5. Alternatives

Alternatives were developed to meet the operational and facility requirements that would support forecast aviation activity at the Airport throughout the planning period. These alternatives were then evaluated to identify the preferred alternative for development giving consideration to many factors such as cost, safety, efficiency and level of service.

5.1 Airfield Alternatives

Alternatives that address the airfield requirements presented in Section 4 were developed and evaluated. As the current runway system is adequate to accommodate the aircraft operational demand associated with all three PALs, these alternatives do not include new runways or the extension of existing runways. However, these alternatives do include the planned decommissioning of Runway 18-36. Therefore, the airfield alternatives described herein were primarily focused on the following:

- Airfield modifications associated with the decommissioning of Runway 18-36
- Airfield modifications necessary to mitigate runway incursions and comply with the current airfield design standards in FAA AC 150/5300-13A (Change 1), *Airport Design*
- Taxiway pavement fillet modifications necessary to allow right turns from Taxiway C4 onto Taxiway C
- Airfield modifications that would enable the development of a bypass taxiway at the Runway 31L threshold
- Potential relocation of the Runway 31R glideslope antenna to eliminate its encroachment on Taxiway M.
- Potential extension of Taxiway M to reach Runway 13L threshold.

5.1.1 CROSSFIELD TAXIWAY MODIFICATIONS - RUNWAY 18-36 DECOMMISSIONED

In January 2015, the Department of Aviation submitted a formal request to the FAA to permanently decommission Runway 18-36, which has been closed as a runway, but used as a taxiway since April 2011. The EA for the decommissioning of Runway 18-36, initiated in 2014, was approved by the FAA in February 2015 with the issuance of a Finding of No Significant Impact (FONSI). However, to maintain a complete project record, all alternatives were included in the Master Plan Update alternatives analysis discussed herein. The airfield capacity analyses resulted in the conclusion that the planned decommissioning of the runway would not compromise the ability of the airfield to accommodate operational demand associated with the three

PALs. In fact, it was determined that conducting aircraft operations on Runway 18-36 actually degrades the hourly capacity of the airfield because of the runway's intersection with the parallel runways.

As Runway 18-36 is permanently decommissioned, reconfiguration of the midfield taxiway infrastructure between Runways 13L-31R and 13R-31L becomes possible. Although converting Runway 18-36 to a permanent taxiway would be a low-cost approach, a full reconfiguration of the taxiway infrastructure would reduce aircraft taxiing distances while maximizing the amount of Airport property that would become available for other development. Five alternatives for reconfiguring the midfield taxiway system were considered based on Runway 18-36 being decommissioned.

It should be noted that, under all five alternatives, the portions of Runway 18-36 that extend north of Taxiway A and south of Taxiway J would be removed or abandoned and the portion of Runway 18-36 between Taxiways A and B would be reconfigured as runway exits supporting arrivals on Runway 31R. The proposed runway exit reconfigurations are depicted on **Exhibit 5-1**. The five alternatives described below address reconfiguration of the portion of Runway 18-36 between Taxiways B and L.

5.1.1.1 Alternative 1 – Runway 18-36 Partially Converted to a Taxiway

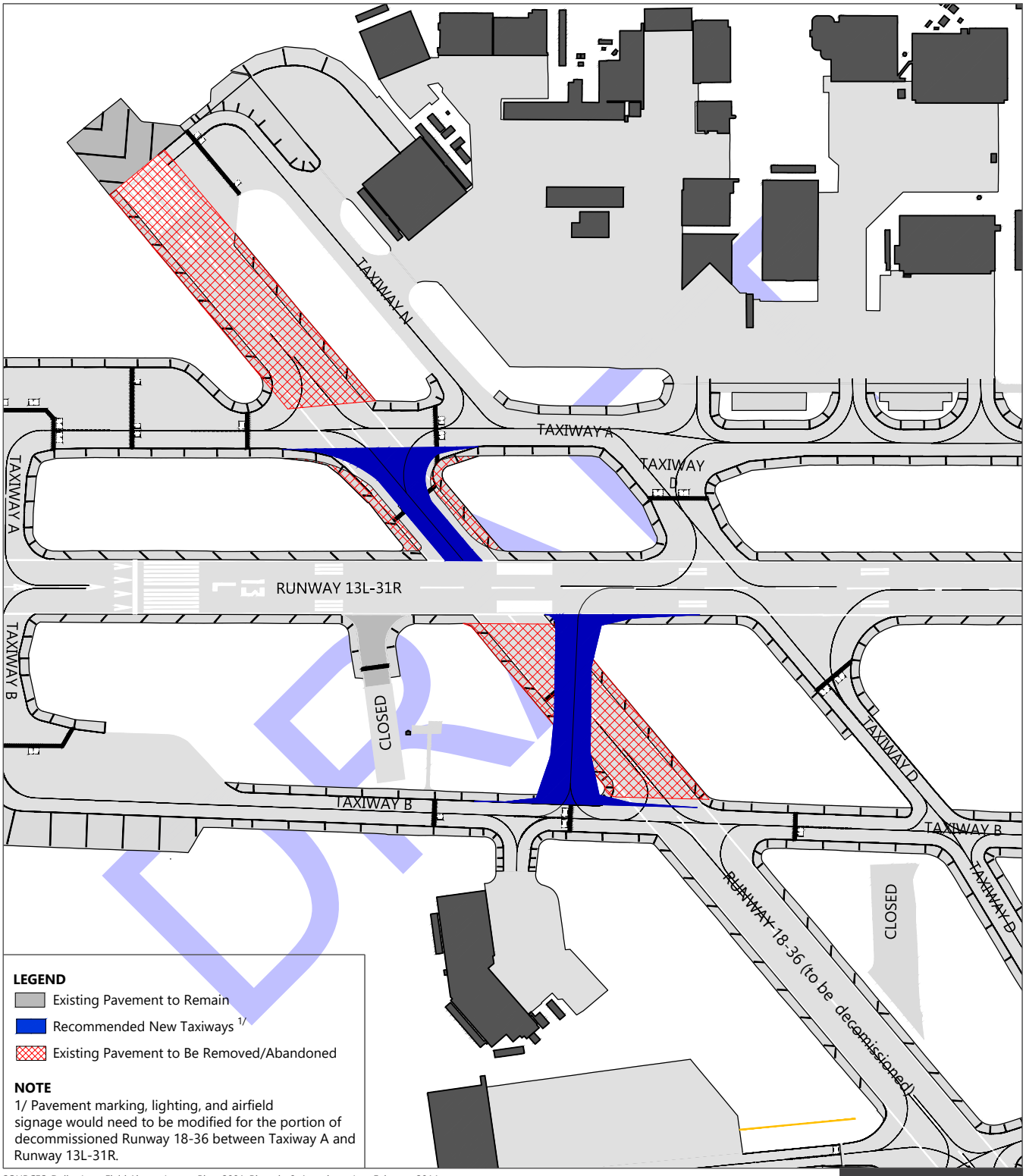
As illustrated on **Exhibit 5-2,** Alternative 1 reflects the partial conversion of Runway 18-36 to a midfield taxiway. For consistency with the existing airfield, the converted taxiway would be 75 feet wide, with 25-foot shoulders. No additional pavement would be required, but the installation of new edge lights, centerline lights, and airfield guidance signs would be necessary. The excess pavement and lighting could be removed or abandoned. The resulting net increase in property that would become available for future development would be minimal.

5.1.1.2 Alternative 2 – Dual ADG III Parallel Crossfield Taxiway System

As shown on **Exhibit 5-3**, Alternative 2 consists of dual ADG III parallel taxiways with a lateral centerline-to-centerline separation of 152 feet. Approximately 28 acres would become available for future airfield development, including approximately 13 acres adjacent to the terminal apron that could be used for RON parking and GSE storage/staging and 15 acres north of the crossfield taxiways that could be used for other airfield facility development.

5.1.1.3 Alternative 3 - Dual ADG III Parallel Crossfield Taxiway System with Centralized Deicing Pad

As shown on **Exhibit 5-4**, Alternative 3 consists of dual parallel taxiways to accommodate ADG III and smaller aircraft, with a centerline-to-centerline separation of 379 feet to enable development of a deicing pad or to accommodate RON/hardstand aircraft parking between the dual parallel taxiways. As the taxiways are designed to accommodate ADG III or smaller aircraft, larger aircraft may not be able to access the deicing pad or RON/hardstand positions without specific taxiing restrictions. Two 20-foot-wide service roads are located outside of each taxiway OFA, allowing a 153-foot-wide deicing pad/RON parking area to accommodate ADG III aircraft. An additional area of approximately 25 acres would become available for future development, including approximately 11 acres adjacent to the terminal apron that could be used for RON parking or GSE storage/staging and 13 acres north of the crossfield taxiways that could be used for other airfield facility development.



SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-1

NORTH 0 400 ft.

Recommended Runway 13L-31R Exit Reconfigurations

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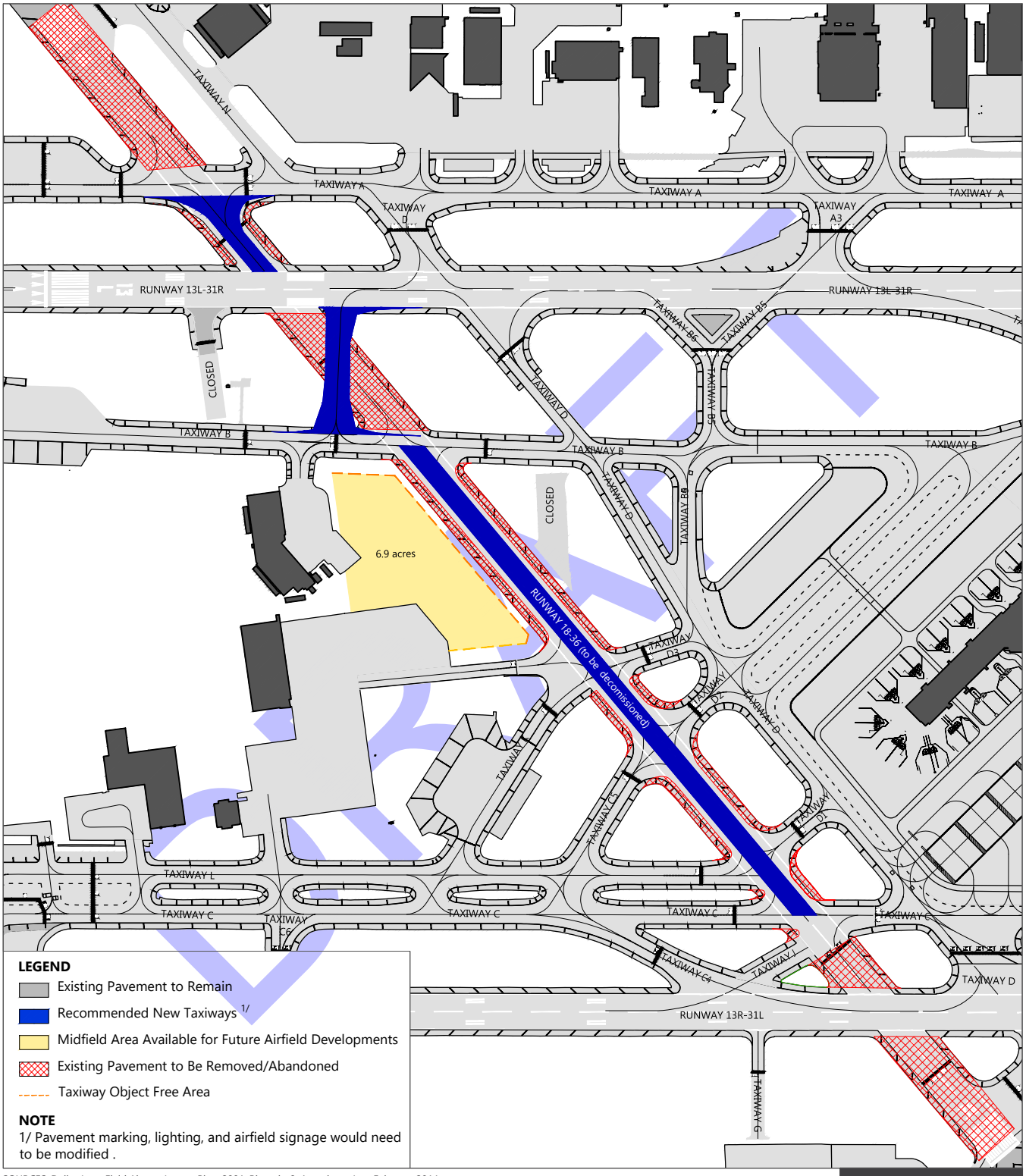

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-2

NORTH 0 600 ft.

Crossfield Taxiway Alternative 1
Decommissioned Runway 18-36 Partially Converted To a Taxiway

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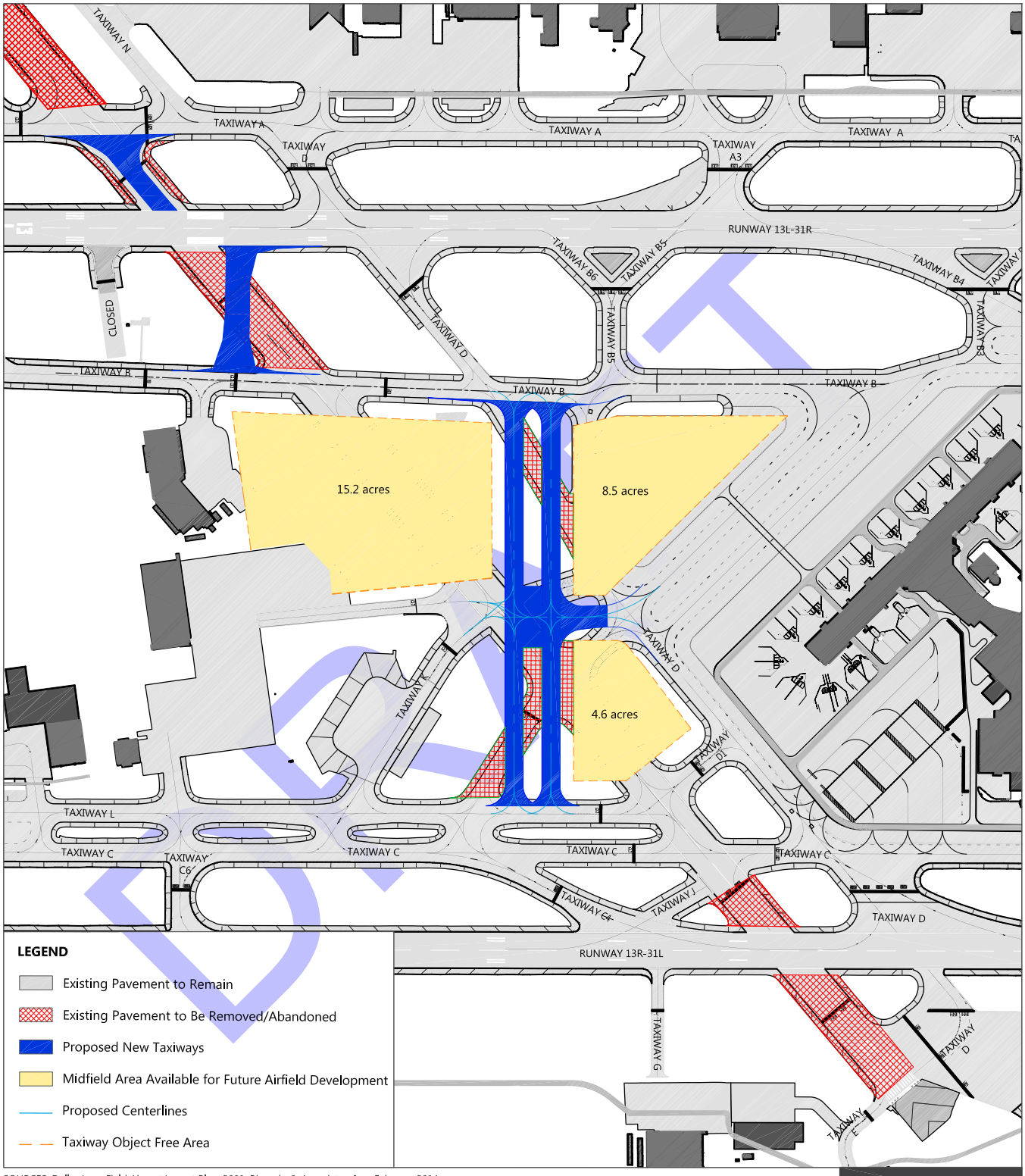

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-3

NORTH 0 600 ft.

Crossfield Taxiway Alternative 2
Dual ADG III Parallel Taxiway System

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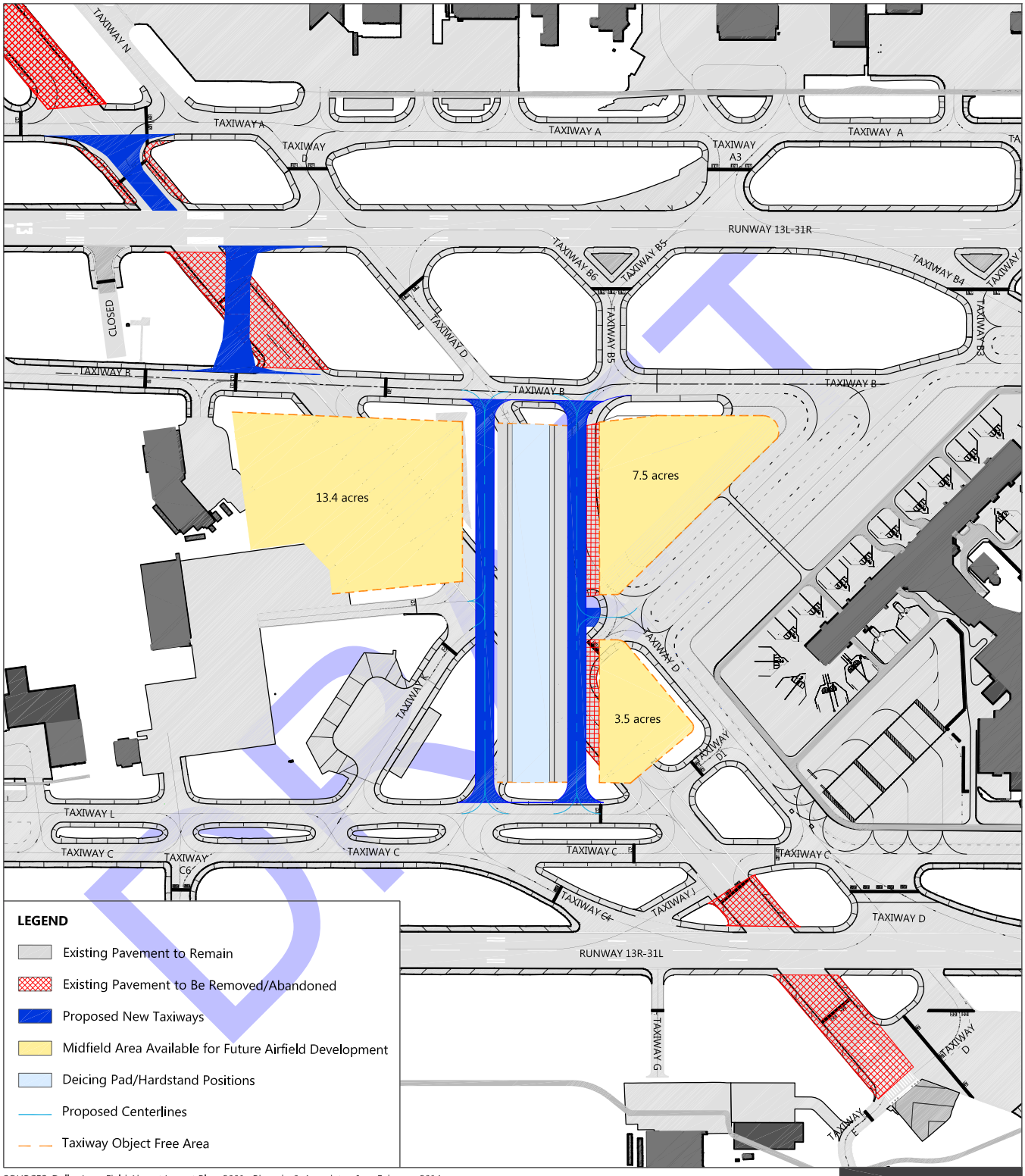

SOURCES: Dallas Love Field Airport Layout Plan, 2001 ; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-4

NORTH 0 600 ft.

Crossfield Taxiway Alternative 3
Dual ADG III Parallel Taxiway System with Centralized Deicing Pad

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5.1.1.4 Alternative 4 - Dual ADG IV Parallel Crossfield Taxiway System

As shown on **Exhibit 5-5**, Alternative 4 consists of dual parallel taxiways that would accommodate ADG IV and smaller aircraft. The lateral centerline-to-centerline separation between the two taxiways would be 215 feet. An area of approximately 25 acres would become available for future development, including approximately 10 acres adjacent to the terminal apron that could be used for RON parking or GSE storage/staging and 15 acres north of the crossfield taxiways that could be used for other airfield facility development.

5.1.1.5 Alternative 5 - Dual ADG IV Parallel Crossfield Taxiway System with Centralized Deicing Pad

As shown on **Exhibit 5-6**, Alternative 5 consists of dual parallel taxiways with a centerline-to-centerline separation of 460 feet, which would be able to accommodate ADG IV or smaller aircraft. A 160-foot-wide area between the two taxiways would be preserved for deicing activities or RON/hardstand positions. Most ADG IV aircraft, such as the Boeing 757-200 and the Boeing 767-200, which are based at the Airport, are less than 160 feet long and could use the centralized deicing pad. Similar to Alternative 2, two 20-foot-wide service roads would be located outside of each taxiway OFA and could be used for deicing vehicles.

An area of approximately 20 acres would become available for future facility development, including more than 7 acres adjacent to the terminal apron that could be used for GSE staging/storage and RON parking and more than 12 acres north of the crossfield taxiways that could be used for other airfield facility development.

5.1.1.6 Alternatives Comparison and Recommendation

Alternatives 2 through 5 provide dual taxiways as a crossfield connection between Taxiways B and L immediately west of the terminal apron. To minimize the potential for runway incursions, the crossfield taxiways would terminate at Taxiways B and L.

With the exception of the removal or abandonment of portions of Runway 18-36, Alternative 1 would use most of the existing taxiway network, thereby minimizing construction costs. Alternatives 2, 3, 4, and 5, however, would require decommissioning the portion of Taxiway B5 southwest of Taxiway B, as well as Taxiways C5, D3, and P, and a significant portion of Taxiway D. In addition, the proposed alignments of the crossfield taxiways under Alternatives 2 through 5 would be to the west of existing Taxiway B5, avoiding a direct access to Runway 13L-31R and potential aircraft incursions onto that runway.

Table 5-1 provides a comparison of the five crossfield taxiway modification alternatives described above.

To optimize airfield capacity and flexibility and provide opportunities for future development, midfield dual parallel taxiways perpendicular to Runways 13L-31R and 13R-31L are recommended. These dual parallel taxiways would also provide areas that can be used for future aircraft parking, terminal development, or other airfield development. However, it is recommended that Runway 18-36 continue to be used as a taxiway as a near-term solution until operational demand warrants future facility development or the existing pavements associated with Runway 18-36 and Taxiway D reach the end of their useful lives.

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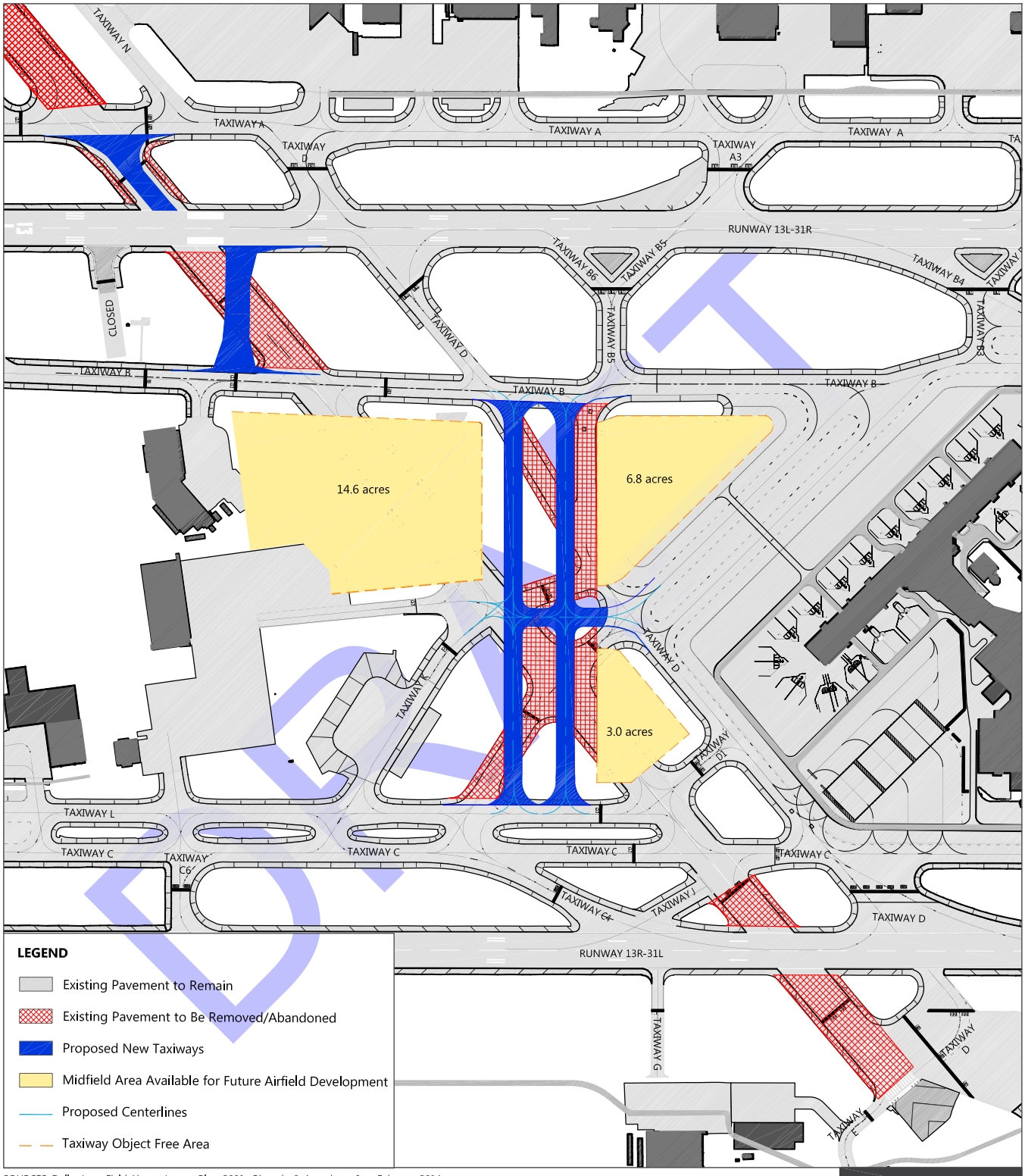

SOURCES: Dallas Love Field Airport Layout Plan, 2001 ; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-5

NORTH 0 600 ft.

Crossfield Taxiway Alternative 4
Dual ADG IV Parallel Taxiway System

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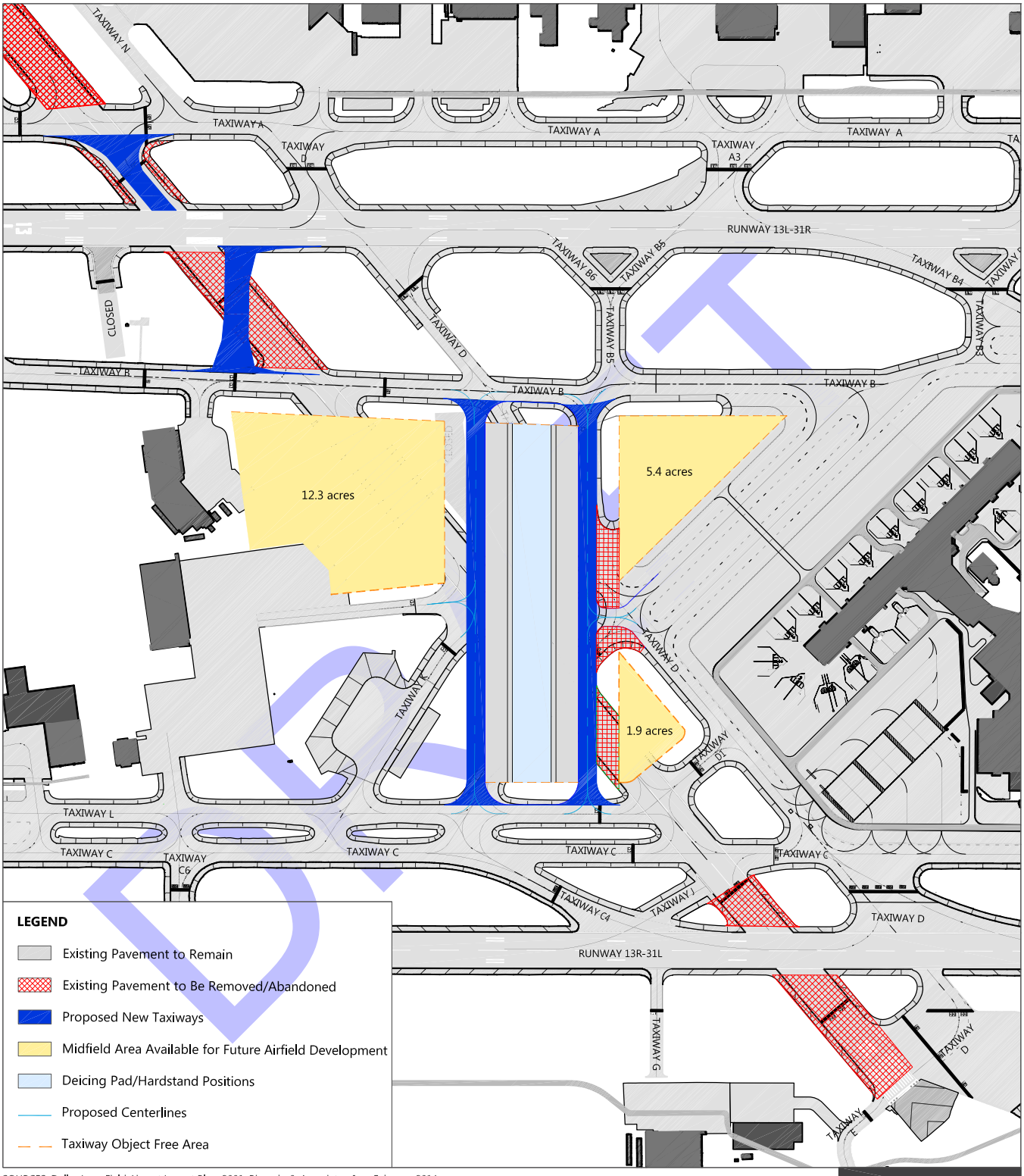

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-6

NORTH 0 600 ft.

Crossfield Taxiway Alternative 5
Dual ADG IV Parallel Taxiway System with Centralized Deicing Pad

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Table 5-1: Comparison of Crossfield Taxiway Modification Alternatives

	ALTERNATIVES				
CRITERIA	**1**	**2**	**3**	**4**	**5**
Relative Cost	Low	Moderate	High	Moderate	High
Aircraft Allowed on Dual Parallel Taxiways	N/A	ADG III	ADG III	ADG IV	ADG IV
Area Available for Deicing Pad/Remain Overnight Parking Positions	No	No	Yes	No	Yes
Approximate Area Available for Future Airfield Facility Development (acres)	7	29	25	25	20
Recommendation [1/]	Preferred for interim use	Preferred as ultimate configuration	No	No	No

NOTES: N/A = Not Applicable

1/ Recommended only if Runway 18-36 is decommissioned.

SOURCE: Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

Following an evaluation and discussions with Airport staff, it was determined that the current deicing and hardstand positions are adequate to accommodate current (2013) demand, but aircraft hardstand parking requirements are anticipated to increase during the planning period. The midfield area that would become available on each side of the crossfield taxiways in Alternatives 2 and 4 is estimated to be sufficient to accommodate future development, including additional hardstand positions. Additionally, airfield projects compliant with ADG III design standards are eligible for FAA funding. Therefore, Alternative 2 was identified as the preferred crossfield taxiway alternative in the long term, while Alternative 1 is preferred in the near term.

