



Calgary Airport Authority

Review and Update of the 2012 Airport Trail Functional Planning Study

EXECUTIVE SUMMARY

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Executive Summary

Introduction

The “Airport Trail NE Functional Planning Study, Deerfoot Trail to East of 36 Street NE” was completed in 2011/2012, with the Final Report issued in June 2012 (referred to simply as “the 2012 Study” for the purposes of this report). The 2012 Study identified three stages of Airport Trail development in the vicinity of the Calgary International Airport (YYC), as follows:

- Stage 1: Widen Airport Trail from a basic four-lane cross section to six lanes (this work was completed in 2013)
- Stage 2: Construct “Parclo” interchanges at 19 Street and at Barlow Trail, as shown in **Figure ES-1**
- Stage 3/“Ultimate”: Construct complex (fully directional) interchange(s) with multiple directional ramps between 19 Street and Barlow Trail, as shown in **Figure ES-2**

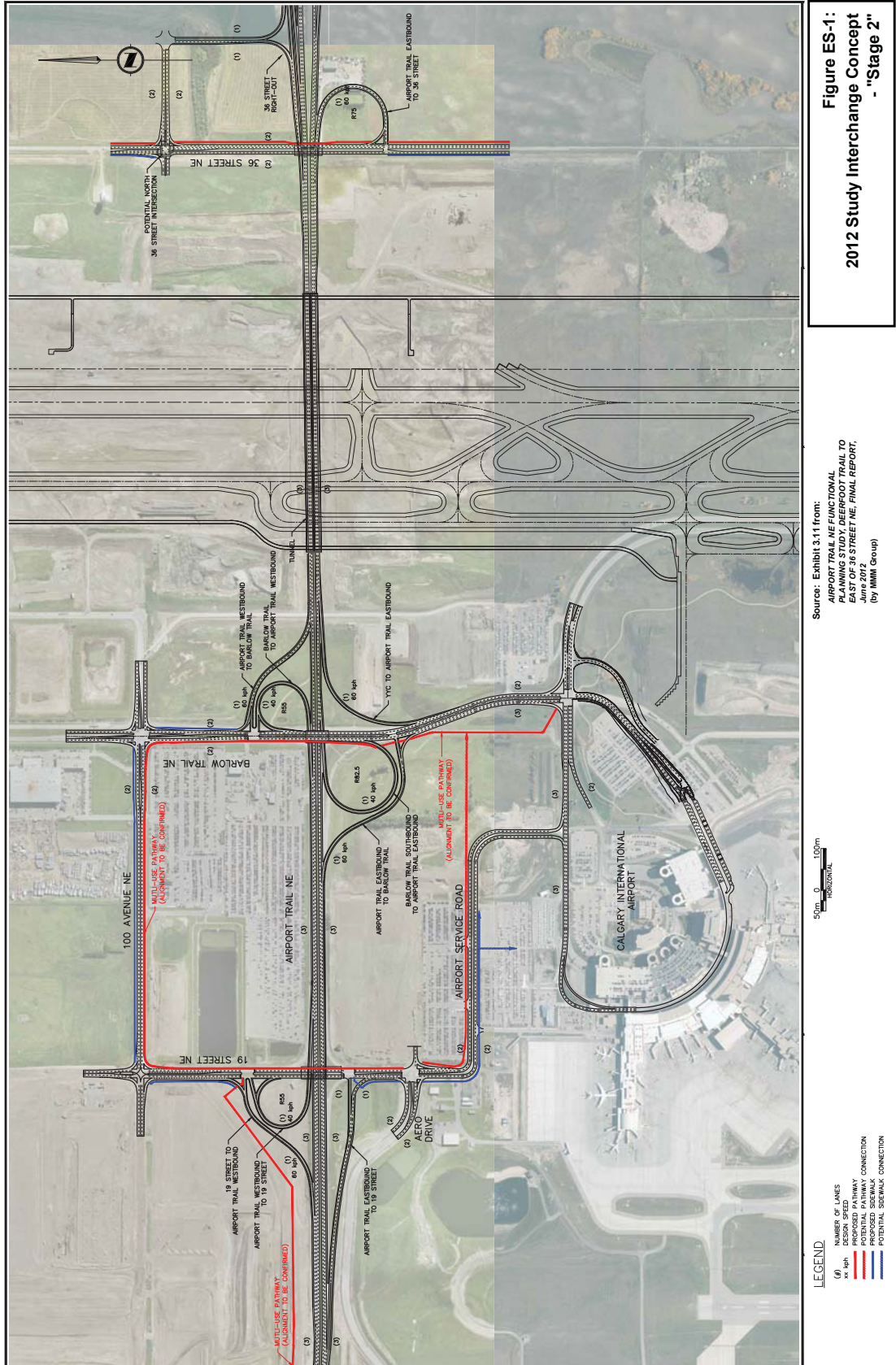
Since the completion of the 2012 Study, a number of changes have occurred in the general vicinity of YYC, including:

