

**BOARD OF COMMISSIONERS
NORFOLK AIRPORT AUTHORITY
September 26, 2019
AGENDA**

CALL TO ORDER:

- Approval of Board Meeting Minutes July 25, 2019

REGULAR AGENDA:

- R-1** Recommendation to Approve Advanced Refunding of Series 2011 Bonds
(**Executive Director**)

- R-2** Recommendation to Approve Preferred Airport Master Plan Update Development
Alternatives (**Executive Director**)

EXECUTIVE DIRECTOR'S REPORT:

CHAIRMAN'S REPORT:

OLD BUSINESS:

NEW BUSINESS:

- Date Selection for December 2019 Board Meeting

CLOSED MEETING (IF REQUIRED):

RECONVENE OPEN MEETING:

ADJOURNMENT:



NORFOLK AIRPORT AUTHORITY

Norfolk International Airport / 2200 Norview Avenue / Norfolk, Virginia 23518-5807
757-857-3351 / Fax: 757-857-3265

September 18, 2019

Board of Commissioners
Norfolk Airport Authority

Dear Ladies and Gentlemen,

Staff has completed its review of Master Plan Update Working Paper #4 and has selected its preferred Airport Development Alternatives for the upcoming twenty-year planning period. For each preferred alternative I have enclosed pertinent pages from Working Paper #4 as additional information. Staff's preferred alternatives are as follows:

1. Runway 14/32 Alternative 3, Close Runway 14/32 (Figure 5-2).
2. Parallel Runway Alternative 5, Runway 5R-23L, 9001' x 150', Offset 876', ARC D-IV, 34:1 TSS (Figure A-3) in accordance with the Grant of Avigation Easement – US Navy Little Creek for the Airport Layout Plan.
3. Parallel Runway Alternative 12B, Runway 5R-23L, 5,500' x 100' with EMAS at Both Ends, Offset 876", ARC C-II, 20:1 TSS, Visibility not lower than 1 mile (Figure 5-5) for the 20-Year Planning Period.
4. Taxiway Alternative 1, Partial Realignment of Taxiway C (Figure 5-6).
5. Terminal Alternative 1 (Figure 5-11).
6. Landside Commercial Development – Commercial Retail/Cell Phone Lot/Gas Station (Figure 5-18): Should be **tabled** for consideration until all new or relocated airfield support facilities are accommodated.
7. Rental Car Quick Turnaround (QTA) Alternative 3 (Figure 5-19).
8. Rental Car Consolidated Car Facility (CONRAC) Alternative 2 – CONRAC Only – Lower Level of New Parking Garages B&C (Figure 5-20) with public parking on the upper levels.

9. Air Cargo North Cargo Alternative 1 (Figure 5-21) but **without** the aircraft Maintenance, Repair, and Overhaul (MRO) Facilities.
10. General Aviation Alternative 1 (Figure 5-24) for expansion of existing Fixed Base Operation (FBO).
11. Aviation Fuel and Glycol Storage Facility Alternative 1 (Figure 5-26).
12. Aircraft Deicing Facilities Alternative 1 Remote Terminal Deicing Apron (Figure 5-27) adjacent to the Air Cargo Facilities.
13. Airfield Maintenance Facilities Alternatives #1, #2, #3 and #4 (Figure 5-28) are **not** preferred. Instead, staff recommends consideration be given to relocating the Airfield Maintenance Facilities to the Future Non-Aeronautical Commercial Retail/Cell Phone Lot/Gas Station Area depicted in Figure 5-21.

I recommend that the Board approve these selections for the final Master Plan Update. Please let me know if you have any questions. I will place this matter on the agenda for Board action at our meeting scheduled for September 26, 2019.

Sincerely,



Robert S. Bowen, A.A.E.
Executive Director

Enclosures:

Copy with encl: Directors
 Anita O. Poston, Esquire



NORFOLK INTERNATIONAL AIRPORT

AIRPORT MASTER PLAN

WORKING PAPER #4

AIRPORT DEVELOPMENT ALTERNATIVES AND ENVIRONMENTAL REVIEW

August 2019



Prepared By:



Alternative 3: Close Runway 14/32

This alternative (Figure 5-2) would permanently close Runway 14/32 and enable redevelopment of the property for expanded airport facilities. Runway 14/32 can only effectively serve piston aircraft and is used infrequently. (More detail regarding usage of Runway 14/32 is provided in Chapter 3, Table 4-7: Runway Usage). Furthermore, even with a runway extension the surrounding regional airspace would render commercial activity on this orientation difficult. As such, with very limited benefit, there is a strong case for this alternative; therefore, it is also advanced for additional consideration. Table 5-3 lists the opportunities and constraints for Runway Alternative 3.

Table 5-3 – Alternative 3: Close Runway 14/32

Opportunities	Constraints
<ul style="list-style-type: none"> ✈ Recaptures airport property to expand critical aviation facilities ✈ Avoids airspace conflicts with surrounding facilities ✈ Eliminates some operational conflicts and safety concerns 	<ul style="list-style-type: none"> ✈ Reduces crosswind coverage for light General Aviation aircraft

Source: CHA, 2019.

Proposed Parallel Runway 5R/23L Alternatives

Alternative 8: Runway 5R/23L – 6,000 Feet, ARC C-III

This alternative (Figure 5-3) includes building a new parallel runway 876 feet east of the existing Runway 5/23. The new runway would be 6,000 feet in length and 150 feet in width, providing the greatest length without physically impacting adjacent Lake Whitehurst. This runway concept would be capable of serving up to C-III aircraft. Constraints to this alternative include penetration to the Runway 5L glideslope critical area, potentially requiring its relocation¹.

Accompanying the parallel runway would be a full-length parallel taxiway capable of accommodating aircraft up to TDG 3. This taxiway would be 50 feet wide and provide 400 feet of separation from the runway. As shown in Figure 5-3, Lake Whitehurst would impede the TOFA, TSA, and RSA. To minimize airspace and obstruction considerations, both runway ends would include displaced thresholds, reducing landing distance to 5,000 or 5,500 feet. The US Navy has indicated their concern for impacts to Naval training activity for this and any parallel runway alternative.

This concept warrants further consideration and was used as the foundation for the remaining derivative alternatives of various lengths and approach capabilities. Table 5-4 lists the opportunities and constraints for Runway Alternative 8.

¹ It should be noted that this constraint would be present for the other parallel runway alternatives -with the same runway to runway offset.



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MASTER PLAN UPDATE**

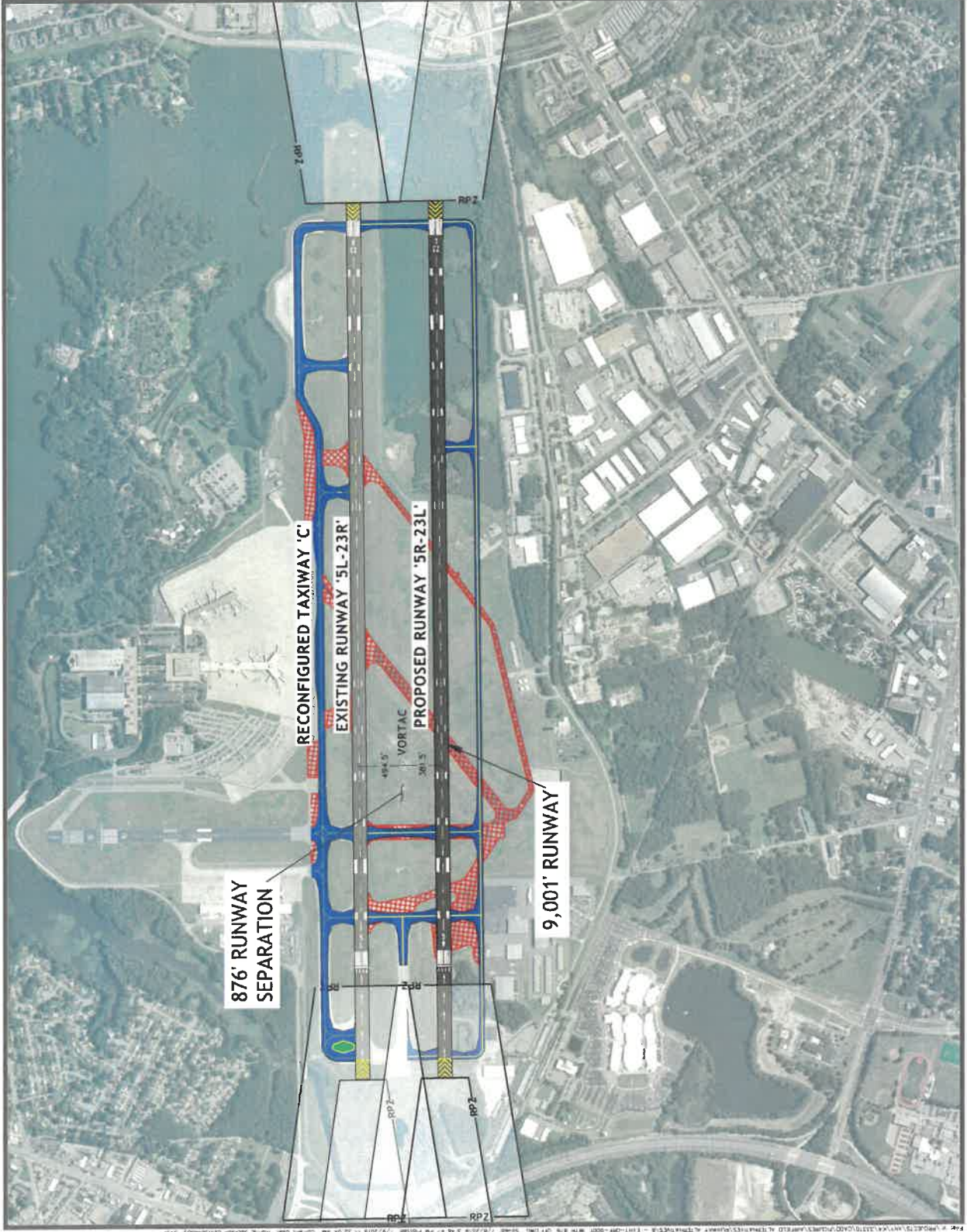


Figure A-3
Proposed 5R-23L - 9,001'
34:1 TSS, D-IV Runway
180° SHIP HEIGHTS
Alternative 5

APPENDIX A – ELIMINATED RUNWAY ALTERNATIVES

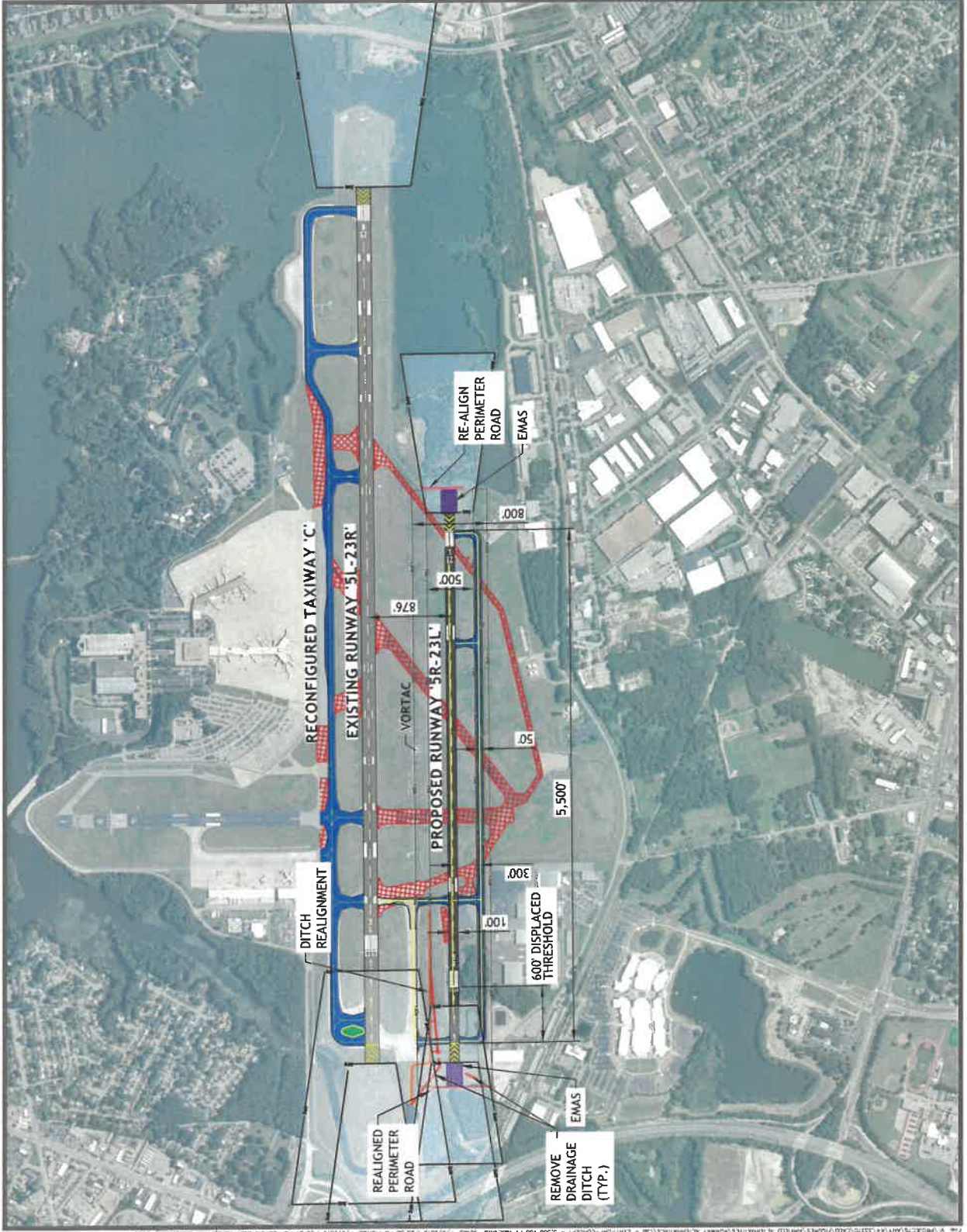
Table A-1 – Eliminated Runway Alternatives Summary