5.1.2 RUNWAY INCURSION MITIGATION MEASURES

As described in Section 4, FAA AC 150/5300-13A, *Airport Design* (Change 1), incorporates guidance for reducing the risk of runway incursions related to airfield configuration. Among the eight planning strategies for mitigating runway incursion risks set forth by the FAA, the following strategies relate to deficiencies of the current DAL airfield:

- Avoid wide expanses of pavement, particularly for entrance and exit taxiways.
- Avoid high energy intersections within the center of the runway. Runway crossings should be limited to the first or last third of a runway, while crossings in the middle third of a runway should be avoided.
- Acute angle runway exits should not be used for aircraft crossings. Runway crossing points should be perpendicular to the runway centerline to increase pilot visibility.
- Direct runway access from an apron area is not recommended.

The following subsections describe the airfield modifications that would mitigate the deficiencies of the airfield areas at DAL that are not in conformance with FAA guidance.

5.1.2.1 Modifications to Taxiway D Crossing of Runway 13R-31L

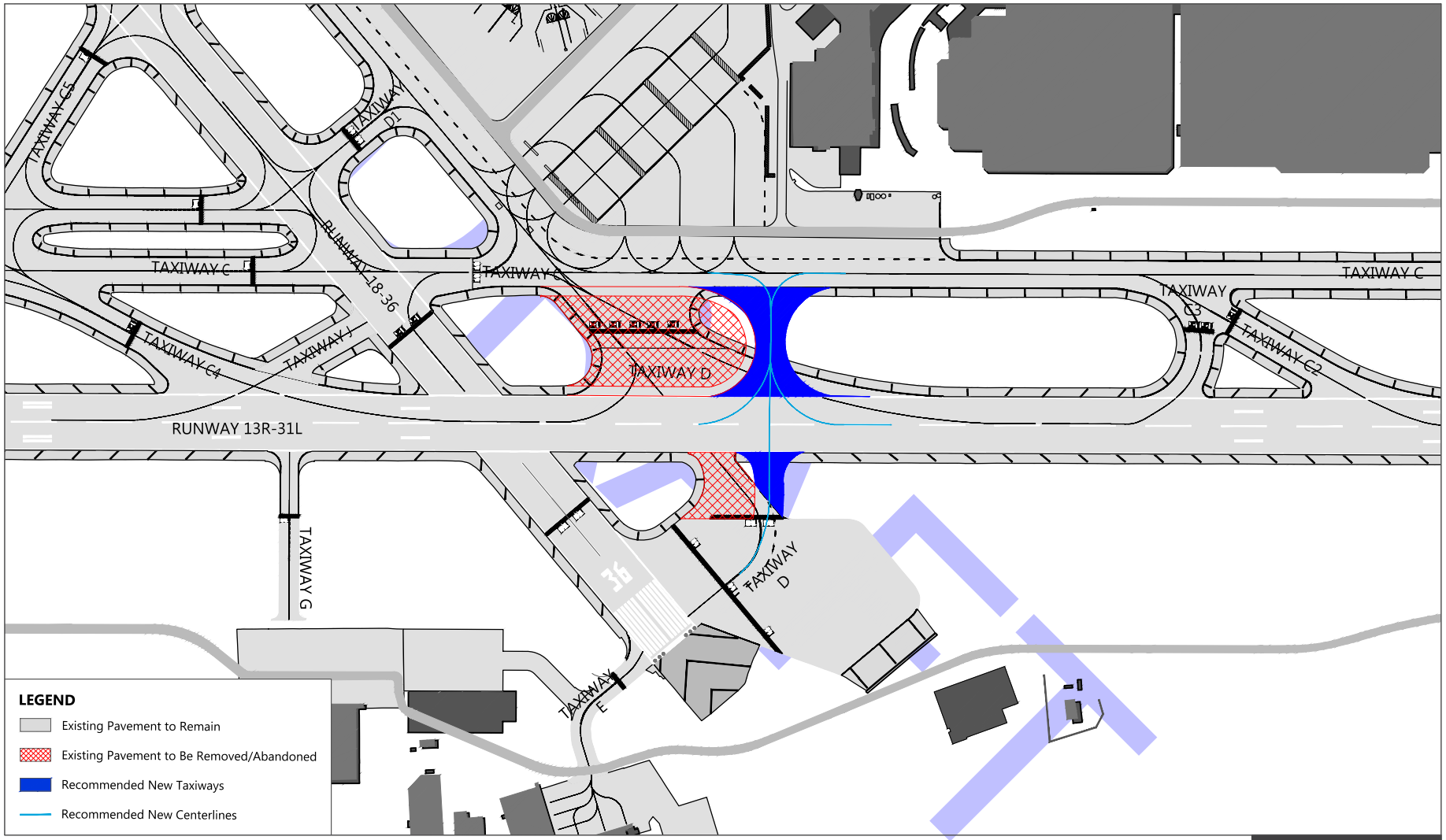
In addition to providing access to the south end of Runway 18-36, Taxiway D crosses Runway 13R-31L, providing access to the Business Jet Center facility on the west side of the airfield. The intersection of Runway 13R-31L and Taxiway D deviates from the FAA's runway incursion prevention guidance in four ways:

- With an overall pavement width of 340 feet at the Runway 13R-31L hold position marking, Taxiway D is considered a wide expanse of pavement that could inhibit a pilot's situational awareness on the airfield.
- The intersection of the runway and the taxiway occurs in the middle third of the runway, thereby resulting in a high-energy intersection.
- The taxiway intersects the Runway 13R-31L centerline at an acute angle.
- Completion of the centralized deicing pad on the west terminal apron would result in direct access from the terminal ramp area to the runway.

To mitigate the potential incursion risk for the Taxiway D crossing of Runway 13R-31L, two alternatives were identified. **Exhibit 5-7** illustrates Taxiway D modifications if Runway 18-36 were to remain operational, and **Exhibit 5-8** illustrates Taxiway D modifications if Runway 18-36 were decommissioned. With the exception of eliminating the crossing in the middle third of Runway 13R-31L, both alternatives would mitigate the other three runway incursion risks and the revised taxiway orientation would enhance pilot visibility at a high-energy point. Given that there is no parallel taxiway along the southwest side of Runway 13R-31L, it is not feasible to relocate the crossing point away from the middle third of the runway. Furthermore, the number of aircraft that actually use this crossing point is low, regardless of whether Runway 18-36 remains operational or not. Under both alternatives, Taxiway D would be converted to a 90-degree exit for arrivals on Runways 13R and 31L.

Taxiway D Modifications with Runway 18-36 Operational

If Runway 18-36 remains operational, the centerline of Taxiway D between Runways 13R-31L and 18-36 would be realigned to intersect Runway 13R-31L at a right angle. In addition, the section of Taxiway D between Taxiway C and Runway 13R-31L would be closed and a new 90-degree exit taxiway would be constructed south of Taxiway D. The new exit would be aligned with the realigned centerline of Taxiway D west of Runway 13R-31L for perpendicular runway crossings, maximizing pilot visibility. The centerline of the new exit would not be aligned with the deicing pad markings, mitigating the availability of direct access from the terminal ramp area to the runway. As shown on Exhibit 5-7, the existing pavement connecting Runway 13R-31L with the holding pad east of the Runway 36 threshold would be removed or abandoned and access to that holding pad would be provided via the new pavement.



SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., June 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-7

NORTH 0 400 ft.

Modifications to Taxiway D Crossing of Runway 13R-31L with Runway 18-36 Operational

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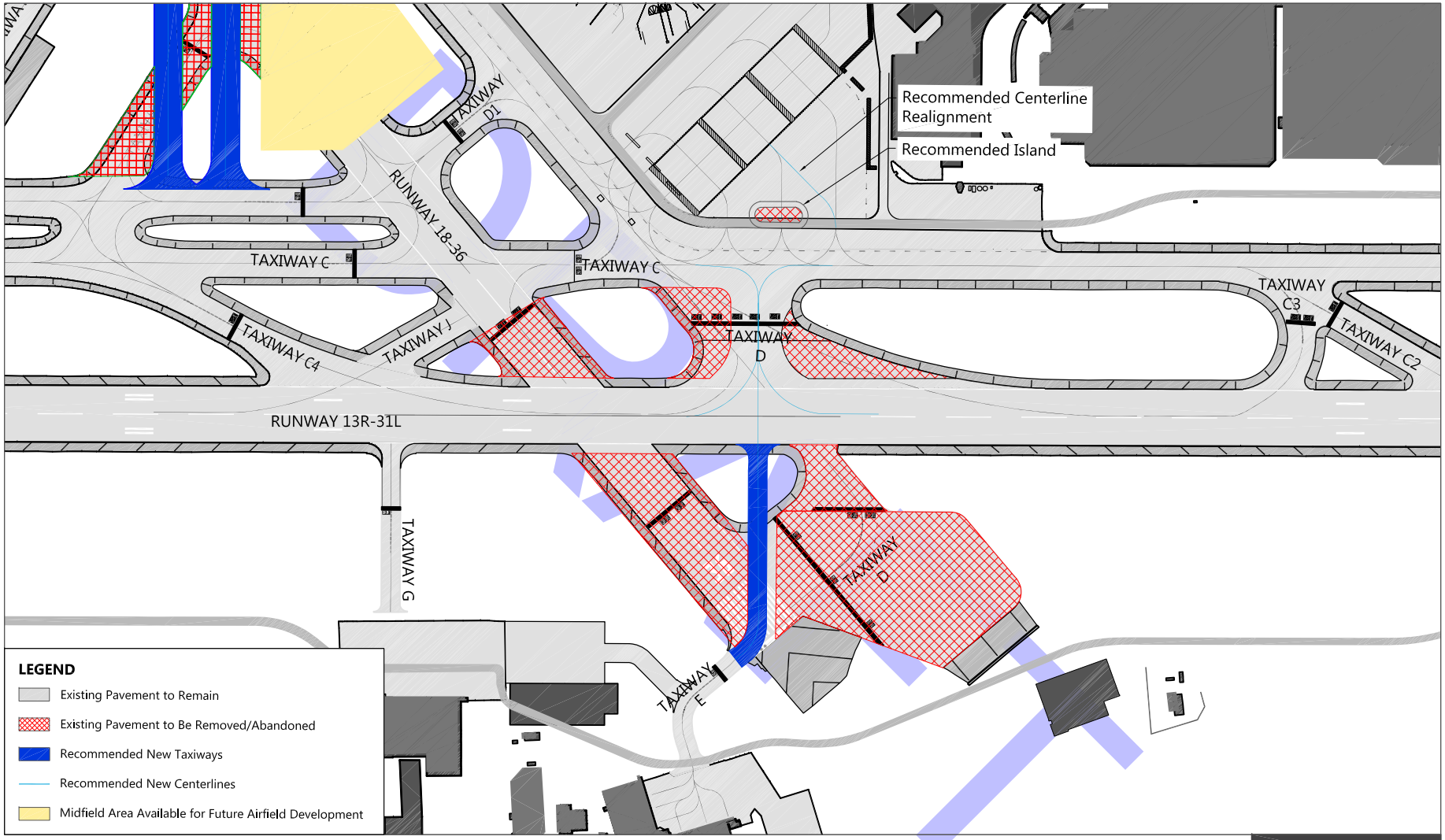

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., June 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-8

NORTH 0 400 ft.

Modifications to Taxiway D Crossing of Runway 13R-31L with Runway 18-36 Decommissioned

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Taxiway D Modifications with Runway 18-36 Decommissioned

Upon the decommissioning of Runway 18-36, the section of Taxiway D south of Runway 13R-31L would only provide access to the Business Jet Center facility to the west of the Runway 36 threshold. Therefore, reconfiguring this portion of the taxiway should be considered once Runway 18-36 is decommissioned. It is recommended that Taxiway D be closed south of Runway 13R-31L and that a new connector taxiway be constructed perpendicular to the runway to provide access to the Business Jet Center facility (as illustrated on Exhibit 5-8). This reconfigured taxiway would connect with Taxiway E and have the same width as Taxiway E (50 feet).

Upon realignment of the Taxiway D centerline, it is recommended that an island be developed south of the middle position of the future deicing pad and that the taxilane leading to Taxiway C be realigned to avoid direct access from the deicing pad to Runway 13R-31L (see Exhibit 5-8). The island would also limit the wide expanses of pavement in this area.

5.1.2.2 Modifications to Taxiway D Crossing of Runway 13L-31R

The crossing of Runway 13L-31R via Taxiway D deviates from the FAA's runway incursion prevention guidance in two ways:

- The taxiway bisects the Runway 13L-31R centerline at an acute angle.
- The intersection of Taxiway D with Taxiway A is adjacent to one of the exits from the general aviation apron area, thereby resulting in direct access from this apron to the runway.

Whether or not Runway 18-36 is decommissioned, reconfiguration of the Taxiway D crossing at its intersection with Runway 13L-31R is warranted. **Exhibit 5-9** illustrates the recommended reconfiguration that would mitigate both deviations. The recommended placement of the perpendicular taxiway crossing would be in the northern third of the runway and would also be north of the ultimate location of the recommended crossfield parallel taxiways under Alternatives 2, 3, 4, and 5 described in Section 5.1.1. This location would provide the ability to implement the other crossfield parallel taxiway modifications without requiring relocation of this new crossing.

5.1.2.3 Modifications to Taxiways B1 and B3 Crossing of Runway 13L-31R

Currently, Taxiways B1 and B3 are primarily used to cross Runway 13L-31R. Because the taxiways do not intersect the runway at a right angle, pilot visibility is reduced and the risk of runway incursion is increased. According to FAA design standards, acute angle runway exits should not be used as runway crossing points. As Taxiways B1 and B3 are too close to the Runway 31R threshold to serve as runway exits and are located outside the middle third of the runway, they are intended to be exclusively used for Runway 13L-31R crossings. It is recommended that these taxiways be realigned with Taxiways A1 and A2, respectively, and perpendicular to the runway to minimize the potential for runway incursions. **Exhibit 5-10** depicts the reconfiguration of the two taxiways.

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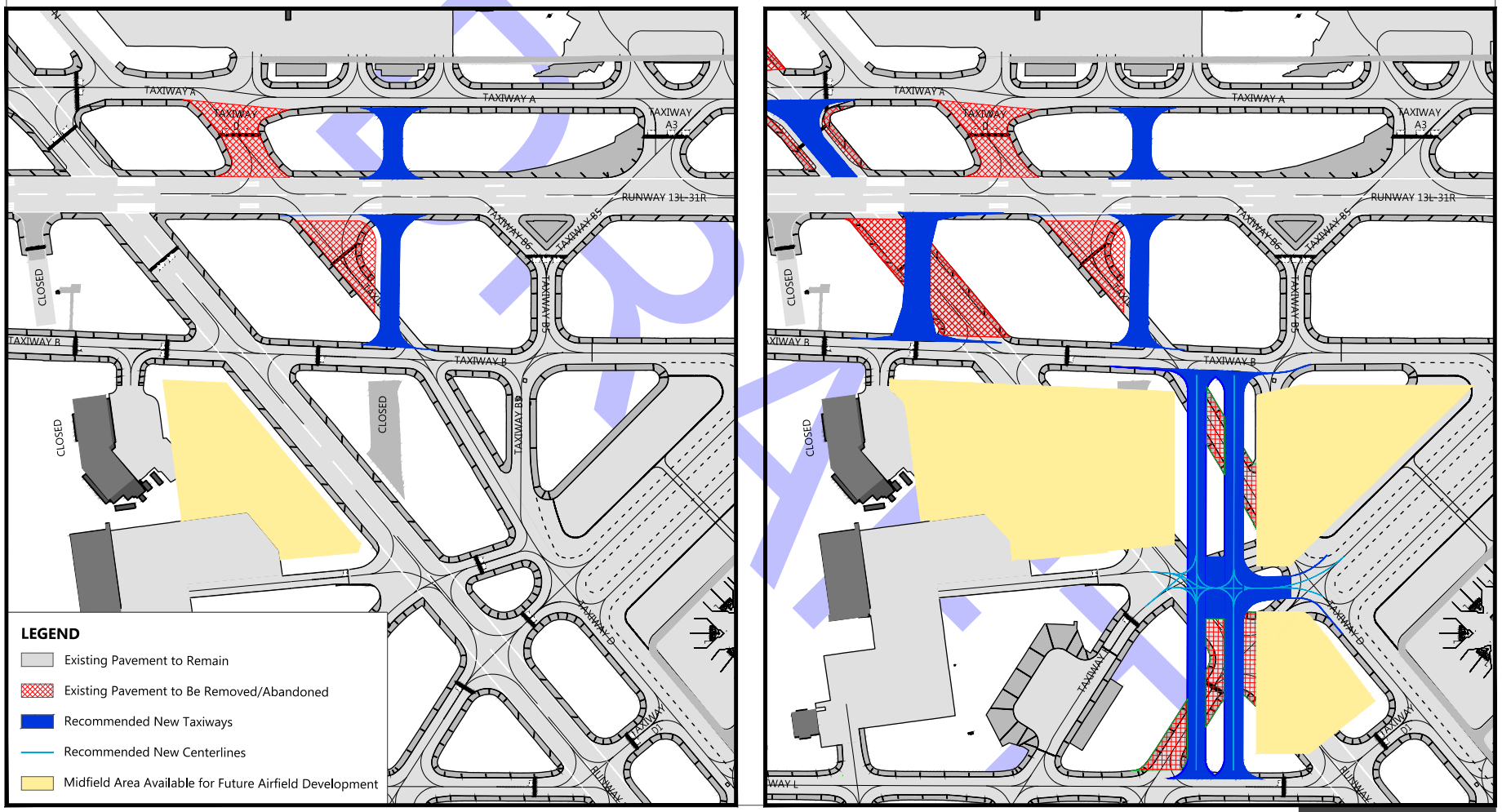

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., June 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-9

NORTH 0 400 ft.

Modifications to Taxiway D Crossing of Runway 13L-31R

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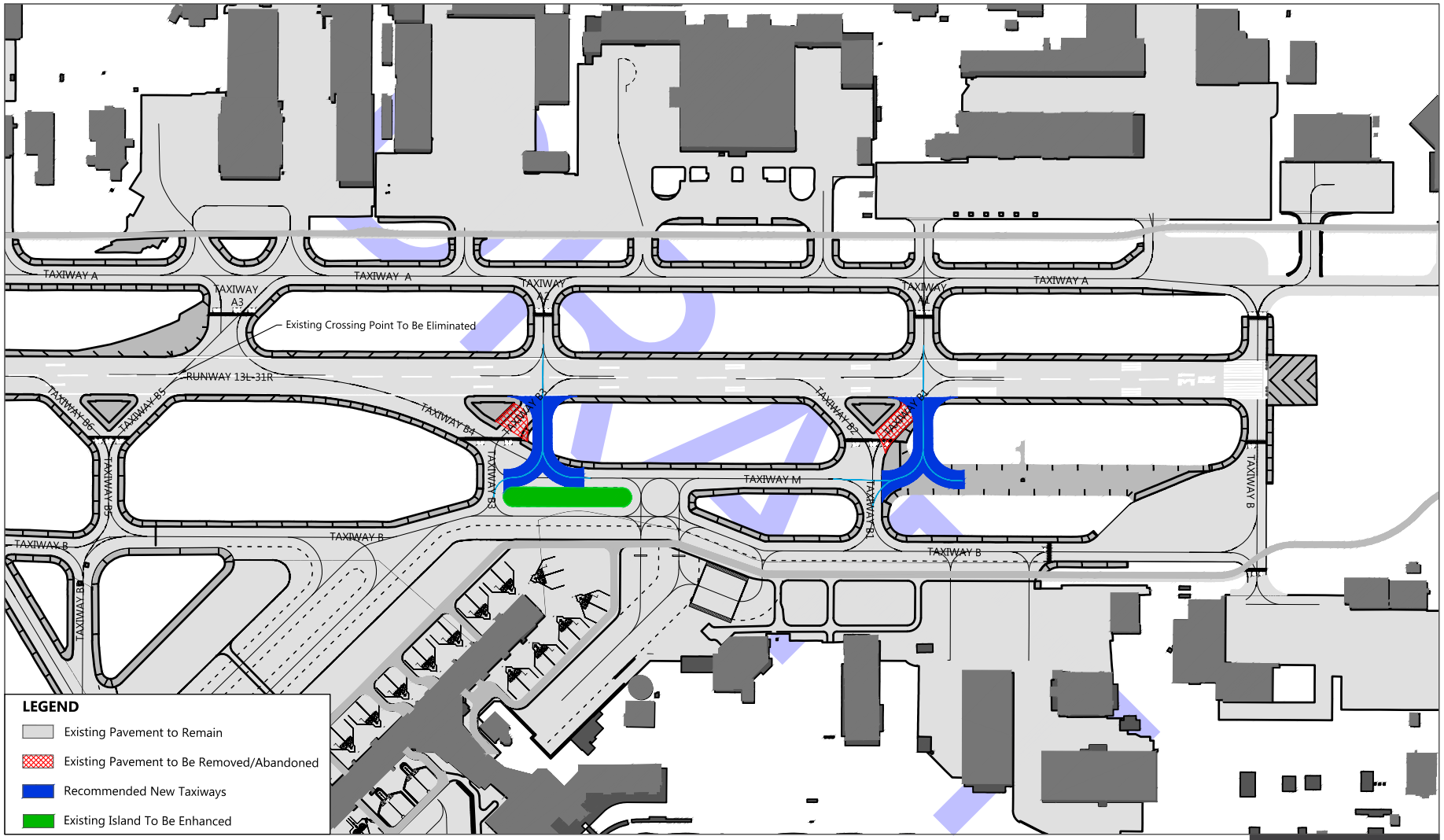

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., June 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-10

NORTH 0 600 ft.

Modifications to Taxiways B1 and B3 Crossing of Runway 13L-31R

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Taxiway B1

As shown on Exhibit 5-10, realigned Taxiway B1 would connect Runway 13L-31R with Taxiway M and the Taxiway B1 OFA would remain outside the glideslope and PAPI located between the southern section of Taxiway M and Runway 13L-31R.

Taxiway B3

The realigned Taxiway B3, shown on Exhibit 5-10, would allow aircraft to cross Runway 13L-31R at a right angle in the first third of the runway. To avoid a straight access from the GA apron to the runway and be in conformance with FAA guidance, it is recommended that the existing island located southwest of Taxiway B3, currently indicated by dashed markings, be enhanced by the removal of unnecessary pavement.

5.1.2.4 Reconfiguration of Taxiways B5 and B6

Whether or not Runway 18-36 is decommissioned, Taxiway B6 and the section of Taxiway B5 between Runway 13L-31R and Taxiway B should be reconfigured for the following reasons:

- The Y shape is not recommended by FAA design standards.
- The angled crossing of Runway 13L-31R on Taxiways B5 and A3 increases the risk of runway incursion at a high-energy point (nonperpendicular crossings are not recommended).

Therefore, reconfiguring Taxiways B5 and B6 in conformance with FAA design standards would reduce the risk of runway incursions and increase pilot situational awareness, eliminating a complex intersection.

5.1.2.5 Modifications to Other Direct Apron-to-Runway Access Points

Whether or not Runway 18-36 is decommissioned, several other taxiways at DAL do not conform with FAA design standards because they currently provide direct access from an apron area to a runway. **Exhibits 5-11** and **5-12** and **Table 5-2** present the modifications recommended for the remaining taxiways that currently lead directly from an apron to a runway. For all intersection locations listed in Table 5-2, the alignment of the taxiways/taxilanes would be mitigated by relocating the access points away from the associated apron areas.

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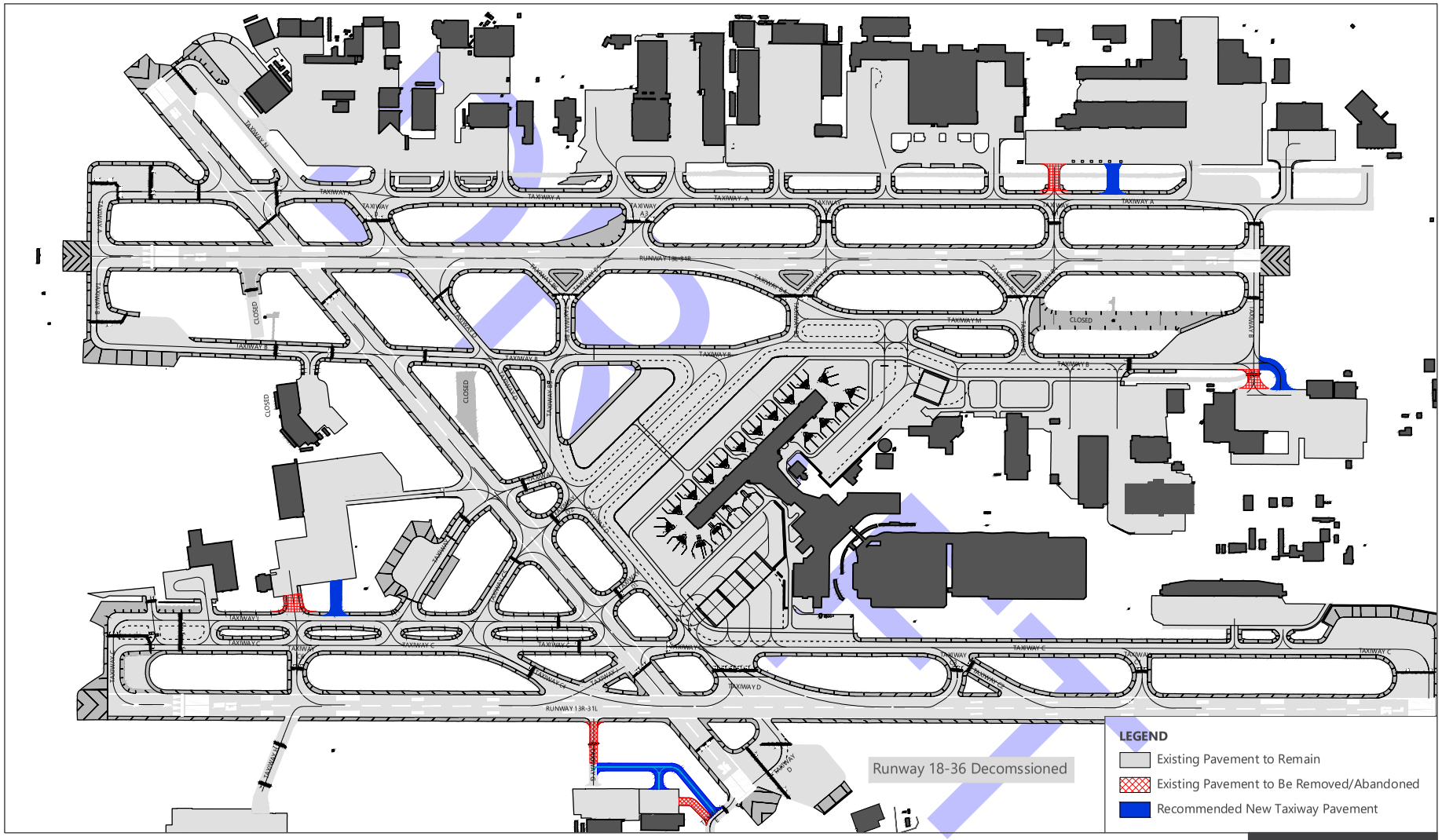

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-11

NORTH 0 1,000 ft.

Modifications to Other Direct Apron-to-Runway Access Points
Runway 18-36 Operational

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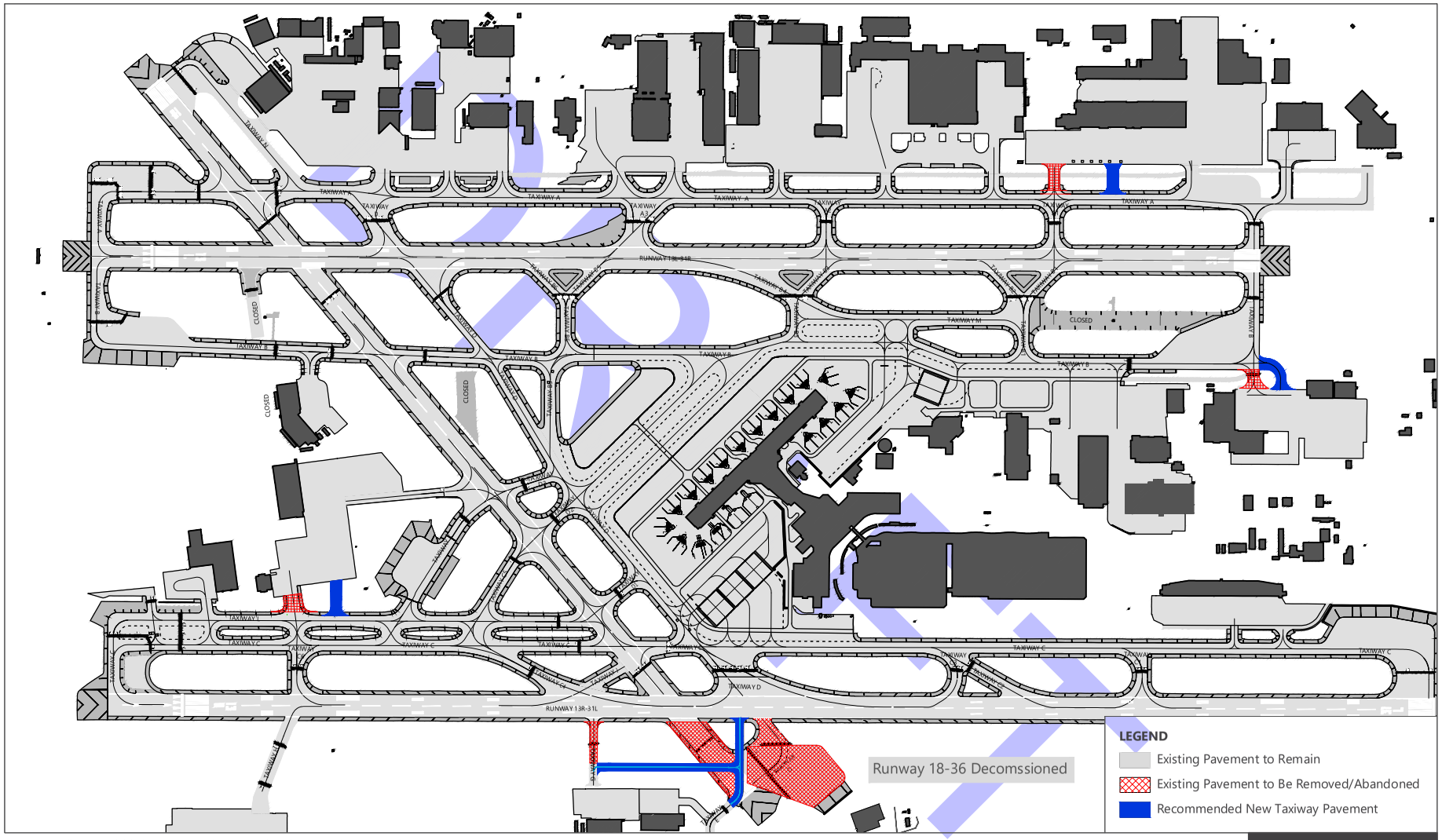

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-12

NORTH 0 1,000 ft.

Modifications to Other Direct Apron-to-Runway Access Points
Runway 18-36 Decomissioned

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Table 5-2: Recommended Modifications to Other Direct Apron-to-Runway Access Points

INTERSECTION LOCATION	RECOMMENDED MODIFICATION FOR FAA COMPLIANCE
Runway 13L-31R and Taxiway A1 intersection (from Signature Flight Support)	Close the taxiway connector between Taxiway A and the apron and construct a new taxiway connector 385 feet to the south. This new connector would not be aligned with Taxiway A1 and would not provide direct access to the runway.
Runway 13L-31R and Taxiway B intersection (from LearJet TX, Trinity Industries, and Bombardier Aerospace Services)	Close the taxiway connector and construct a new connector slightly to the south so that it does not provide direct access to the runway.
Runway 13R-31L and Taxiway C6 intersection (from Textar and ExxonMobil)	Close the taxiway connector between Taxiway L and the northeast apron and construct a new taxiway connector 280 feet to the south to eliminate the direct access from the apron to the runway.
Taxiway G and Runway 13R-31L	Close Taxiway G and construct a new 50-foot-wide taxiway parallel to Runway 13R-31L. • If Runway 18-36 is decommissioned, the new taxiway would intersect Taxiway D. • If Runway 18-36 remains operational, the new taxiway would connect with Taxiway E, west of the Runway 36 threshold.