- The construction and opening of the Airport Trail tunnel (though Airport Trail currently terminates at 36 Street, immediately east of the tunnel). This new facility has changed traffic patterns in the area.
- Changes in area land use patterns and projections.
- The relocation of the Park & Jet operation from the north side of Airport Trail onto airport lands just south of Airport Trail.
- Advancements in the planning for implementation of the “Green Line” LRT, and increased interest in the proposed provision of an LRT system connection between the Blue Line and the Green Line with a connection to/from YYC.

Therefore, The City of Calgary (The City) and the Calgary Airport Authority jointly developed the scope of work for this review/update of the 2012 Study, to investigate alternative interchange configurations and to better define the future location of the LRT system connection. This update is not intended to be a full functional planning study, but rather is an “update” of the 2012 Study, with the following specific goals:

- Complete functional planning level development of a single updated/replacement concept for the previous Stage 2 interchange concepts on Airport Trail at Barlow Trail and at 19 Street, based on up-to-date traffic forecasts, to provide more capacity (e.g., targeting a lifespan of at least 40 years) and/or improved constructability, without the complexity, high cost and extensive land impacts of the old Stage 3/Ultimate plan. In essence, this new plan could be considered as a “hybrid” of the previous Stage 2 and Stage 3 plans.
- An additional goal emerged during the study with respect to the planning for the Airport Trail interchanges and the interface with YYC’s internal circulation system. Specifically, the Airport Authority would like to maintain the internal YYC access and circulation system as is, with the Airport Trail/Barlow Trail junction remaining as the primary point of entry/exit for passenger terminal traffic, for as long as possible. This objective led to the requirement for development of an interim plan. For the purposes of this study, and for ease of comparison with the previous study, the new interchange plans developed in this study will be referred to as follows:
 - Replacement for the 2012 Study’s Stage 2 plan = “**Updated Stage 2**” plan
 - Replacement for the 2012 Study’s Stage 3/Ultimate plan = “**Updated Stage 3**” plan
- Complete concept-level development of a plan and profile for an LRT connection between Airport Trail and the passenger terminal building, and a conceptual layout/footprint for the LRT station at the terminal.