Alternative	Opportunities	Constraints
Alternative 1: Relocate Runway 5 Threshold	<ul style="list-style-type: none"> ✈ Captures full length of runway for landing on Runway 5 (current Landing Distance Available is adequate for all aircraft operations) 	<ul style="list-style-type: none"> ✈ Cost and impact of relocating approach lighting system and navigational aids (glideslope, PAPIs, runway markings)
	-	<ul style="list-style-type: none"> ✈ Off-airport tree removal required
Alternative 4: 9,000' Offset: 400'	<ul style="list-style-type: none"> ✈ Provides secondary runway for operational flexibility ✈ Proposed length accommodates all commercial activity ✈ Avoids impacts to existing landside facilities 	<ul style="list-style-type: none"> ✈ 400' separation does not permit simultaneous operations ✈ Overlapping Runway Object Free Areas (ROFAs) ✈ Requires relocation or decommissioning of VORTAC ✈ Environmental impacts to Lake Whitehurst ✈ Significant construction costs ✈ Approach/departure overfly Little Creek Naval Base
Alternative 5: 9,000' Offset: 876'	<ul style="list-style-type: none"> ✈ Provides secondary runway for operational flexibility ✈ Proposed length accommodates all commercial activity ✈ Avoids impacts to VORTAC ✈ 876' separation enables simultaneous VFR operations 	<ul style="list-style-type: none"> ✈ Impacts to Lake Whitehurst ✈ Impacts to on-airport facilities (airport maintenance facilities, ARFF training facility, MRO hangar, and GA parking apron) ✈ Significant construction costs ✈ Approach/departure overfly Little Creek Naval Base
Alternative 6: 7,900' and 7,200' Offset: 876'	<ul style="list-style-type: none"> ✈ Provides secondary runway for operational flexibility ✈ Proposed length accommodates all or most commercial activity ✈ Avoids impacts to VORTAC ✈ 876' separation enables simultaneous VFR operations ✈ Reduces costs and impacts due to shorter runway lengths (7,900' or 7,200') 	<ul style="list-style-type: none"> ✈ Impacts to Lake Whitehurst ✈ Impacts to on-airport facilities (airport maintenance facilities, ARFF training facility, MRO hangar, and GA parking apron) ✈ Approach/departure overfly Little Creek Naval Base

Table continued on next page



**NORFOLK INTERNATIONAL AIRPORT
MASTER PLAN UPDATE**



DECLARED DISTANCES	
PROPOSED RUNWAY 5R-23L	
RUNWAY 5R	RUNWAY 23L
TORA	5,500'
TODA	5,500'
ASDA	5,500'
LDA	4,900'
	5,500'

**Figure 5-5
Proposed 5R-23L
5,500' With EMAS At Both Ends**
20:1 TSS, C-II Runway
Not Lower than 1 Mile Visibility
Alternative 12B

Table 5-4 – Alternative 8: Runway 5R/23L (6,000', ARC C-III)

Opportunities	Constraints
<ul style="list-style-type: none"> ✈ Provides secondary runway for GA airport users ✈ Avoids impacts to VORTAC ✈ 876' separation enables simultaneous VFR operations ✈ No direct physical impacts to Lake Whitehurst (however some wetland impacts will occur) ✈ Greater height over Little Creek Naval Base 	<ul style="list-style-type: none"> ✈ Length limits usage by most commercial operations ✈ Impacts to on-airport facilities (airport maintenance facilities, ARFF training facility, MRO hangar, and GA parking apron) ✈ RPZ impacts to commercial buildings Potential Impact to Naval training activity

Source: CHA, 2019.

Alternative 11: Runway 5R/23L – 4,876 Foot, ARC B-II

This alternative (**Figure 5-4**) illustrates the shortest parallel runway concept, providing the existing length of Runway 14/32 at 4,876 feet. The purpose of this concept is to replace the crosswind runway with a parallel runway. At this length, an ARC of B-II is appropriate with a taxiway offset of only 240 feet. A one-mile visibility minimum results in a steeper 20:1 threshold surface. This minimalist concept would reduce costs and impacts but would not accommodate the full general aviation corporate jet fleet. Larger aircraft would often taxi across the new runway to use the longer length of the primary runway. Nevertheless, with the lowest costs and impacts, this concept is advanced for further consideration. **Table 5-5** lists the opportunities and constraints for Runway Alternative 11.

Table 5-5 – Alternative 11: Runway 5R/23L (Length: 4,876', ARC B-II)

Opportunities	Constraints
<ul style="list-style-type: none"> ✈ Lower cost GA runway for non-jet aircraft ✈ No impacts to airport support facilities ✈ No impacts to Lake Whitehurst ✈ No VOR impacts ✈ Allows for 876-foot simultaneous runway operations 	<ul style="list-style-type: none"> ✈ Runway use limited to propeller and light jet aircraft ✈ Potential Impact to Naval training activity

Source: CHA, 2019.

Alternative 12B: Runway 5R/23L – 5,500 Foot, ARC C-II

Alternative 12B (**Figure 5-5**) is also intended to be a modest approach to providing a capable parallel runway, and thus, includes a 5,500-foot length and 100-foot width. To keep costs and potential impacts at a minimum, this concept adds an aircraft arresting system, known as an Engineered Materials Arresting System (EMAS), at both ends of the runway. The EMAS beds eliminate the requirement for an RSA beyond the “stop-end” of the runway, with only a 600-foot long RSA on the approach end. As such, the RSA impacts to Lake Whitehurst are avoided, requiring little filling or grading overall. The ARC C-II design includes a 300-foot runway-taxiway offset. A 600-foot runway displacement is included on Runway 5R to avoid building and object obstructions.

Alternative 12B depicts one-mile visibility minimum, which results in a reduced width of the RPZ that is clear of all buildings. It also has a steeper 20:1 threshold surface. Due to its minimum impacts, 12B is advanced for potential implementation. **Table 5-6** lists the opportunities and constraints for Runway Alternative 12B, and **Appendix A** lists the differences between Alternatives 12A and 12B.

Table 5-6 – Alternative 12B: Runway 5R/23L (Length: 5,500’, ARC C-II)

Opportunities	Constraints
<ul style="list-style-type: none"> ➔ Provides secondary runway for GA airport users ➔ Avoids impacts to VORTAC ➔ 876’ separation enables simultaneous VFR operations ➔ No impacts to Lake Whitehurst ➔ No wetland impacts 	<ul style="list-style-type: none"> ➔ Length restricts usage by commercial operations ➔ Potential Impact to Naval training activity

Source: CHA, 2019.

5.3.4 Taxiway Alternatives

Aircraft ground movement at ORF is supported by a system of taxiways providing access to all portions of the airfield. Nevertheless, portions of the taxiway system are considered non-standard with regard to current FAA design standards or are such that an improved configuration could reduce the risk of pilot confusion and thus a runway incursion. The following taxiway alternatives were developed with the aforementioned considerations and adherence to all FAA design standards.

It is important to note that with each concept, focus is given to the portions of the taxiway system west of the existing Runway 5/23; therefore, the conceptualized taxiway system supporting the potential parallel Runway 5R/23L remains the same throughout each alternative with a TDG 3 full-length parallel taxiway. **Table 5-6** lists the opportunities and constraints for all taxiway alternatives.

Taxiway Alternative 1

Taxiway Alternative 1 (**Figure 5-6**) addresses the variable separation distance between Taxiway ‘C’ and Runway 5/23. Taxiway ‘C’ is currently designated as TDG 5, requiring a minimum taxiway to runway centerline distance of 400 feet. However, the current separation of Taxiway ‘C’ ranges from 400 feet at the Runway 5 end to over 600 feet at the Runway 23 end. While this distance provides an added separation margin, it also reduces the available non-movement space near the southeasternmost gates of Terminal Concourse B, requiring aircraft push-back into the Taxiway ‘C’ environment. Therefore, Taxiway Alternative 1 illustrates a parallel Taxiway ‘C’ offset of 400 feet from the Runway 5 end to Taxiway ‘H’.

Additionally, Taxiway Alternative 1 illustrates the conversion of the Runway 14/32 pavement (from Runway 5/23 northeastward) into a new TDG 3 taxiway. This conversion of pavement allows for continued ingress/egress to the cargo area and for potential aeronautical development along the taxiway.

Lastly, Taxiway Alternative 1 shows the removal and update of taxiways that would be either no longer required or are non-standard. Specifically, this concept shows a realignment of Taxiway ‘F’ to meet current FAA taxiway design geometry. As a result of this realignment, this concept also shows a relocation of Taxiway ‘E’ to provide improved access. Although this concept shows the removal of Taxiway ‘G’, a pavement corridor is reserved for an ARFF access road between the existing firefighting station and the southern portion of the airfield.

AIRPORT MASTER PLAN // Norfolk International Airport

- Consistent air traffic flows and beneficial airspace considerations
- Maximizes use of available airport property
- Releases critical airport property for needed landside development
- Minimizes environmental impacts

Runway 5R/23L – 6,000 Foot, ARC C-II (EXHIBIT 9)

This alternative (**Figure A-6**) is a refinement or “scale-back” of the alternative depicted in **Figure 5-9**, providing instrument visibility minimums of greater than 3/4-mile. The higher minimums enable a steeper 20:1 threshold surface and corresponding greater clearance over the Little Creek Naval Base. In addition, the parallel taxiway offset may be reduced to 300 feet for ARC C-II. The other runway dimensions and configuration presented in **Figure 5-10** are the same as those presented in **Figure 5-9**.

Runway 5R/23L – 5,500 Foot, ARC C-II (EXHIBIT 10)

This derivative alternative (**Figure A-7**) refines or scales-back the previous concepts, providing a shorter 5,500-foot runway length while providing the lower minimums of 3/4-mile serving ARC B-II aircraft. The reduced length further reduces costs and impacts to providing a standard RSA. With the lower minimums, the threshold surface is the flatter 34:1 slope.

Runway 5R/23L – 5,500 Foot, ARC C-II (EXHIBIT 12A)

This alternative (**Figure A-8**) is the same as Alternative 12B with the exception of planned approach visibility minimums. Alternative 12A provides 3/4-mile visibility minimum, which has a wider Runway Protection Zone (RPZ) that would include both on- and off-airport existing buildings.

Runway 5R/23L – Realignment and Shift (EXHIBIT 13A & 13B)

Two final derivative runway alternatives [13A (**Figure A-9**) and 13B (**Figure A-10**)] were developed to avoid direct overflight of the Little Creek Naval Base: a runway realignment (Option A) and a runway shift (Option B). It should be noted that these concepts were examined exclusively for ground-based requirements; therefore, they have not been fully vetted for airspace impacts.

Option A examines the realignment of Runway 5/23, as well as the proposed parallel runway, by approximately 20-degrees counterclockwise, designating the runways at Runway 3L/21R and Runway 3R/21L, respectively. As a result of the realignment, the primary runway (i.e., Runway 3R/21L) length is reduced to 7,500 feet to accommodate the RSA and ROFA length beyond the end of the runway and avoid significant environmental permitting to fill and grade a portion of Lake Whitehurst; however, a smaller area of the lake located northwest of the ARFF station would still require fill to accommodate portions of the parallel taxiway (i.e., Taxiway C) and associated safety areas. Furthermore, the existing ARFF station, ARFF storage building, and airport triturator would require removal and relocation if this alternative is adopted.