SOURCES: Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design* (Change 1), February 26, 2014; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

5.1.2.6 Taxiway J Closure

Whether or not Runway 18-36 is decommissioned, it is recommended that Taxiway J be closed. Taxiway J currently connects Runways 13R-31L and 18-36 and its geometry could result in incursions on Runway 18-36. Removing this high-speed exit taxiway would reduce the risk of runway incursions and would not significantly affect arrivals on Runway 13R, as a very limited number of aircraft use that exit taxiway, which is located less than 1,500 feet from the Runway 13R touchdown zone. Additionally, with the recommended closure of Taxiway G, the use of Taxiway J would be even more limited.

5.1.3 TAXIWAY PAVEMENT FILLET MODIFICATIONS

According to discussions with Airport staff, it was determined that the pavement fillet at the intersection of Taxiways C4 and C limit aircraft turning movements. Of particular concern is that aircraft landing on Runway 31L cannot exit the runway via Taxiway C4 and turn right onto Taxiway C. No other pavement geometry deficiencies were identified.

Taxiway C4 is one of the two high-speed exits available for aircraft arriving on Runway 31L. Currently, no centerline marking exists for a right turn onto Taxiway C from Taxiway C4 because the pavement fillet is inadequate to allow aircraft to safely make this maneuver. However, ATC reported that some business jets exiting on Taxiway C4 turn right on Taxiway C to access the Jet Aviation facilities south of the passenger terminal. As the result of inadequate pavement fillets at this intersection, larger business jets that cannot make the turn often use outer parallel Taxiway L instead, increasing taxiing distance and travel times to the Jet Aviation ramp.

To enable aircraft exiting Runway 31L via Taxiway C4 to access Taxiway C, modifications of the pavement geometry at this intersection is recommended to comply with the FAA's fillet design criteria. As previously discussed in Section 4, new taxiway improvements are recommended to comply with TDG 5 to reduce the risk of large aircraft mistakenly using taxiways designed for small aircraft. **Exhibit 5-13** illustrates the additional taxiway pavement and shoulders required to enable TDG 5 aircraft to make right turns onto Taxiway C from Taxiway C4.

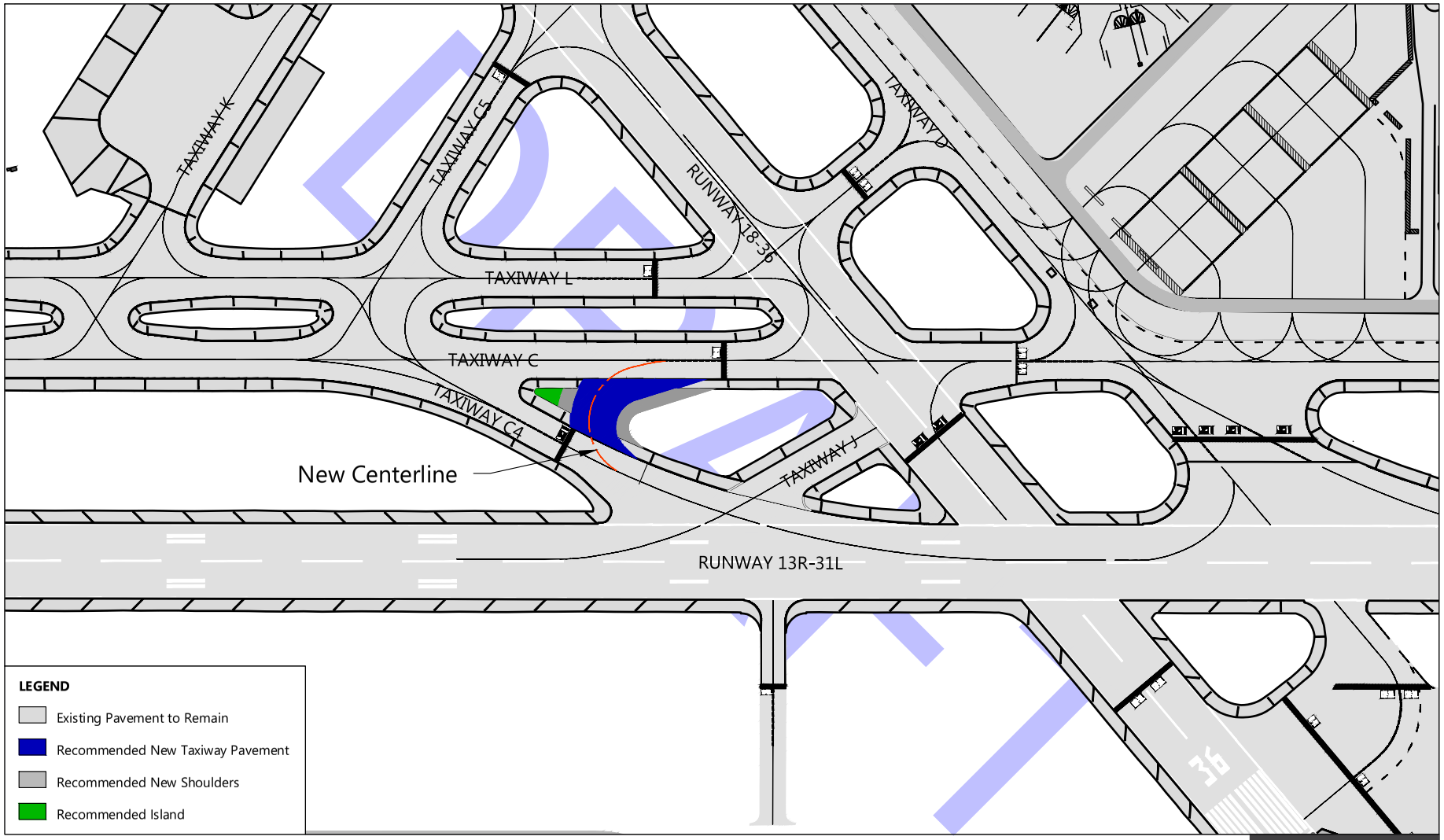
5.1.4 RUNWAY 31L BYPASS TAXIWAY MODIFICATIONS

The wide area of pavement east of the Runway 31L threshold needs to be modified to comply with FAA design standards. To provide more ATC flexibility in sequencing departures, it is recommended that a perpendicular bypass taxiway be constructed parallel to the portion of Taxiway C intersecting Runway 13R-31L. This bypass taxiway would enable one TDG 4 aircraft to bypass another TDG 4 aircraft. TDG 5 aircraft would not be allowed to bypass other aircraft because of the pavement width in this area. It is recommended that the island be painted and marked appropriately. TDG 4 includes all Boeing 737 versions and the Airbus A320 family of aircraft except the Airbus A321 with sharklets (the Airbus equivalent of winglets). The recommended reconfiguration and centerline marking are depicted on **Exhibit 5-14**.

5.1.5 RUNWAY 31R GLIDESLOPE AND RUNWAY VISUAL RANGE RELOCATION ALTERNATIVES

The glideslope serving Runway 31R ILS Category I approaches is currently located 400 feet laterally from the Runway 13L-31R centerline, placing it directly on the centerline of Taxiway M. The RVR, which indicates the visibility on Runway 13L-31R, is located 80 feet from the Taxiway M centerline. As a result, the southernmost portion of Taxiway M is closed and Taxiway B is the only taxiway available to access the Runway 31R threshold from the south side of the airfield. Air carrier aircraft and general aviation aircraft taxiing from facilities located between the parallel runways currently use Taxiway B to depart from Runway 31R in North Flow. Reopening Taxiway M would enable ATC to form two departure queues, thereby enhancing the ability to sequence aircraft for departures from Runway 31R. Alternatives to relocate the glideslope and reopen Taxiway M were evaluated.

The glideslope equipment includes the mast, antenna, and shelter. In accordance with FAA Order 6750.16E, *Siting Criteria for Instrument Landing Systems*, the equipment "must be located on a longitudinal reference line that is parallel to the runway centerline and at a lateral distance as determined by applying the obstacle-free zone (OFZ) criteria." Additionally, the FAA Order states that "the antenna mast, for non-frangible systems, must be located outside the OFZ, must be located outside the runway safety area (RSA), and must be located within 650 feet from runway centerline. The glideslope should be optimally located outside the object free area (OFA), but ultimately determined by site analysis." The RVR consists of one antenna and the processing equipment next to it and needs to be located along the runway and close to its edge to report accurate visibility distances. Based on these requirements, four alternatives were considered for relocating the glideslope and the RVR.



SOURCES: FAA Advisory Circular 150/5300-13A (Change 1), February 2014; Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-13

NORTH 0 300 ft.

Taxiway C4 Pavement Fillet Modifications

Drawing: P:\Dallas Airport System\~On-Call Planning 2012-2014\07 Master Plan\7.6 Development Alternatives\Airfield\CAD\Airfield ImprovementsEx5-13 Taxiway C4 Taxiway C Fillet.dwg_Layout: 5-12_Mar 25, 2015, 9:26am

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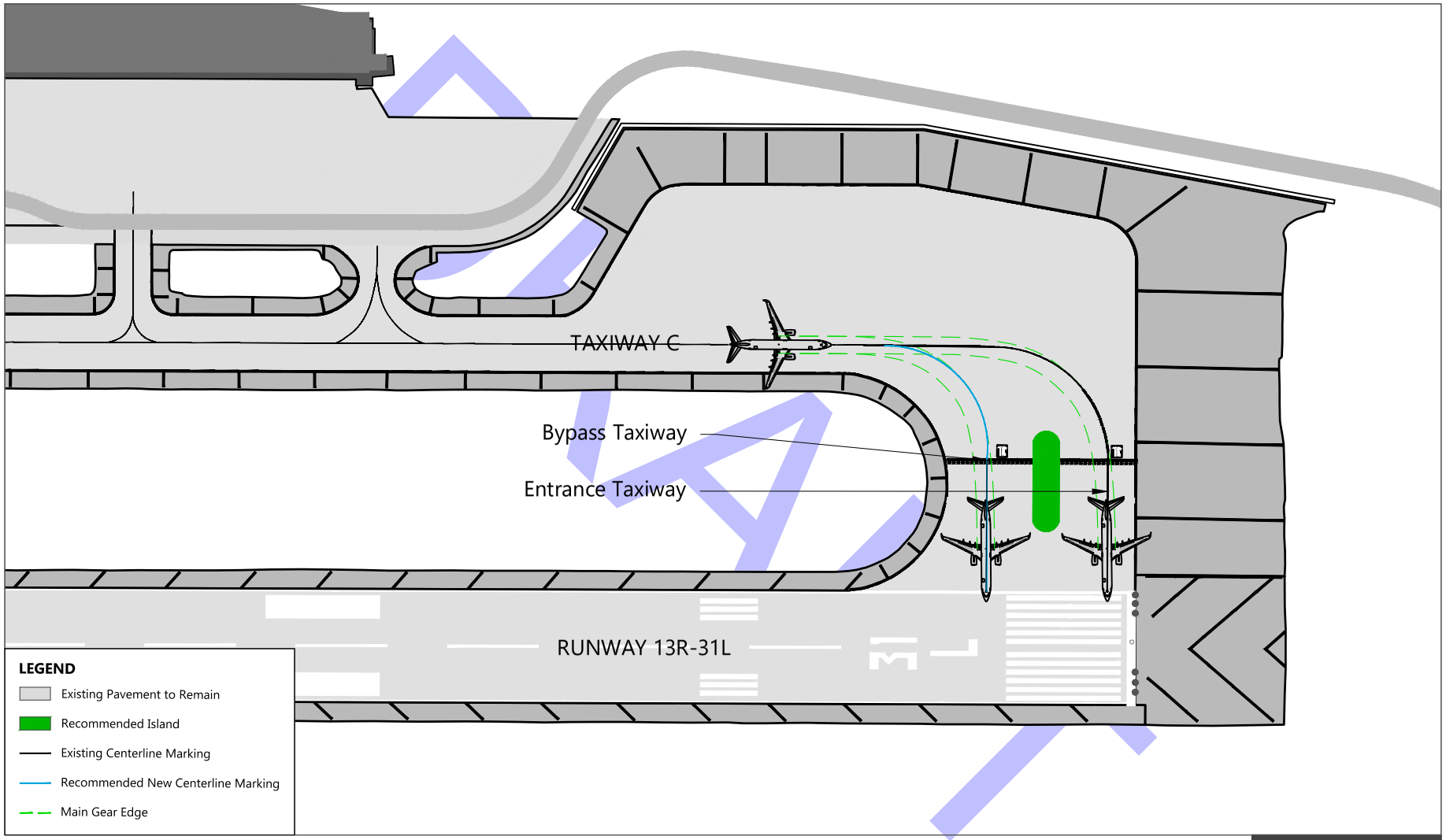

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., June 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-14

NORTH 0 200 ft.

Runway 31L Bypass Taxiway

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For all alternatives, the only variable is the lateral separation between the Runway 13L-31R centerline and the component of the glideslope and the RVR closest to the runway. In addition, under these four alternatives, relocation of the glideslope and RVR facilities was considered, as Taxiway M can only be reopened if all components of the existing facilities are relocated.

5.1.5.1 Alternative 1 - No Changes

As shown on **Exhibit 5-15,** Alternative 1 consists of no changes to the location of the Runway 31R glideslope and RVR equipment. This alternative was considered because the need to increase the departure capacity in North Flow is not immediate. Under this alternative, the glideslope and the RVR equipment would remain in their current locations and the southern portion of Taxiway M would remain closed. This configuration may affect aircraft traffic in north flow and decrease airfield capacity further as operational demand increases. According to the forecasts presented in Section 3 of this Master Plan Update, the increase in operations would mainly be attributed to an increase in operations by air carrier aircraft. Therefore, in north flow, aircraft traffic from the terminal area would intensify, departure queues on Taxiway B would lengthen, and congestion may occur on Taxiway B.

5.1.5.2 Alternative 2 – Relocate Glideslope and RVR 405 Feet Northeast of the Runway 13L-31R Centerline

Under this alternative, the glideslope would be relocated northeast of the Runway 31R threshold. To be outside of the OFA, the glideslope would be located 405 feet from the runway centerline and, as a result, would be on Taxiway A. The RVR would be relocated next to the glideslope, at the same distance from the runway centerline as the glideslope, and outside of the glideslope critical area (see **Exhibit 5-16**). The glideslope and RVR relocation on Taxiway A would result in the closure of a section of Taxiway A, which is the only taxiway that provides access to the Runway 31R threshold from the northeast side of the Airport. To depart from Runway 31R, general aviation aircraft movements originating from facilities northeast of Runway 13L-31R would need to cross the runway and taxi on Taxiway B or M, which would be reopened. This alternative would comply with FAA Order 6750-16E, but would significantly affect general aviation aircraft operations and increase runway crossings, reducing runway capacity and increasing the potential for runway incursions or surface incidents.

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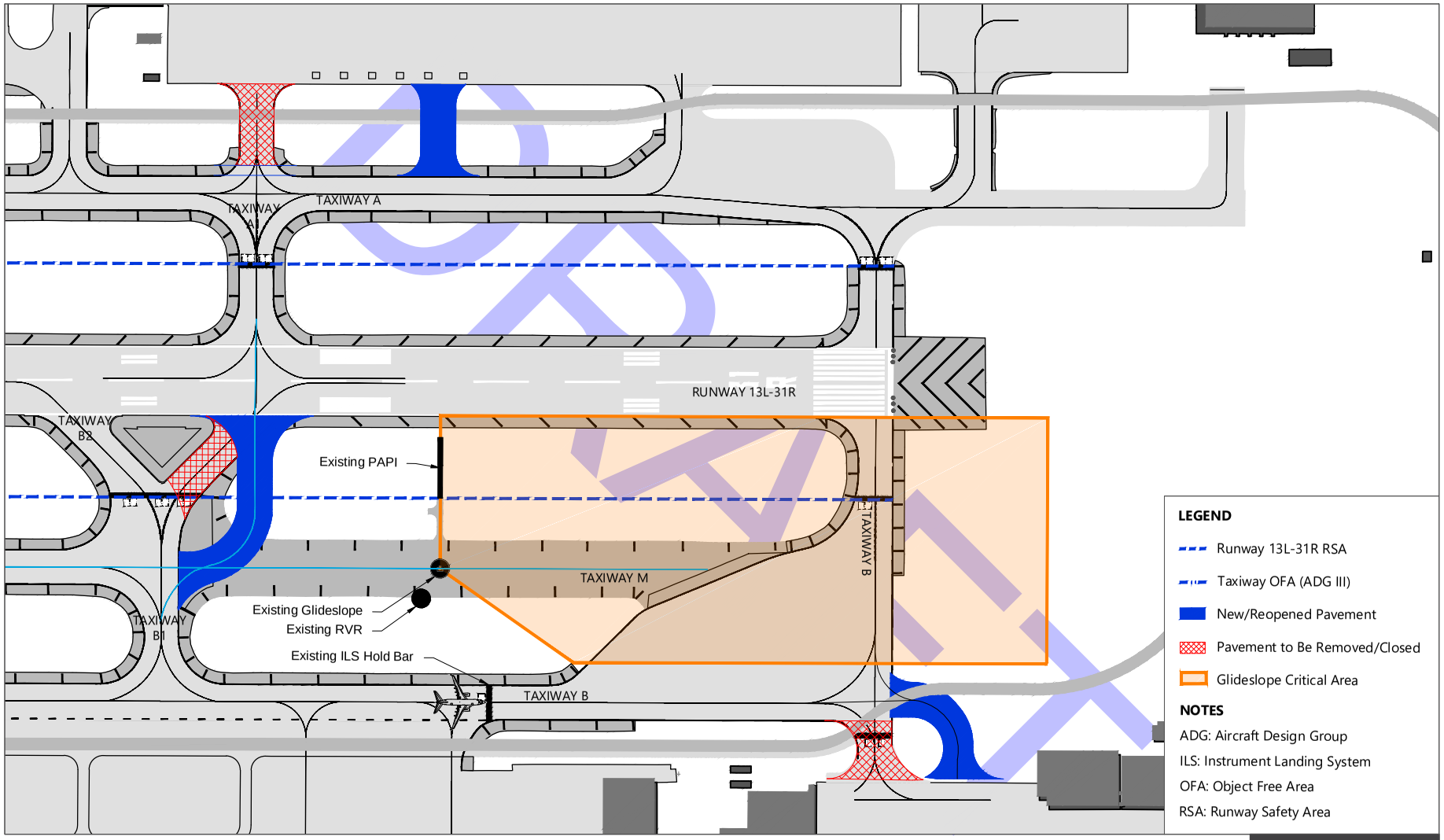

SOURCES: FAA Advisory Circular 150/5300-13A (Change 1), February 2014; FAA Order 6750.16E, May 2014; Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-15

NORTH 0 300 ft.

Runway 31R Glideslope and RVR Relocation - Alternative 1
No Changes

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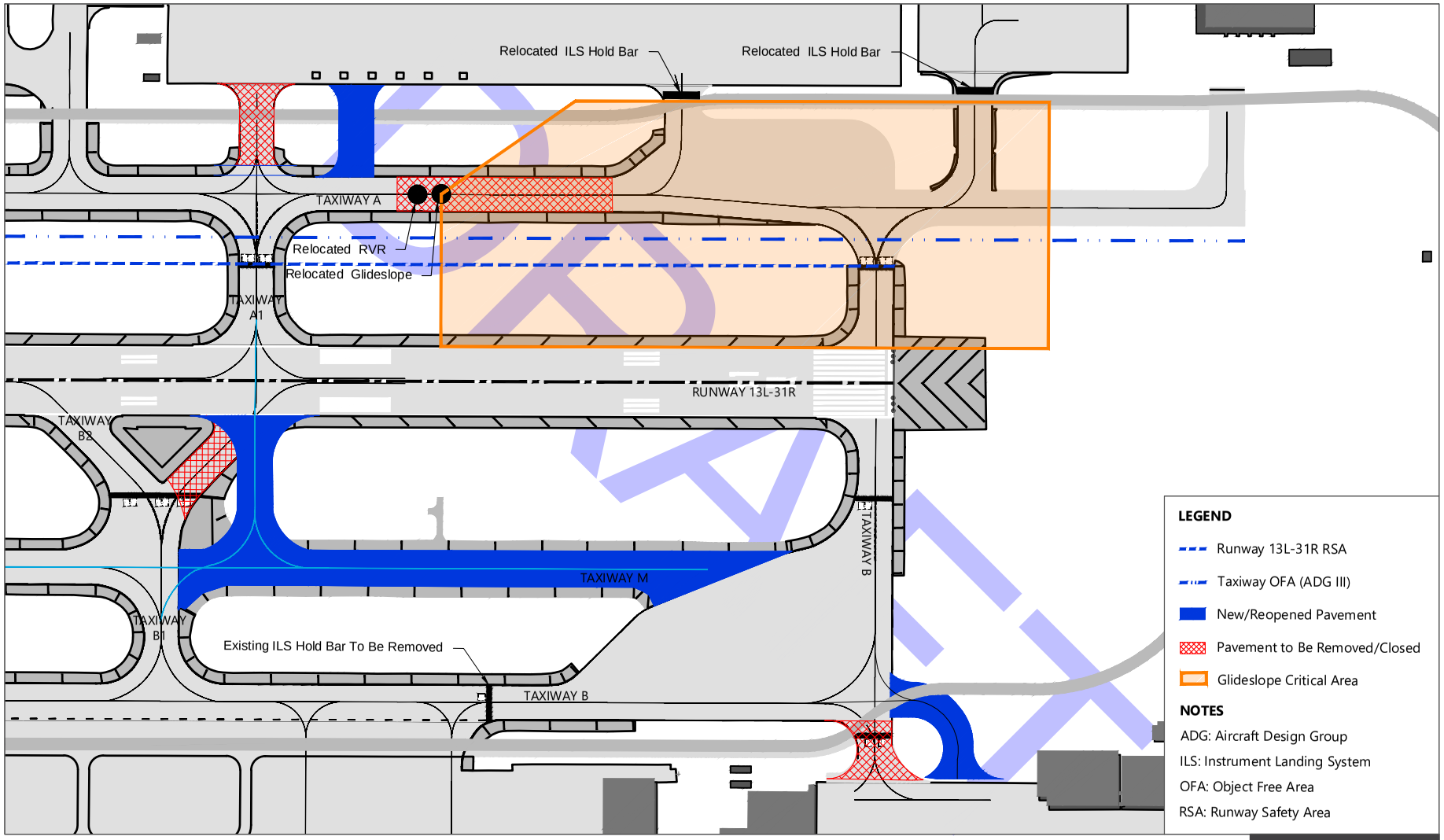

SOURCES: FAA Advisory Circular 150/5300-13A (Change 1), February 2014; FAA Order 6750.16E, May 2014; Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-16

NORTH 0 300 ft.

Runway 31R Glideslope and RVR Relocation - Alternative 2
Relocate Glideslope and RVR 405 Feet Northeast of Runway 13L-31R Centerline

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5.1.5.3 Alternative 3 – Relocate Glideslope and RVR 268 Feet Southwest of the Runway 13L-31R Centerline

Under this alternative, the entire glideslope (including the mast, antenna, and shelter) would remain southwest of the runway, but would be relocated 268 feet from the runway centerline, outside of the RSA and OFZ, outside of the Taxiway M OFA (provided that Taxiway M is restricted to use by ADG III or smaller aircraft), but inside the runway OFA. The RVR would be relocated next to the glideslope, at the same distance from the runway centerline as the glideslope and outside of the glideslope critical area (as shown on **Exhibit 5-17**). With an overall height of 48 feet above mean sea level (MSL), the existing glideslope antenna would not exceed the height limitation associated with the Runway 13L-31R inner transitional OFZ. As the RVR antenna height is lower than that of the glideslope antenna, it would also be lower than the Runway 13L-31R inner transitional OFZ. The PAPI serving Runway 31R approaches, and located in the Runway 31R RSA, would not affect relocation of the glideslope, as the PAPI and glideslope would remain aligned perpendicular to the runway and the glideslope would be outside the RSA. Under this alternative, the layout of the Runway 31R glideslope, RVR, and PAPI would be similar to the layout of the navigational aids for Runway 13R, which is also equipped with a Category I ILS. In that case, the glideslope and RVR are located outside the Runway 13R RSA and OFZ, but inside the Runway 13R-31L OFA, and the PAPI is aligned with the glideslope.

This relocation would enable reopening of the southern portion of Taxiway M to ADG III or smaller aircraft and improve air traffic flow for departures on Runway 31R, providing ATC with more flexibility to sequence departures in north flow. Aircraft on Taxiway M would have to hold outside the glideslope critical area to avoid glideslope signal interference. In addition, this alternative would not affect general aviation aircraft traffic northeast of Runway 13L-31R.

5.1.5.4 Alternative 4 – Relocate Glideslope and RVR 268 Feet Northeast of the Runway 13L-31R Centerline

This alternative consists of relocating the entire glideslope northeast of Runway 13L-31R and 268 feet from the runway centerline (see **Exhibit 5-18**). At this location, the glideslope would be inside the runway OFA, but outside the RSA, the OFZ, and the Taxiway A OFA (provided that Taxiway A is restricted to ADG III or smaller aircraft). The RVR would be relocated next to the glideslope, at the same distance from the runway centerline as the glideslope and outside of the glideslope critical area. Similar to Alternative 3, with an overall height of 48 feet above MSL, the existing glideslope antenna and RVR antenna would not exceed the height limitation associated with the Runway 13L-31R inner transitional OFZ. This relocation would enable the southern portion of Taxiway M to be used by ADG III and ADG IV aircraft and improve air carrier aircraft traffic in orth flow. During peak times, the relocated glideslope could affect general aviation aircraft movements originating from the northern area of the Airport, as these aircraft would have to hold outside of the glideslope critical area to prevent signal interference.

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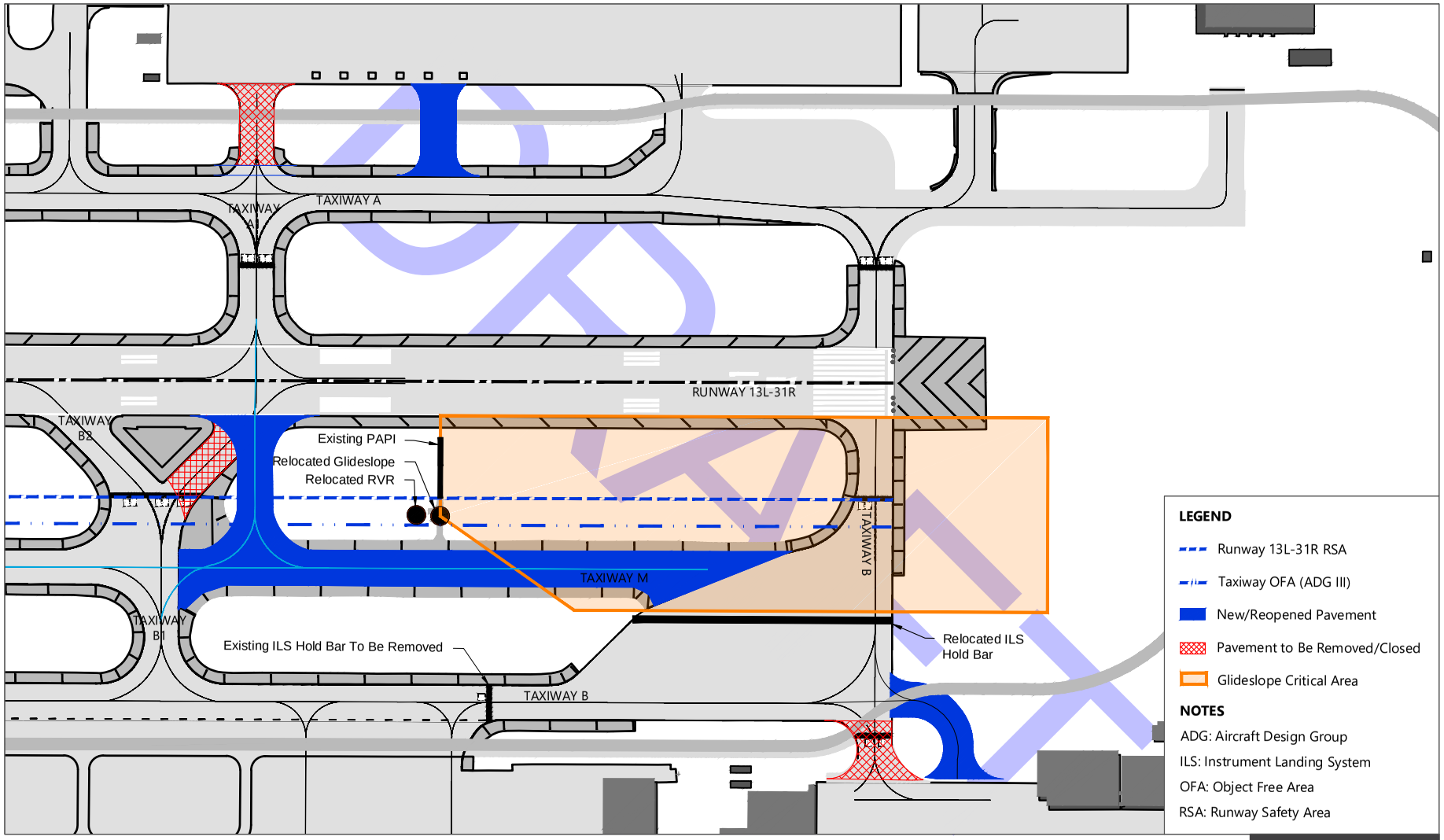

SOURCES: FAA Advisory Circular 150/5300-13A (Change 1), February 2014; FAA Order 6750.16E, May 2014; Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-17

NORTH 0 300 ft.

Runway 31R Glideslope and RVR Relocation - Alternative 3
Relocate Glideslope and RVR 268 feet Southwest of Runway 13L-31R Centerline

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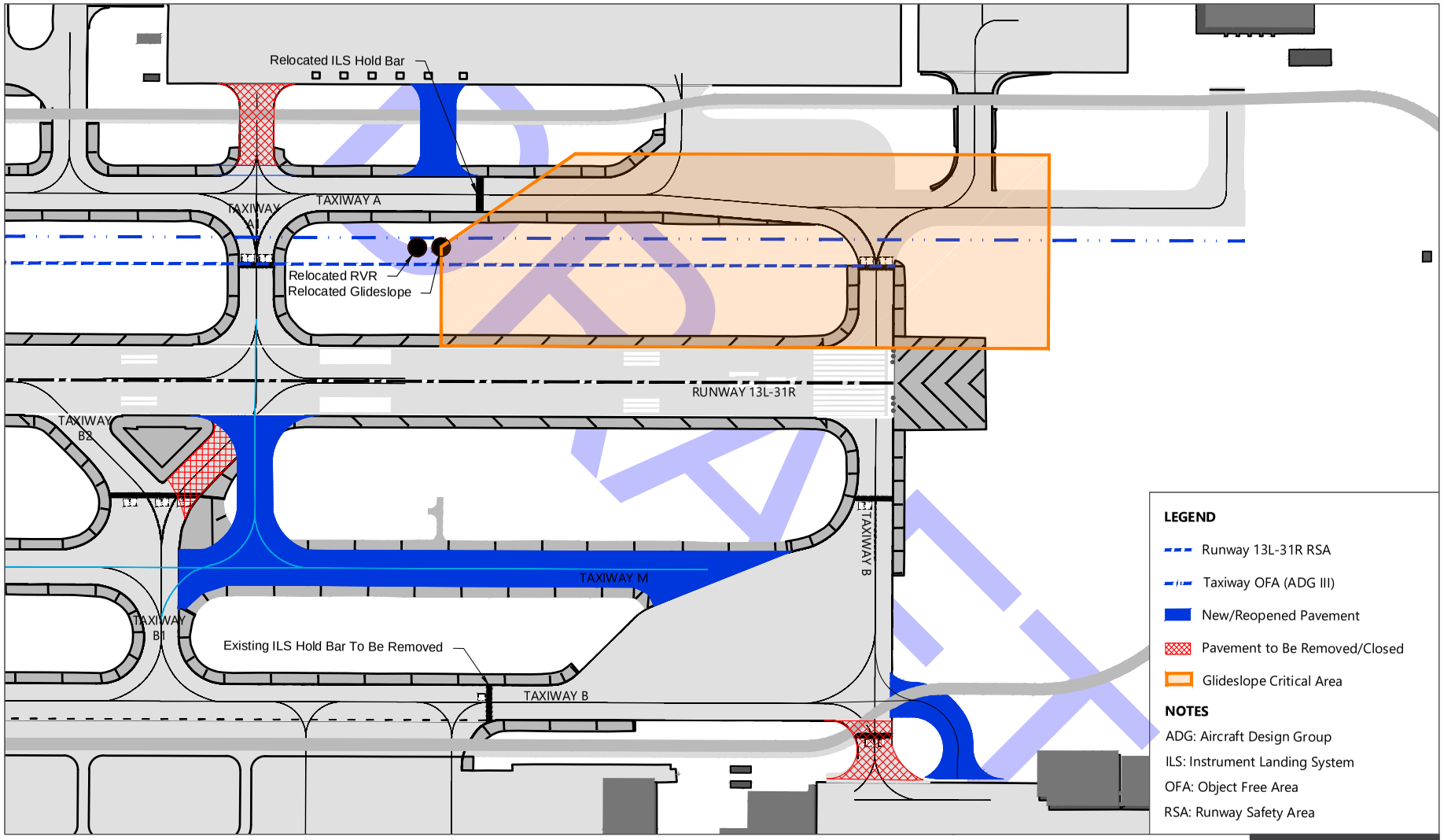

SOURCES: FAA Advisory Circular 150/5300-13A (Change 1), February 2014; FAA Order 6750.16E, May 2014; Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-18

NORTH 0 300 ft.