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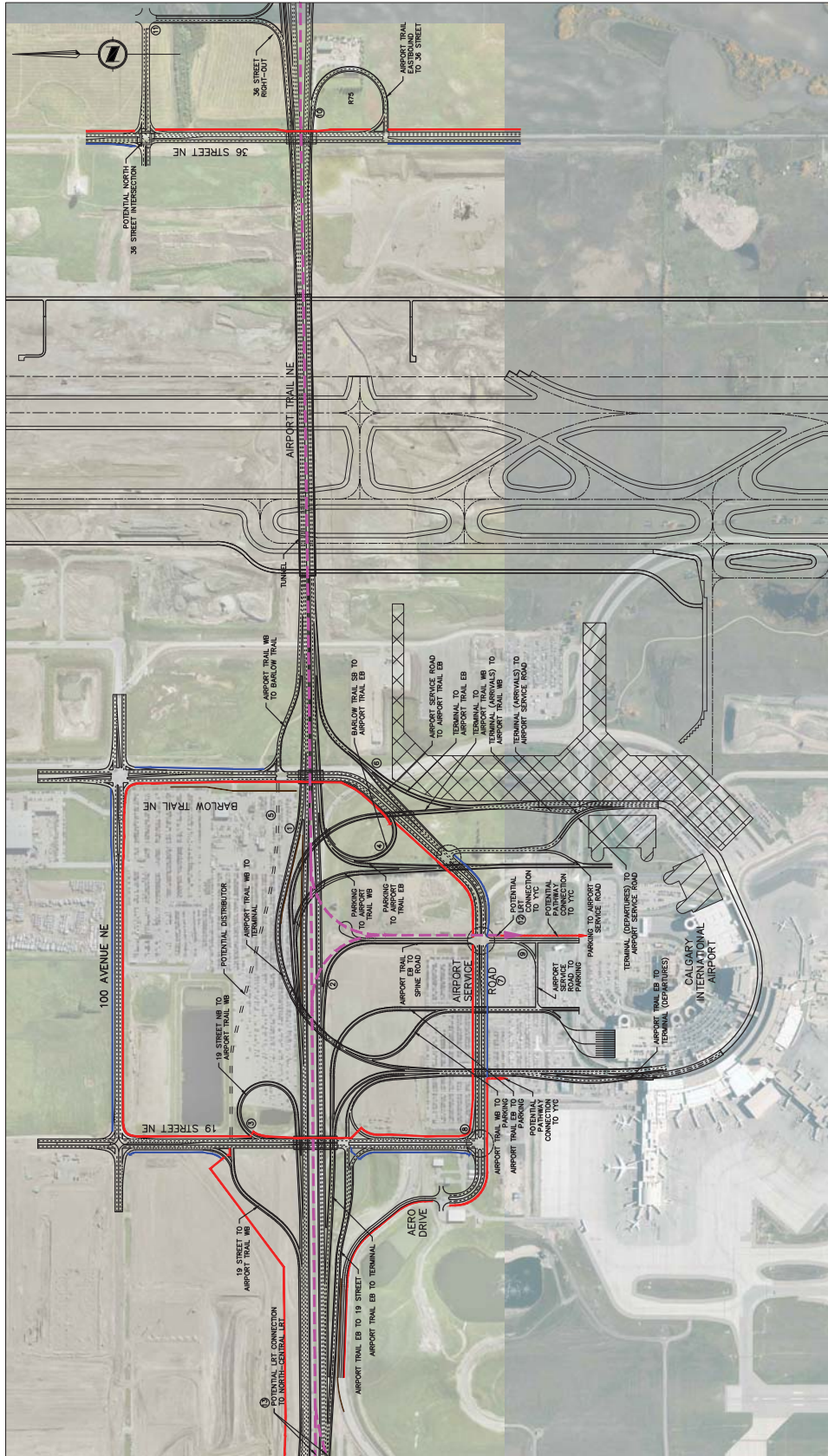


Figure ES-2:
2012 Study Interchange Concept
- "Ultimate" Stage

Source: Exhibit 3.5 from:
AIRPORT TRAIL NE FUNCTIONAL
PLANNING STUDY, DEERFOOT TRAIL TO
EAST 36 STREET NE, FINAL REPORT,
MARCH 2012
(by MMR Group)

50m 100m
HORIZONTAL

① DESCRIPTION REFERENCE TAGS WITH SECTION 3.3 ULTIMATE PLAN OF THE REPORT
○ POTENTIAL ROUNDABOUT

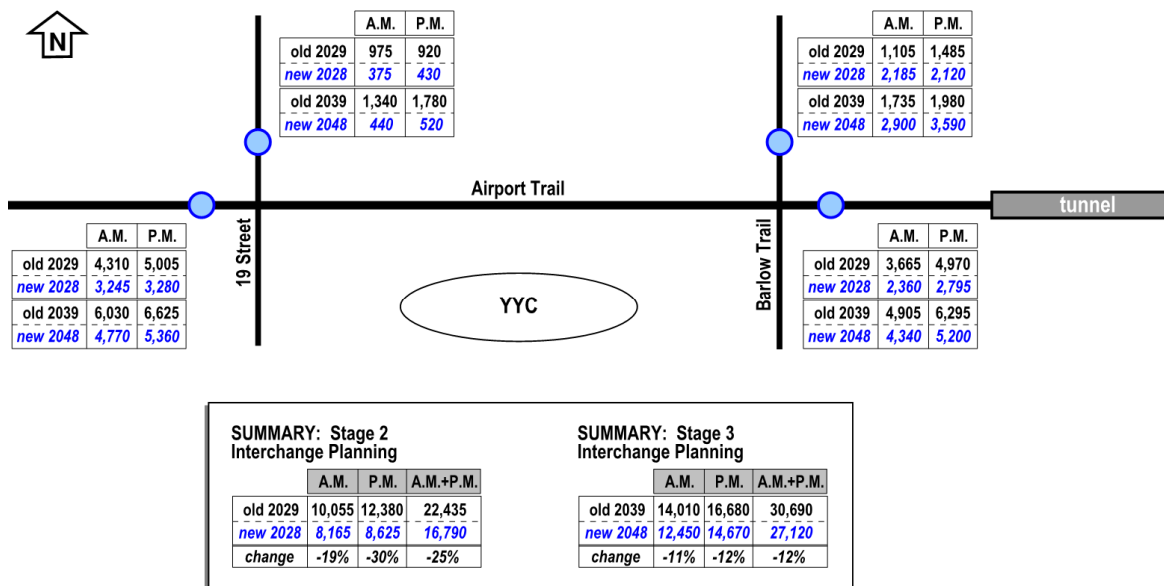
LEGEND
--- CONCEPTUAL LIFT ALIGNMENT
--- POTENTIAL PATHWAY
--- PROPOSED PATHWAY
--- FUTURE TERMINAL
--- FUTURE PACKAGE