Additionally, the existing Runway 5/23 RPZ, given the current configuration of the runway, is located over Little Creek Bay, as well as over land being used for industrial purposes. If the runway is realigned as detailed in Option A, it will encroach upon a residential-use area (i.e., the East



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- Future Airfield Pavement
- Future Parallel Runway

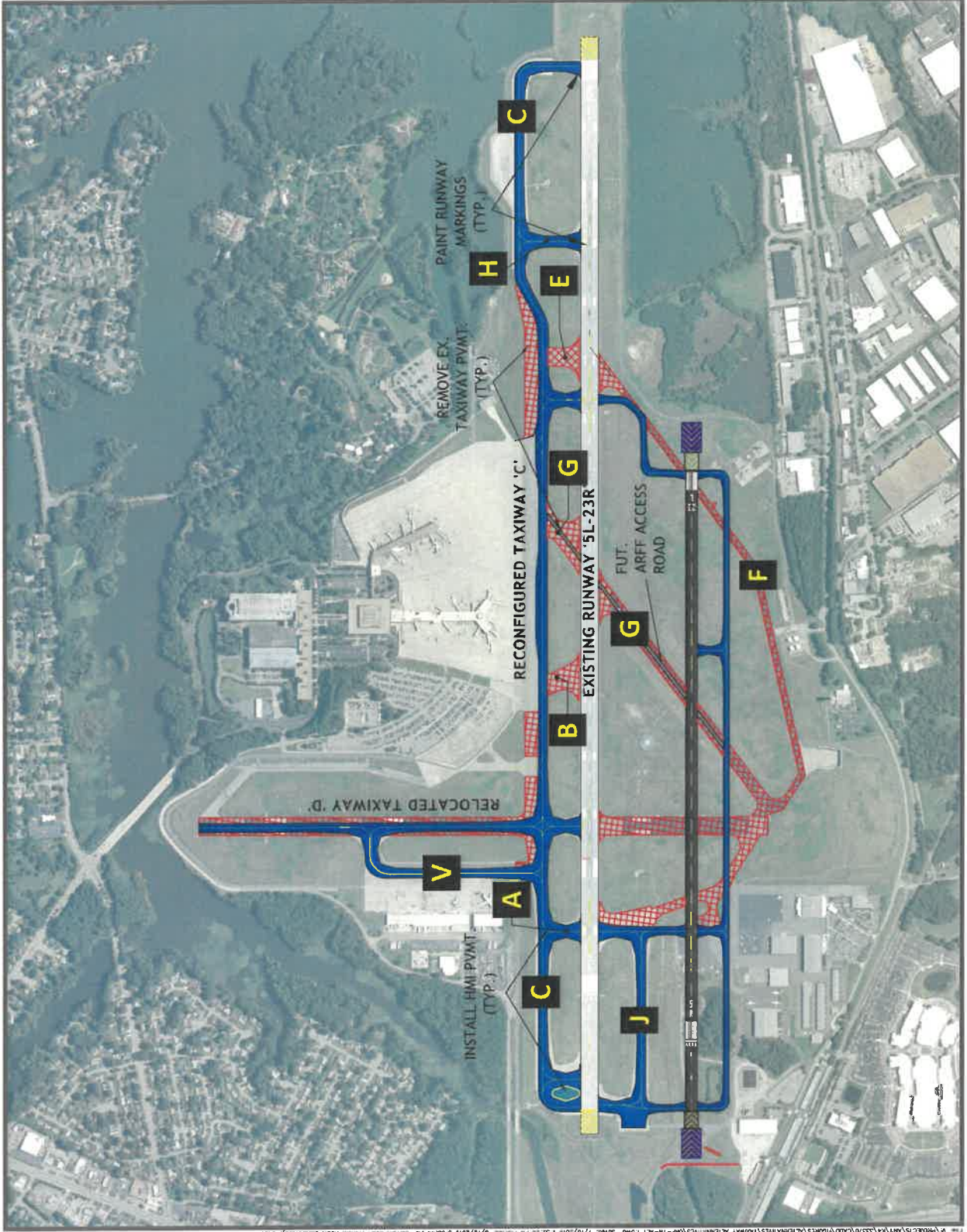


Figure 5-6
Taxiway Alternative 1

Table 5-6 – Alternative 12B: Runway 5R/23L (Length: 5,500’, ARC C-II)

Opportunities	Constraints
<ul style="list-style-type: none"> ➤ Provides secondary runway for GA airport users ➤ Avoids impacts to VORTAC ➤ 876’ separation enables simultaneous VFR operations ➤ No impacts to Lake Whitehurst ➤ No wetland impacts 	<ul style="list-style-type: none"> ➤ Length restricts usage by commercial operations ➤ Potential Impact to Naval training activity

Source: CHA, 2019.

5.3.4 Taxiway Alternatives

Aircraft ground movement at ORF is supported by a system of taxiways providing access to all portions of the airfield. Nevertheless, portions of the taxiway system are considered non-standard with regard to current FAA design standards or are such that an improved configuration could reduce the risk of pilot confusion and thus a runway incursion. The following taxiway alternatives were developed with the aforementioned considerations and adherence to all FAA design standards.

It is important to note that with each concept, focus is given to the portions of the taxiway system west of the existing Runway 5/23; therefore, the conceptualized taxiway system supporting the potential parallel Runway 5R/23L remains the same throughout each alternative with a TDG 3 full-length parallel taxiway. **Table 5-6** lists the opportunities and constraints for all taxiway alternatives.

Taxiway Alternative 1

Taxiway Alternative 1 (**Figure 5-6**) addresses the variable separation distance between Taxiway ‘C’ and Runway 5/23. Taxiway ‘C’ is currently designated as TDG 5, requiring a minimum taxiway to runway centerline distance of 400 feet. However, the current separation of Taxiway ‘C’ ranges from 400 feet at the Runway 5 end to over 600 feet at the Runway 23 end. While this distance provides an added separation margin, it also reduces the available non-movement space near the southeasternmost gates of Terminal Concourse B, requiring aircraft push-back into the Taxiway ‘C’ environment. Therefore, Taxiway Alternative 1 illustrates a parallel Taxiway ‘C’ offset of 400 feet from the Runway 5 end to Taxiway ‘H’.

Additionally, Taxiway Alternative 1 illustrates the conversion of the Runway 14/32 pavement (from Runway 5/23 northeastward) into a new TDG 3 taxiway. This conversion of pavement allows for continued ingress/egress to the cargo area and for potential aeronautical development along the taxiway.

Lastly, Taxiway Alternative 1 shows the removal and update of taxiways that would be either no longer required or are non-standard. Specifically, this concept shows a realignment of Taxiway ‘F’ to meet current FAA taxiway design geometry. As a result of this realignment, this concept also shows a relocation of Taxiway ‘E’ to provide improved access. Although this concept shows the removal of Taxiway ‘G’, a pavement corridor is reserved for an ARFF access road between the existing firefighting station and the southern portion of the airfield.

Taxiway Alternative 2

Taxiway Alternative 2 (Figure 5-7) shows similar concepts to address non-standard taxiway conditions and improved design geometry. While Taxiway Alternative 1 shows a Taxiway ‘C’ offset of 400 feet from the Runway 5 end to Taxiway ‘H’, this concept shows the offset distance throughout the full length of the taxiway. This full-length offset of 400 feet does not require a turn north of Taxiway ‘H’ and is compliant with current FAA taxiway geometry; however, this configuration impacts the existing Runway 23 glide slope antennae and PAPI, requiring relocation of both NAVAID systems. As a result of these relocations, a portion of Lake Whitehurst east of the Runway 23 end would require filling and grading in order to provide sufficient ground to accommodate reinstallation and operation of both systems, as well as to provide access roads. Significant environmental permitting and coordination would be required prior to moving the NAVAIDs.

Taxiway Alternative 3

Similar to Taxiway Alternative 1, Taxiway Alternative 3 (Figure 5-8) shows a partially realigned offset of Taxiway ‘C’ from the Runway 5 end to Taxiway ‘H’, along with the conversion of the Runway 14/32 pavement (from Runway 5/23 northward) into a new TDG 3 taxiway; however, this concept adds a new TDG 5 partial-length parallel taxiway east of Runway 5/23 from the end of Runway 5 to the realigned portion (as discussed in Taxiway Alternative 2) of Taxiway ‘E’, terminating prior to Lake Whitehurst to avoid filling a portion of the lake.

To accommodate the parallel taxiway, relocation of both the VORTAC and Runway 5 glide slope antenna would be required.

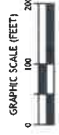
Table 5-7 – Taxiway Alternatives

Alternative	Opportunities	Constraints
Alternative 1: Partial Realignment of Taxiway C	<ul style="list-style-type: none"> ➤ Realignment of Taxiway C to 400’ offset improves the separation from Concourse B ➤ Partial taxiway realignment avoids impact to Runway 23 Glideslope ➤ Conversion of Runway 14/32 to Taxiway expands area for air cargo apron ➤ Removes non-standard conditions (direct apron to runway access) 	<ul style="list-style-type: none"> ➤ Taxiway C retains existing curves near Runway 23 end ➤ Does not provide full-length standard parallel taxiway ➤
Alternative 2: Full Realignment of Taxiway C	<ul style="list-style-type: none"> ➤ Full Realignment removes all curves in Taxiway C centerline ➤ Realignment improves separation from Concourse B ➤ Conversion of Runway 14/32 to Taxiway expands area for air cargo apron 	<ul style="list-style-type: none"> ➤ Taxiway C realignment near Runway 23 requires relocation of Glideslope and PAPI ➤ Substantial environmental impacts to Lake Whitehurst
Alternative 3: Extension of Taxiway J	<ul style="list-style-type: none"> ➤ Improves operational flexibility ➤ Provides additional runway exits 	<ul style="list-style-type: none"> ➤ Requires relocation of VORTAC ➤ Taxiway J cannot be extended to full parallel without impacts to Lake Whitehurst

Source: CHA, 2019.



**NORFOLK INTERNATIONAL AIRPORT
MASTER PLAN UPDATE**



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- Existing Facility
- Circulation/Holdroom
- Concessions
- Airline
- Security/Regulatory
- New Apron/Airfield Pavement
- New Landside Pavement
- Removal/Demolition

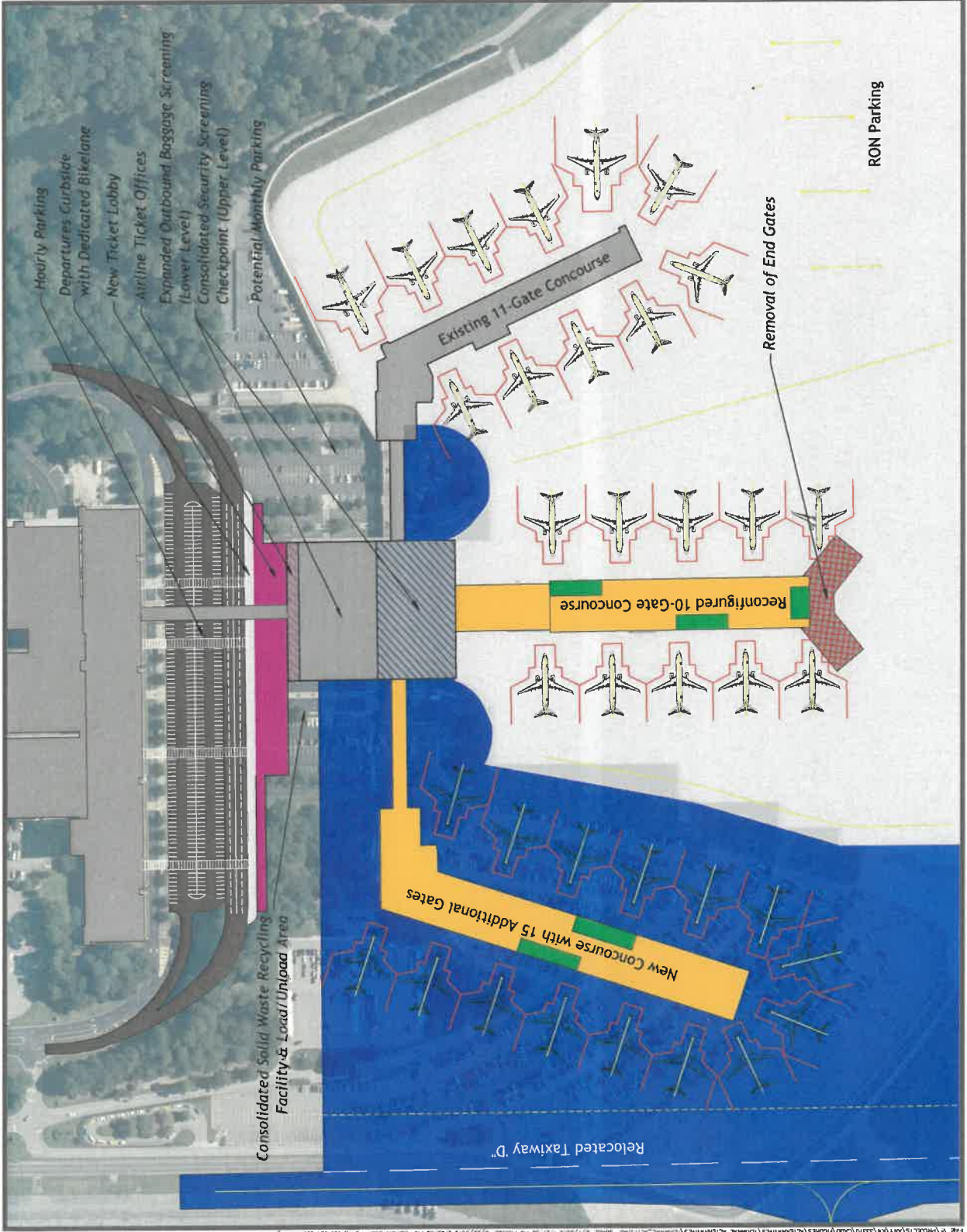


Figure 5-11
Terminal Facility
Alternative 1

Table 5-8 – 2009 Passenger Terminal Facility Summary

General Layout	
Retain the existing terminal layout including the departure and arrivals building, curbside and circulation, but expand the number of gates, hold rooms, and post-security concessions by adding a third concourse.	
Advantages	Disadvantages
<ul style="list-style-type: none"> ✈ Low capital costs ✈ Ease of construction phasing; virtually no impact to passenger activity ✈ Provides adequate number of gates and added space for related services. 	<ul style="list-style-type: none"> ✈ Requires addition of a third security checkpoint. Issues with TSA staffing and duplication of facilities ✈ Results in separation and some duplication of all post-security facilities, services, and concessions ✈ Reduced flexibility for airline gate utilization and operations ✈ No improvements or expansion of other needed facilities (e.g., out-bound baggage) ✈ Existing deficiencies remain in passenger circulation ✈ Retains split facilities for the ticking hall and curb side drop-off, with associated passenger confusion ✈ Retains the overly complex roadway layout, see Figure 5-10.