Runway 31R Glideslope and RVR Relocation - Alternative 4
Relocate Glideslope and RVR 268 Feet Northeast of Runway 13L-31R Centerline

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5.1.5.5 Comparison of Runway 31R Glideslope and RVR Relocation Alternatives

Table 5-3 presents a comparison of the four alternatives for relocating the Runway 31R glideslope and RVR.

Table 5-3: Comparison of Runway 31R Glideslope and RVR Relocation Alternatives

CRITERIA	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Glideslope Facility and RVR to Be Relocated	No	Yes	Yes	Yes
Lateral Separation Between The Glideslope and Runway 13L-31R Centerline	400 feet (existing)	405 feet (northeast)	268 feet (southwest)	268 feet (northeast)
Glideslope Inside The Runway OFA	No	No	Yes	Yes
Taxiway M Operational	No	Yes	Yes, but with restrictions	Yes
Largest Aircraft Allowed on Taxiway M	None	ADG IV	ADG III	ADG IV
Effect on Other Taxiways	None	Yes: a section of Taxiway A would be closed	No	Yes: glideslope critical area would encroach on Taxiway A

SOURCE: Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

Because the current placement of the Runway 31R glideslope requires the closure of the southern portion of Taxiway M, the ability to circumvent the glideslope via Taxiway B provides ATC limited ability to sequence aircraft for departures. Given that the airfield is currently operating at approximately 45 percent of its hourly capacity during IMC, the operational constraint of not having the full length of Taxiway M available is not significant at this time. However, as operational demand is forecast to increase in the future, the taxiway circulation constraints associated with the current placement of the Runway 31R glideslope and RVR will become significant. Therefore, it is recommended that Alternative 3 be incorporated in the future ALP for DAL. For capital improvement planning purposes, the recommended relocation of the Runway 31R glideslope and RVR would be implemented no sooner than PAL O2.

Relocation of the Runway 31R glideslope and RVR equipment would allow aircraft to operate on the full length of Taxiway M. As the navigational aid equipment is required to remain outside of the RSA, the glideslope antenna and associated equipment shelter and the RVR antenna would restrict operations on the portion of Taxiway M south of Taxiway B1 to ADG III aircraft. In addition, to allow pilots to access Runway 31R via Taxiway M, relocating the glideslope closer to the runway centerline would also allow for relocation of the ILS critical area boundaries closer to the departure threshold, thereby increasing departure capacity during IMC. Relocating the glideslope would also increase the area available for aircraft queuing on Taxiway B.

The electrical work required to relocate the glideslope equipment would be similar under Alternatives 2, 3, and 4. Implementation of preferred Alternative 3 might result in slight cost and time savings compared with Alternatives 2 and 4, as the electrical power and communications infrastructure are already onsite.

5.1.6 TAXIWAY M EXTENSION

In January 2015, Kimley Horn completed a pavement condition evaluation study for DAL, the *Dallas Love Field Airfield Pavement Evaluation*, which concluded that the Taxiway B pavement is in poor condition, thus nearing the end of its useful life. The full length of this taxiway is predicted to require full reconstruction within the next 5 years. To minimize operational impacts during construction, it is recommended that Taxiway M first be extended the entire length of the Runway 13L-31R. With the current separation of 400 feet between the taxiway and the Runway 13L-31R centerline, ADG IV aircraft could operate simultaneously on the runway and on Taxiway M.

As illustrated on **Exhibit 5-19**, the portion of Taxiway B between Taxiways B5 and P would be rehabilitated and a new portion of Taxiway B would be constructed between Taxiway B5 and the Runway 13L threshold after Taxiway M has been extended, providing two parallel taxiways the full length of Runway 13L-31R. The parallel taxiways would be separated by 152 feet, allowing two ADG III aircraft to taxi simultaneously and improving traffic flows of aircraft taxiing around the terminal. However, because the glideslope serving Runway 13L is currently located 400 feet from the Runway 13L-31R centerline, it would need to be relocated outside the new Taxiway M OFA and consequently inside the Runway 13L-31R OFA, similar to the recommended relocation of the glideslope serving Runway 31R. As the glideslope cannot be relocated within the runway RSA, the portion of Taxiway M between Runway 18-36 and the Runway 13L threshold would be restricted to ADG III aircraft. For simplification purposes, it is recommended that the entire length of extended Taxiway M be restricted to ADG III aircraft. Larger aircraft would use Taxiway B and no simultaneous operations would be allowed on Taxiway M.

5.1.7 VEHICLE SERVICE ROAD REALIGNMENT

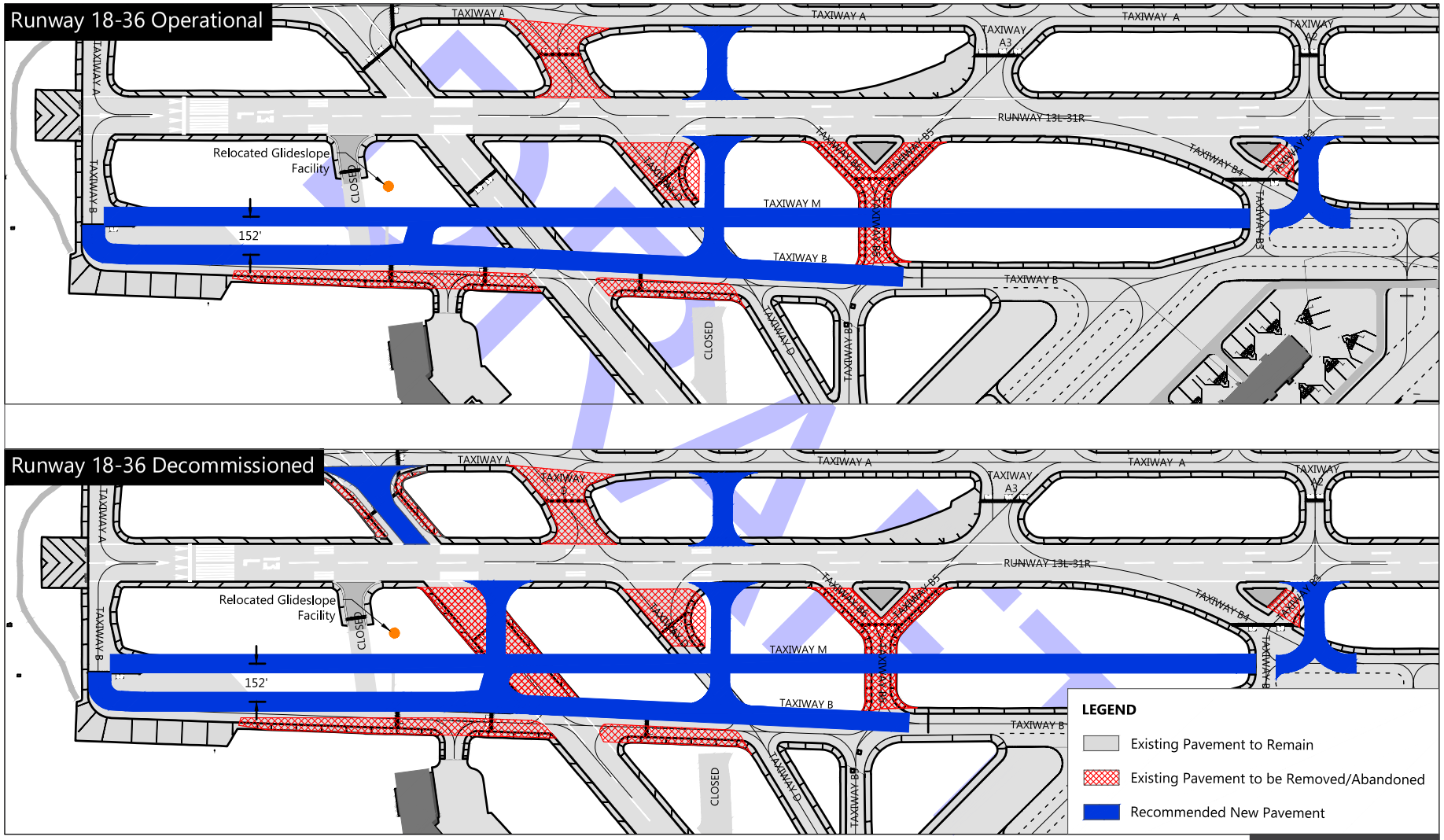
Airfield vehicle service roads (VSRs) are usually configured to allow service vehicles to access portions of the airfield while minimizing time spent on taxiways, therefore reducing the risk of incursions or incidents and improving traffic flows on the airfield. VSRs must be located outside RSAs and outside taxiway OFAs. Several deficiencies have been identified at DAL. They include:

- Noncompliant separation between Taxiway B and the existing VSR south of the terminal area
- Noncompliant separation between the Runway 13L threshold and the current VSR surrounding this runway end
- Discontinuity of the VSR west of Runway 18-36

Recommended changes, including the realignment and construction of portions of the VSR system at the Airport, are included with the preferred development alternative.

5.1.8 PREFERRED DEVELOPMENT ALTERNATIVES

The City has prepared an EA for the potential decommissioning of Runway 18-36. Because the FONSI had not been issued at the time the airfield alternatives were evaluated, two "preferred" airfield development alternatives were identified, one reflecting the future airfield configuration if Runway 18-36 remains operational, and the other reflecting the future airfield if Runway 18-36 is decommissioned.



SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-19

NORTH 0 600 ft.

Taxiway M Extension

Drawing: P:\Dallas Airport System\~On-Call Planning 2012-2014\07 Master Plan\7.6 Development Alternatives\Airfield\CAD\Airfield ImprovementsEx5-19 Taxiway M Extension Only.dwg_Layout: 5.19-Revised_Mar 25, 2015, 11:01am

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5.1.8.1 Preferred Alternative 1 – Runway 18-36 Operational

Exhibit 5-20 illustrates the preferred alternative encompassing the airfield modifications that would be implemented if Runway 18-36 remains operational. The recommended improvements would include:

- Reconfigure the Taxiway D crossing of Runway 13L-31R between Taxiways A and B.
- Relocate apron access to Signature Flight Support facilities (Taxiway A1) to the south.
- Relocate the Runway 13L glideslope and RVR antenna inboard, to a lateral separation of 268 feet from the Runway 13L-31R centerline.
- Decommission Taxiways B5 and B6 between Runway 13L-31R and Taxiway B.
- Reconfigure Taxiways B1 and B3 to allow perpendicular crossings of Runway 13L-31R.
- Relocate the Runway 31R glideslope and RVR antenna inboard, to a lateral separation of 268 feet from the Runway 13L-31R centerline.
- Extend Taxiway M.
- Reopen the southernmost portion of Taxiway M.
- Realign Taxiway B.
- Construct/realign the airfield vehicle service road.
- Relocate apron access to Learjet TX, Trinity Industries, and Business Jet Center facilities (Taxiway B) to the south.
- Decommission the portion of Taxiway C6 between Taxiway L and the apron and construct a new taxiway connector south of the existing connector.
- Reconfigure Taxiway C4 pavement geometry to allow aircraft to exit Runway 31L and turn directly onto Taxiway C.
- Reconfigure the Taxiway D crossing of Runway 13R-31L between Taxiway C and the Runway 36 threshold.
- Develop a bypass taxiway for use by two TDG 4 aircraft at the Runway 31L threshold.
- Close Taxiway G and construct a new taxiway parallel to Runway 13R-31L.

5.1.8.2 Preferred Alternative 2 – Runway 18-36 Decommissioned

Exhibit 5-21 illustrates the preferred alternative encompassing the airfield modifications that would be implemented if Runway 18-36 is decommissioned. The recommended improvements would include:

- Reconfigure the portion of Runway 18-36 between Taxiways A and B to the Runway 31R exits.
- Reconfigure the Taxiway D crossing of Runway 13L-31R between Taxiways A and B.
- Relocate apron access to Signature Flight Support facilities (Taxiway A1) to the south.
- Relocate the Runway 13L glideslope and RVR antenna inboard, to a lateral separation of 268 feet from the Runway 13L-31R centerline.

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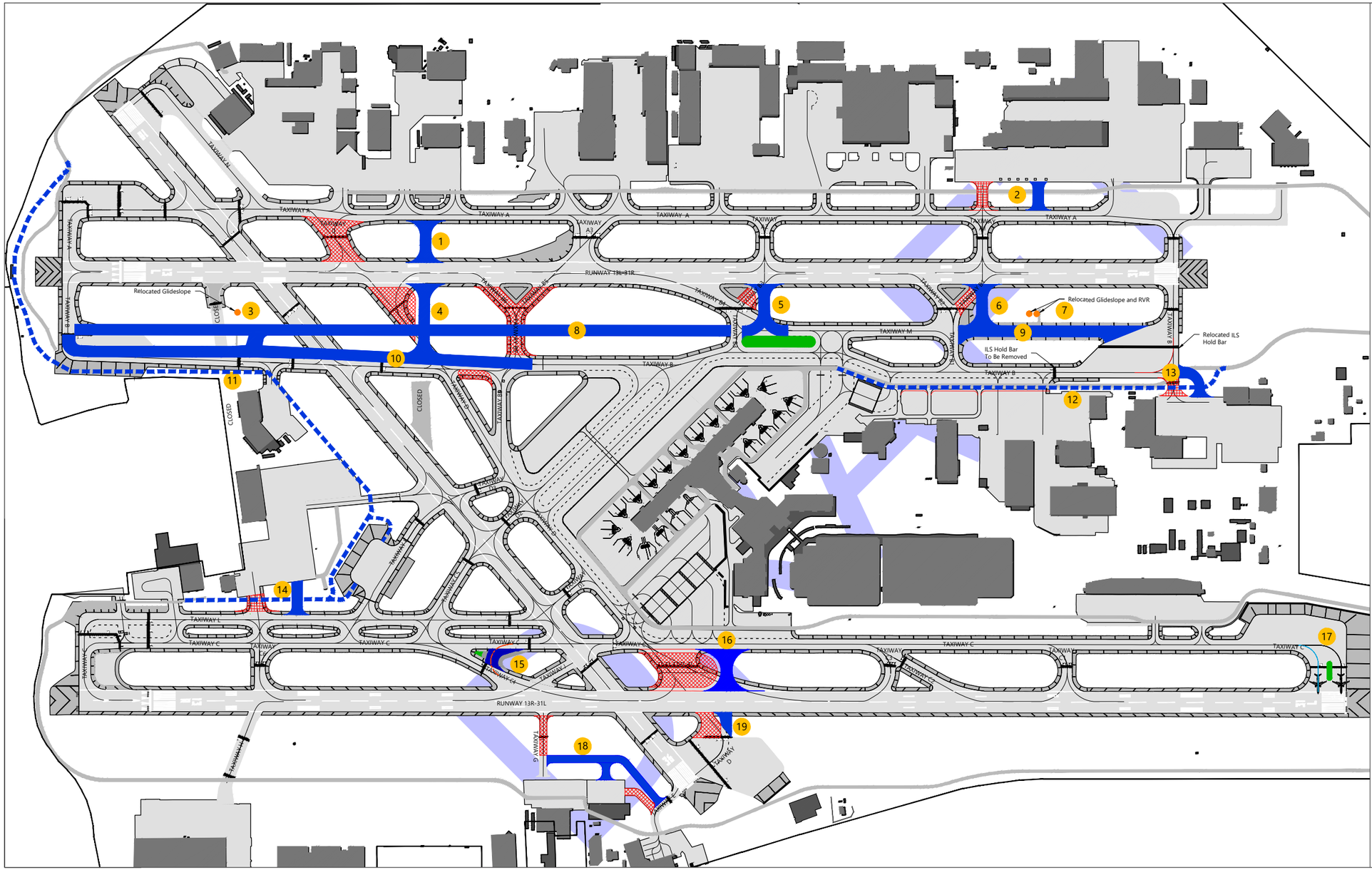

RECOMMENDED AIRFIELD PROJECTS

1. Runway 13L-31R New Exit and Runway Crossing Point
2. Taxiway Connector Relocation
3. Runway 13L Glideslope Facility Relocation
4. Runway 13L-31R New Exit and Runway Crossing Point
5. Modification to Taxiway B3 Crossing of Runway 13L-31R
6. Modification to Taxiway B1 Crossing of Runway 13L-31R
7. Runway 31R Glideslope and RVR Relocation
8. Taxiway M Extension
9. Taxiway M Southernmost Section Rehabilitation
10. Taxiway B Reconstruction and Realignment
11. Service Road Construction/Realignment
12. Service Road Realignment
13. Taxiway Connector Relocation
14. Taxiway Connector Relocation
15. Taxiway C4 Pavement Fillet Modification
16. Runway 13R-31L Exit Realignment
17. Runway 31L Bypass Taxiway Modification
18. Taxiay G Closure and New Taxiway Construction
19. Taxiway Connector Relocation

LEGEND

- Existing Pavement to Remain
- Existing Pavement to Be Removed/Abandoned
- Recommended New Pavement
- Recommended Island
- Realigned Vehicle Service Road
- Airport Property Boundary

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-20

NORTH 0 750 ft.

Preferred Alternative 1 - Runway 18-36 Operational

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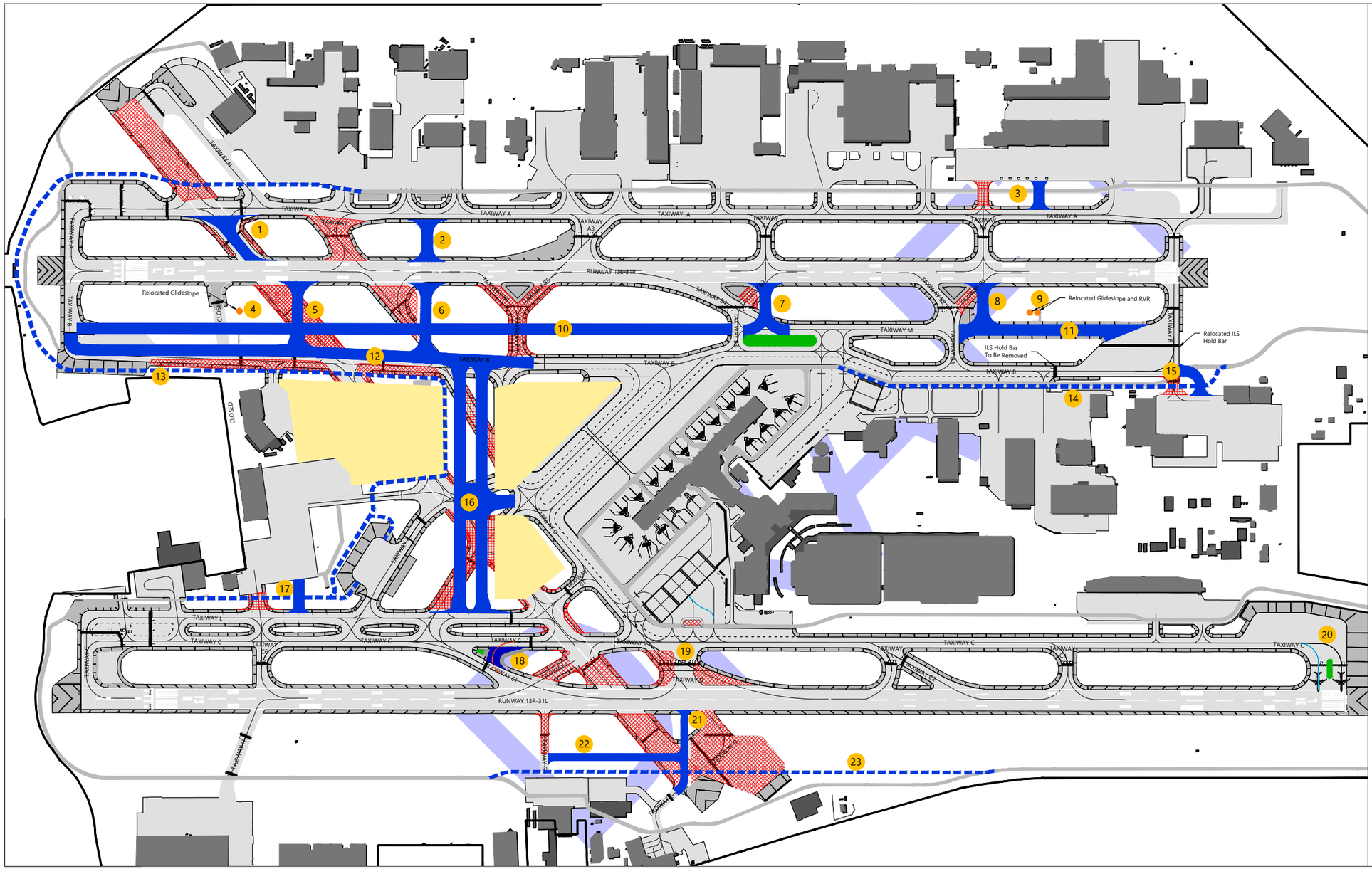

RECOMMENDED AIRFIELD PROJECTS

1. Runway 13L-31R Exit Reconfiguration
2. Runway 13L-31R New Exit and Runway Crossing Point
3. Taxiway Connector Relocation
4. Runway 13L Glideslope Facility Relocation
5. Runway 13L-31R Exit Reconfiguration
6. Runway 13L-31R New Exit and Runway Crossing Point
7. Modification to Taxiway B3 Crossing of Runway 13L-31R
8. Modification to Taxiway B1 Crossing of Runway 13L-31R
9. Runway 31R Glideslope and RVR Relocation
10. Taxiway M Extension
11. Taxiway M Southernmost Section Rehabilitation
12. Taxiway B Reconstruction and Realignment
13. Service Road Construction/Realignment
14. Service Road Realignment
15. Taxiway Connector Relocation
16. Dual Parallel Crossfield Taxiways Construction
17. Taxiway Connector Relocation
18. Taxiway C4 Pavement Fillet Modification
19. Runway 13R-31L Exit Reconfiguration on Taxiway D
20. Runway 31L Bypass Taxiway Modification
21. Modification to Taxiway D Crossing of Runway 13R-31L
22. New Taxiway Construction
23. Service Road Realignment

LEGEND

- Existing Pavement to Remain
- Existing Pavement to Be Removed/Abandoned
- Recommended New Pavement
- Midfield Area Available for Future Airfield Development
- Recommended Island
- Realigned Service Road
- Airport Property Boundary

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-21

NORTH 0 750 ft.

Preferred Alternative 2 - Runway 18-36 Decommissioned

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- Decommission Taxiways B5 and B6 between Runway 13L-31R and Taxiway B.
- Reconfigure Taxiways B1 and B3 to allow perpendicular crossings of Runway 13L-31R.
- Relocate the Runway 31R glideslope and RVR antenna inboard, to a lateral separation of 268 feet from the Runway 13L-31R centerline.
- Extend Taxiway M.
- Reopen the southernmost portion of Taxiway M.
- Realign Taxiway B.
- Construct/realign the airfield vehicle service road.
- Relocate apron access to Learjet TX, Trinity Industries, and Business Jet Center facilities (Taxiway B) to the south.
- Construct a dual parallel crossfield taxiway system between Taxiways B and L.
- Decommission the portion of Taxiway C6 between Taxiway L and the apron and construct a new taxiway connector south of the existing connector.
- Reconfigure the Taxiway C4 pavement geometry to allow aircraft to exit Runway 31L and turn directly onto Taxiway C.
- Reconfigure the Taxiway D crossing of Runway 13R-31L between Taxiway C and the Runway 36 threshold.
- Develop a bypass taxiway for use by two TDG 4 aircraft at the Runway 31L threshold.
- Close Taxiway G and construct a new taxiway parallel to Runway 13R-31L.

The recommended dual parallel taxiways would modify the ARFF vehicle emergency route to reach Runway 13L-31R, but emergency response times would continue to meet FAA requirements. According to simulation modeling, the ARFF emergency vehicle would be able to reach the midpoint of Runway 13L-31R in less than 3 minutes and the Runway 31R threshold in less than 4 minutes. An ARFF station closer to the dual parallel taxiways would be ideal to reduce response times and increase emergency routing efficiency. However, relocating the ARFF station is not required as the estimated response times comply with FAA standards. Additionally, response times could be reduced if an ARFF VSR were developed to connect Runway 13L-31R and Taxiway B between Taxiways B5 and B4. A detailed analysis would be necessary to determine the optimized location and geometry of the ARFF road. This road, if constructed, would be limited to ARFF vehicles and unavailable to other vehicles.

5.2 Landside Development Alternatives

5.2.1 ON-AIRPORT PARKING AND RENTAL CAR CONCEPT ALTERNATIVES

On-Airport parking and rental car concept alternatives were developed together, as parking and rental car facilities can be designed to share a new multipurpose facility. The demand day public parking requirement at PAL E3 is 2,020 new parking spaces and 1,490 total employee parking spaces. The rental car facility

requirements at PAL E3 are 17.9 acres for ready/return/storage areas and 5.3 acres for structured rental car quick turnaround (QTA)/service area. The alternatives address as much of the requirements as possible near the terminal area, with any remaining requirements assumed to be accommodated on-airport and potentially off-airport land areas further from the terminal.

Three families of concept alternatives were developed:

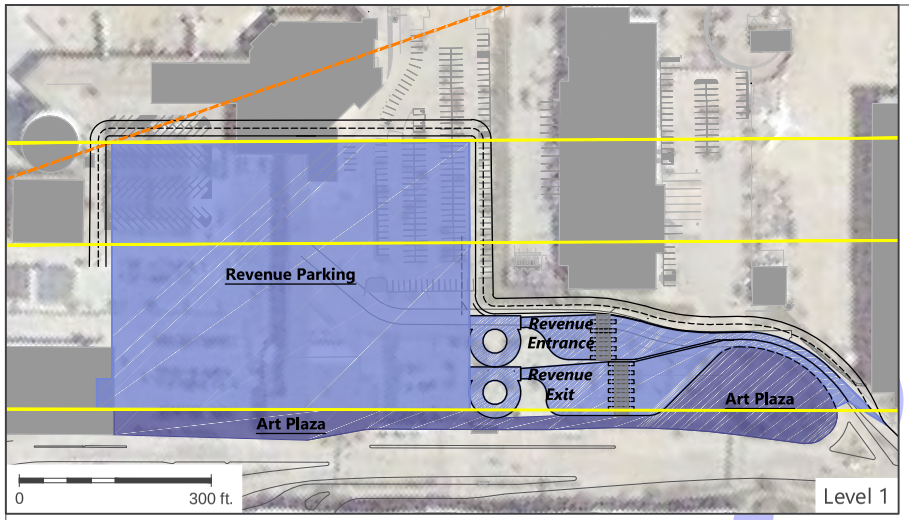
- Concept Alternative 1 consists of the construction of a new facility for revenue parking only with rental car facilities accommodated at another location.
- Concept Alternative 2 combines revenue parking and a full consolidated rental car facility (CRCF), which would include light maintenance and vehicle storage onsite.
- Concept Alternative 3 combines revenue parking and the CRCF, but light maintenance and vehicle storage would be located at separate location resulting in a split operation configuration.

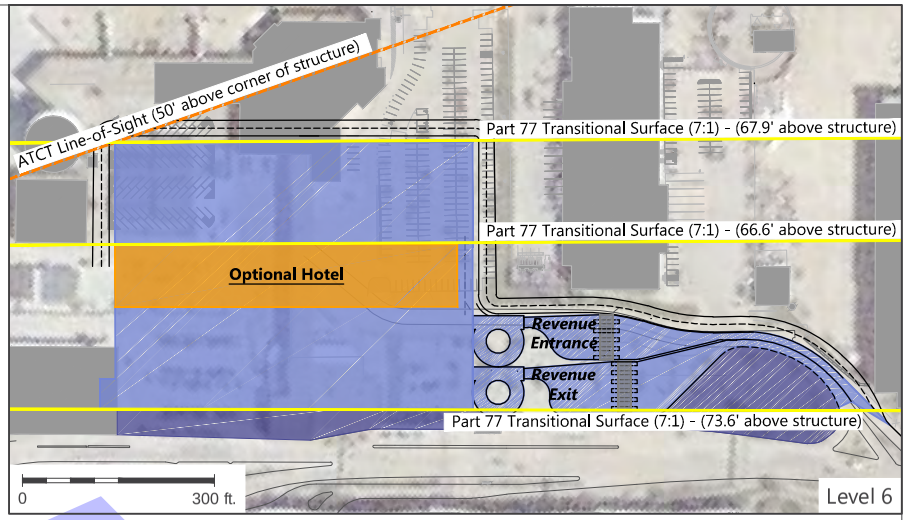
In all three concept alternatives, the flexibility for development of an optional 200-room hotel would be accommodated.

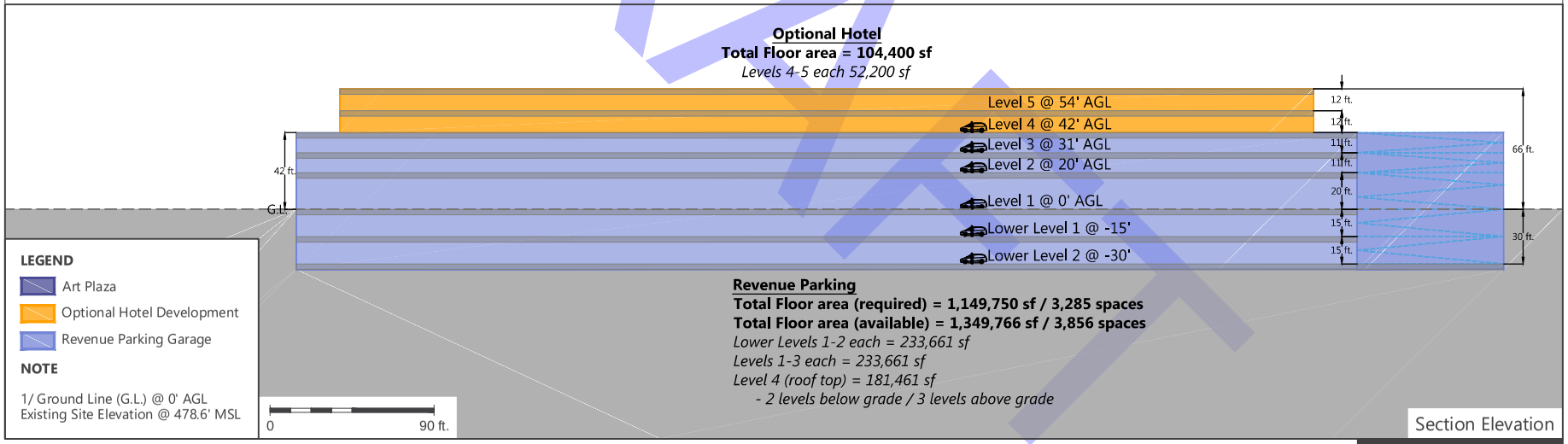
Concept Alternative 1A is presented on **Exhibit 5-22**, and consists of a public parking garage that would provide 3,856 revenue parking spaces. The Concept Alternative 1A garage would be located east of the main terminal building in a separate structure adjacent to the ticketing hall. This alternative also provides for the optional development of a 200-room hotel on the top of the proposed garage. Concept Alternative 1B is presented on **Exhibit 5-23**, and is similar to Concept Alternative 1A, but the optional hotel would not be located on the top of the public parking garage, but in one of three optional stand-alone hotel locations adjacent to the revenue parking garage on the west, north, or east side of the parking structure. With both Concepts in the Concept Alternative 1 family, the rental car facilities would either be accommodated at a new CRCF at the existing rental car location on Herb Kelleher Way just north of Tom Braniff Lane, or accommodated at current individual facilities with growth accommodated onsite in in the new CRFC mentioned. This configuration is presented on **Exhibit 5-24**.