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Interchange Planning

Traffic Volumes

The determination of appropriate “design hour volumes” for the Airport Trail interchanges was a critical early step in the study process. Traffic volumes were based on the latest available forecasts from The City’s Regional Transportation Model (RTM) with the future “Green Line” LRT accounted for, along with up-to-date land use statistics and forecasts. The 2012 Study was based on planning horizons of 2029 for Stage 2 and 2039 for Stage 3; this study update used the new 2028 and 2048 model scenarios/horizons for the planning for Updated Stage 2 and Updated Stage 3 concepts. In both studies, adjustments to the model output provided were needed to reflect the traffic generation of the airport; after adjustment, both studies use comparable levels of peak period airport traffic generation for the interim and long-range horizons. The following diagram provides an overall summary of the adjusted a.m. and p.m. peak hour traffic volumes from the 2012 Study and the current update study.



Key points of comparison between the previous and new sets of traffic volumes include:

- For Stage 2 planning, the new 2028 scenario shows a 25 percent decrease in overall traffic on the key roads in the area, relative to the 2029 scenario used in the 2012 study (19 percent decrease in the a.m. peak period traffic, and 30 percent decrease in the p.m. peak period traffic).
- For Stage 3 planning, the new 2048 scenario used in this study shows a 12 percent decrease in overall traffic on the key roads in the area, relative to the 2039 scenario used in the 2012 study (11 percent decrease in the a.m. peak period traffic, and 12 percent decrease in the p.m. peak period traffic).
- For both Stage 2 and Stage 3 planning, note that the updated forecasts reflect a higher percentage of traffic using Barlow Trail than was the case in the previous study (i.e., somewhat reduced Airport Trail usage).

Interchange Configurations

In terms of planning for the updated physical interchange configurations, this study generally followed a traditional process of identifying initial concepts, shortlisting and high-level evaluating, selection of a single long-term concept

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with which to move ahead, and then a detailed assessment and refinement of the selected concept. In this particular case, a significant number of initial concepts were reviewed/compared in terms of basic functionality/mobility characteristics. From that initial work, two specific concepts emerged: a “directional” concept which bore some resemblance to the previous “ultimate” or Stage 3 plan though less complex; and, a “trumpet” concept that fit in a completely independent interchange between 19 Street and Barlow Trail dedicated to serving YYC terminal/parkade traffic. Following an initial comparative assessment, The City and the Airport Authority agreed that the directional concept should be carried forward to become the long-term or “Updated Stage 3” plan.

The final long-term or Updated Stage 3 interchange concept, based on the shortlisted directional concept, is illustrated in **Figure ES-3**. This plan provides for free-flow inbound and outbound YYC traffic between the terminal/parkades and Airport Trail eastbound and westbound. YYC-related traffic to/from the north via Barlow Trail would still pass through at least a couple of signalized intersections in order to access the terminal/parkades. As with the “ultimate” plan from the 2012 Study, this new interchange concept requires establishment of a large one-way loop for YYC terminal/parkade traffic through the relocation/separation of the YYC inbound traffic from the east side of the study area over to the west side. This rework of the internal circulation requires significant reworking of the interior YYC roads and parking lots; the Airport Authority would prefer to maintain the existing circulation system, using Barlow Trail as the primary access point, for as long as possible. Therefore, the scope of the study was expanded to include the determination of an interim concept that can be developed with minimal impact to internal YYC operations. The final interim or “Updated Stage 2” plan developed and assessed after reviewing several options, is illustrated in **Figure ES-4**.