Source: CHA, 2019.

Due to the disadvantages of the 2009 Terminal Alternative, four new concepts were developed as part of this Master Plan and are subsequently discussed and illustrated below.

5.4.3 Passenger Terminal Facility Alternative 1

Passenger Terminal Facility Alternative 1 (Figure 5-11) addresses pre-security configuration issues of the current terminal complex. In particular, the split ticketing halls are combined and relocated to the west side of the departure building, facing the arrival building. This enables reconfiguration and shortening of the departure roadways with an efficient parallel alignment with the arrivals building’s curbside. The new departure curbside will provide greater overall length, with adjacent short-term parking serving both arrivals and departures.

Relocation of the ticketing halls enable redevelopment of the lower level of the departure building for expansion of the outbound baggage make-up facilities to serve all three concourses. TSA security would be consolidated into a single check point that is located on the eastern half of the atrium area. As is the case with the Status Quo Alternative, the previous Airport Master Plan developed an incremental terminal recommendation that retained the existing building layout and internal configuration, and included gates, and associated facilities through the addition of a third concourse (Concourse C). This layout utilizes the area of the long-term surface parking lot for the location of the additional concourse. This alternative is a simple and low-cost expansion option that maximizes use of existing facilities; however, several shortcomings are apparent, including long walking distances and taxilane/push-back conflicts between the concourses. Figure 5-11) provides a graphic depiction of this concept, while Table 5-9 summarizes Passenger Terminal Alternative 1.

Figure 5-10 – Existing Terminal Curbside Layout

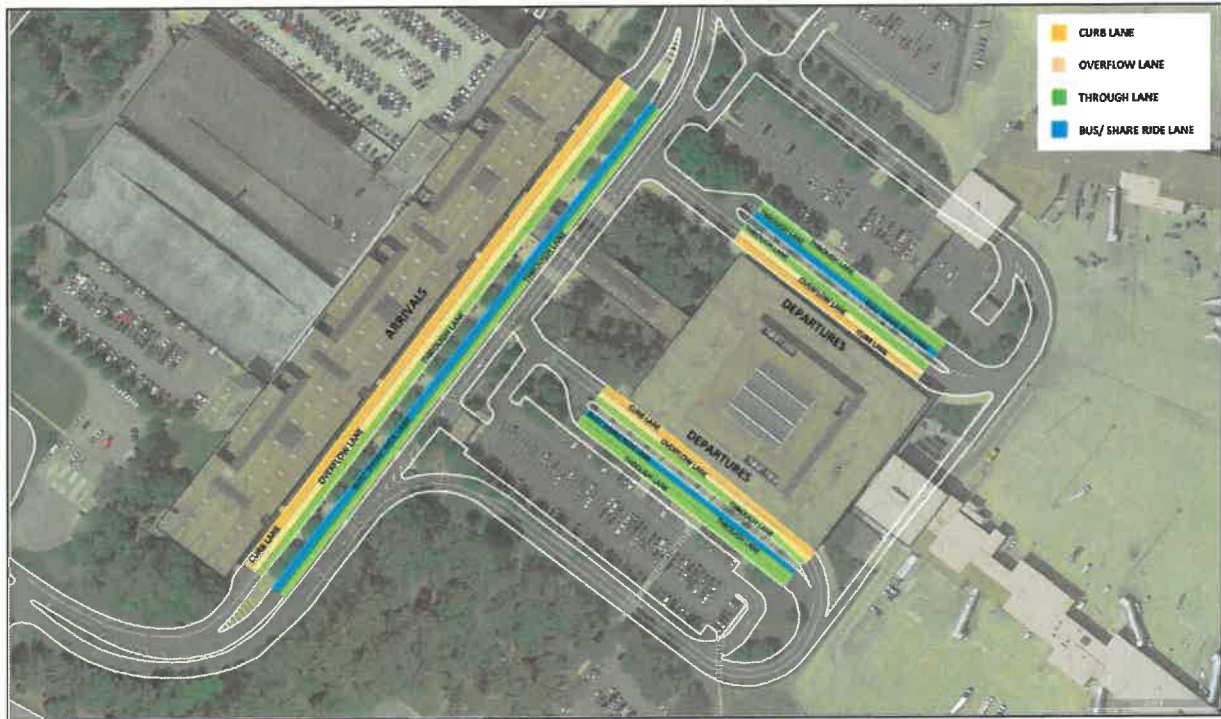


Table 5-9 – Passenger Terminal Facility Alternative 1 Summary

General Layout	
<p>Builds upon the 2009 terminal layout with three concourses, and retention of the arrival building. The departure building is modified to relocate and consolidation of the ticketing halls, security screening check point, and departure curbside, expansion of outbound baggage make-up facilities, and improve vehicular circulation.</p>	
Advantages	Disadvantages
<ul style="list-style-type: none"> ✈ Modest capital costs through retention of several existing facilities ✈ Ease of construction phasing with minor impacts to passenger activity ✈ Provides adequate additional facilities for all terminal requirements, including outbound baggage ✈ Removes deficiencies in passenger circulation ✈ Combines split facilities for the ticketing hall and curbside drop-off (reduces passenger confusion) ✈ Eliminates overly complex roadway layout ✈ Eliminates the need for a third security checkpoint. 	<ul style="list-style-type: none"> ✈ Results in separation and potential duplication of all post-security facilities, services, and concessions ✈ Reduced flexibility for airline gate utilization and operations ✈ Retains existing long walking distances to baggage claim and parking garages


Source: CHA, 2019.



**NORFOLK INTERNATIONAL AIRPORT
MASTER PLAN UPDATE**



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 Future Building

 Future Landside Pavement

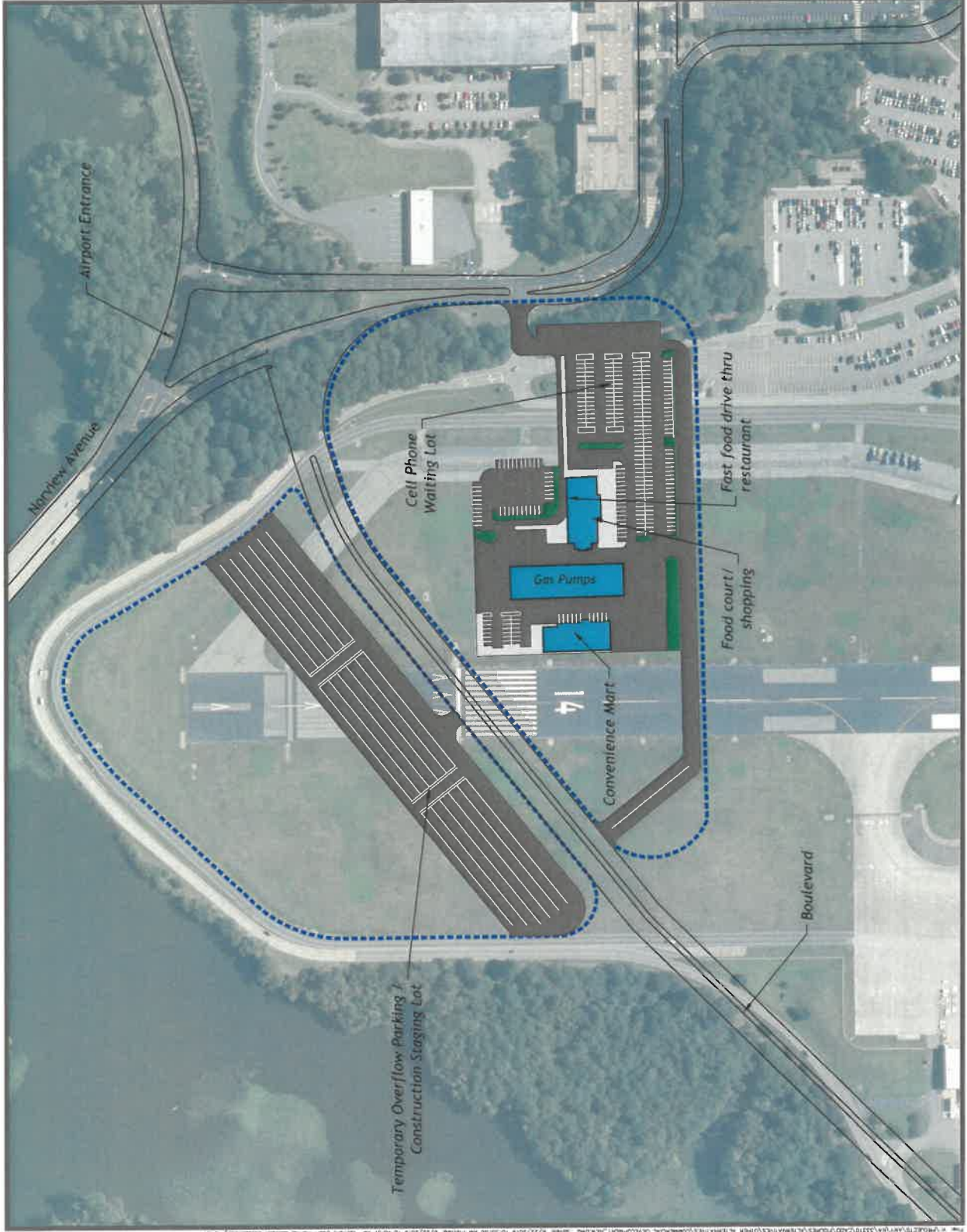


Figure 5-18
Landside Commercial
Development Options

5.5 LANDSIDE COMMERCIAL DEVELOPMENT OPTIONS

The previous Master Plan identified the northwestern corner of the new Robin Hood Road/Norview Road intersection for additional long-term parking along with the eastern corner as new employee parking should the Airport’s parking capacity become constrained. As detailed within **Chapter 3**, even with the loss of the existing long-term parking lot, passenger parking is adequate throughout the forecast period with the development and construction of Garage D. As previously described, with the new Passenger Facility Terminal options presented, additional parking locations become available in proximity to the Terminal front, resulting in additional parking for temporary or emergency purposes in the event construction phasing impacts existing parking capacity. However, should the Airport require additional parking, these two areas are potential locations for a future surface parking lot and are illustrated within **Figure 5-18** and **Table 5-16** summarizes all Landside Commercial Development Options

Landside Commercial Development

With the potential closure of Runway 14/32 and realignment of Robin Hood Road, considerable land for redevelopment would become available. Several opportunities are presented throughout these alternatives for various options on the land use of these available properties. This alternative presents potential non-aeronautical opportunities within this area.

Commercial Retail/Cell Phone Lot/Gas Station

One option is to develop a commercial retail station along the eastern corner of the new Robin Hood Road and Norview Road intersection. This commercial center has the potential to house a consolidated gas station, thus providing a partnership opportunity with terminal concessionaires for an external food court option along with a potential location for a more robust cell phone/passenger wait lot. This concept is a growing trend amongst heavily trafficked airports and provides a potential opportunity for increased revenue generation.

Table 5-16 – Landside Commercial Development Options

General Layout	
Includes commercial retail/concessions, cell phone lot, and gas station	
Opportunities	Constraints
<ul style="list-style-type: none"> ✈ Revenue generation ✈ Passenger convenience ✈ Consolidation of new gas station, cell phone lot, “courtyard” ✈ Provides opportunities for new partnership with concessionaires ✈ Potential overflow or emergency parking 	<ul style="list-style-type: none"> ✈ Utilizes area with potential for airside connectivity ✈ Potential parking for employees and/or temporary staging lots are pushed further from the Terminal ✈ Requires realignment of Robin Hood Road and Norview Avenue/Airport Road

Source: CHA, 2019.



