28L) from EIS Study, Alternative D1.

Hazard Standards: FAA Order 8260.3: TERPS – Future Airfield Alternatives



AIRPORT

- Existing runway
 - Proposed new runway / runway extension (1)
 - Decommissioned runway
 - Extended runway centerline
 - IFR departure obstacle clearance surface (TERPS)
 - 150 — Elevation contour of above-named surface, feet AMSL
- Note: where overlap occurs, contours are for lowest surface.

SEAPORT

- Study area
- 25 — Berth number
- Crane envelope of operation, approximately 150 feet AMSL
- Crane envelope of operation, approximately 250 feet AMSL
- Cargo ships, up to 55m (180 feet) above waterline
- Cruise ships, up to 62m (203 feet) above waterline



Figure 6
CRITICAL TERPS DEPARTURE SURFACES OVER STUDY AREA
PROPOSED AIRFIELD DEVELOPMENT
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Air Service Capability Standards: OEI's

Standards used by individual airlines to establish emergency procedures under one-engine-inoperative conditions.

Air carriers determine maximum allowable weight of aircraft at operation based on established emergency procedures and area obstacles

Based on: 14 CFR Part 25.121 – One Engine Inoperative Climb Procedures
14 CFR 121.189 – Airplanes – Takeoff Limitations

Initial evaluations based on ICAO standard OEI surface of 62.5:1

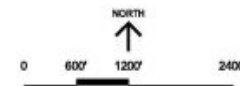
**If obstacles penetrate an OEI surface
air carrier service to certain markets may be affected.**

Air Service Capability Standards: OEI's – Current Airfield Configuration



- AIRPORT**
- Existing runway
 - Proposed new runway / runway extension (1)
 - Decommissioned runway
 - Extended runway centerline
 - ICAO one-engine inoperative (OEI) surface
 - 150 Elevation contour of above-named surface, feet AMSL
- Notes: Where overlap occurs, contours are for lowest surface. Contour contours shown are for 82.5:1 (1.4%) slope, the slope for which aircrew must take clear cut into account when designing OC procedures. There may be existing obstacles that protrude the surfaces as shown. Introduction of new obstacles may have a negative affect on air service capabilities.
- (1) Extended South Runway (SR12), from E11 term, Alternative B10. New 14th Parallel Runway (R10), from E11 term, Alternative D1

- SEAPORT**
- Study area
 - Berth number
 - Crane envelope of operation, approximately 180 feet AMSL
 - Crane envelope of operation, approximately 280 feet AMSL
 - Cargo ships, up to 55m (180 feet) above waterline
 - Cruise ships, up to 62m (203 feet) above waterline