The Concept Alternative 2 family of alternatives consists of a new joint-use structure adjacent to the ticketing hall, with dedicated levels for rental car ready/return vehicles, light maintenance, and QTA rental car operations; dedicated levels for public parking (1,800 revenue spaces); and an optional 200-room rooftop hotel. All rental car operations would be contained within the joint-use structure, eventually requiring an additional offsite lot(s) for heavy maintenance and overflow rental car vehicle storage. The only difference between the two alternatives is that Concept Alternative 2A, shown on **Exhibit 2-25**, has QTA fueling inside the garage, while Concept Alternative 2B, shown on **Exhibit 2-26**, has QTA fueling outside the garage.

With the Concept Alternative 3 family of alternatives, the maintenance and storage component of the rental car operation would be located at a surface lot off Herb Kelleher Way near Tom Braniff Lane. **Exhibit 2-27** shows the locations of the split operation sites. Similar to Concept Alternative 2, Concept Alternative 3 has revenue parking for 1,800 spaces on the upper levels of the parking garage, and the lower levels would be configured for rental car customer service, QTA, and rental car ready/return operations, with onsite vehicle fueling. Concept Alternative 3A, shown on **Exhibit 2-28**, has QTA fueling inside the garage while Concept Alternative 3B, shown on **Exhibit 2-29**, has QTA fueling outside the garage.







SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., November 2014.

EXHIBIT 5-22

NORTH 0 See Drawing

Parking Concept Alternative 1A

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\A_Parking_CRCF_Hotel Concept_2014-06-13.dwg Layout: Exhibit 5-22 Plotted: May 22, 2015, 09:17AM

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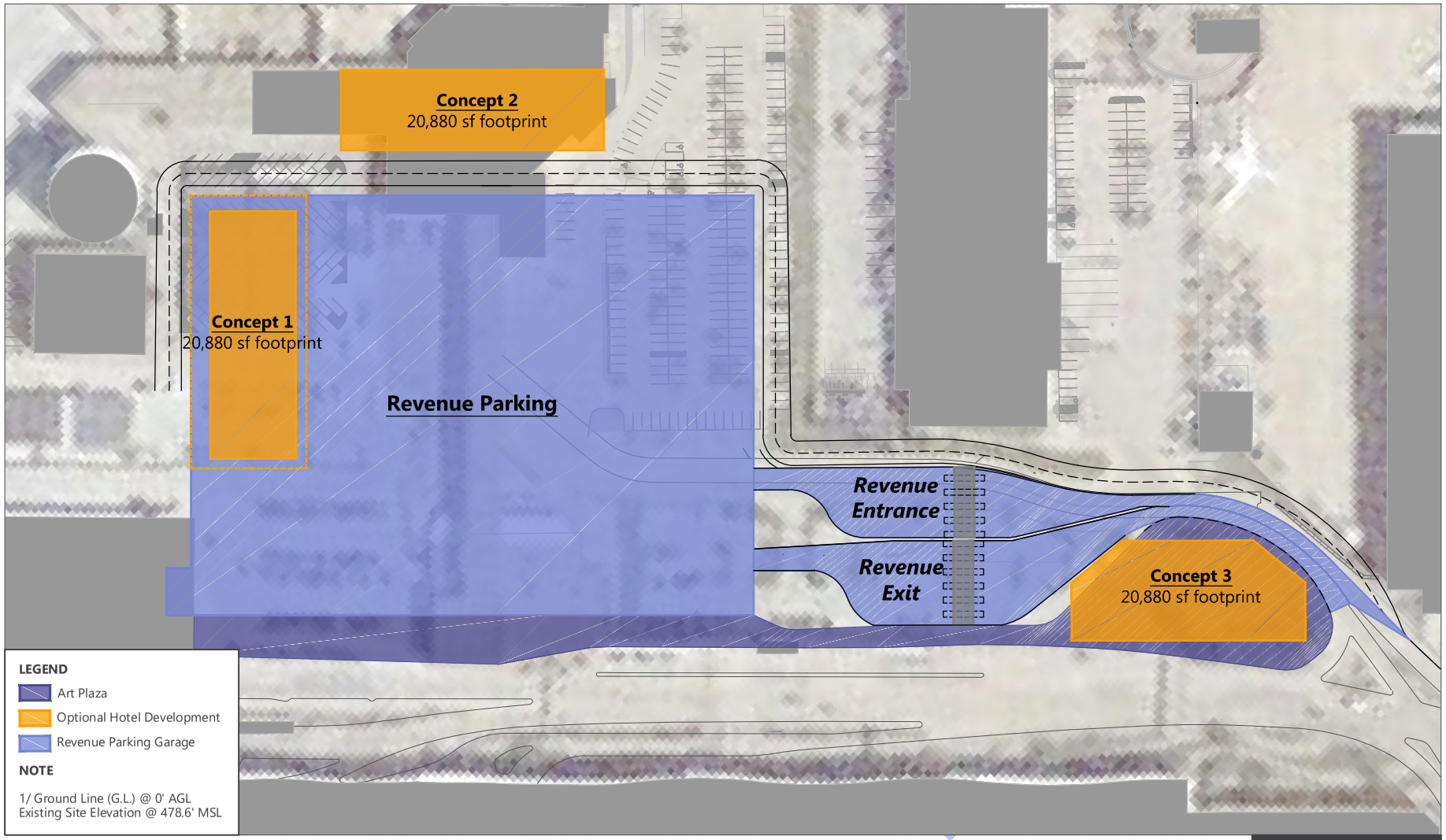

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., July 2014.

EXHIBIT 5-23

NORTH 0 150 ft.

Parking Concept Alterative 1B

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\D_Concepts_Parking_CRCF_Hotel Concept_2014-07-24.dwg Layout: 8.5x11L Plotted: May 22, 2015, 09:20AM

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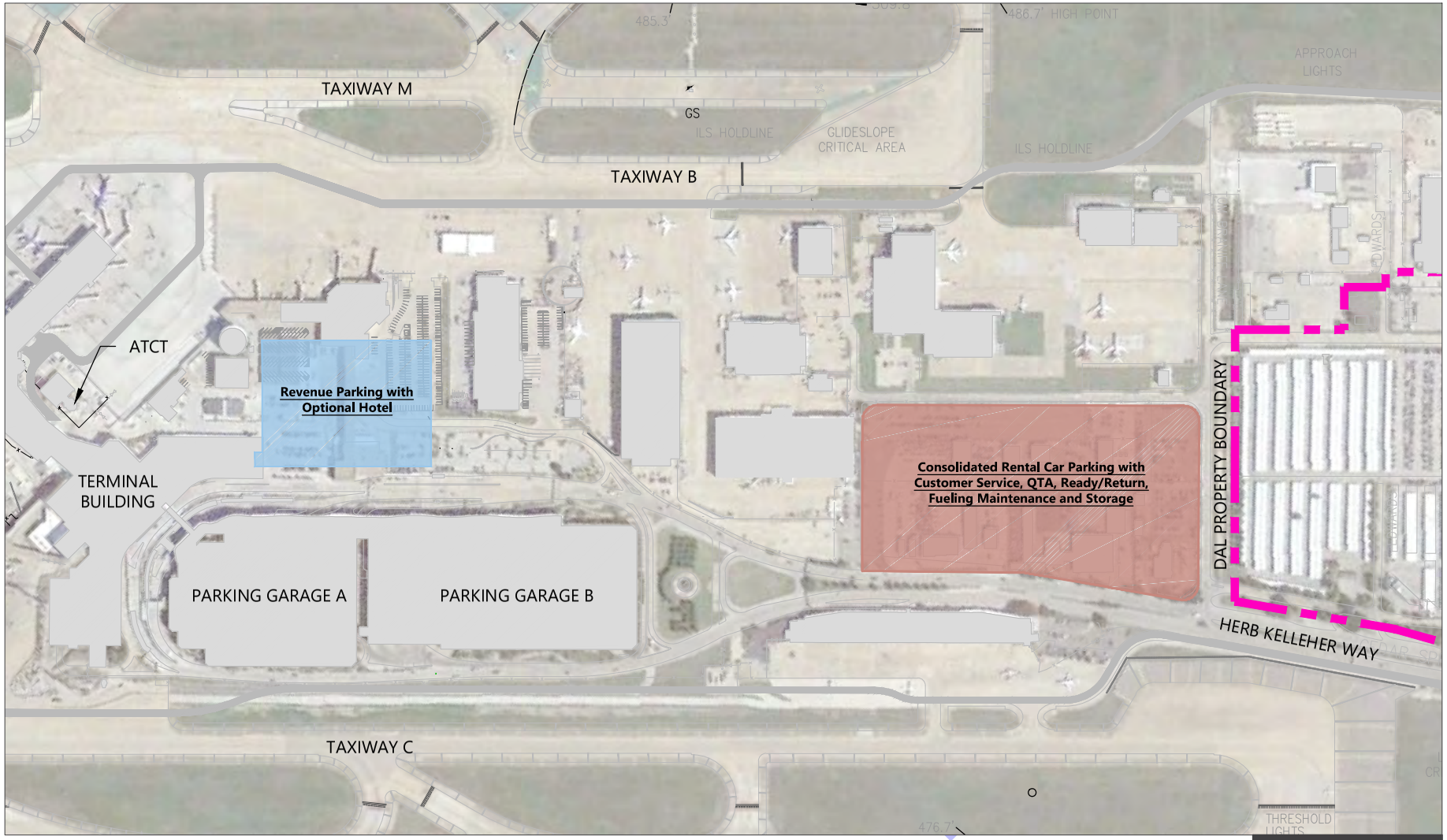

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., November 2014.

EXHIBIT 5-24

NORTH 0 500'

Concept Alternatives 1A and 1B Overview and Rental Car Facility Location

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\C-3_Sites_CRCF_Hotel Concept_20150423.dwg Layout: Exhibit 5-24 Plotted: May 14, 2015, 03:43PM

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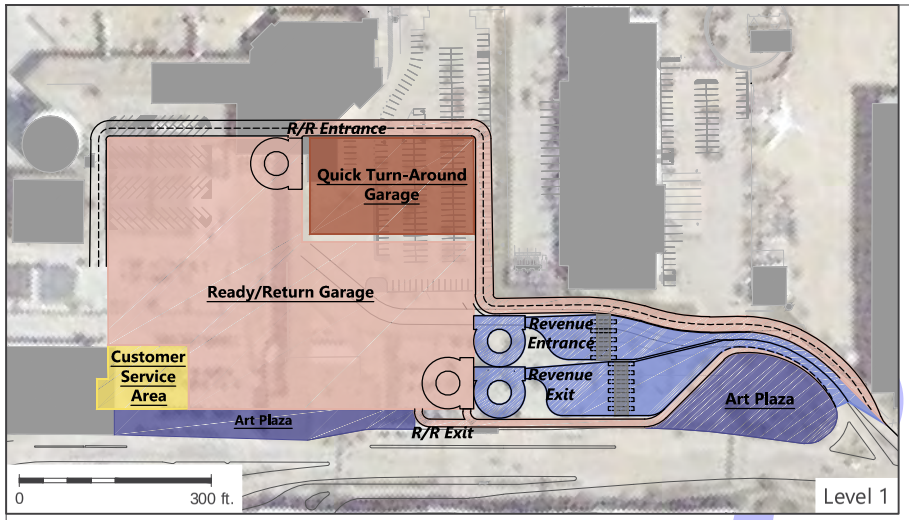

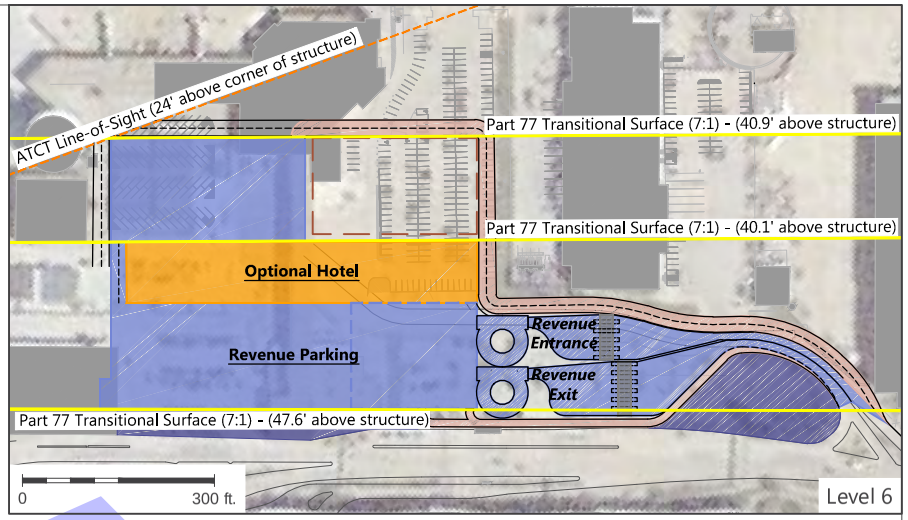

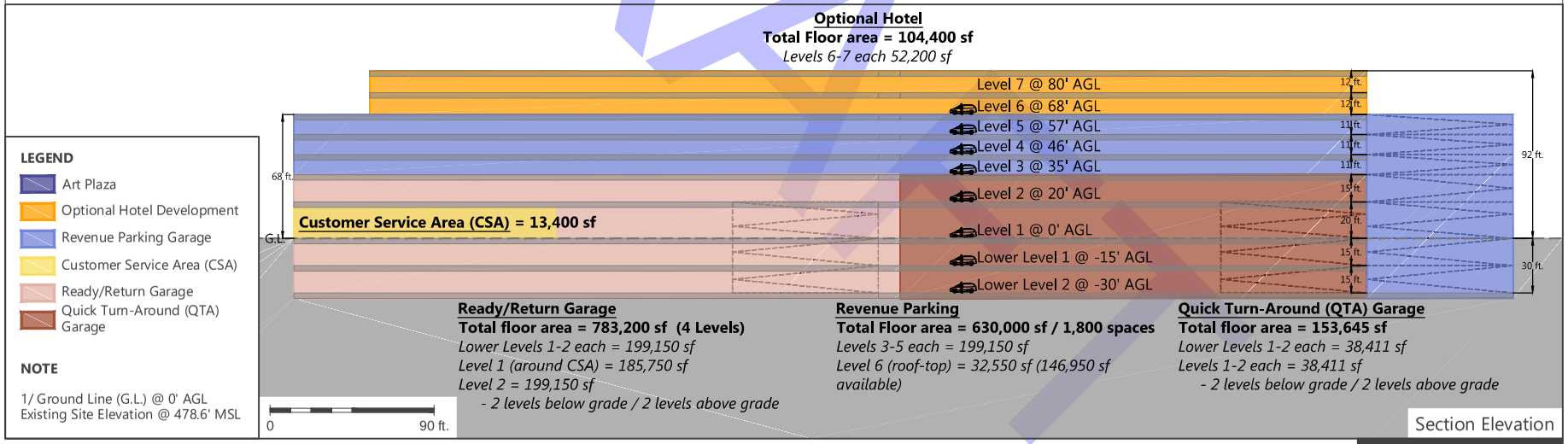

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., November 2014.

EXHIBIT 5-25

NORTH 0 See Drawing

Parking/Consolidated Rental Car Facility Preferred Concept Alternative 2A

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\B-1_Parking_CRCF_Hotel Concept_20150423.dwg Layout: Exhibit 5-25 Plotted: May 22, 2015, 09:33AM

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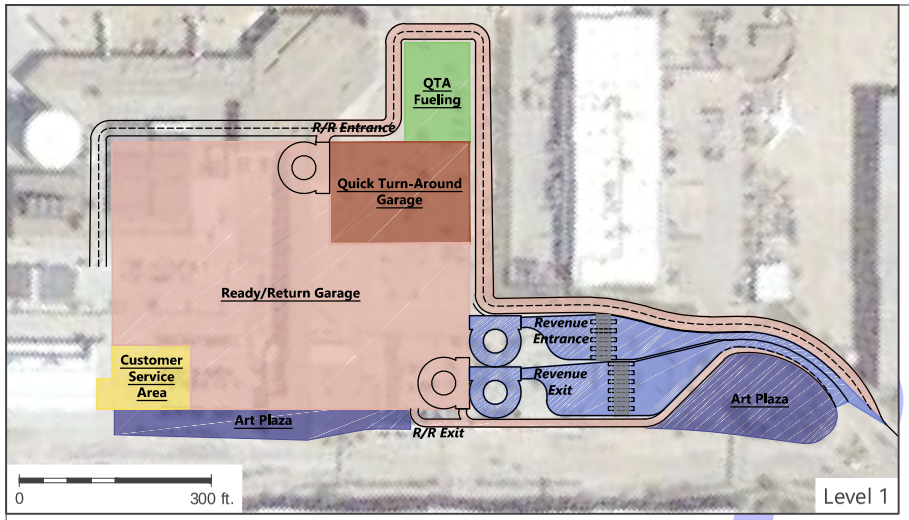

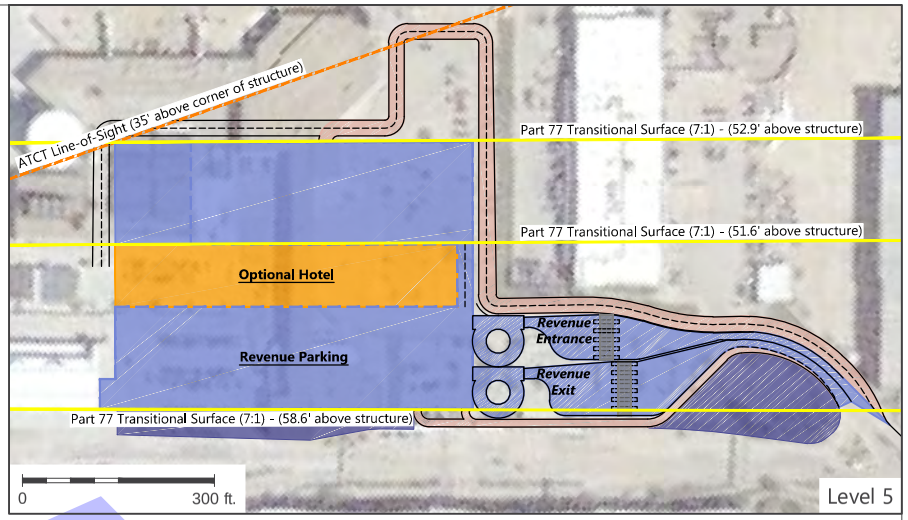

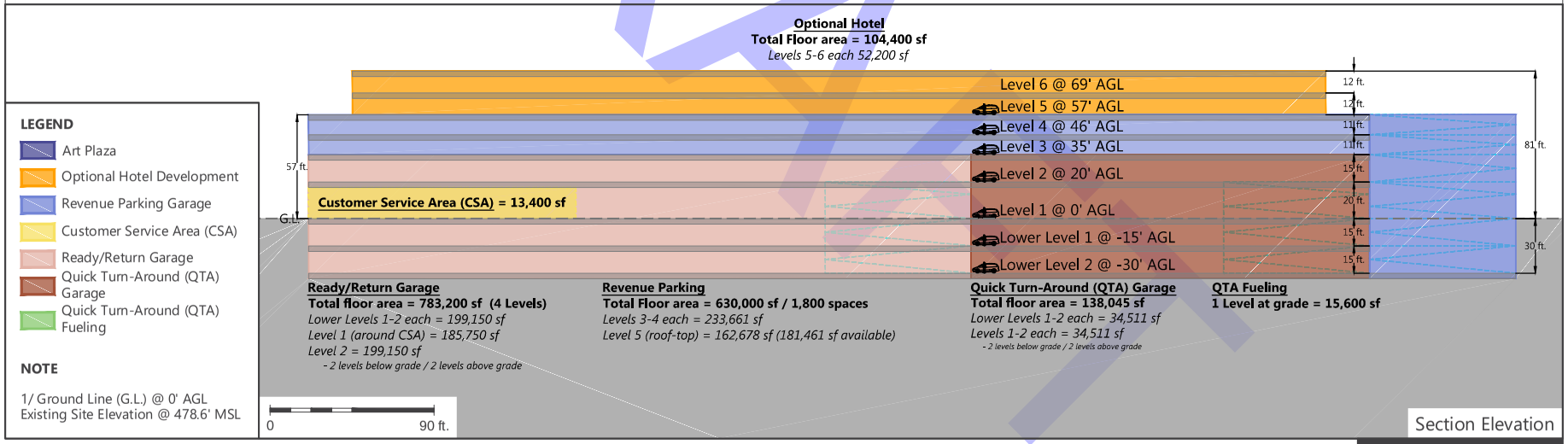

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., June 2014.

EXHIBIT 5-26

NORTH 0 See Drawing

Parking/Consolidated Rental Car Facility Preferred Concept Alternative 2B

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\B-2_Parking_CRCF_Hotel Concept_20150423.dwg Layout: 8.5x11L Plotted: May 22, 2015, 09:36AM

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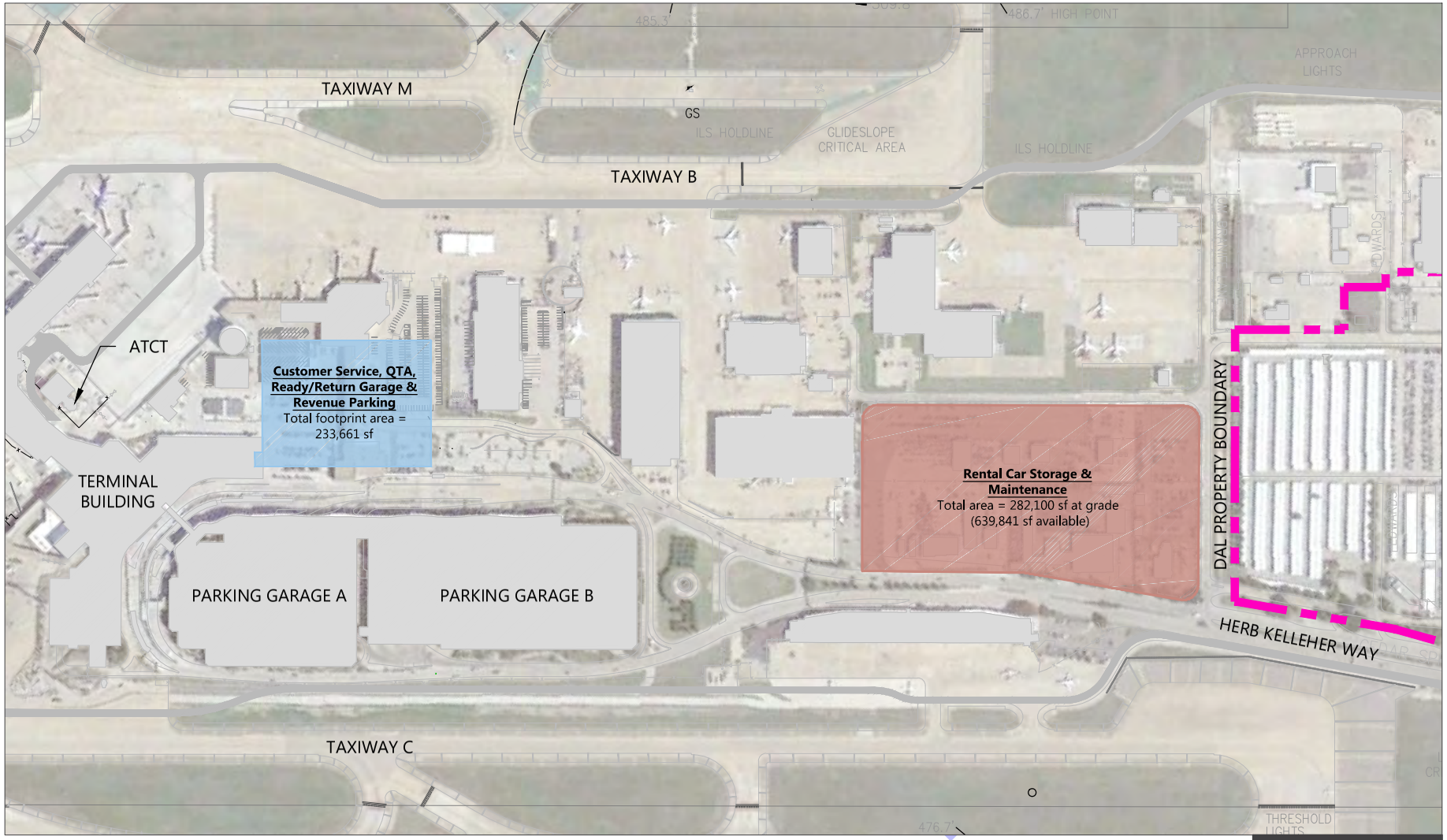

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., November 2014.

EXHIBIT 5-27

NORTH 0 500'

Parking/Consolidated Rental Car Facility Concept Alternatives 3A and 3B with Split Operation

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\C-3_Sites_CRCF_Hotel Concept_20150423.dwg Layout: Exhibit 5-27 Plotted: May 14, 2015, 03:50PM

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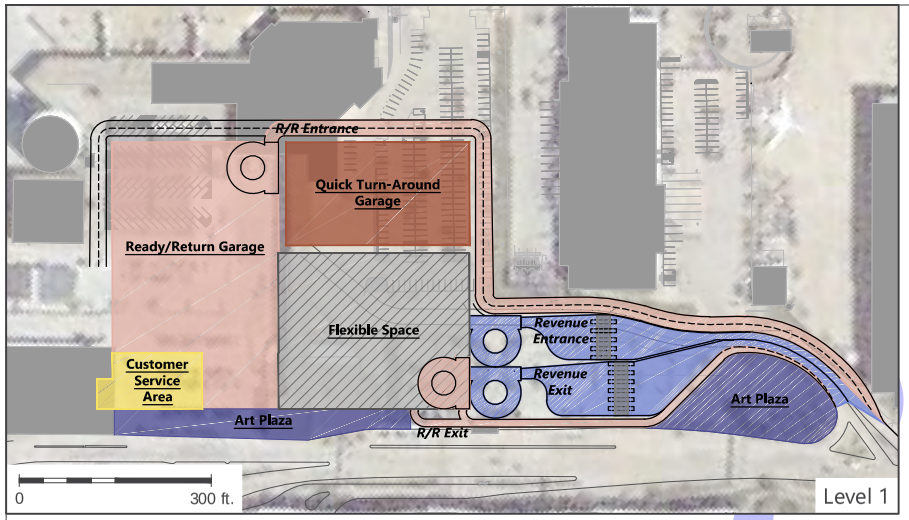

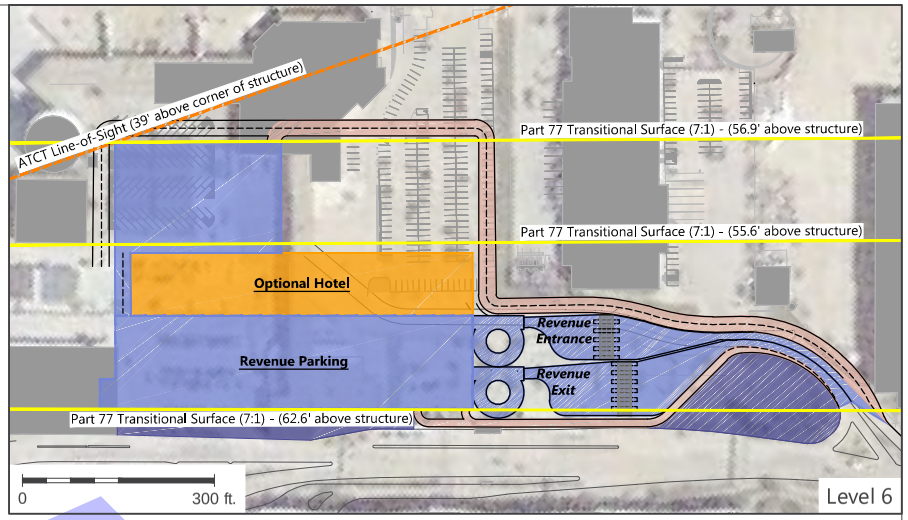

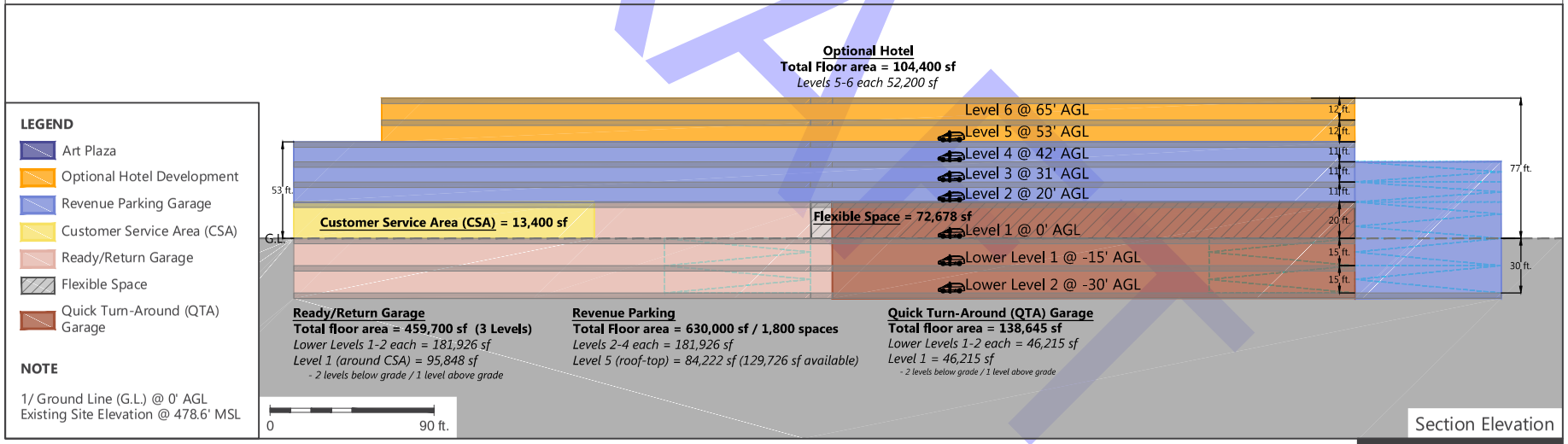

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., June 2014.