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GRAPHIC SCALE (FEET)
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LEGEND

- Future Landside Pavement
- Future Building

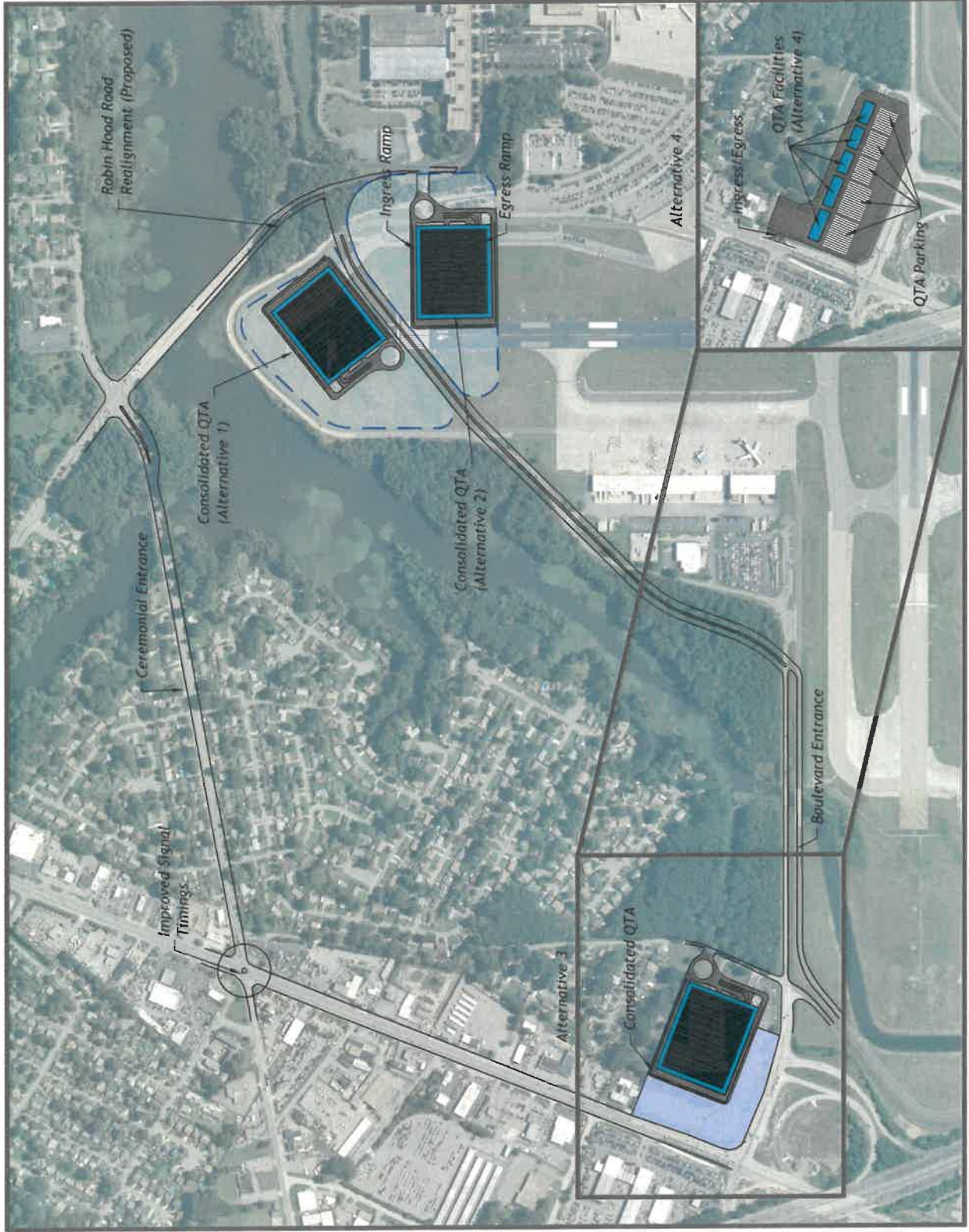


Figure 5-19
QTA Alternatives

5.6 SUPPORT FACILITIES DEVELOPMENT CONCEPTS

5.6.1 Rental Car Concessions Alternatives

The Facility Requirements analysis in **Chapter 4** identified sufficient short- and long-term vehicle parking spaces for ORF throughout the planning horizon. However, the analysis further identified a growing deficit of rental car spaces during peak periods, including a need for approximately 450 additional spaces by PAL 4. This additional capacity can be accommodated in a various number of ways. Physical capacity increases, consolidation of rental car operations, and relocating off-site rental car activities nearer to the Airport's terminal itself.

As discussed in **Chapter 2** and **Chapter 4**, rental car companies currently have off-site Quick Turnaround (QTA) facilities along Military Highway, resulting in unnecessary rental car throughput (i.e., rental car companies moving overflow and vehicles requiring maintenance) along the terminal curbsides, Norview Ave., and Airport/Robin Hood Road, and unnecessary expenditures for rental car companies maintaining off-site facilities. As such, there has been a need identified to decrease rental car traffic or separate rental car activity from passenger/pedestrian activity along the Airport's roads and consolidate rental car functions in proximity to the Airport terminal; therefore, concepts have been developed that provide additional rental car space to accommodate growing demand through consolidated QTA facilities or through the development of a Consolidated Rental Car Facility (CONRAC).

It is important to note, that although these alternatives show potential structures to accommodate rental car activity, for planning purposes the overarching goal is the preservation of land to accommodate these activities. As demand changes, the physical structures necessary to accommodate the activity will change; therefore, three potential layouts were developed for a QTA and two potential layouts for a CONRAC facility. All QTA Alternatives are depicted in **Figure 5-19** and all CONRAC alternatives are presented in **Figure 5-20**. **Table 5-17** summarizes both the QTA and CONRAC alternatives.

QTA Alternatives

Alternative 1 - New QTA Facility

QTA Alternative 1 shows a new rental car QTA facility along the western portion of the airfield nearby the existing Runway 14 end. The construction of a consolidated QTA area/facility provides easy access to all rental car operations for both passengers and rental car employees and reduces the need for vehicle transport to/from airport property. In this concept, Robin Hood Road is realigned (but is not necessary), providing increased connectivity to Military Highway. While this location preserves the area adjacent to the existing long-term and (Transportation Network Company) TNC parking lots (e.g., *Uber*, *Lyft*, etc.), the location of the QTA facility is dependent upon closure of Runway 14/32.

Alternative 2 - Consolidated QTA

Similar to Alternative 1, QTA Alternative 2 shows a new QTA facility at the existing Runway 14 end. The location shown in Alternative 2 allows for development of a new QTA facility without the need for immediate realignment Robin Hood Road. This concept does require some degree of reconstruction of the existing Airport Road and access to/from Robin Hood Road. This location, however, limits full aeronautical or non-aeronautical (i.e., parking, retail commercial, etc.)

development potential of the area as this location east of the Robin Hood Road realignment has access to the airfield.

Alternative 3 - Dedicated QTA

QTA Alternative 3 shows the repurposing of the existing employee parking lot into a dedicated QTA facility. For the purposes of the physical make-up of this location, a consolidated single-structure QTA is not feasible; however, this concept allows for a more cost-effective solution by providing a dedicated area for rental car operations without the need for construction of a parking garage. This concept requires a longer shuttle of rental cars to/from the airport along Robin Hood Road but limits the potential throughput of rental vehicles along the arrivals or departures curbsides and eliminates the use of Norview Avenue as a potential rental car route.

CONRAC Alternatives

With the identified need for consolidation of rental car facilities, and the first potential step being the consolidation of QTA facilities from Military Highway, it was identified that if a permanent structure was to be constructed, is the possibility of a ConRAC feasible on the Airport. Typically, ConRACs provide a full service on-stop location for all rental car activities, including ready return, QTA, overflow storage, and rental pick-up (including rental car counters). Such a facility is most commonly attached to the terminal in some fashion, providing access for arriving passengers.

ConRAC facility sizing varies from airport to airport based on demand for rental car services, if a ground transportation center is included, etc. However, several design considerations exist and should be sized accordingly to accommodate the existing and future needs of the rental car companies. When developing a ConRAC facility, it is important to account for safety of the employees and the general public, convenience to the rental car agencies and customers, efficient operational capabilities, operational sustainability, and cost efficiency. For the purposes of this study, two locations for a ConRAC were identified, and the facility sizing of each location were independent of each other.

Alternative 1 – Consolidated ConRAC and QTA

This alternative proposes the construction of a CONRAC and QTA facility west of Airport Road, nearby the taxi queue area. This facility would consolidate all rental car functions and operations, with a pedestrian access bridge that would be constructed across Airport Road to connect the ConRAC facility with the existing Arrivals building. Access into and out of the ConRAC facility would be via Robin Hood Rd and Airport Road. As such, preventing interference and congestion of the Terminal Loop. Based on industry standard facility sizing, it is expected that this ConRAC would accommodate all rental car vehicles and operations across five levels, sufficiently accommodating all current and future demand at the Airport. However, it is important to note that facility sizing may change prior to any future planning for this facility, and the purpose of this alternative is for the preservation of space sufficient to accommodate such a facility.

This site for the ConRAC has the potential to accommodate the ConRAC itself, additional parking along Robin Hood Rd, and plenty of space for a potential commercial/retail development at the corner of Robin Hood Rd and Norview Ave., potentially housing a gas station/convenience store and food options with a cell phone lot for passengers, visitors and the general public.



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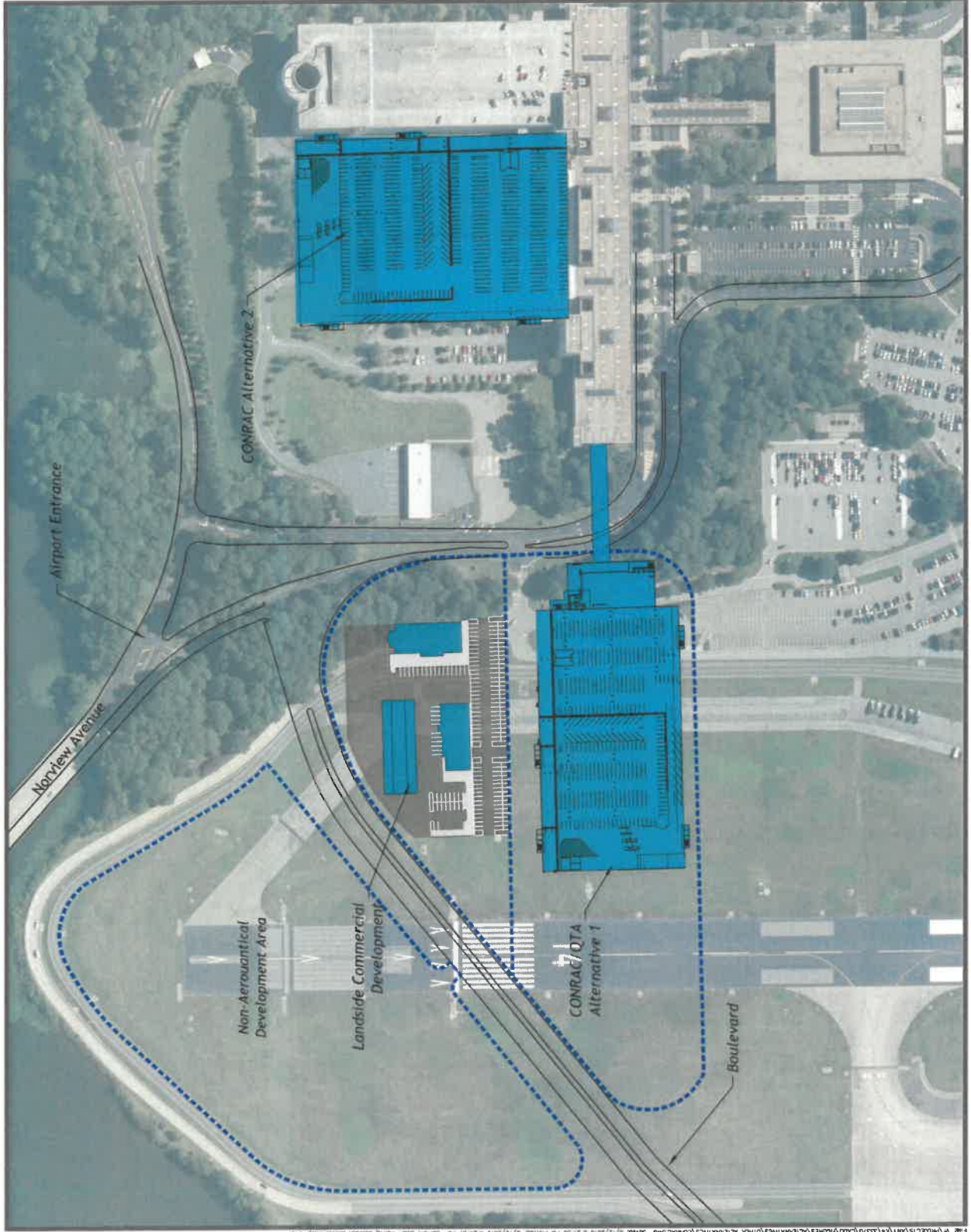
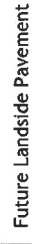
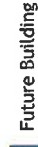


Figure 5-20
CONRAC Alternatives

development potential of the area as this location east of the Robin Hood Road realignment has access to the airfield.

Alternative 3 - Dedicated QTA

QTA Alternative 3 shows the repurposing of the existing employee parking lot into a dedicated QTA facility. For the purposes of the physical make-up of this location, a consolidated single-structure QTA is not feasible; however, this concept allows for a more cost-effective solution by providing a dedicated area for rental car operations without the need for construction of a parking garage. This concept requires a longer shuttle of rental cars to/from the airport along Robin Hood Road but limits the potential throughput of rental vehicles along the arrivals or departures curbsides and eliminates the use of Norview Avenue as a potential rental car route.

CONRAC Alternatives

With the identified need for consolidation of rental car facilities, and the first potential step being the consolidation of QTA facilities from Military Highway, it was identified that if a permanent structure was to be constructed, is the possibility of a ConRAC feasible on the Airport. Typically, ConRACs provide a full service on-stop location for all rental car activities, including ready return, QTA, overflow storage, and rental pick-up (including rental car counters). Such a facility is most commonly attached to the terminal in some fashion, providing access for arriving passengers.

ConRAC facility sizing varies from airport to airport based on demand for rental car services, if a ground transportation center is included, etc. However, several design considerations exist and should be sized accordingly to accommodate the existing and future needs of the rental car companies. When developing a ConRAC facility, it is important to account for safety of the employees and the general public, convenience to the rental car agencies and customers, efficient operational capabilities, operational sustainability, and cost efficiency. For the purposes of this study, two locations for a ConRAC were identified, and the facility sizing of each location were independent of each other.