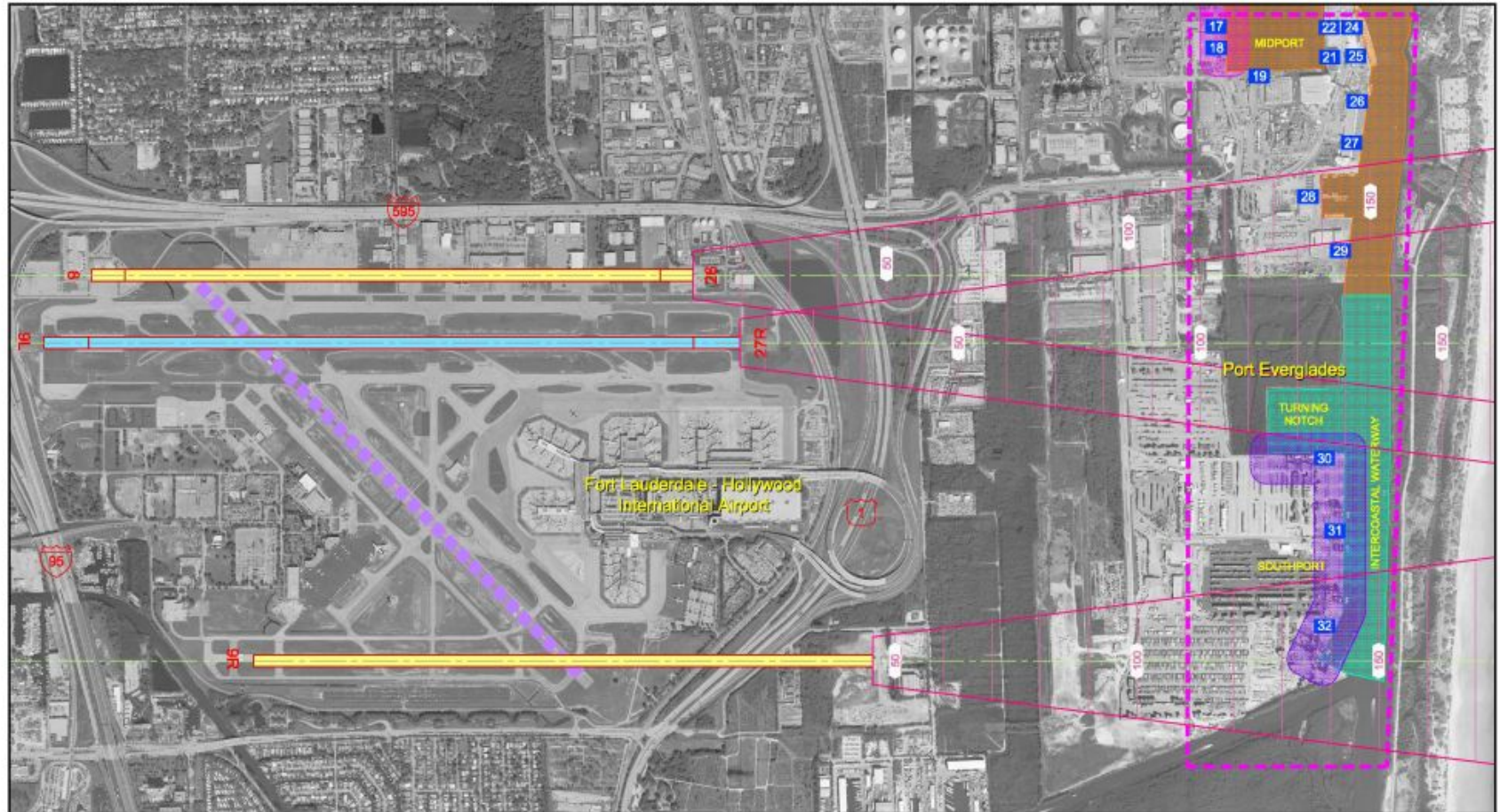


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Figure 7
ICAO ONE ENGINE INOPERATIVE (OEI) SURFACE
OVER STUDY AREA
EXISTING CONDITIONS
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Port Everglades Cranes and Ships
Fort Lauderdale-Hollywood International Airport
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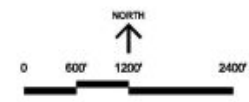
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Air Service Capability Standards: OEI's – Future Airfield Alternatives



- AIRPORT**
- Existing runway
 - Proposed new runway / runway extension (1)
 - - - Decommissioned runway
 - Extended runway centerline
 - ICAO one-engine inoperative (OEI) surface
 - 150 - Elevation contour of above-named surface, feet AMSL
- Notes: Where overlaps occur, contours are for lowest surface. Contour contours shown are for 62.5 ft (1.9%) slope, the slope for which air level must take clearance into account when designing OC procedures. There may be existing obstacles that protrude the surface as shown. Introduction of new obstacles may have a negative affect on air service capabilities.
- (1) Extended South Runway (SR12), from CR Term, Alternative B10. Note: 1640' Pacific Runway (PR10), from E1 Term, Alternative D1

- SEAPORT**
- - - Study area
 - 26 Berth number
 - Crane envelope of operation, approximately 180 feet AMSL
 - Crane envelope of operation, approximately 280 feet AMSL
 - Cargo ships, up to 55m (180 feet) above waterline
 - Cruise ships, up to 62m (203 feet) above waterline