EXHIBIT 5-28

NORTH 0 See Drawing

Parking/Consolidated Rental Car Facility Concept Alternative 3A, Split Operation

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\C-1_Parking_CRCF_Hotel Concept_20150423.dwg Layout: 8.5x11L Plotted: May 22, 2015, 09:39AM

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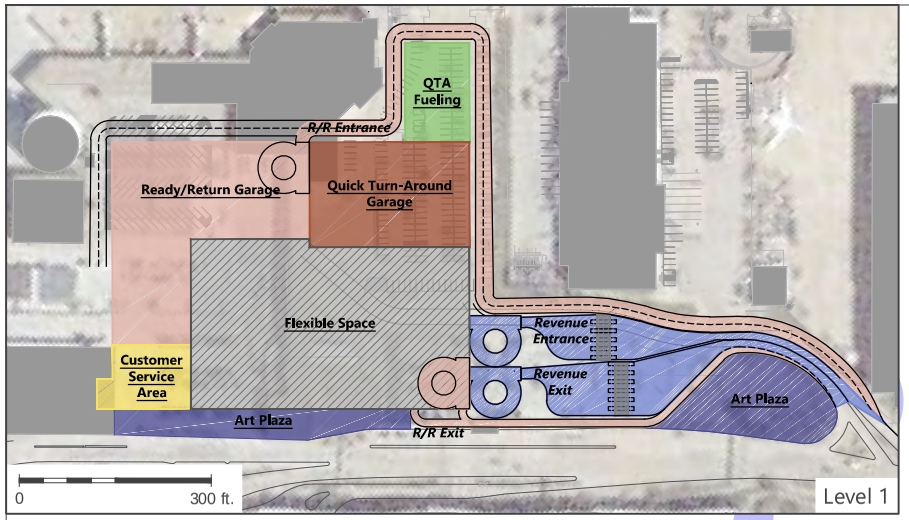
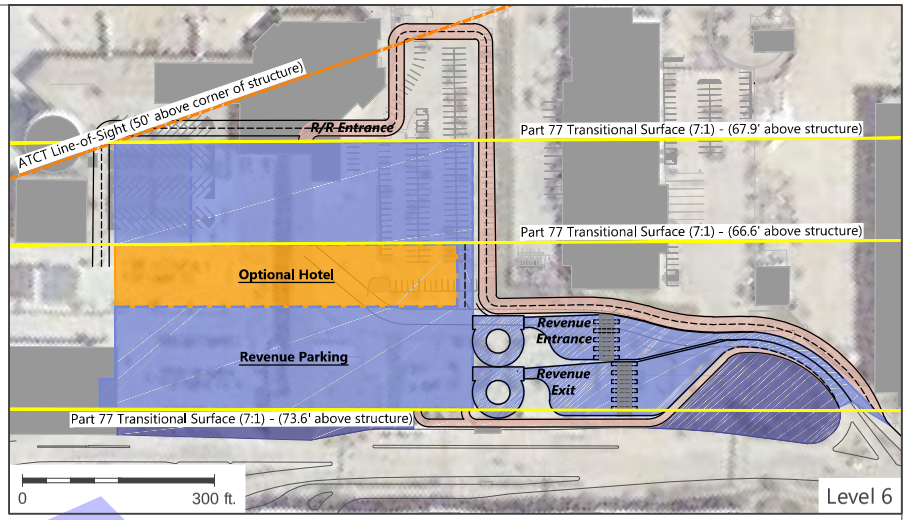


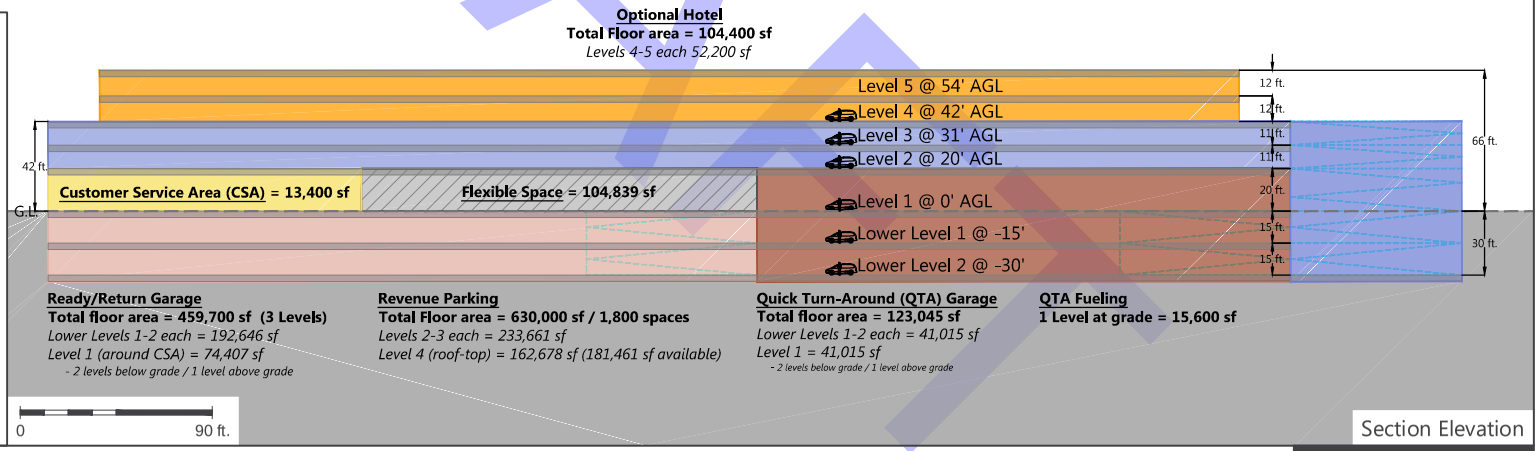


LEGEND

- Art Plaza
- Optional Hotel Development
- Revenue Parking Garage
- Customer Service Area (CSA)
- Ready/Return Garage
- Flexible Space
- Quick Turn-Around (QTA) Garage
- Quick Turn-Around (QTA) Fueling

NOTE

1/ Ground Line (G.L.) @ 0' AGL
Existing Site Elevation @ 478.6' MSL



SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., June 2014.

EXHIBIT 5-29

NORTH 0 See Drawing

Parking/Consolidated Rental Car Facility Concept Alternative 3B, Split Operation

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\C-2_Parking_CRCF_Hotel Concept_20150423.dwg Layout: 8.5x11L Plotted: May 22, 2015, 09:43AM

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Of the three alternative families, Option 1 was selected as the option that most closely aligned with the Department of Aviation's priorities. Of the two alternatives in this family Option 1B was identified as preferred as the optional hotel development would be better accommodated on a surface site rather having to design the parking structure to accommodate a potential future hotel development.

5.2.2 AIRPORT ACCESS ALTERNATIVES

5.2.2.1 Non-Terminal Area Roadways

The results of the demand/capacity analysis for the off-Airport roadways and intersections during the a.m. and p.m. peak hours indicated that, at PAL E3, the intersection of Mockingbird Lane at Cedar Springs Road/Herb Kelleher Way would perform at LOS F and that the intersection of Mockingbird Lane at Denton Drive would operate at LOS E. The combination of growing Airport traffic with heavy background commuter traffic on Mockingbird Lane led to the development of three new off-Airport roadway and intersection alternatives. These alternatives are presented on **Exhibit 5-30** (Alternative 1), **Exhibit 5-31** (Alternative 2), and **Exhibit 5-32** (Alternative 3) and are described below.

Alternative 1 – Conventional Urban Diamond Interchange

Alternative 1 consists of a compressed conventional urban diamond interchange at the affected intersection. This alternative would grade-separate the heavy through traffic on Mockingbird Lane in a tunnel under the at-grade diamond portion of the intersection serving Cedar Springs Road/Herb Kelleher Way through traffic and all associated turning movements. The two-lane northbound and two-lane southbound through movements on Mockingbird Lane would be depressed under Cedar Springs Road/Herb Kelleher Way so as not to encroach on the FAA *U.S. Standard for Terminal Instrument Procedures* (TERPS) and 14 CFR Part 77, *Objects Affecting Navigable Airspace*, surfaces near the end of Runway 31L. Upgrades to the Denton Drive and Mockingbird Lane intersection would include the addition of a second left turn lane on eastbound Denton Drive and an additional southbound continuous right turn lane on Mockingbird Lane between Cedar Springs Road/Herb Kelleher Way and Denton Drive. This alternative was analyzed to improve the peak hour level of service from LOS F at both intersections at PAL E3 to LOS C at the compressed conventional urban diamond intersection at Cedar Springs Road/Herb Kelleher Way, and LOS D at the Denton Drive intersection

Alternative 2 – Diverging Diamond Interchange

Alternative 2 consists of the same improvements at Denton Drive as Alternative 1, but the Cedar Springs Road/Herb Kelleher Way intersection would be reconfigured as a diverging diamond interchange. Similar to Alternative 1, northbound and southbound through traffic would be depressed in a tunnel under Cedar Springs Road/Herb Kelleher Way and all associated turning movements would be controlled by the two at-grade diverging diamond intersections. The diverging diamond is based on the concept that the conflict between left-turning traffic and oncoming through traffic could be eliminated if the traffic is switched to the opposite side of the roadway. This would result in signals providing maximum efficiency, fewer conflict points, and more traffic better served with improved safety and less congestion. The outbound Airport traffic heading south onto Mockingbird Lane would take a "free right" turn to the south as it would at a typical diamond interchange.

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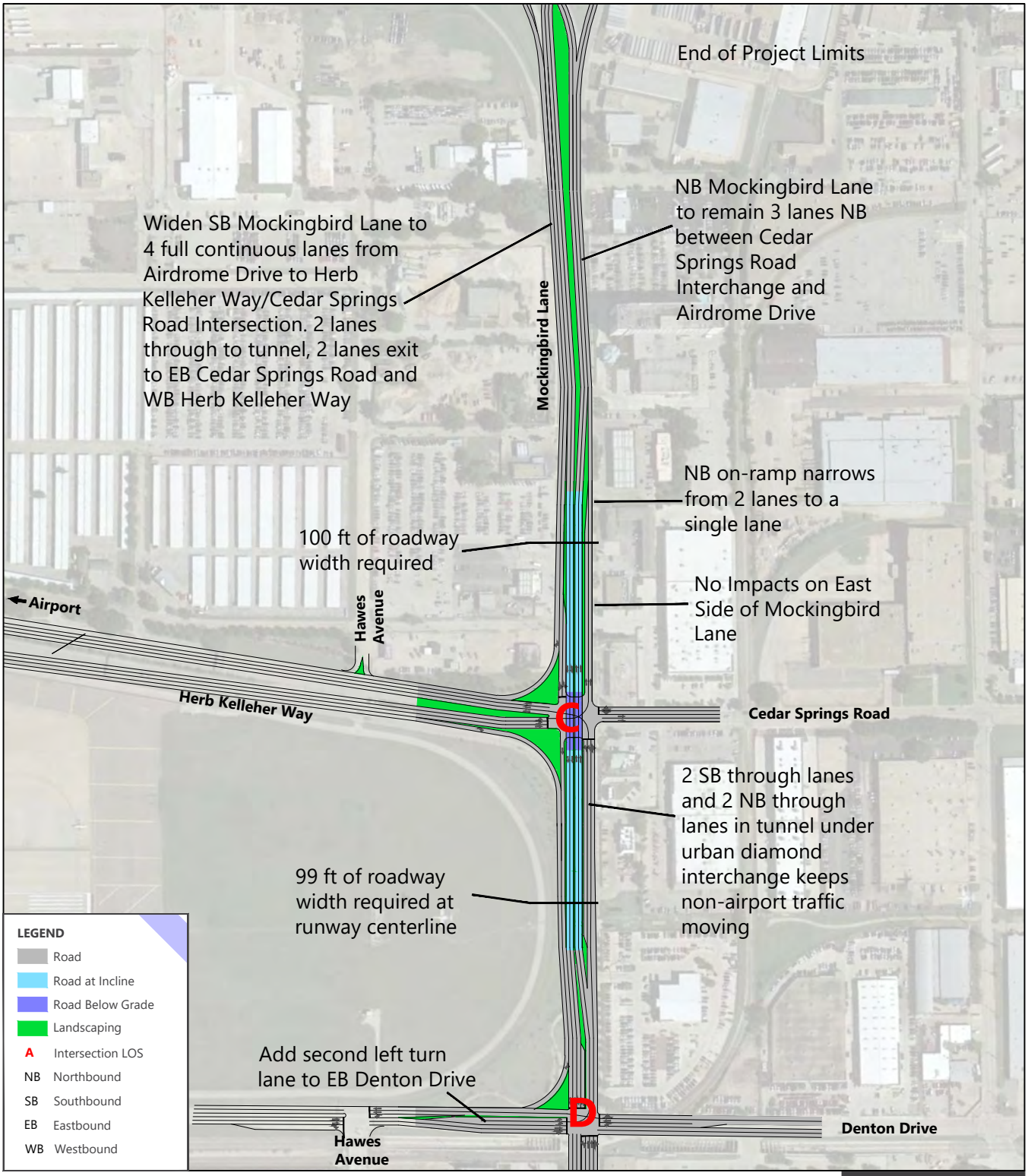

SOURCE: Google Earth Pro, February 2014; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., March 2015.

EXHIBIT 5-30

NORTH 0 400 ft.

Mockingbird Lane-Cedar Springs Road/Herb Kelleher Way Intersection Conventional Urban Diamond Interchange-Alternative 1

Drawing: N:\Love Field\08 Master Plan Update 2013\03 Alternatives\02 CAD\Mockingbird_CedarSpring_Alternatives_v8(10ft).dwg_Layout: Alt 1 Preferred_May 20, 2015, 10:25am

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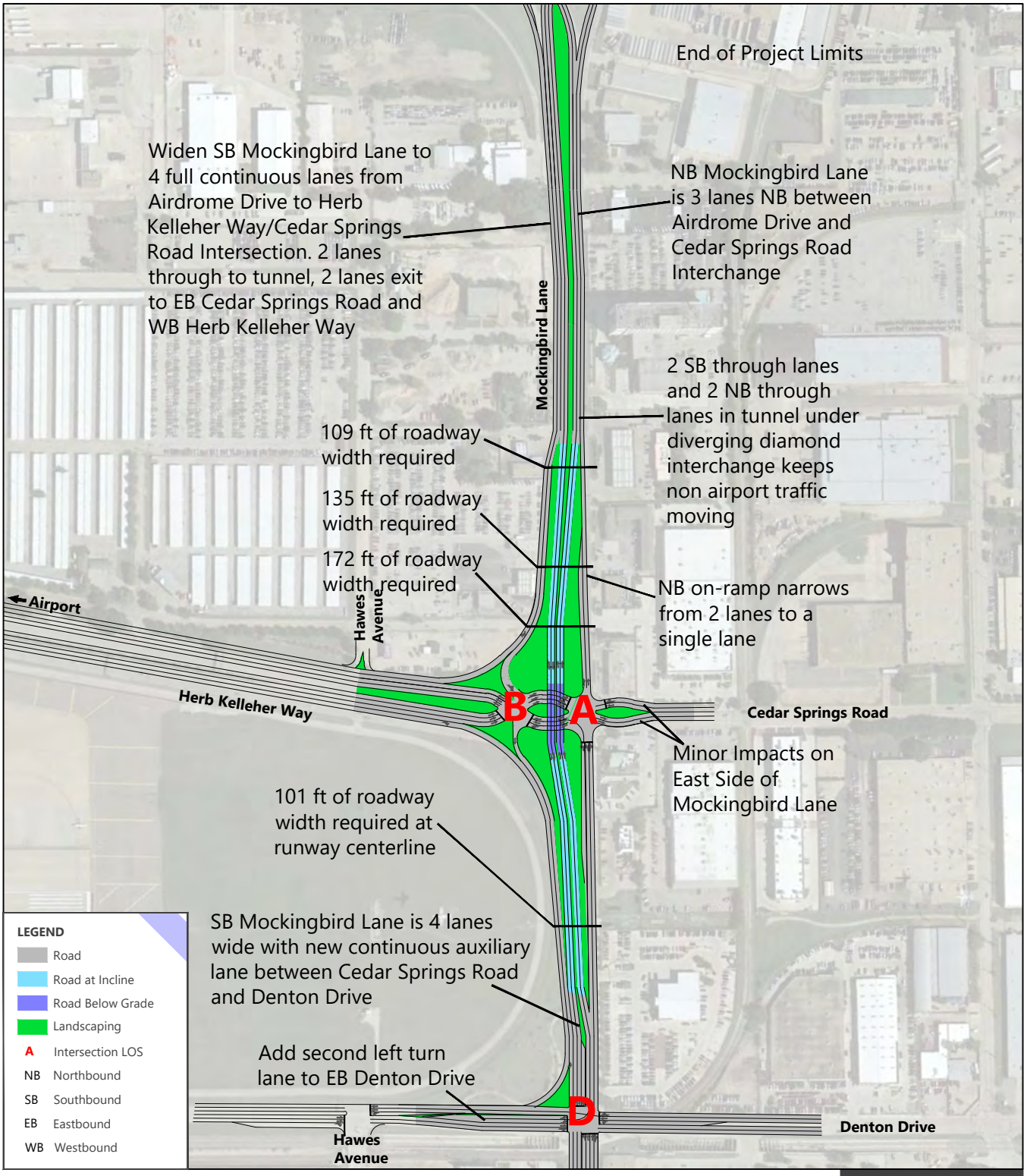

SOURCE: Google Earth Pro, February 2014; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., March 2015.

EXHIBIT 5-31

NORTH 0 400 ft.

Mockingbird Lane-Cedar Springs Road/Herb Kelleher Way Intersection
Diverging Diamond Interchange-Alternative 2

Drawing: N:\Love Field\08 Master Plan Update 2013\03 Alternatives\02 CAD\Mockingbird_CedarSpring_Alternatives_v8(10ft).dwg_Layout: Alt 2_May 20, 2015, 10:26am

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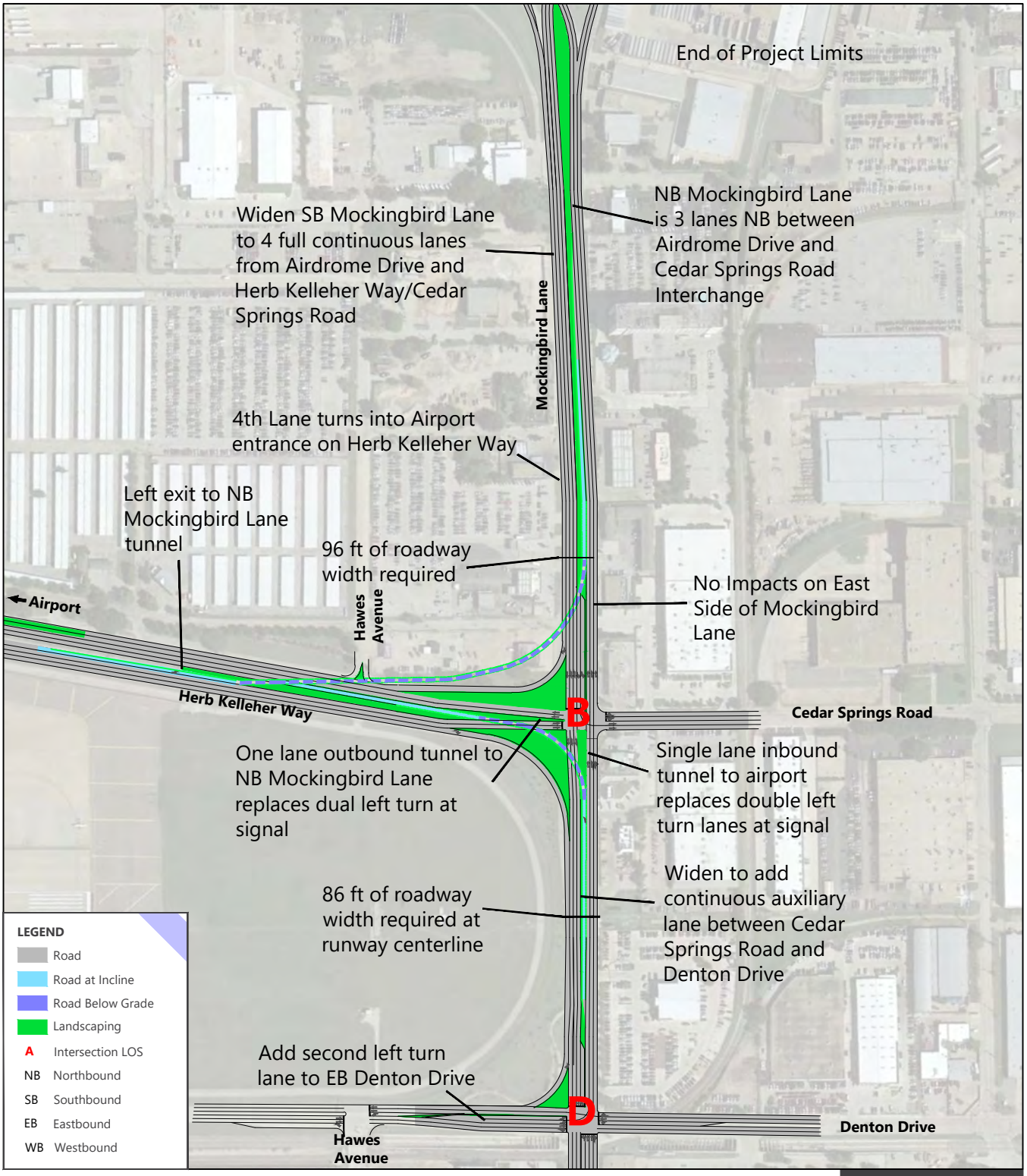

SOURCE: Google Earth Pro, February 2014; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., March 2015.

EXHIBIT 5-32

NORTH 0 400 ft.

Mockingbird Lane-Cedar Springs Road/Herb Kelleher Way Intersection
Direct Ramp Interchange-Alternative 3

Drawing: N:\Love Field\08 Master Plan Update 2013\03 Alternatives\02 CAD\Mockingbird_CedarSpring_Alternatives_v8(10ft).dwg_Layout: Alt 3_May 20, 2015, 10:26am

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The remaining outbound stream of Airport vehicles would cross over to the left side of the roadway, making it possible to also make a "free left" turn to access Mockingbird Lane heading north. The remaining traffic, continuing eastbound on Cedar Springs Road/Herb Kelleher Way, would then cross back to the normal right side of road. The "free left" turns could greatly reduce congestion, increase capacity, and reduce conflict points. Although unconventional, the diverging diamond intersections at Cedar Springs Road/Herb Kelleher Way would improve traffic flows compared with the conventional urban diamond interchange because of the low volume of east-west through movements on Cedar Springs Road/Herb Kelleher Way, and the very high volume of "free left" turning traffic. The resulting peak hour level of service at PAL E3 with the diverging diamond intersection was determined to be LOS B at the two-phase signal closest to the Airport, and LOS A at the two-phase signal on the east side of the interchange. The signal at Denton Drive would be the same as in Alternative 1 at LOS D.

Alternative 3 – Direct Ramp Interchange

Alternative 3 consists of a direct ramp interchange at Cedar Springs Road/Herb Kelleher Way with the same improvements at Denton Drive as in the first two alternatives. The two direct ramps added in this alternative would be single lane tunnels that would remove the two busiest left-turn movements from the existing intersection. The northbound left turn into the Airport would be tunneled under the intersection, as would the outbound left-turn movement to northbound Mockingbird Lane. Intersection analysis determined that this alternative would result in improving the Cedar Springs Road intersection to LOS B, and the same LOS D results as in the other alternatives at the Denton Drive intersection.

Preferred Alternative

Upon review with Airport management and staff, Alternative 1 was selected as the preferred alternative. Reasons for preferring this alternative provided by Airport staff include the least amount of tunneling as Airport management and staff are unsure of the locations of underground utility and obstructions in the interchange area. Alternative also consists of a more conventional roadway design that requires less right-of-way, and does not requires vehicles to perform a double crisscross pattern in which vehicles are switched onto the wrong side of the road. Finally, Alternative 3 appears to be the most costly alternative due to all the tunnels and new traffic signals that would be required.

5.2.2.2 Terminal Area Roadways and Intersections

The demand/capacity analysis of the existing terminal area roadways showed that only one roadway section would operate at a level of service worse than LOS D by PAL E3 during the peak hour. The single lane ramp (Link K in Table 4-25) from the inbound roadway toward the entrances of Garage A and Garage B was projected to accommodate 928 vehicles during the a.m. peak hour, resulting in a link LOS E. By PAL E3, a new public parking garage would be needed to accommodate the Airport wide parking capacity deficit. Therefore, the projected demand for the Garage A and Garage B entrances would be reduced, as some parking demand would be directed toward a new public parking location, as shown on **Exhibit 5-33**.

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SOURCES: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.

PREPARED BY: Ricondo & Associates, Inc., June 2014.

EXHIBIT 5-33

NORTH 0 300 ft.

Redistributed Traffic at Aviation Place and Herb Kelleher Way at PAL E3

Drawing: N:\Love Field\08 Master Plan Update 2013\04 CRCF-Parking-Hotel\CAD\$Parking_CRCF_Hotel Concept_2014-06-13\$Parking_CRCF_Hotel Concept_2014-06-13_GCW.dwg Layout: Ex 5-26 Plotted: May 19, 2015, 06:49PM

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Other alternatives developed to address intersection capacity would require reconfiguring the intersection at Herb Kelleher Way and Hawes Avenue. The intersection today is free flowing on Herb Kelleher Way with a stop-controlled approach on Hawes Avenue. The exiting traffic from Hawes Avenue experiences two major traffic engineering problems; Hawes Avenue has long approach delays as there are insufficient gaps (breaks in traffic between vehicles) on westbound Herb Kelleher Way, and the queues from the intersection of Cedar Springs Road/Herb Kelleher Way and Mockingbird Lane routinely back up past the Hawes Avenue intersection. In addition to the traffic on the Hawes Avenue approach, the left-turning eastbound approach on Herb Kelleher Way onto Hawes Avenue experiences LOS F delays caused by insufficient gaps across four lanes of inbound Airport traffic. It is recommended that the center median on Herb Kelleher Way be closed and that the access/egress to/from Hawes Avenue be converted to right-turn-in and right-turn-out traffic only. The lane configuration for this intersection is depicted in all three alternatives presented on Exhibits 5-30 through 5-32.

The existing intersection of Aviation Place and Herb Kelleher Way was previously evaluated and summarized in Section 4. In the analysis of this intersection, straight line traffic growth was assumed based on existing traffic patterns, resulting in the two-phase traffic signal at this intersection projected to operate at LOS A during the a.m. and p.m. peak hours through PAL E3. As the Department of Aviation is considering the construction of a new on-Airport public parking/rental car/hotel development, as previously discussed, additional intersection and link demand/capacity analysis was conducted to evaluate each of the two busiest conceptual alternatives discussed in Section 5.2.1. Exhibit 5-33 presents the redistributed a.m. and p.m. traffic volumes at the intersection and the resulting intersection LOS for PAL E3 demand. From the analysis, it was determined that the existing intersection would degrade to LOS C in the a.m. and p.m. peak hours. The Department of Aviation also requested an evaluation of the possibility of a grade-separated outbound lane from Aviation Place over inbound Herb Kelleher Way. Cross-section and plan views of this concept are presented on **Exhibit 5-34**. Depending on the steepness of the roadway grade, the lengths of approach ramps to the bridge over Herb Kelleher Way could range from as short as 220 feet to more than 440 feet, affecting weaving distances and stopping sight distances for drivers.

A slope of 6 percent or less is desirable. Addition of the bridge could eliminate the need for a signal at Aviation Place if all future outbound Aviation Place traffic is given access to the up-and-over bridge, but the benefit provided by the signal metering traffic flow to the curbside area would be lost, therefore losing the ability to meter curbside demand in controlled groups of traffic. Additional analysis and evaluation of the feasibility and potential benefit of constructing an Aviation Place grade-separated crossing of Herb Kelleher Way will be necessary once the design of the future public parking structure adjacent to the ticketing hall is complete. The facility design will influence the traffic characteristics that are relevant to the construction of this grade-separated crossing.

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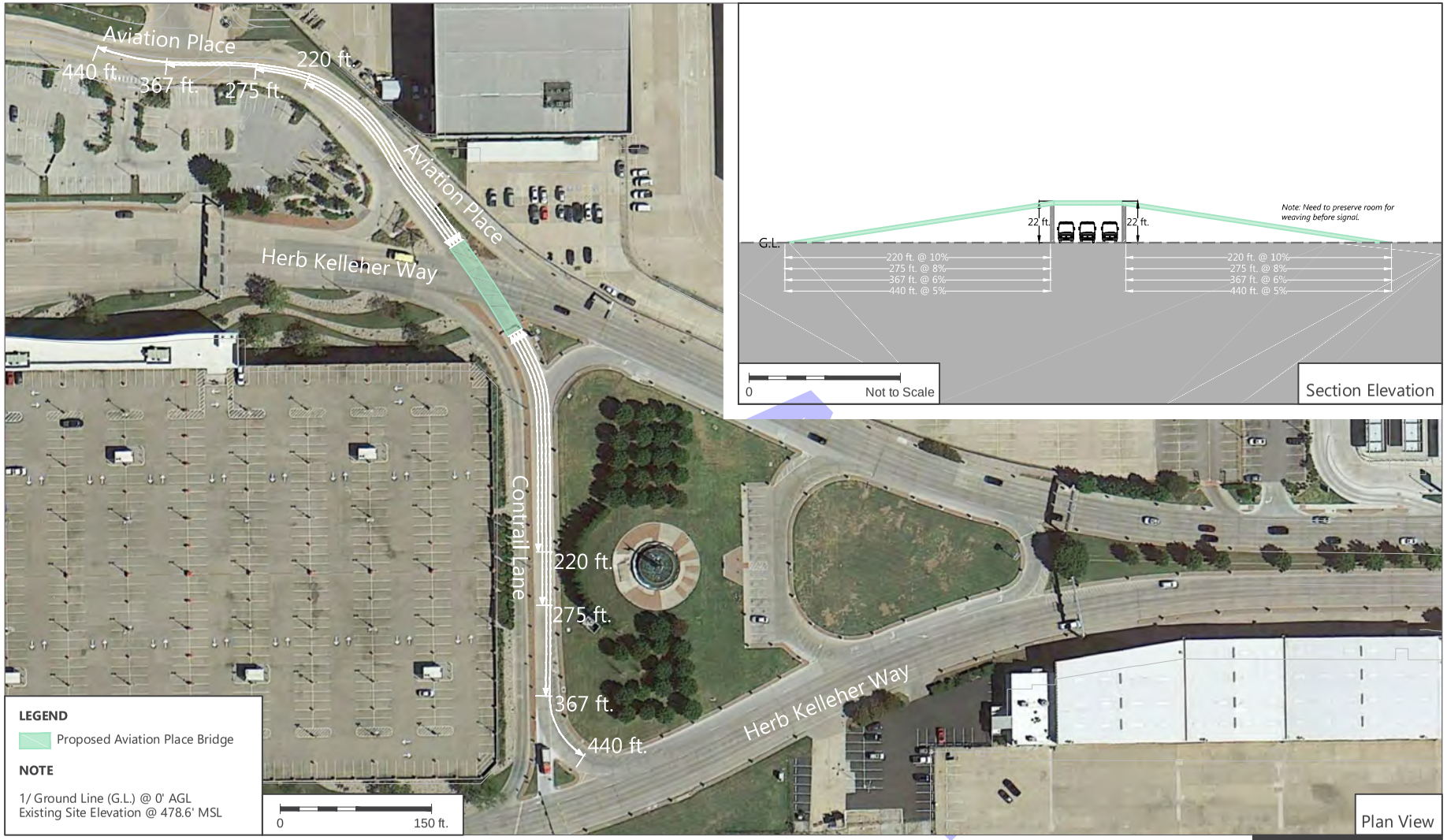

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., July 2014.

EXHIBIT 5-34

NORTH 0 See Drawing

Outbound Aviation Place Bridge

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\Aviation Place Bridge_Parking_CRCF_Hotel Concept_2014-07-17.dwg Layout: Ex 5-34 Plotted: May 22, 2015, 10:00AM

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5.3 General Aviation Development Alternatives

This section presents the development alternatives for GA facilities, which include FBO facilities, corporate hangar space, and aircraft MRO facilities. The alternatives were developed to explore opportunities to accommodate forecast demand, and resulting facility requirements defined for each PAL. Given the uncertainties associated with the future operation of Runway 18-36 at the time the alternatives were developed, alternatives with and without Runway 18-36 were explored.

A FONSI was issued by the FAA following its review of the EA of the DalFort facility in October 2014. Thus, it is possible that the hangar and apron parking areas could be used to meet some of the tenant facility requirements discussed in this section. The alternatives described in this section include the use of the DalFort facility as a potential area for development.

Because of the physical constraints of the Airport, no surplus land is available within the current Airport property boundary to support the expansion of GA facilities. Furthermore, existing development, infrastructure, and natural limitations surrounding the Airport make it infeasible to acquire additional property to support facility development. If Runway 18-36 is decommissioned, however, the property immediately north of Taxiway N and east of Taxiway A would become available for future GA facility development. As shown on **Exhibit 5-35**, a total of 13 acres of Airport property would then be available for future GA facility development. Upon reconfiguring the midfield taxiway system to include dual parallel crossfield taxiways, an additional parcel of 15 acres would also become available for future facility development. Because of restricted landside access to this parcel and its proximity to the terminal core, the Department of Aviation has elected to preserve this 15-acre parcel for future terminal support functions.

The Department of Aviation plans to use the 13 acres that would become available if Runway 18-36 is decommissioned, as well as the DalFort structure, to support GA demand. It is recognized that this space is limited; therefore, the Department of Aviation prefers to accommodate additional GA demand within the Dallas Airport System, which includes, in addition to DAL, Dallas Executive Airport, located less than 12 miles from Dallas Love Field, which may be able to accommodate additional GA growth.

Table 5-4 summarizes the GA facility requirements derived for each PAL for operations. As no surplus Airport property exists for future GA facility development, the existing Airport property is not adequate to accommodate all of the facility needs to support future growth. If Runway 18-36 is decommissioned, however, the facility requirements projected for PAL O1, and a portion of the PAL O2 requirements, could be accommodated at Dallas Love Field. Therefore, the identification of GA development alternatives focused on maximizing the availability of GA facilities within the constraints of the existing Airport property boundary, noting that GA facilities requirements in excess of those that could be accommodated at Dallas Love Field could still be accommodated within the Dallas Airport System at Dallas Executive Airport.