Alternative 1 – Consolidated ConRAC and QTA

This alternative proposes the construction of a CONRAC and QTA facility west of Airport Road, nearby the taxi queue area. This facility would consolidate all rental car functions and operations, with a pedestrian access bridge that would be constructed across Airport Road to connect the ConRAC facility with the existing Arrivals building. Access into and out of the ConRAC facility would be via Robin Hood Rd and Airport Road. As such, preventing interference and congestion of the Terminal Loop. Based on industry standard facility sizing, it is expected that this ConRAC would accommodate all rental car vehicles and operations across five levels, sufficiently accommodating all current and future demand at the Airport. However, it is important to note that facility sizing may change prior to any future planning for this facility, and the purpose of this alternative is for the preservation of space sufficient to accommodate such a facility.

This site for the ConRAC has the potential to accommodate the ConRAC itself, additional parking along Robin Hood Rd, and plenty of space for a potential commercial/retail development at the corner of Robin Hood Rd and Norview Ave., potentially housing a gas station/convenience store and food options with a cell phone lot for passengers, visitors and the general public.

Alternative 2 – ConRAC Only

This alternative suggests a replacement of Garages B and C to support a ConRAC facility. For the purposes of the sizing of this facility, the current spacing of Garages B and C provide more than adequate width required for a potential ConRAC, thus decreasing the requirement to accommodate additional floors for rental purposes. As such, an opportunity within this alternative suggests the potential for additional floors within this ConRAC facility could be used for passenger parking, which continues the adequate capacity for public parking on the Airport. The lower floors would be dedicated to QTA, rental car ready and return parking, preventing interference with existing public parking within the garages. Customers would be able to access the facility via ingress and egress points currently in place. Although this option would provide the necessary space for ConRAC activity, QTA operations within the lower level of this space would be difficult. In addition, rental car vehicular access would impede the Airport’s Terminal Loop, potentially resulting in congestion during peak periods.

The positioning of the facility would also allow space for future commercial development, such as those shown in **Figure 5-18**.

Table 5-17 – Rental Car Alternatives (QTA and/or CONRAC)

Alternative	Opportunities	Constraints
QTA Development	<ul style="list-style-type: none"> ➤ Runway 14/32 end provides sufficient space for either consolidated or dedicated QTA facility ➤ Existing employee lot provides immediate space for consolidation or dedicated QTA facility 	<ul style="list-style-type: none"> ➤ QTA development near existing Runway 14 end dependent upon runway closure and realignment of Robin Hood Road ➤ Building within existing long-term lot limits development of future terminal facilities within the existing area
Consolidated ConRAC and QTA	<ul style="list-style-type: none"> ➤ Prevent interference and congestion of the Terminal Loop ➤ Ingress/Egress points in place (Airport Road) 	<ul style="list-style-type: none"> ➤ Require relocation of the existing taxi queuing area ➤ Maintenance cost for pedestrian access bridge
ConRAC (Not QTA)	<ul style="list-style-type: none"> ➤ Does not require building an entirely new facility ➤ Avoids interference with existing public parking ➤ Ingress/Egress points in place (to the terminal facilities and by roadway) 	<ul style="list-style-type: none"> ➤ No space for QTA activity, thus requiring a QTA elsewhere ➤ Rental car traffic will still impede the Airport’s Terminal Loop

Source: CHA, 2019.



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LEGEND

- Future Airfield Pavement
- Future Landside Pavement
- Future Building
- Pavement Removal

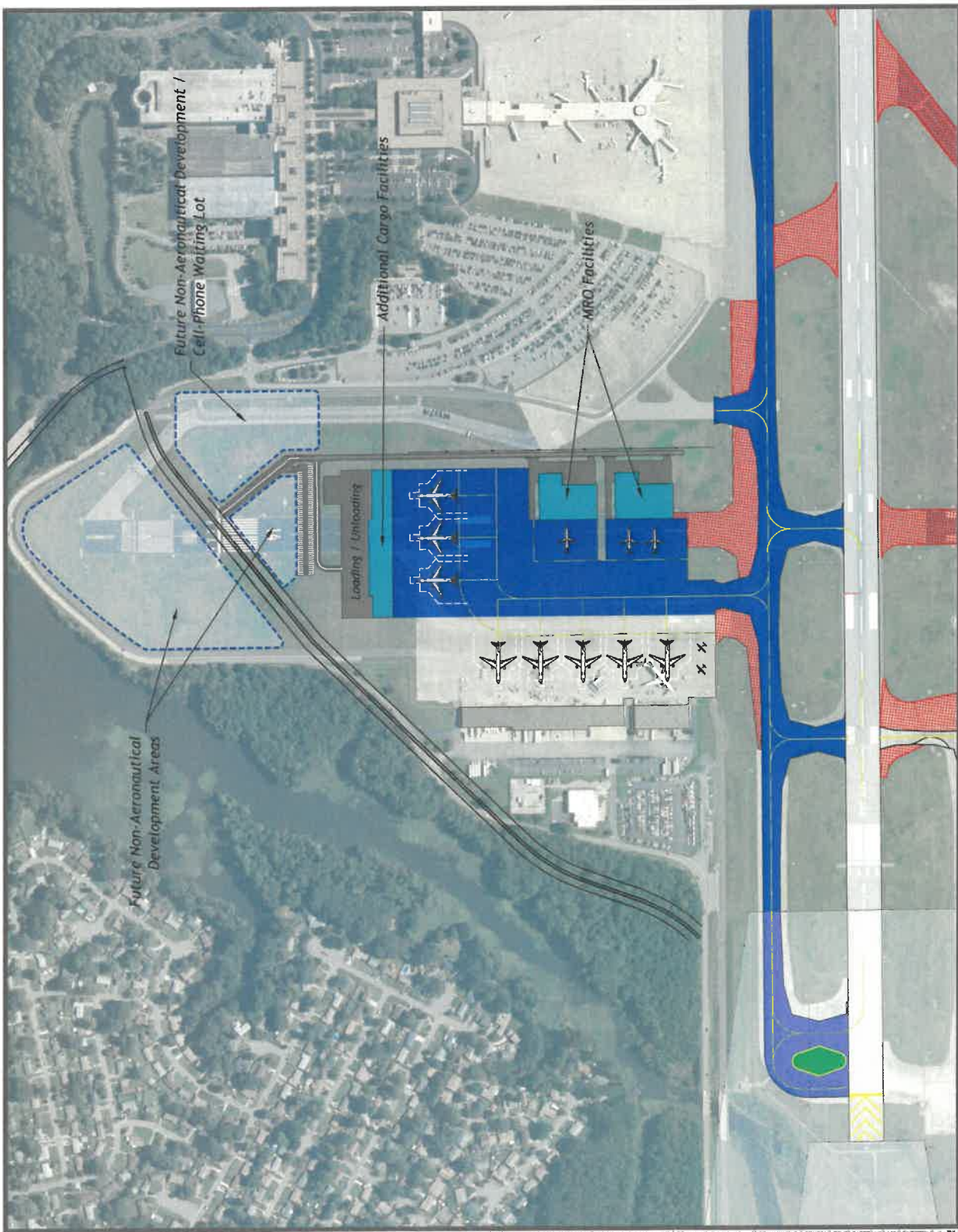


Figure 5-21
North Cargo / MRO Area
Alternative 1

5.6.2 Air Cargo Facilities Alternatives

As described in **Chapter 4**, air cargo facilities at ORF are currently undersized to adequately accommodate the existing level of cargo activity, both by physical footprint and functionality, as leaseholds and processors are separated for each cargo operator. Based on the facility requirements calculations, cargo operations currently exceed maximum capacity by approximately 10 percent during peak periods. The dedicated air cargo apron is currently sufficient in size and capable of supporting up to four widebody aircraft and one single-engine turboprop aircraft with angled parking; however, by PAL 1, it is forecasted that there will be a need for one additional cargo aircraft parking position, with a deficit of approximately 3,450 square yards (SY). This deficit may grow to over 19,000 SY by PAL 4. Furthermore, the existing 88,000 square feet (SF) of cargo processing building space does not meet the current need of approximately 97,000 SF, with demand forecasted to grow to over 143,800 SF by PAL 4.

During the development of the alternatives, future transition of cargo fleet mixes was incorporated as air cargo operators transition to new and converted B767-300 aircraft with decreased operations of A300 and B757 airframes. Based on these observations and the projected growth of cargo operations over the forecast period, three conceptual air cargo facility alternatives were identified for evaluation.

North Cargo/MRO Area Alternative 1

The North Cargo/MRO Area Alternative 1 (**Figure 5-21**) shows an approximate 56,000 SF cargo facility northeast of the current facilities, improving the physical footprint of cargo infrastructure and allowing consolidation of processors. This alternative further depicts area dedicated to loading and unloading activity on the landside of the newly proposed facility, as well as parking for ground-cargo vehicles and cargo operator employee parking.

This concept would shift Taxiway V approximately 114 feet west, providing additional space for aircraft parking and improved functionality. By shifting the taxiway, cargo operators would have the ability to park widebody aircraft perpendicular to the present facilities rather than the current angled configuration. In addition to parking reorientation, the apron would sufficiently accommodate up to five B767-300 aircraft and two Cessna 208 Caravans.

Additional apron space will be required to accommodate the shifted taxiway, as well as for aircraft parking at the additional processing facility. Apron parking at the depicted cargo facility would accommodate two to three B767-300 aircraft. In addition to cargo activity, MRO activity can also be supported within the development area, with space for two MRO facilities (approximately 85,000 SF each). In total, approximately 74,030 SY of airfield pavement is recommended to support the shifted taxiway, as well as to support parking for aircraft at the newly proposed cargo and Maintenance, Repair, and Overhaul (MRO) facilities. The additional pavement and infrastructure repurposes the pavement currently serving as Runway 14/32, lowering developmental costs. This alternative is cost-effective due to the reuse of existing pavement and retaining existing cargo buildings and apron, rather than razing and replacing current facilities. **Table 5-18** summarizes the North Cargo/MRO Area Alternative 1.

Table 5-18 – North Cargo/MRO Area Alternative 1 Summary

General Layout	
Incremental Expansion of existing Air Cargo facilities.	
Opportunities	Constraints
<ul style="list-style-type: none"> ✈ Accommodates relocation of Robin Hood Road. ✈ Provide locations for additional infrastructure needed throughout the Planning Period ✈ Maintains existing air cargo facilities ✈ Repurposes Runway 14/32 for apron/taxiway ✈ Includes locations for MRO facilities ✈ Does not infringe upon long-term surface parking lot ✈ Lowest cost of the air cargo concepts 	<ul style="list-style-type: none"> ✈ Requires closure of Runway 14/32 ✈ Layout is limited to a single taxilane, resulting in potential for some apron congestion/delay

Source: CHA,2019.

North Cargo/MRO Area Alternative 2

North Cargo/MRO Area Alternative 2 (Figure 5-22) shows razing of the existing cargo buildings for improved functionality and best-use of the developable area. As such, two new cargo facilities are incorporated, providing a minimum of approximately 56,000 SF of total space. The largest of the two facilities (located northeast of the current building) would serve as a dedicated cargo sort facility, with vehicular parking to the north (landside) and an aircraft parking apron to the south (airside). The aircraft parking apron would utilize the pavement and infrastructure currently used for cargo related vehicular parking, aiding in cost efficiency. The new apron would measure approximately 100,000 SY and could support up to 10 cargo aircraft, allowing cargo operators more options and flexibility when processing freight. The smaller facility shown would also have dedicated apron space capable of supporting up to two B767-300s. To allow for the development of the new cargo buildings and apron space, it is necessary to shift Taxiway V approximately 400 feet to the west, converting the pavement currently used for a runway (Runway 14/32) to use as a taxiway, thus lowering costs.

Similar to the first development concept, this alternative also provides the option for the development of two MROs to the east of the shifted taxiway, enabling increased utilization of the available developable area. Table 5-19 summarizes the North Cargo/MRO Area Alternative 2.