The Updated Stage 2 concept is very similar to the approved Stage 2 concept from the 2012 Study. The overall airport access and internal circulation systems remain essentially the same as they exist today, with all inbound and outbound terminal/parkade traffic intended to enter/exit via the south leg of the Airport Trail/Barlow Trail junction, and with 19 Street primarily providing accesses to surface parking lots in the area between the passenger terminal and Airport Trail. The directional ramp from the Updated Stage 3 plan, serving movements from westbound Airport Trail into the YYC terminal and parkades is not provided in the interim, thus inbound (to YYC) traffic from the east is not free-flowing. Drivers approaching the airport from the east would exit at Barlow Trail and head south. Free-flow YYC movements are still provided for inbound traffic from the west (to the terminal and parkades, exiting to Barlow Trail south). Once past the Barlow Trail/Airport Road signalized intersection, outbound terminal/parkades traffic to both the east and west on Airport Trail is also free-flowing with this interchange concept. Other elements of the final Updated Stage 2 interchange concept worth noting include:

- 98 Avenue, the proposed new “service road” north of Airport Trail, is included in its long-term or Updated Stage 3 plan alignment.
- 19 Street south ties to the existing road network south of Aero Drive, with the current “T” intersection at Aero Drive proposed to be signalized.
- At the Barlow Trail interchange, the eastbound off ramp for Barlow Trail was initially planned to wrap around a loop ramp for the southbound-to-eastbound movement. Because of impacts on Park & Jet, the loop was eliminated (replaced by a left-turn movement at the south ramp intersection) and the ramp alignment was adjusted.

Staging of Implementation

It is assumed that the Updated Stage 2 plan will be constructed as the first stage, with an upgrade to the Updated Stage 3 plan when needed. There are two key factors that can trigger the need for an upgrade from the interim or Updated Stage 2 interchange configuration to the proposed long-term or Updated Stage 3 plan: physical expansion of the passenger terminal building to a point where the ability to enter/exit the airport to/from Airport Trail using the Barlow Trail connection is compromised; and, growth in airport and/or background traffic volumes to the point at which the added capacity of the Updated Stage 3 plan is needed. The following points summarize these two possible triggers for the upgrade:

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- The future expansion of the passenger terminal building to its ultimate footprint, as is highlighted on many of the figures and drawings in this report, will require that the Updated Stage 3 interchange plan be constructed, as the new terminal footprint will require the removal of segments of the Barlow Trail connection south of Airport Trail. The terminal will, however, likely be expanded in incremental stages. From a preliminary overview, the expansion of the next pier (Pier F) will not force the development of (upgrade to) the Updated Stage 3 configuration. The terminal area connection via Barlow Trail will most likely be retained, with realignment of only a portion of Barlow Trail, with the expansion to provide Pier F.
- Should terminal expansion that extends far enough to eliminate the Barlow Trail connection not be required for an extended period of time, the “trigger” for the upgrade from the Updated Stage 2 interchanges to the Updated Stage 3 plan will likely be deterioration of traffic operations with growth in both airport-generated traffic volumes, and in background traffic using the interchanges. A sensitivity analysis was conducted to estimate the point at which the Updated Stage 2 interchanges may start to see unacceptable delays, thereby suggesting that the upgrade to the Updated Stage 3 plan should be considered.

The overall conclusion arising from this sensitivity analysis is that the Updated Stage 2 interchange plan should provide sufficient capacity through to the late 2030s, possibly even into the early 2040s, assuming that traffic growth (for YYC and for other area development and background traffic) proceeds as reflected/assumed in this study. Ideally, regular monitoring/ tracking of traffic volumes at key locations should occur, which will allow for potential refinement of the timing for the next stage of construction (i.e., the upgrade to the Updated Stage 3 plan) based on actual growth and observed operating conditions.