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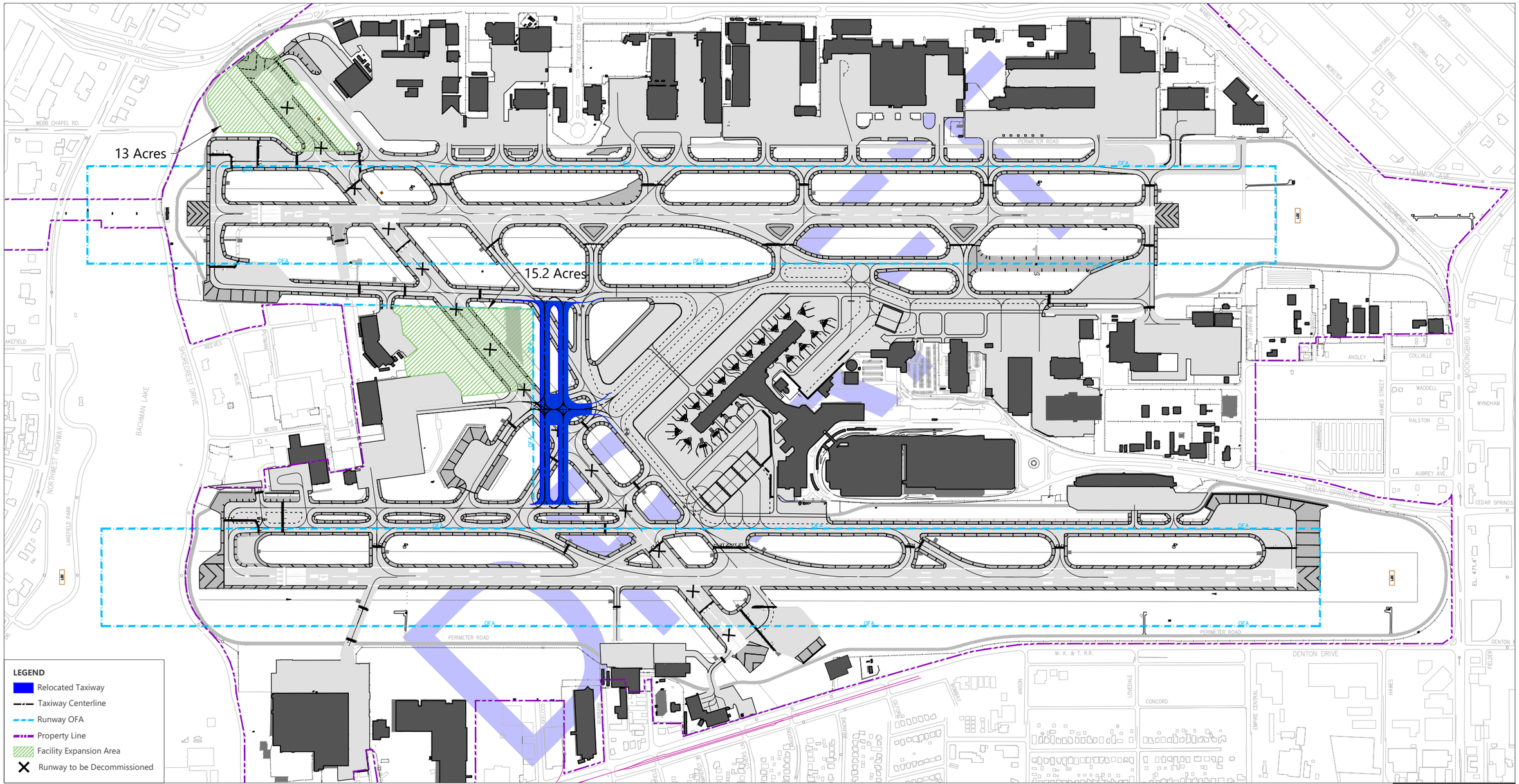

SOURCE: DAL Airport Layout Plan, 2001; Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., December 2013.

EXHIBIT 5-35

NORTH 0 800 ft.

Potential General Aviation Expansion Areas

Drawing: Z:\Love Field\2013 Master Plan Update\5 - Tenant Alternatives\DAL_Facility Improvement Areas.dwg_Layout: 5-35_May 18, 2015, 10:18am

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Table 5-4: General Aviation Land Requirements Summary (in gross acres)

PLANNING ACTIVITY LEVEL	FIXED BASE OPERATORS	CORPORATE/ MAINTENANCE	TOTAL
PAL O1	8.1	0.0	8.1
PAL O2	19.1	18.2	37.3
PAL O3	38.6	32.6	71.2

SOURCE: Ricondo & Associates, Inc., January 2014.
PREPARED BY: Ricondo & Associates, Inc., January 2014

The GA development alternatives identified were focused on facilities on the northeast side of the airfield. Two distinct development strategies were explored, as follows:

- **North Corner Alternatives:** These development alternatives reflect a variety of hangar configurations within the 13-acre tract that would become available with the decommissioning of Runway 18-36. Existing GA facilities would either remain in their current configurations or be replaced in-kind. These alternatives would support facility requirements through PAL O2 if the DalFort facility is available for development.
- **Lemmon Avenue Redevelopment Alternatives:** Existing GA facilities along Lemmon Avenue are becoming outdated. Many of the hangars and apron areas are not sized to accommodate some of the larger corporate jets in the current GA fleet at the Airport. Furthermore, corporate GA activity is anticipated to be the catalyst for growth in GA demand in the future. With the exception of the DalFort facility, the redevelopment alternatives address opportunities for systematically replacing all of the GA facilities along Taxiway A. These alternatives also include separate concepts for redevelopment with Runway 18-36 both operational and decommissioned.

The following subsections describe the range of additive and redevelopment alternatives that would improve the capacity and/or operational efficiency of the GA facilities. Each alternative is presented graphically with a brief description of its physical characteristics and operational capabilities/constraints. The alternatives were evaluated with the two airfield configurations (with Runway 18-36 operational and decommissioned).

5.3.1 North Corner Alternatives

As shown on **Exhibit 5-36**, the 13-acre tract that would become available if Runway 18-36 is decommissioned is bordered by Taxiway A and its associated hold bay, Shorecrest Drive, and Lemmon Avenue. The Department of Aviation is in the process of constructing an airside service road adjacent to the Taxiway A OFA. The terrain within the 13-acre tract is relatively flat; however, it drops off along the northern boundary of the tract. As a result, Shorecrest Drive is approximately 20 feet below the existing ground elevation of the potential development site.

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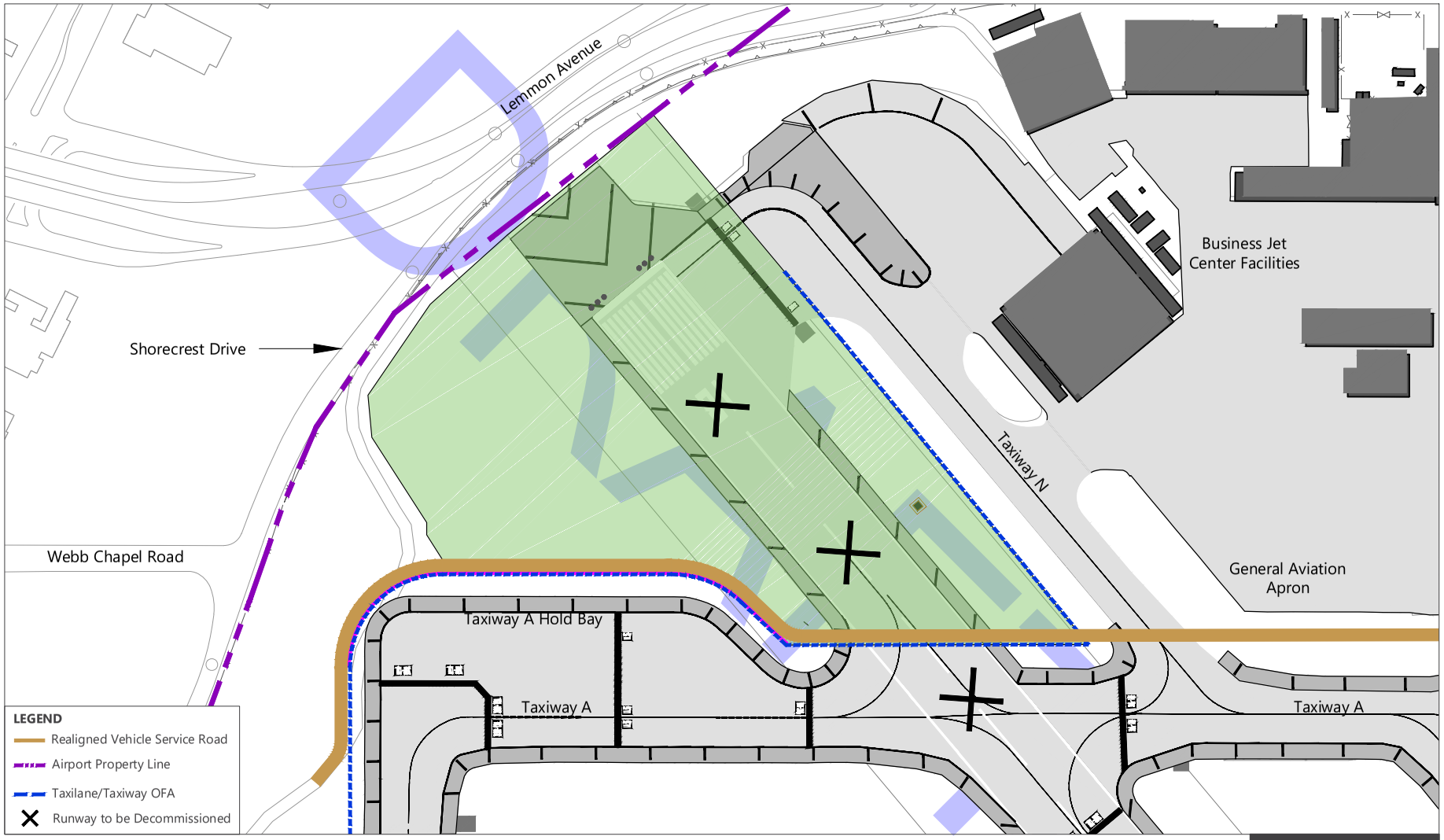

SOURCE: DAL Airport Layout Plan, 2001; Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2014.

EXHIBIT 5-36

NORTH 0 250 ft.

North Corner Development Area with Runway 18-36 Decommissioned

Drawing: Z:\Love Field\2013 Master Plan Update\5 - Tenant Alternatives\GA Facility Development Area.dwg_Layout: Option 1A_May 18, 2015, 10:19am

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A total of six North Corner alternatives were developed. Each alternative includes landside parking and access roads, and hangar and apron areas for aircraft storage. For comparison purposes, the following planning considerations were applied to each alternative:

- Airside access associated with all six alternatives would be via Taxiway A, with existing Taxiway N converted to a taxilane to serve as a primary expanded GA facility access point. All taxilanes would be configured to ADG III design standards and jet blast deflectors would protect vehicular parking, access roads, parked aircraft, and other structures.
- Landside access for these alternatives would connect to either Shorecrest Drive or Lemmon Avenue. A potential connection point would be adjacent to the Shorecrest Drive and Webb Chapel Road intersection.
- For aircraft parking and storage, priority was given to aircraft storage/maintenance hangars. A standard hangar configuration with a building depth of 150 feet is depicted on the exhibits. Each hangar would be configured with adequate apron area to allow unimpeded access to the hangar bays. Surplus apron areas that could accommodate aircraft parking positions are also identified.
- Jet blast fences would provide protection for taxiing aircraft on neighboring taxiways from jet blast caused by breakaway thrust from parked aircraft when in a power-out maneuver. Blast fences would also be provided for neighboring buildings and existing aircraft parking areas to protect them from jet blast from aircraft taxiing on Taxiway N to the new ramp areas.

5.3.1.1 North Corner General Aviation Facility Layout - Alternative 1A

Alternative 1A, depicted on **Exhibit 5-37**, consists of the following facilities:

- Four 30,000-square-foot hangars with adjacent 23,600-square-foot vehicle parking areas
- 413,500 square feet of apron area and access taxilane
- Four additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Webb Chapel Road.

5.3.1.2 North Corner General Aviation Facility Layout - Alternative 1B

Alternative 1B, depicted on **Exhibit 5-38,** consists of the following facilities:

- Five 30,000-square-foot hangars with adjacent 43,500-square-foot vehicle parking areas
- 302,200 square feet of apron area and access taxilane
- Five additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Lemmon Avenue

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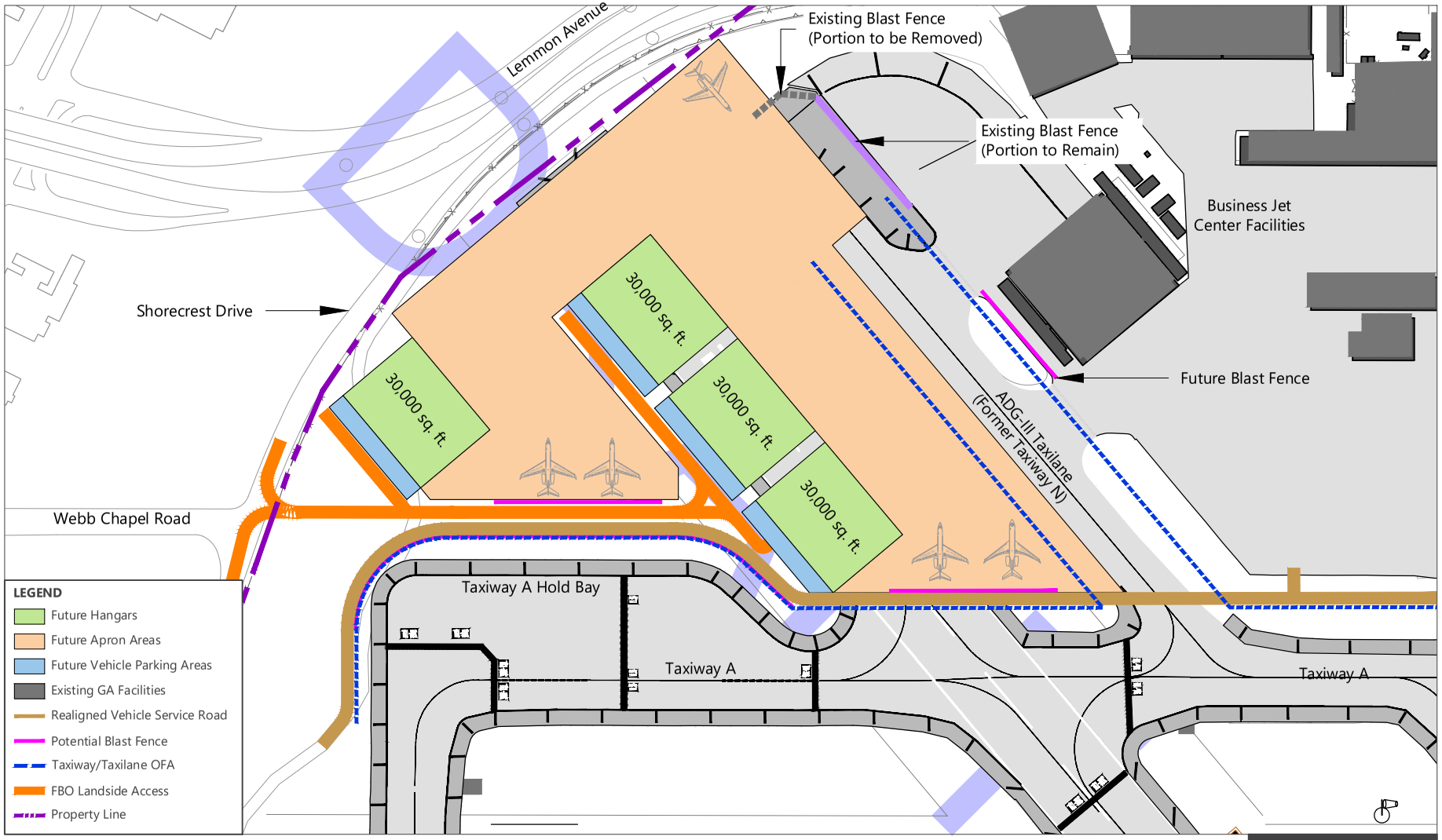

SOURCE: DAL Airport Layout Plan, 2001; Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2014.

EXHIBIT 5-37

NORTH 0 250 ft.

North Corner General Aviation Facility Layout Alternative 1A

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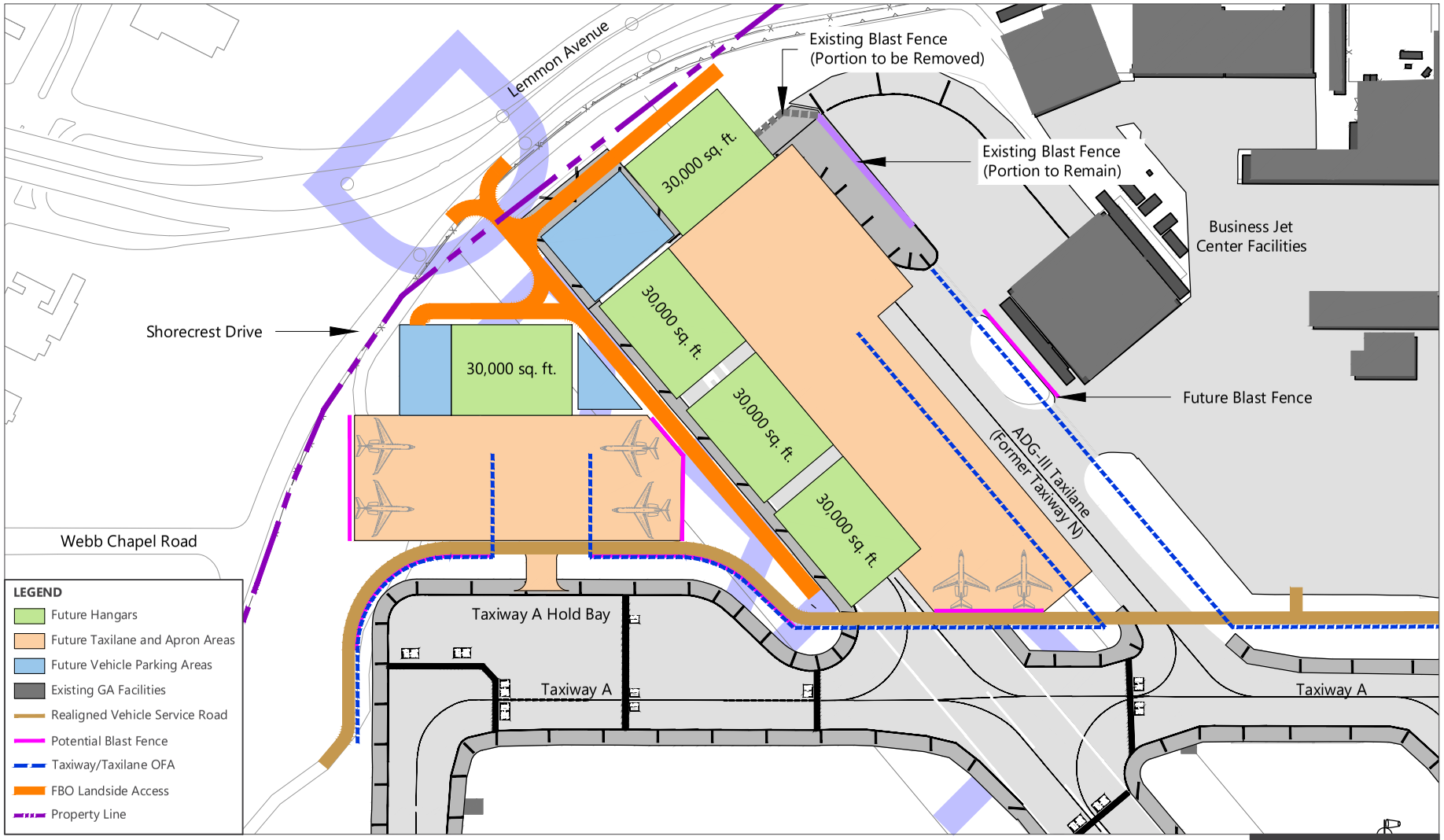

SOURCE: DAL Airport Layout Plan, 2001; Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2014.

EXHIBIT 5-38

NORTH 0 250 ft.

North Corner General Aviation Facility Layout Alternative 1B

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5.3.1.3 North Corner General Aviation Facility Layout - Alternative 1C

Alternative 1C, depicted on **Exhibit 5-39**, would provide the most hangar space, and consists of the following facilities:

- Seven 30,000-square-foot hangars with adjacent 62,400-square-foot vehicle parking areas
- 321,300 square feet of apron area and access taxilane
- Three additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Lemmon Avenue

The existing Business Jet Center hangar would require relocation to allow for an eastward bend in the centerline of Taxiway N (converted to a taxilane under this alternative). This relocation would optimize the ramp area on the west and integrate four of the future hangars with the existing GA apron.

5.3.1.4 North Corner General Aviation Facility Layout - Alternative 1D

Alternative 1D, depicted on **Exhibit 5-40**, includes a perimeter hangar location concept, and consists of the following facilities:

- Five 30,000-square-foot hangars with adjacent 42,200-square-foot vehicle parking areas
- 371,300 square feet of apron area and access taxilane
- Four additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Webb Chapel Road

5.3.1.5 North Corner General Aviation Facility Layout - Alternative 1E

Alternative 1E, depicted on **Exhibit 5-41**, consists of the following facilities:

- Six 30,000-square-foot hangars with adjacent 39,000-square-foot vehicle parking areas
- 355,200 square feet of apron area and access taxilane
- Four additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Webb Chapel Road

Alternative 1E is similar to Alternative 1C in that the hangar expansion would occur linearly, although the hangar orientation would be east-west. In this alternative, four 30,000-square-foot hangars and two 37,500-square-foot hangars would be provided, with an aircraft parking area along the north side of the ramp along Shorecrest Drive. Landside access would be provided from the intersection of Shorecrest Drive and Webb Chapel Road, with access to the easternmost hangars provided via Shorecrest Drive. Dedicated vehicle parking areas for all hangars would be provided along their respective entrance roads. Blast protection would be necessary between the ramp and Taxiway A entrance roads, with additional protection provided between the taxilane and the Business Jet Center hangar.

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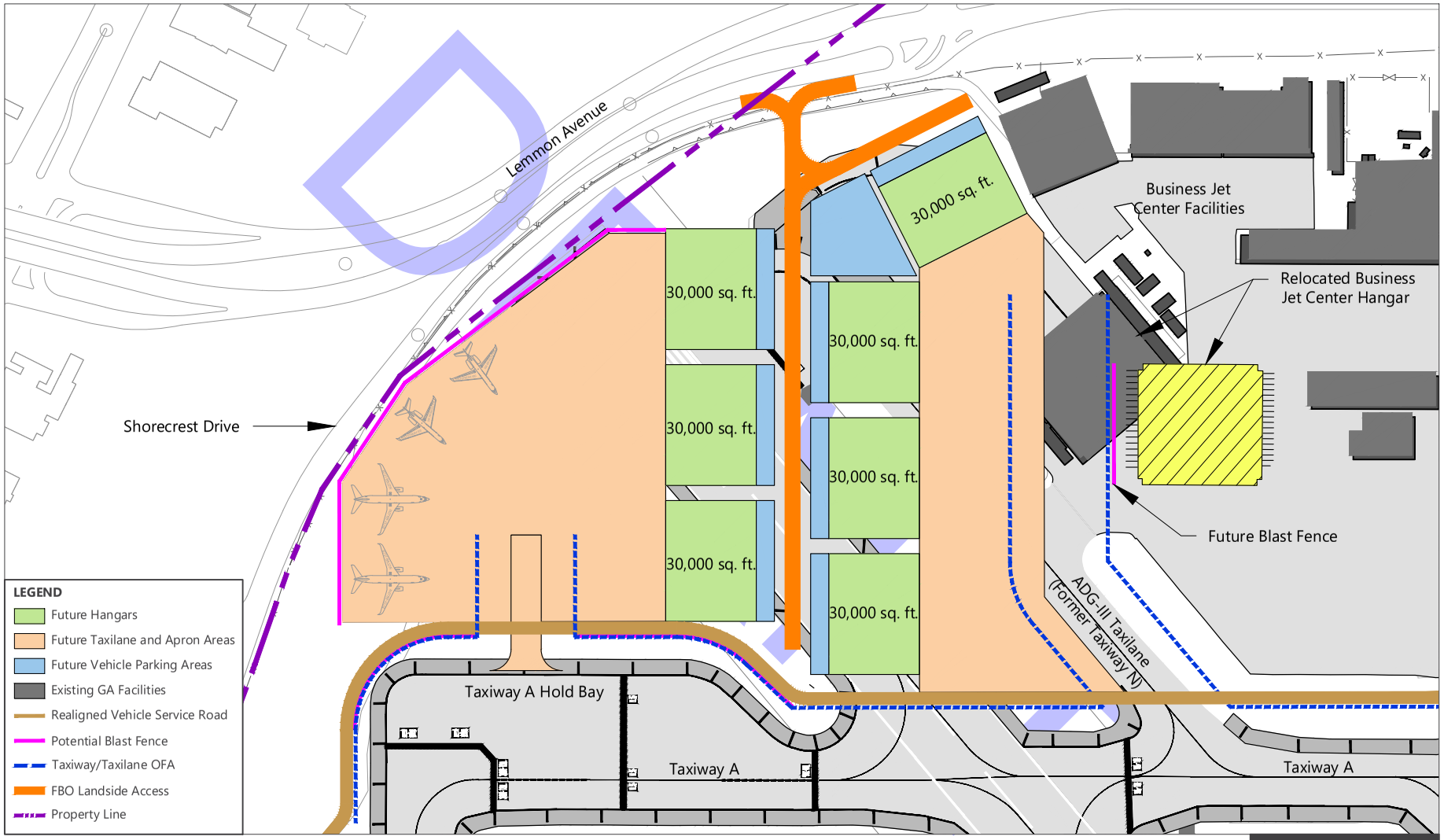

SOURCE: DAL Airport Layout Plan, 2001; Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2014.

EXHIBIT 5-39

NORTH 0 250 ft.

North Corner General Aviation Facility Layout Alternative 1C

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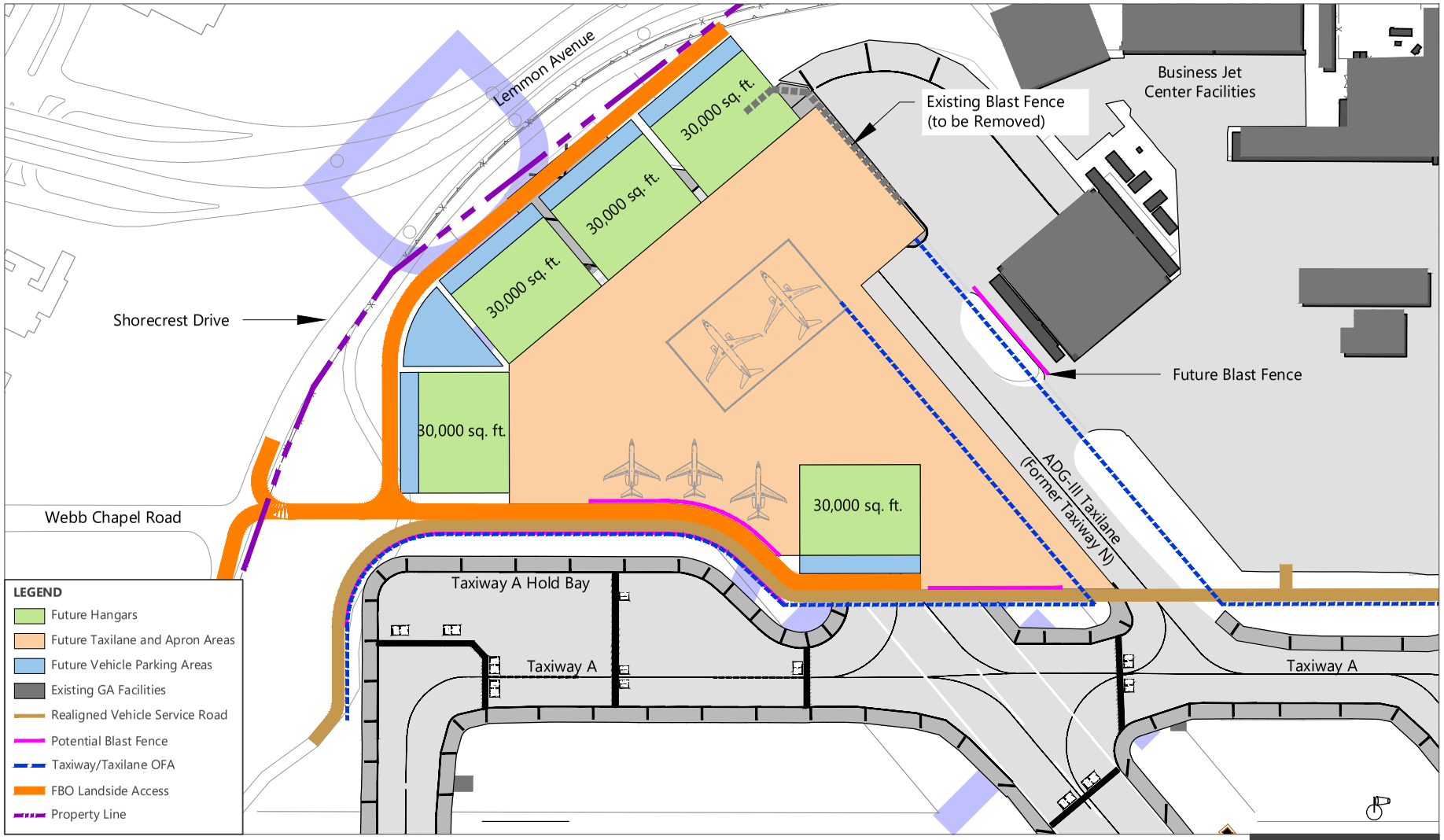

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2014.

EXHIBIT 5-40

NORTH 0 250 ft.

North Corner General Aviation Facility Layout Alternative 1D

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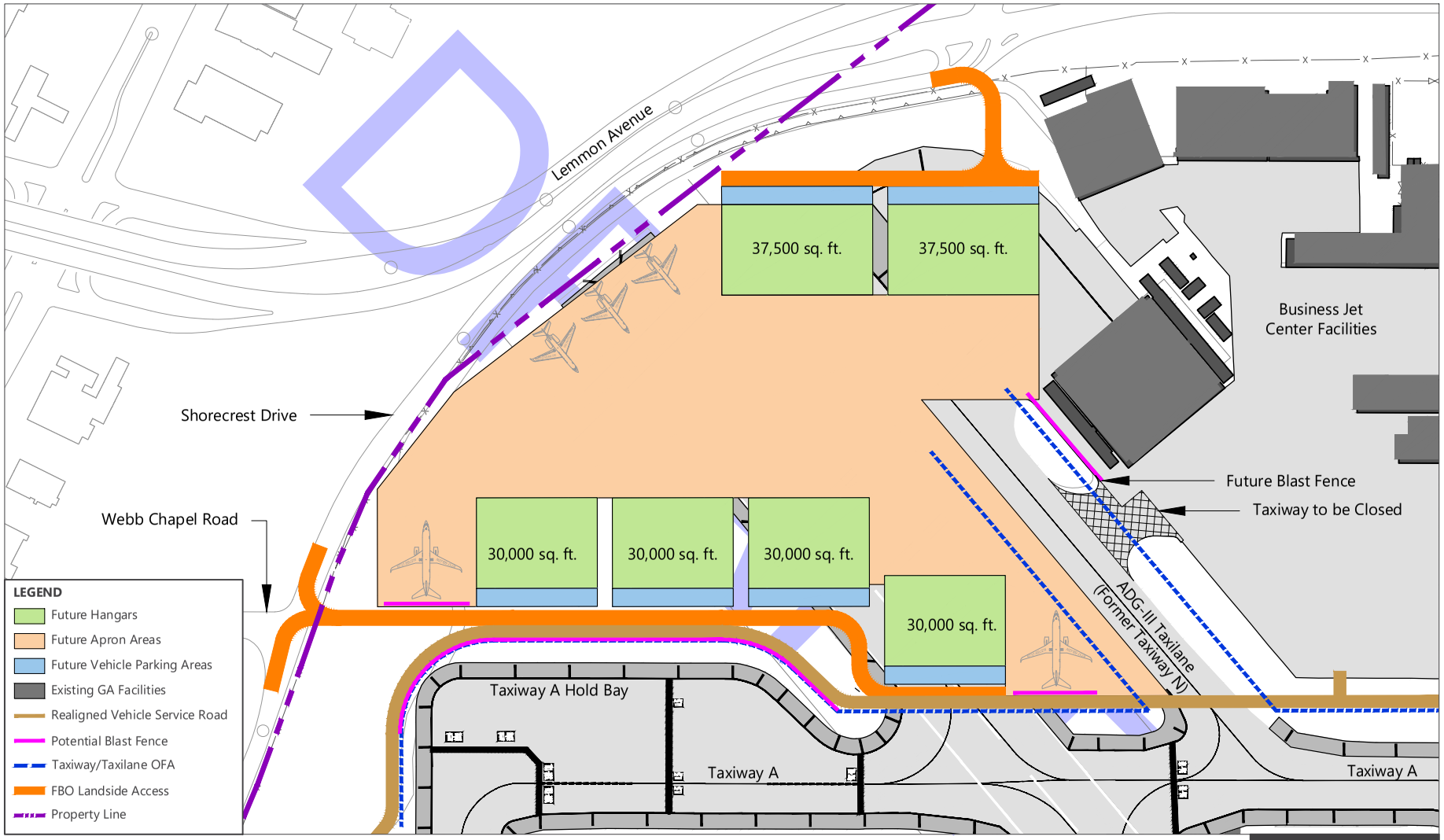

SOURCE: DAL Airport Layout Plan, 2001; Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2014.