Table 5-19 – North Cargo/MRO Area Alternative 2 Summary

General Layout	
Redevelopment of existing Air Cargo facilities	
Opportunities	Constraints
<ul style="list-style-type: none"> ✈ Accommodates relocation of Robin Hood Road. ✈ Provide locations for additional infrastructure beyond that needed during the Planning Period ✈ Repurposes Runway 14/32 for future Taxiway ✈ Includes locations for MRO facilities ✈ Includes separate taxiway access to each component to improve efficiency 	<ul style="list-style-type: none"> ✈ Requires closure of Runway 14/32 ✈ Requires replacement of existing air cargo buildings ✈ Highest cost of the alternative concepts



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LEGEND

- Future Airfield Pavement
- Future Landside Pavement
- Future Building
- Pavement Removal

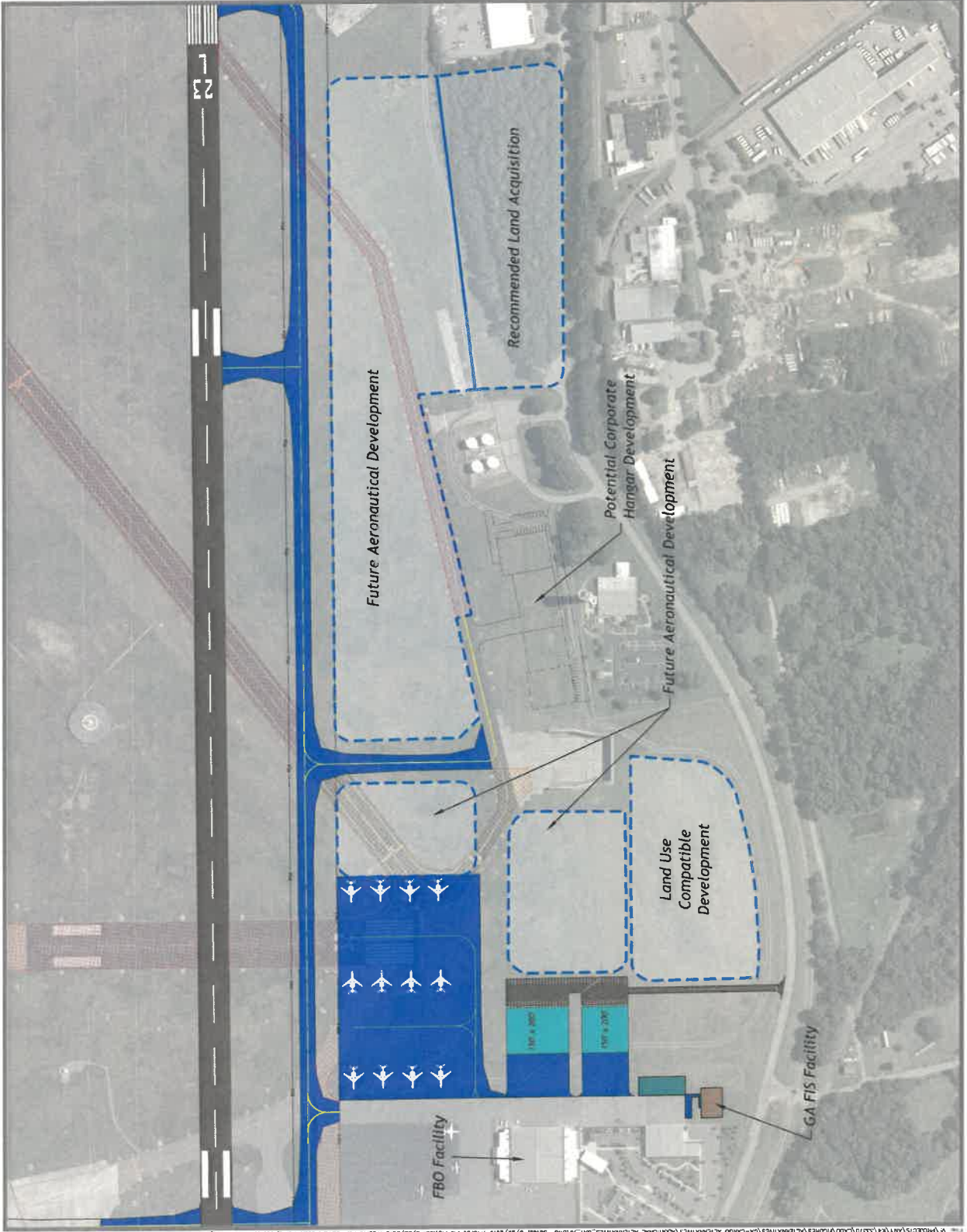


Figure 5-24
General Aviation Area
Alternative 1

5.6.3 General Aviation Facilities Alternatives

General Aviation (GA) activity at ORF represents approximately 31 percent of total annual airport operations and includes various types of private, corporate, and business aircraft flights. GA services and facilities are accommodated by Signature Flight Support, which is located along the southern portion of the airport and currently the Airport’s only Fixed Based Operator (FBO).

The following discusses the existing GA infrastructure as well as potential concepts to accommodate forecasted demand and future buildout. Note that each concept was developed with the presumed closure of Runway 14/32.

General Aviation Alternative 1

General Aviation Area Alternative 1 (Figure 5-24) depicts an option to accommodate forecasted apron and hangar demand within PAL 1 while requiring minimal construction of additional infrastructure to support future development. This concept depicts a northeasterly expansion of the current GA apron by approximately 29,000 SY. The southern portion of the expansion would support a TDG 2 taxiway to provide access as well as ingress/egress for additional expansion. Although more space than currently forecasted is depicted, the expansion accommodates apron parking for 12 ADG II aircraft and allows for phased development.

Southeast of the GA apron expansion, General Aviation Area Alternative 1 depicts two bulk hangars (150’ x 200’), each providing 30,000 SF of aircraft storage. Similar to the GA apron expansion, this concept allows for phased development northeast of the FBO building (Building 20) and along the existing TDG 2 taxiway. Since the development would occur outside of the airside secure limits, vehicle parking/access and associated security measures would likely be required.

This concept depicts several portions of existing taxiway to be either removed or repurposed. As such, a new taxiway providing TDG 3 access to the Ground Runup Enclosure (GRE) is shown. This taxiway would also provide access to potential corporate hangar development located northwest of the FAA Aircraft Traffic Control facility. Lastly, this concept depicts several areas capable of accommodating future aeronautical and/or non-aeronautical development. As stated, this concept requires closure of Runway 14/32, but other existing facilities (i.e., the GRE, ATCT, fuel farm, ASR, etc.) are all retained. Table 21 summarizes the General Aviation Alternative 1.

Table 5-21 – General Aviation Alternative 1 Summary

General Layout	
Northeasterly expansion of the current GA facilities serviced by existing FBO	
Opportunities	Constraints
<ul style="list-style-type: none"> ✈ Minimal additional infrastructure required to accommodate development ✈ Sufficient apron parking and aircraft storage space for short-term demand ✈ Accommodates phased development to accommodate all long-term requirements ✈ Retains existing airport support facilities and access road 	<ul style="list-style-type: none"> ✈ Requires closure of Runway 14/32 ✈ Northeasterly apron expansion may be limited by construction of TDG 3 taxiway to GRE

Source: CHA, 2019.



**NORFOLK INTERNATIONAL AIRPORT
MASTER PLAN UPDATE**



Exhibit 5-26
Fuel / Glycol Storage Facility
Alternatives

5.6.4 Aviation Fueling Facilities Alternatives

The existing Jet-A fuel farm is located north of the Air Traffic Control Tower and includes four aboveground Jet-A fuel tanks with storage capacities of 210,000-gallons per tank. From the fuel farm, fuel is pumped via underground pipeline to a dispensing location north of the ARFF facility, where it is transferred to fuel trucks for dispensing to aircraft.

The Airport maintains the Jet-A fuel farm, dispensing facility, and underground fuel piping system. Do to the age and condition of the fueling system it is near the end of its useful life and the Airport is experiencing increasing operations and maintenance costs for upkeep of the system. Therefore, in an effort to consolidate the fueling system, **Figure 5-26** depicts two potential locations a new consolidated Jet-A fuel farm.

Both alternatives assume that the Jet-A fuel storage and upload will be located within a consolidated area, thus eliminating the need for an underground pipeline. With each location, environmental permitting would be required, as well as the decommissioning and demolition of the existing system.

Alternative 1 depicts a location within the existing rental car overflow parking lot. This location allows for quick access of fuel deliveries along with airside connectivity to commercial and cargo aircraft. However, relocation of the rental car overflow parking lot may be required.

Alternative 2 shows expansion of the existing fuel dispensing facility to also include Jet A storage. This location reuses a portion of the fueling system currently in place and minimizes impacts to existing infrastructure. Access for fuel tanker trucks may be difficult and is shared with the terminal access road. The overall size of this site is limited.

With the potential relocation of Robin Hood road, additional locations are possible that provide both landside and airside access.

5.6.5 Aircraft Deicing Facilities Alternatives

Commercial Aircraft deicing operations at ORF are confined to the main terminal apron, and the cargo apron on the west side of the airfield. The Airport's main deicing facility/pad is located on the northeast side of the main terminal apron and consists of four deicing positions, which are utilized on a first-come-first-serve basis.



Source: Google Earth.



Source: Google Earth.



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MASTER PLAN UPDATE

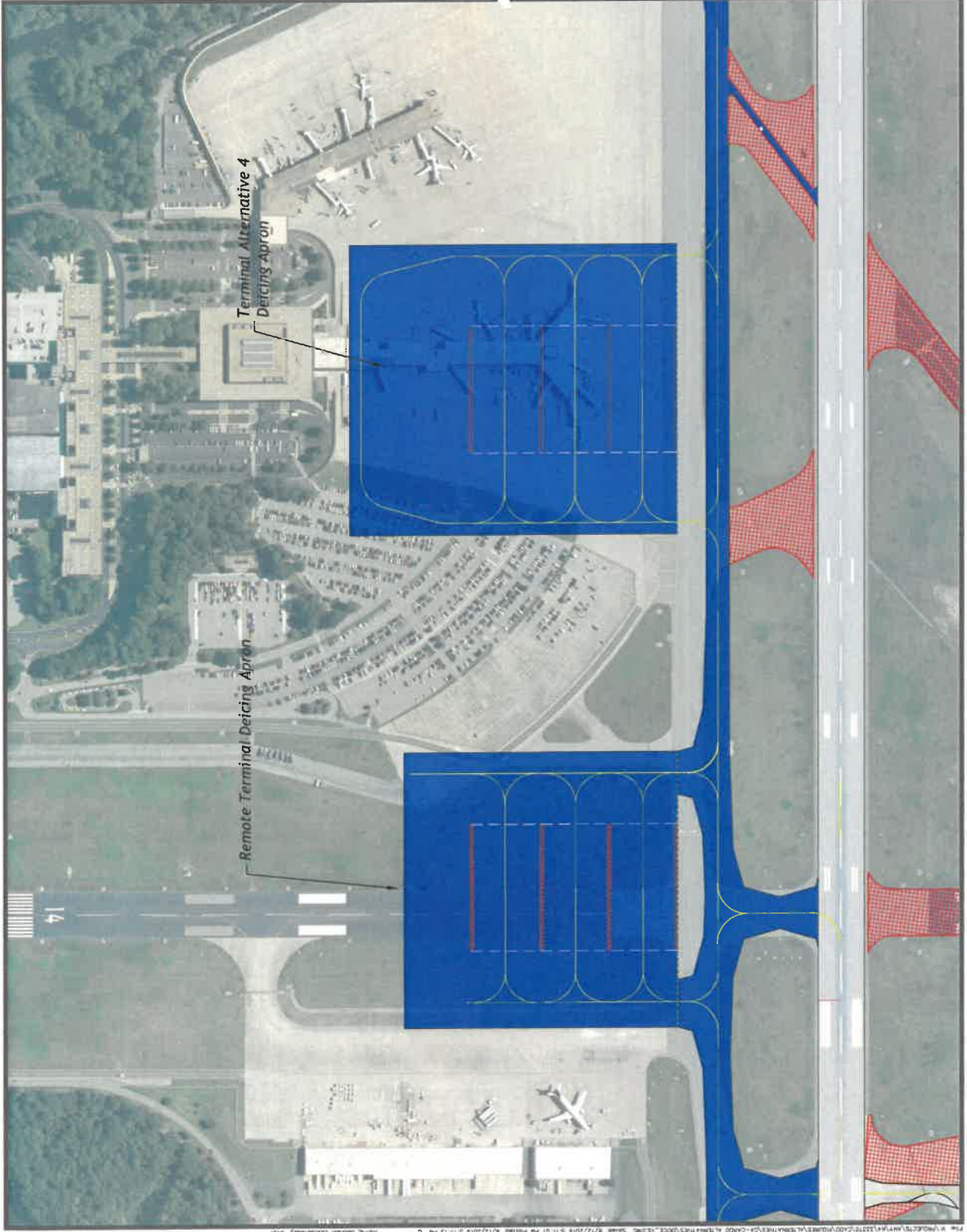


Figure 5-27
Deicing Apron Alternatives

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Alternative 2 shows expansion of the existing fuel dispensing facility to also include Jet A storage. This location reuses a portion of the fueling system currently in place and minimizes impacts to existing infrastructure. Access for fuel tanker trucks may be difficult and is shared with the terminal access road. The overall size of this site is limited.

With the potential relocation of Robin Hood road, additional locations are possible that provide both landside and airside access.



Source: Google Earth.

5.6.5 Aircraft Deicing Facilities Alternatives

Commercial Aircraft deicing operations at ORF are confined to the main terminal apron, and the cargo apron on the west side of the airfield. The Airport's main deicing facility/pad is located on the northeast side of the main terminal apron and consists of four deicing positions, which are utilized on a first-come-first-serve basis.



Source: Google Earth.

To ensure that deicing operations are accounted for during future terminal development, **Figure 5-27** depicts two deicing alternative locations.

The remote terminal deicing apron location shows an area for four ADG IV deicing positions along the northwestern edge of Taxiway C and on a portion of the current Runway 14/32, which is presumed closed for this alternative. As this location is not a part of the Passenger Terminal apron, a deicing fluid (i.e., glycol) drainage system would be required, however, deicing would be served by mobile trucks and deicing equipment, as impacts to terminal area operations may hinder the likelihood any permanent deicing equipment may remain in place. This location is respective of Cargo Alternative 1 (**Figure 5-21**), which currently depicts MRO development within the area, and would provide a consolidated commercial/cargo deicing location. Based on ingress and egress requirements for the taxilanes associated with the terminal gates, the overall length or the deicing bays are more than adequate for single use and may be simultaneously occupied with two aircraft at a time. The over space is a dual use with RON capability at night with positions for up to eight RON aircraft.

The Terminal Alternative 4 deicing apron location shows an area southwest of the existing deicing area. This alternative depicts four ADG IV deicing positions and is respective of Passenger Terminal Alternative 4 (**Figures 5-16**) and **5-17**). This location allows for utilization of existing apron space and aircraft ingress/egress nearby the terminal gates. Similar to the remote deicing facility, lane length is more than adequate for single aircraft use, and may be utilized by up to two aircraft at a time per lane for simultaneous use, therefor increasing the overall deicing capacity at the Airport. Additionally, during non-deicing periods the area can accommodate up to ten RON aircraft. Single taxilane access as a result of this location may be considered an operational disadvantage.