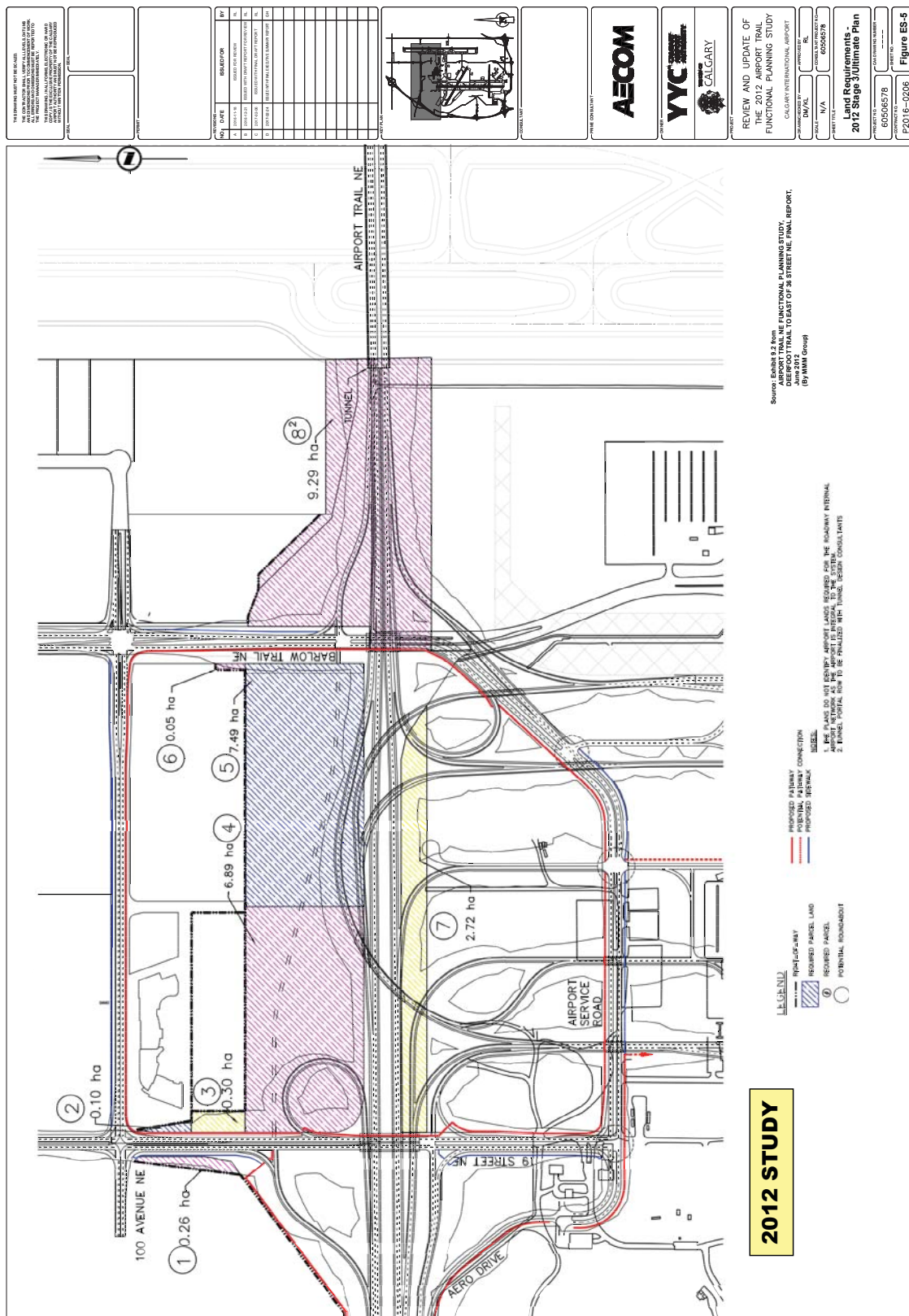
Land Requirements

Figure ES-5 shows the land acquisition summary diagram from the 2012 Study, and **Figure ES-6** shows the land impacts and requirements for the current study. The primary difference between the two plans is the reduced land area identified as being required along the north side of Airport Trail, between the 19 Street and Barlow Trail interchanges. In the 2012 Study the entire block of land north of Airport Trail was shown as being required, with the report text indicating that some of that land may be found to be excess in the future and available for resale. The previous plans showed a “potential distributor” road running east-west between Barlow Trail and 19 Street north of Airport Trail; the current plans include this east-west connection (designated as 98 Avenue, an industrial street) as an integral part of the concepts, which allows for definition of the final size of the parcel required.