EXHIBIT 5-41

NORTH 0 250 ft.

North Corner General Aviation Facility Layout Alternative 1E

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Under this alternative, the ramp entrance taxiway located south of the Business Jet Center hangar would have to be closed because of jet blast caused by aircraft movements from Taxiway N.

5.3.1.6 North Corner General Aviation Facility Layout - Alternative 1F

Alternative 1F, depicted on **Exhibit 5-42**, was developed to mitigate the need for ingress and egress via the Taxiway A hold bay. This alternative consists of the following facilities:

- Five 30,000-square-foot hangars with adjacent 39,800-square-foot vehicle parking areas
- 286,800 square feet of apron area and access taxilane
- Four additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Webb Chapel Road

5.3.1.7 North Corner Alternatives Summary

In the evaluation of the additive alternatives for the North Corner development, hangar space, ramp area, and landside facilities were considered, as were ease of access, potential constructability, and effects on existing facilities. Alternatives 1C and 1E would provide for the greatest amount of hangar space and parking area available for landside vehicles. Other alternatives, such as Alternatives 1A and 1D, would provide for slightly more ramp area for aircraft movement and storage. Although Alternative 1C would provide for the greatest amount of hangar space and landside facilities, access from the Taxiway A hold bay was determined to be a detriment, along with required relocation of the Business Jet Center hangar.

Alternative 1E was selected as the preferred alternative for the North Corner development area. The layout of the hangars and parking area would provide for efficient use of the 13 acres available for both landside and airside operations and for potential expansion to the full eastside redevelopment (Alternative 2A, discussed in the following subsection). Dedicated parking areas for passenger vehicles, as well as on-apron aircraft parking and storage areas, also enhance the functionality of this alternative.

While facility expansion in the North Corner development area would be sufficient for expansion through PAL O1, the Airport will not have the development area necessary to accommodate anticipated GA facility needs at PAL O2 and PAL O3. It should be noted that Dallas Executive Airport may have available areas to accommodate future GA demand in the region. If the operations planning metrics are met, deficiencies of 34.0 acres and 65.2 acres, respectively, would occur at PAL O2 and PAL O3. Similarly, if Runway 18-36 is not decommissioned, the facilities anticipated to be accommodated in the North Corner development area may also have to be accommodated at Dallas Executive Airport.

Tables 5-5 through **5-7** present the North Corner development alternatives along with the surplus or deficiency of functional areas under each alternative.

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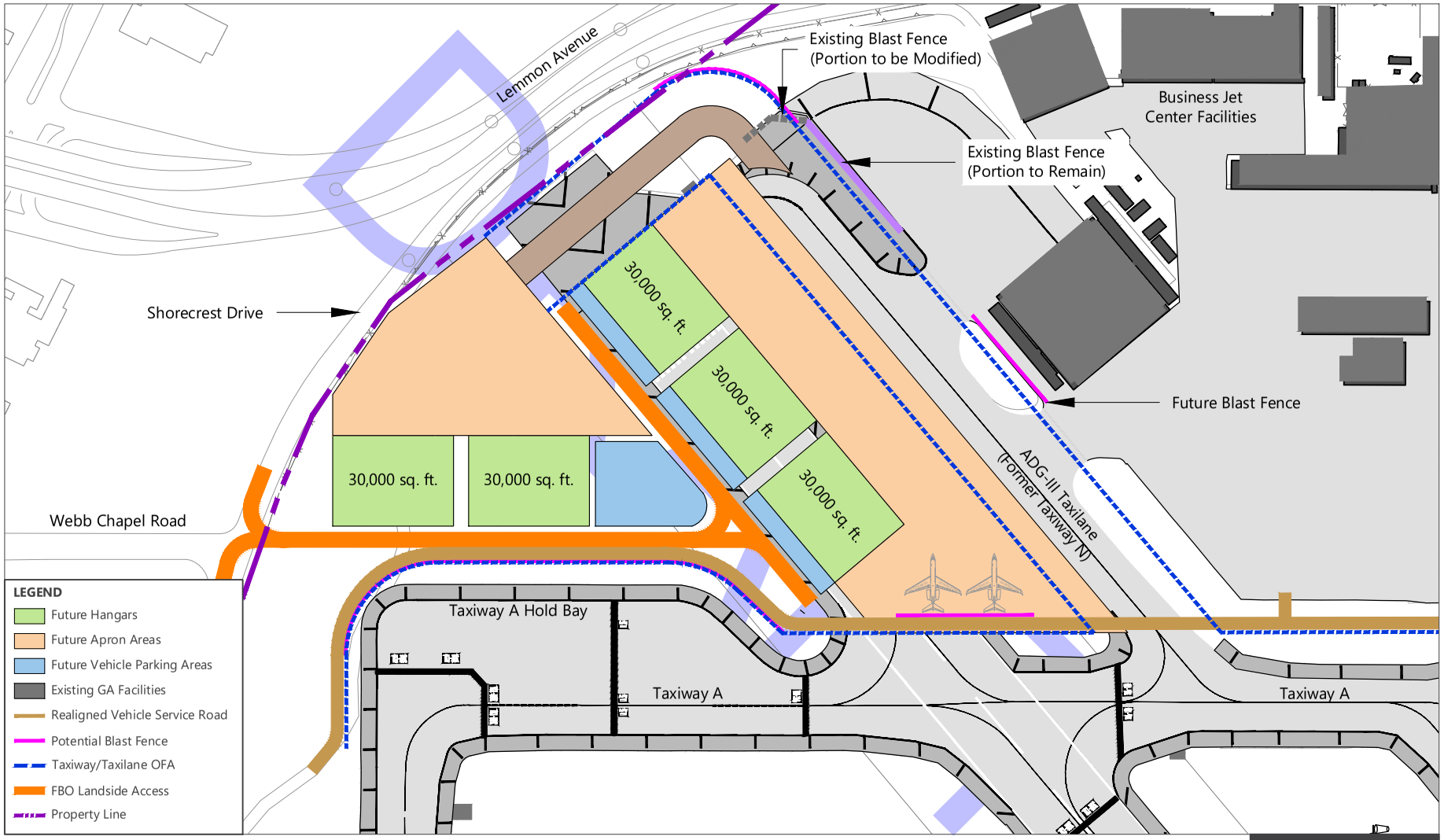

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2014.

EXHIBIT 5-42

NORTH 0 250 ft.

North Corner General Aviation Facility Layout Alternative 1F

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Table 5-5: General Aviation Hangar Area Summary (in square feet)

	ALTERNATIVE	PAL O1	PAL O2	PAL O3
	Additional Hangar Area Required	90,000	385,000	716,000
	Proposed Hangar Area		**Surplus/Deficiency**	
1A	120,000	30,000	-265,000	-596,000
1B	150,000	60,000	-235,000	-566,000
1C	210,000	120,000	-175,000	-506,000
1D	150,000	60,000	-235,000	-566,000
1E	195,000	105,000	-190,000	-521,000
1F	150,000	60,000	-235,000	-566,000

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.

SOURCE: Ricondo & Associates, Inc., July 2014.

PREPARED BY: Ricondo & Associates, Inc., July 2014.

Table 5-6: General Aviation Apron Area Summary (in square feet)

	ALTERNATIVE	PAL O1	PAL O2	PAL O3
	Additional Apron Area Required	220,000	831,000	1,583,000
	Proposed Apron Area		**Surplus/Deficiency**	
1A	413,000	193,000	-417,000	-1,170,000
1B	302,000	82,000	-529,000	-1,281,000
1C	321,000	101,000	-510,000	-1,262,000
1D	371,000	151,300	-460,000	-1,212,000
1E	355,000	135,000	-476,000	-1,228,000
1F	287,000	67,000	-544,000	-1,296,000

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.

SOURCE: Ricondo & Associates, Inc., July 2014.

PREPARED BY: Ricondo & Associates, Inc., July 2014.

Table 5-7: General Aviation Parking and Landside Area Summary (in square feet)

ALTERNATIVE		PAL O1	PAL O2	PAL O3
Additional Parking and Landside Area Required		9,000	263,000	541,000
Proposed Parking and Landside Area		**Surplus/Deficiency**		
1A	24,000	15,000	-239,000	-517,000
1B	44,000	35,000	-219,000	-497,000
1C	62,000	53,000	-201,000	-479,000
1D	42,000	33,000	-221,000	-499,000
1E	39,000	30,000	-224,000	-502,000
1F	40,000	31,000	-223,000	-501,000

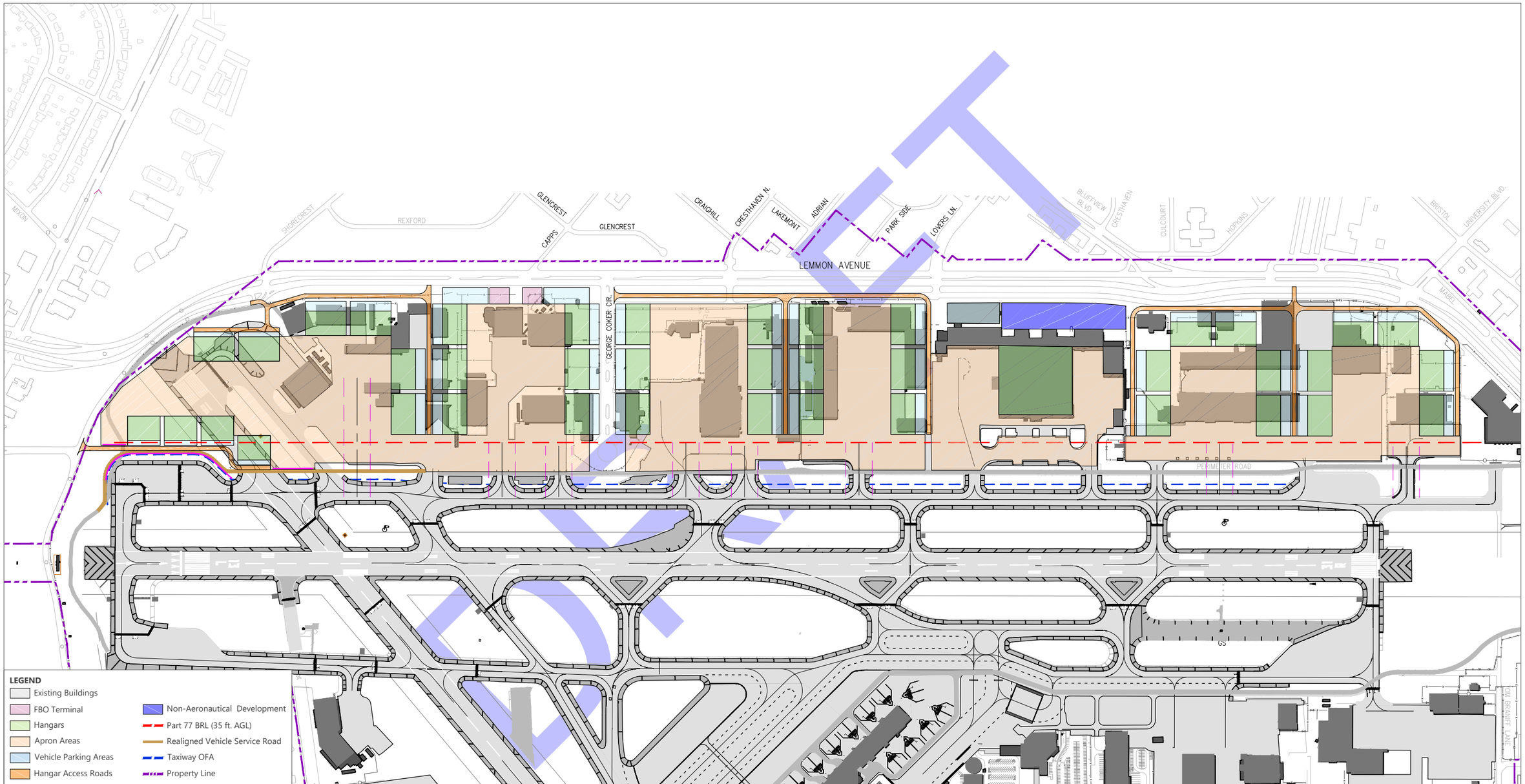
NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.
SOURCE: Ricondo & Associates, Inc., July 2014.
PREPARED BY: Ricondo & Associates, Inc., July 2014.

5.3.2 Lemmon Avenue Redevelopment Alternatives

Alternatives to consolidate facilities on the existing GA ramp were explored to simplify ramp maneuverability and hangar access. The consolidation of facilities would allow some open landside areas to be used for retail or other nonaeronautical revenue-generating functions. For the purposes of this analysis, it was assumed that the DalFort facility would not be affected by the redevelopment alternatives, although it may be available to accommodate some GA facility requirements. The alternatives discussed in the following subsections are based on the assumption that North Corner development Alternative 1E would be constructed to accommodate some GA facility requirements; therefore, Alternative 1E was incorporated into the full GA ramp redevelopment alternatives. Alternatives for redevelopment of the GA ramp with Runway 18-36 operational and decommissioned are presented in the following subsections.

5.3.2.1 Lemmon Avenue Redevelopment Alternatives 2A and 2B

Lemmon Avenue redevelopment Alternatives 2A and 2B incorporate consolidated hangars in parallel and U-shaped arrangements. These arrangements would create efficiencies for aircraft movements and parking on the apron. Additionally, such hangar configurations would maximize ramp space while providing dedicated aircraft parking areas in front of tenant hangars. **Exhibit 5-43** depicts the Alternative 2A layout concept with Runway 18-36 decommissioned, and **Exhibit 5-44** depicts the Alternative 2B layout concept with Runway 18-36 remaining operational.



SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., December 2013.

EXHIBIT 5-43

NORTH 0 800 ft.

Lemmon Avenue Redevelopment Alternative 2A
with Runway 18-36 Decommissioned

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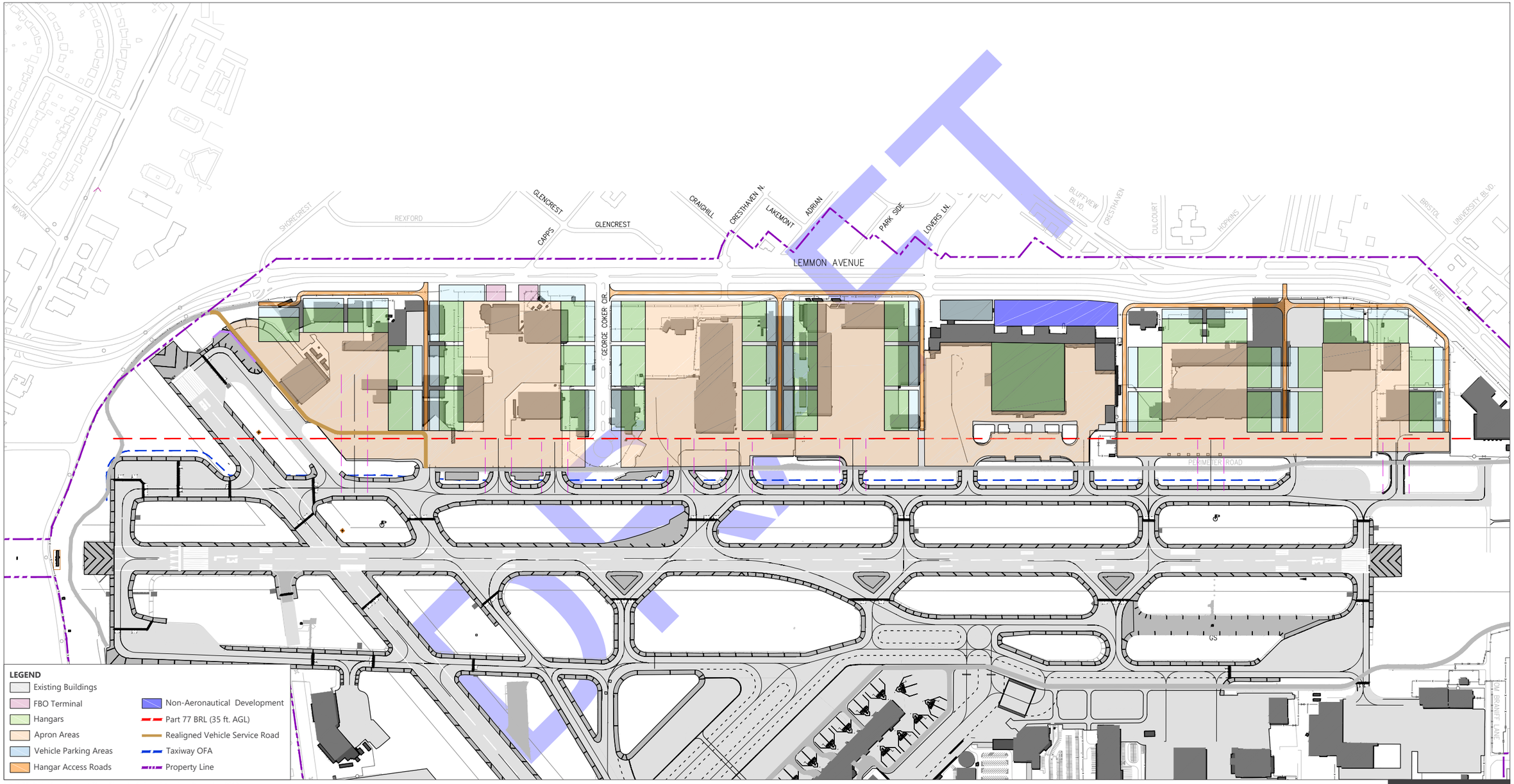

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., December 2013.

EXHIBIT 5-44

NORTH 0 800 ft.

Lemmon Avenue Redevelopment Alternative 2B with Runway 18-36 Operational

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Alternative 2A would provide for 4 30,000-square-foot hangars and 36 37,500-square-foot hangars to be constructed, with the additional hangar area provided at the DalFort facility, while Alternative 2B would provide for 35 37,500-square-foot hangars. In addition to the hangars, two FBO facilities would be located along the east side of the ramp, accessible from Lemmon Avenue. Signature Flight Support currently operates a terminal for general aviation purposes, as well as hangars for aircraft storage and maintenance. These redevelopment alternatives incorporate demolition and relocation of all FBO and dedicated parking facilities.

Landside access would be provided via connections with Lemmon Avenue to the east and via George Coker Circle. Each hangar would have a dedicated vehicle parking area, accessible from the access roads along the back side of each hangar.

5.3.2.2 Lemmon Avenue Redevelopment - Alternative 3A and 3B

Alternatives 3A and 3B incorporate a similar hangar arrangement as Alternatives 2A and 2B; however, hangars would be provided at the east end of the realigned ramp to maximize hangar space and ramp efficiency while providing space for nonaeronautical development between the GA ramp and Lemmon Avenue. Approximately 135 feet of depth would be reserved for nonaeronautical development, reducing the availability of land for GA ramp, hangar, and landside facilities development. **Exhibit 5-45** depicts the Alternative 3A layout with Runway 18-36 decommissioned, and **Exhibit 5-46** depicts the Alternative 3B layout with Runway 18-36 remaining operational.

Alternative 3A provides 4 30,000-square-foot hangars and 34 37,500-square-foot hangars, with the additional hangar area to be provided at the DalFort facility. Alternative 3B provides 33 37,500-square-foot hangars, also relying on the DalFort facility to accommodate a portion of the hangar demand. The U-shaped hangar arrangement, similar to Alternatives 2A and 2B, would allow for ramp and aircraft parking efficiency, while maximizing hangar space by locating two hangars at the east end of the ramp. In addition to the hangars, three GA terminals would be provided on the west side of the GA ramps, with dedicated parking facilities and space for aircraft to load and offload passengers.

Landside access would be provided via roadway connections with Lemmon Avenue and Shorecrest Drive. These access roads run between the areas identified for retail and non-aeronautical uses and would alleviate some traffic backup that could occur on Lemmon Avenue by diverting retail traffic and hangar traffic onto the access road. In addition to the access roads, a bike path and sidewalk would be provided along the west side of Lemmon Avenue.

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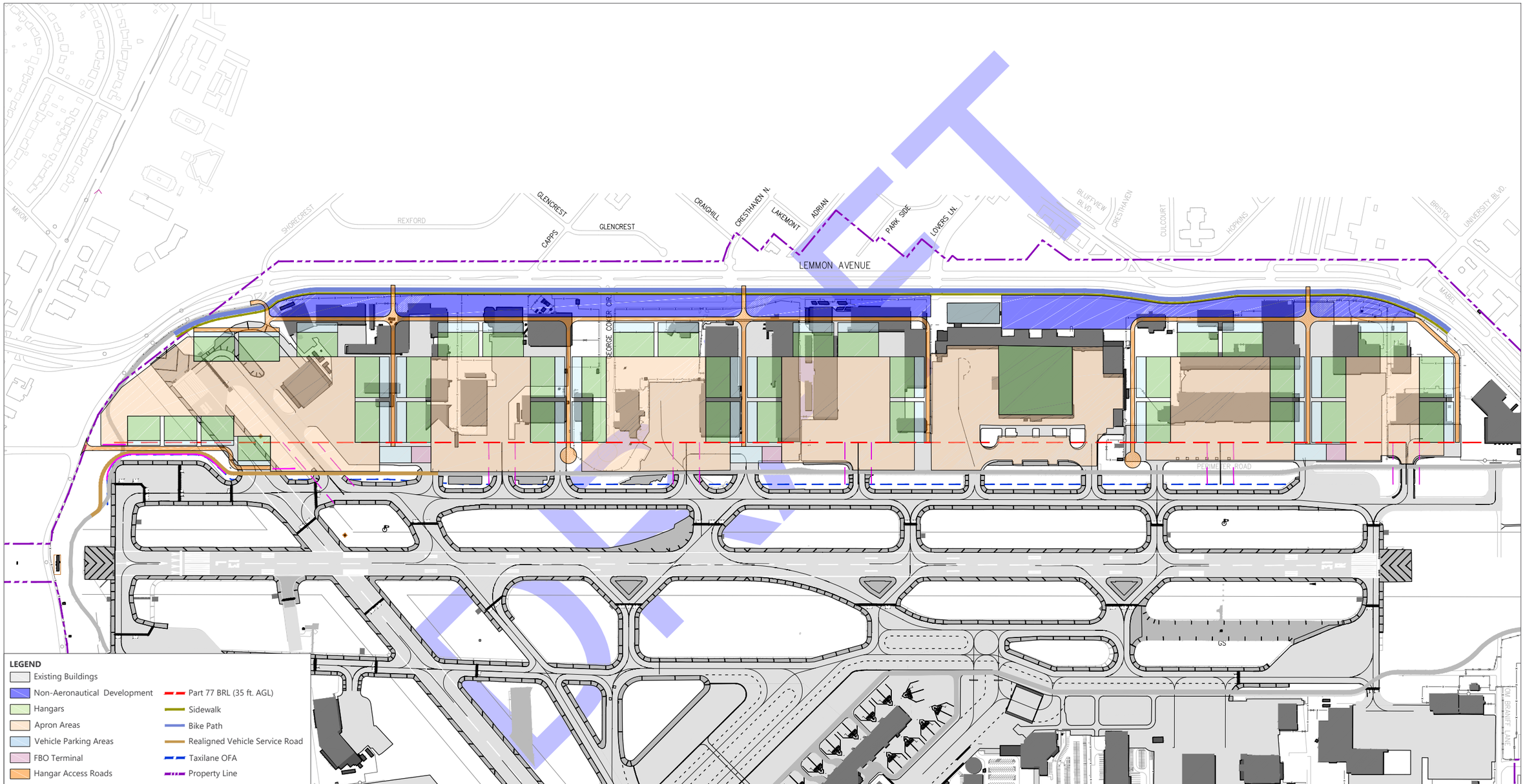

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., December 2013.

EXHIBIT 5-45

NORTH 0 800 ft.

Lemmon Avenue Redevelopment Alternative 3A with Runway 18-36 Decommissioned

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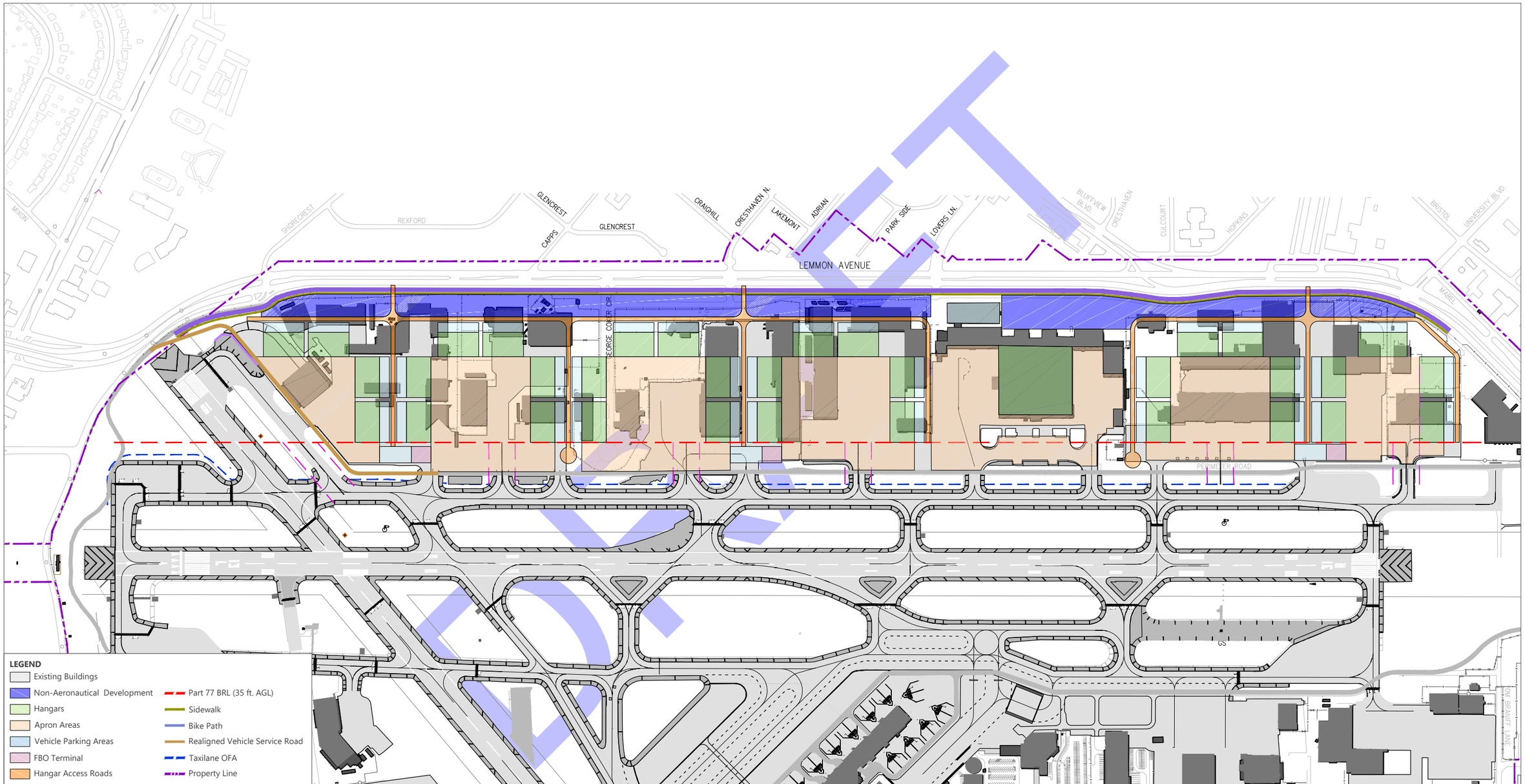

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., December 2013.

EXHIBIT 5-46

NORTH 0 800 ft.

Lemmon Avenue Redevelopment Alternative 3B with Runway 18-36 Operational

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5.3.2.3 Lemmon Avenue Redevelopment Alternatives Summary

Full redevelopment of the east side of the Airport, including nearly all GA facilities located east of Taxiway A, would increase the efficiency of aircraft maneuvering and storage; however, the reduced hangar and ramp space allocation may not meet the needs identified for PAL O1 if the DalFort facility is not available to accommodate demand. The addition of nonaeronautical development under Alternative 3B would further reduce the availability of space to accommodate aeronautical uses and reduce space allocation for current and future aeronautical tenants. Alternative 2A would provide the largest hangar and apron areas, increase efficiency, and could be combined with North Corner Alternative 1E, discussed previously. Therefore, Lemmon Avenue redevelopment Alternative 2A was selected as the preferred alternative if full redevelopment of the east side of the Airport is desired. Similarly, if nonaeronautical development is desired at the Airport, Alternative 3A would serve as the preferred alternative.

Tables 5-8 through **5-10** present the GA redevelopment alternatives, along with the surplus or deficiency of functional areas under each alternative.

Table 5-8: General Aviation Hangar Area (in square feet)

ALTERNATIVE	HANGAR SPACE	PAL O1	PAL O2	PAL O3
2A	2,168,943	144,943	-150,057	-481,057
2B	1,866,500	-157,500	-452,500	-783,500
3A	2,101,443	77,443	-217,557	-548,557
3B	1,434,943	-589,057	-884,057	-1,215,057

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.
SOURCE: Ricondo & Associates, Inc., July 2014.
PREPARED BY: Ricondo & Associates, Inc., July 2014.

Table 5-9: General Aviation Apron and Aircraft Parking Areas (in square feet)

ALTERNATIVE	APRON SPACE	PAL O1	PAL O2	PAL O3	AIRCRAFT PARKING AREAS
2A	5,443,221	830,221	219,221	-532,779	1,146,221
2B	4,977,491	364,491	-246,509	-998,509	1,228,310
3A	4,574,777	-38,223	-649,223	-1,401,223	1,161,274
3B	4,045,580	-567,420	-1,178,420	-1,930,420	1,121,880

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.
SOURCE: Ricondo & Associates, Inc., July 2014.
PREPARED BY: Ricondo & Associates, Inc., July 2014.

Table 5-10: General Aviation Vehicle Parking and Landside Area (in square feet)

ALTERNATIVE	VEHICLE PARKING SPACE	PAL O1	PAL O2	PAL O3
2A	1,029,945	-675,055	-929,055	-1,207,055
2B	1,205,403	-499,597	-753,597	-1,031,597
3A	1,005,350	-699,650	-953,650	-1,231,650
3B	1,180,808	-524,192	-778,192	-1,056,192

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.
SOURCE: Ricondo & Associates, Inc., July 2014.
PREPARED BY: Ricondo & Associates, Inc., July 2014.

5.4 Support Facility Alternatives

Airport support facilities include the fuel farm, General Use Building #1, and Airport maintenance facilities. The Airport maintenance facilities, GUB-1, and the Southwest Airlines fuel farm capacities and areas were presented in Section 4.8.2.

Through conversations with Airport management and staff and other stakeholders, it was determined that an expansion area should be reserved for GUB-1. The recommended location is immediately north of the existing GUB-1. It was further determined that no expansion to Airport support facilities would be required through the planning period. Southwest Airlines operates the fuel farm and does not anticipate any need for tank expansion over the planning period. The Airport maintenance facility was recently expanded and is expected to have sufficient capacity to accommodate anticipated Airport expansion needs through the planning period.