5.6.6 Airfield Maintenance Facilities Alternatives

The NAA airfield maintenance facilities are currently located on the southeast end of the airfield and consist of a 40,000 SF facility that houses the snow removal equipment and a 6,000 SF facility for sand storage and airport maintenance and utility vehicles. According to the NAA, these buildings are at capacity and do not account for the most recent FAA guidance within FAA AC 150/5220/18A, *Buildings for Storage and maintenance of Airport Snow and Ice Control Equipment and Materials*. Therefore, **Figure 5-28** depicts several alternate locations for additional airfield maintenance facilities. Note that with each location, the potential exists for either complete facility relocation or establishment of a secondary airfield maintenance site, depending on need or location.

Airfield Maintenance Alternative 1

Alternative 1 shows an expanded maintenance facility directly northwest of the existing. This location provides consolidation of all airport maintenance resources within a dedicated area. A disadvantage to this concept is the impact to the existing ARFF training area, which is shown relocated southward.

Airfield Maintenance Alternative 2

Alternative 2 shows an expanded area southeast of the GA apron. This location provides quick access to both the airfield and Miller Store Road with the ability for expansion. However, this area is dependent upon closure of Runway 14/32 and is ideal space for future aeronautical and/or



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GRAPHIC SCALE (FEET)
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Future Airfield Pavement

Future Building

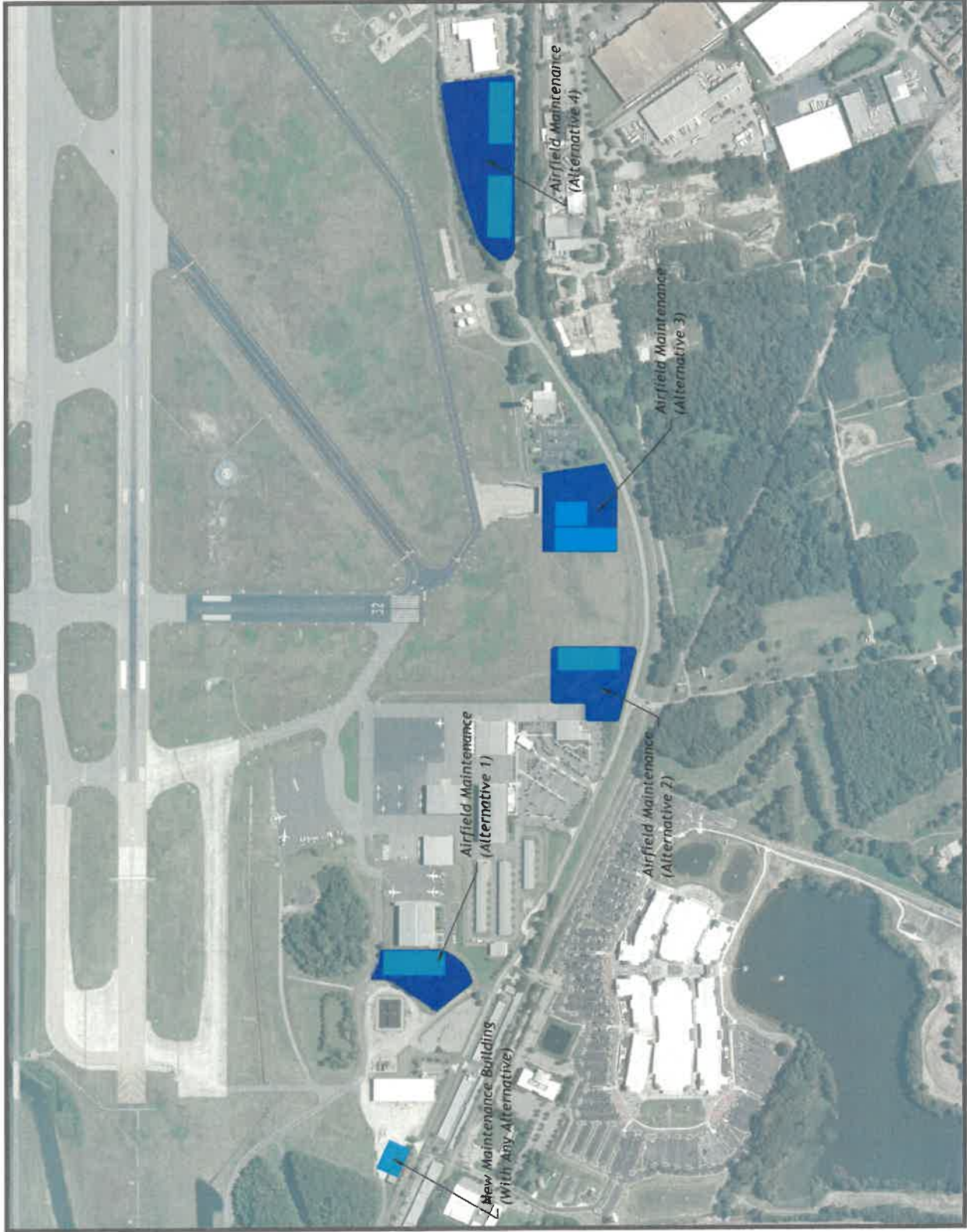


Figure 5-28
Airfield Maintenance Alternatives

To ensure that deicing operations are accounted for during future terminal development, **Figure 5-27** depicts two deicing alternative locations.

The remote terminal deicing apron location shows an area for four ADG IV deicing positions along the northwestern edge of Taxiway C and on a portion of the current Runway 14/32, which is presumed closed for this alternative. As this location is not a part of the Passenger Terminal apron, a deicing fluid (i.e., glycol) drainage system would be required, however, deicing would be served by mobile trucks and deicing equipment, as impacts to terminal area operations may hinder the likelihood any permanent deicing equipment may remain in place. This location is respective of Cargo Alternative 1 (**Figure 5-21**), which currently depicts MRO development within the area, and would provide a consolidated commercial/cargo deicing location. Based on ingress and egress requirements for the taxilanes associated with the terminal gates, the overall length or the deicing bays are more than adequate for single use and may be simultaneously occupied with two aircraft at a time. The over space is a dual use with RON capability at night with positions for up to eight RON aircraft.

The Terminal Alternative 4 deicing apron location shows an area southwest of the existing deicing area. This alternative depicts four ADG IV deicing positions and is respective of Passenger Terminal Alternative 4 (**Figures 5-16** and **5-17**). This location allows for utilization of existing apron space and aircraft ingress/egress nearby the terminal gates. Similar to the remote deicing facility, lane length is more than adequate for single aircraft use, and may be utilized by up to two aircraft at a time per lane for simultaneous use, therefor increasing the overall deicing capacity at the Airport. Additionally, during non-deicing periods the area can accommodate up to ten RON aircraft. Single taxilane access as a result of this location may be considered an operational disadvantage.

5.6.6 Airfield Maintenance Facilities Alternatives

The NAA airfield maintenance facilities are currently located on the southeast end of the airfield and consist of a 40,000 SF facility that houses the snow removal equipment and a 6,000 SF facility for sand storage and airport maintenance and utility vehicles. According to the NAA, these buildings are at capacity and do not account for the most recent FAA guidance within FAA AC 150/5220/18A, *Buildings for Storage and maintenance of Airport Snow and Ice Control Equipment and Materials*. Therefore, **Figure 5-28** depicts several alternate locations for additional airfield maintenance facilities. Note that with each location, the potential exists for either complete facility relocation or establishment of a secondary airfield maintenance site, depending on need or location.

Airfield Maintenance Alternative 1

Alternative 1 shows an expanded maintenance facility directly northwest of the existing. This location provides consolidation of all airport maintenance resources within a dedicated area. A disadvantage to this concept is the impact to the existing ARFF training area, which is shown relocated southward.

Airfield Maintenance Alternative 2

Alternative 2 shows an expanded area southeast of the GA apron. This location provides quick access to both the airfield and Miller Store Road with the ability for expansion. However, this area is dependent upon closure of Runway 14/32 and is ideal space for future aeronautical and/or

aeronautical-related development. Proximity to the FBO terminal building could be considered to an aesthetic disadvantage.

Airfield Maintenance Alternative 3

Alternative 3 is also dependent upon closure of Runway 14/32. Although less of an impact to future aeronautical and/or aeronautical-related development, this location may also be dependent upon potential relocation of the GRE facility.

Airfield Maintenance Alternative 4

Alternative 4 takes advantage of the undeveloped wooded area to the north of the existing fuel farm. This area provides connectivity to the airfield and Miller Store Road but would require land acquisition and site clearing prior to development. **Table 5-23** summarizes the Airfield Maintenance Alternatives.

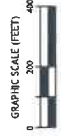
Table 5-23 – Airfield Maintenance Alternatives

Opportunities	Constraints
<ul style="list-style-type: none"> ➤ Existing facility can be retained, allowing for smaller addition(s) to supplement space needs ➤ Sufficient locations throughout airfield allow for total relocation or for a secondary airfield maintenance site 	<ul style="list-style-type: none"> ➤ Partial or total relocation within existing Runway 32 approach area limits potential aeronautical and/or aeronautical-related development ➤ Proximity to the FBO terminal building could be considered an aesthetic disadvantage

Source: CHA, 2019.



**NORFOLK INTERNATIONAL AIRPORT
MASTER PLAN UPDATE**



LEGEND

- Future Airfield Pavement
- Future Landside Pavement
- Future Building
- Pavement Removal

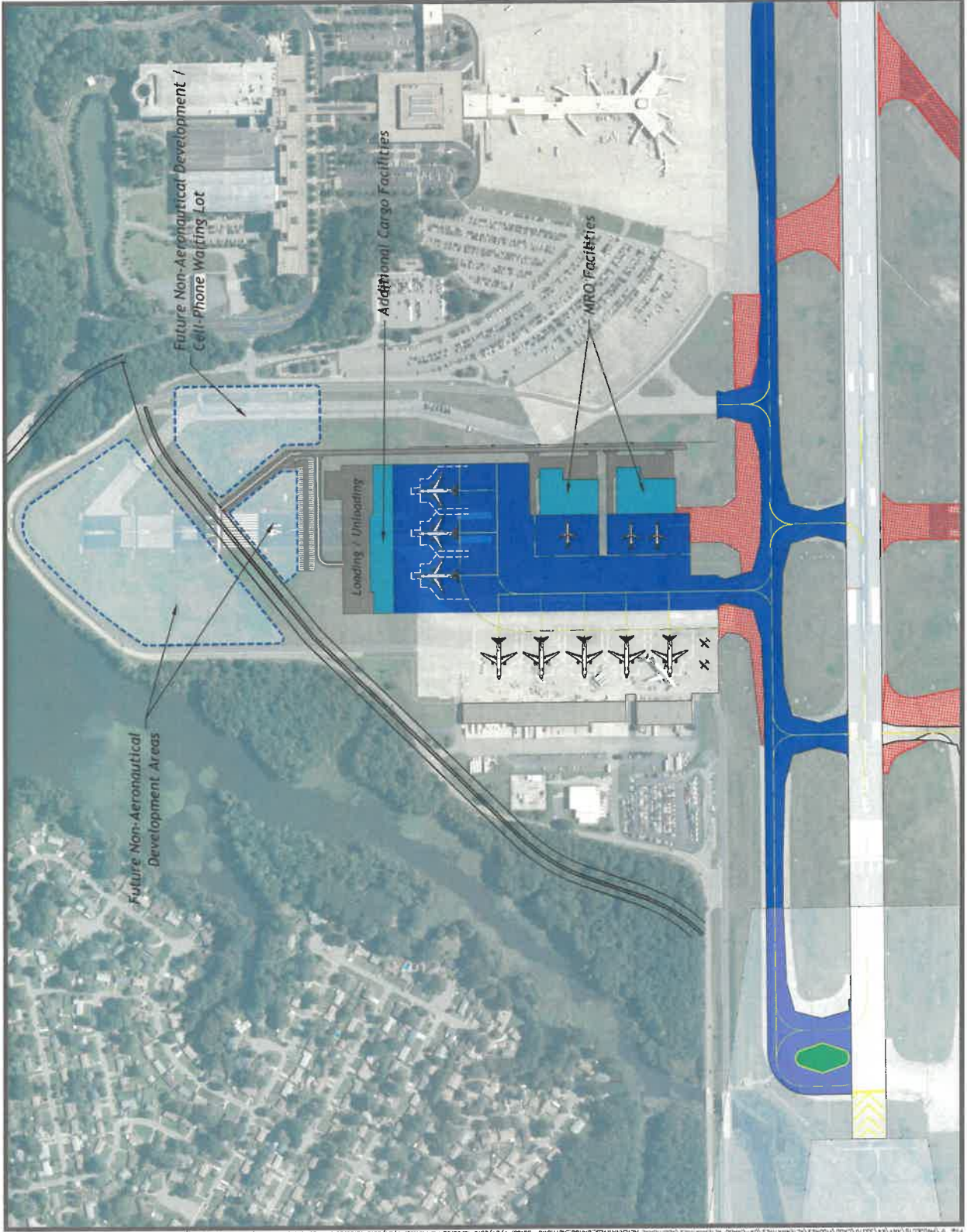


Figure 5-21
North Cargo / MRO Area
Alternative 1