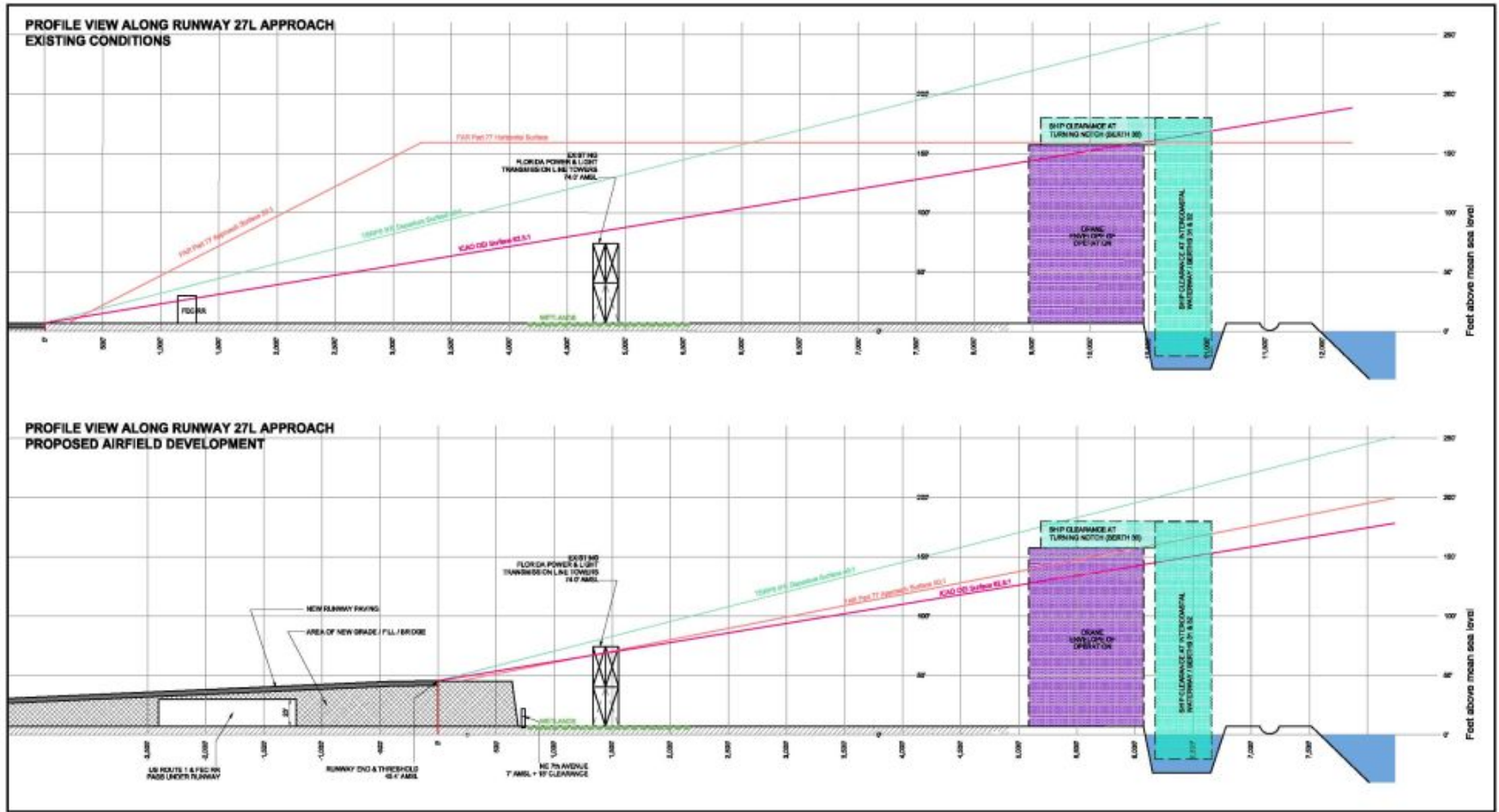


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Figure 8
ICAO ONE ENGINE INOPERATIVE (OEI) SURFACE OVER STUDY AREA
PROPOSED AIRFIELD DEVELOPMENT
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Summary: Profile View Along Runway 27L: Existing and Future Cases



0 400' 800' 1600'
WITH 10x VERTICAL EXAGGERATION

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Figure 9
PROFILE VIEW
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Port Everglades Cranes and Ships
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Conclusions

Heights of future proposed port cranes and vessels require:

- Submission of Form 7460 to FAA – “Notice of Proposed Construction”
- Coordination with FAA on design and use of Instrument Procedures
- Coordination with Airlines’ air service desires and capabilities

Implications of higher cranes combined with future airfield include:

- Potential Obstruction determinations at South and Mid Port
- Coordination with FAA required to avoid Hazard Determinations
- Potential for Air Service implications on future 9R – 27L due to South ends of South and Mid Port cranes, and existing FPL lines

Suggested Action Items

- **Incorporate language addressing obstacle clearance standards in Port Everglades Master Plan Document**
- **Pursue more detailed analysis based on published EIS**
- **Eventually contact FAA for TERPS analysis**
- **Research current airline OEI procedures at FLL**