Construction Cost Estimates

Preliminary construction cost estimates were prepared for both the Updated Stage 3 and Updated Stage 2 interchange concepts, covering the following general extents/limits:

- In the east-west direction, both the Updated Stage 3 and Updated Stage 2 interchange cost estimates cover the segment of Airport Trail from the tunnel portal on the east end through to the starting point of the eastbound mainline exit ramp tapers west of 19 Street (the total length of Airport Trail covered in the estimate is approximately 1.9 km).
- In the north-south direction, the Updated Stage 3 cost estimate covers the works from the tie-ins to the existing 19 Street and Barlow Trail cross sections at the north (just below 100 Avenue), down to approximately Airport Road at the south.
- In the north-south direction, the Updated Stage 2 cost estimate covers the works from the tie-ins to the existing 19 Street and Barlow Trail cross sections at the north (just below 100 Avenue), down to the tie-ins to existing 19 Street and Barlow Trail at the south (just south of the Aero Drive intersection for the 19 Street tie-in, and approximately 400 m south of Airport Trail for the Barlow Trail tie-in).



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The cost estimates for both the Updated Stage 3 and Updated Stage 2 interchange concepts do not include land acquisition costs. However, the Airport Trail widening (for future LRT) is included in both, within the 1.9 km length of Airport Trail covered. Note that the estimated cost associated with the widening/splitting apart of the Airport Trail eastbound and westbound mainline carriageways, which has been broken out at the request of The City, does not include any allowance for accommodating the future east-west LRT line aside from the physical separation of the two roadway segments. The various works required to support the implementation of the future LRT, including the trackbed excavation, retaining walls, concrete barrier protection, stormwater/drainage systems, etc., have been excluded.

Overall project contingency of 30 percent has been included in both the base cost and the Airport Trail widening cost for both Updated Stage 3 and Updated Stage 2 interchange plans. This contingency amount is expected to address uncertainties in the quantities provided as well as various miscellaneous items of work such as signage, landscaping, pavement markings, public art, guardrail and removals not noted in the estimate as presented.

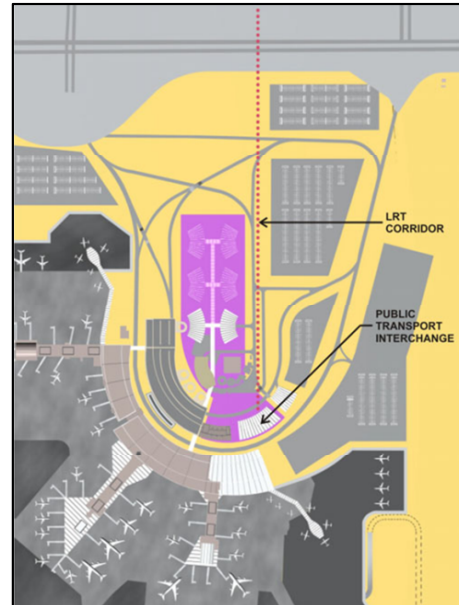
The following table provides a comparison of the construction cost estimates from the 2012 and 2016/2017 studies for both the 2012 Stage 3 and Updated Stage 3 plans and the 2012 Stage 2 and Updated Stage 2 plans. Note that, because of the different timeframes of the two estimates, an adjustment for inflation is also included in the 2012 costs, for a more fair comparison, based on a reported average rate of inflation of 1.49 percent per year between 2012 and 2016. Also note that both the 2012 and Updated Stage 3 plan estimates as shown in the table represent the total cost to build the Stage 3 configurations all at once, not an incremental cost to upgrade from Stage 2 to Stage 3. In both 2012 and Updated scenarios, if the interim or Stage 2 configuration is constructed first (as opposed to going directly from the existing condition to Stage 3), then the incremental or upgrade cost would be approximately the difference between the full Stage 3 costs as shown and the Stage 2 costs.

LONG - TERM				
Current Study - Updated Stage 3 Plan		↔	2012 Study - Stage 3 Plan	
Updated Stage 3 Plan - base plan w/o Airport Trail widening	\$101,247,000 (2016 dollars)		The 2012 Study did not present cost figures for a long-term or Stage 3 plan without the Airport Trail widening included	
Updated Stage 3 Plan - with Airport Trail widening	\$115,217,000 (2016 dollars)		2012 Study Stage 3 Plan - with Airport Trail widening	\$226,400,000 (2012 dollars) from 2012 report \$240,000,000 (2016 dollars) factored up for inflation

INTERIM				
Current Study - Updated Stage 2 Plan		↔	2012 Study - Stage 2 Plan	
Updated Stage 2 Plan - base plan w/o Airport Trail widening	\$73,060,000 (2016 dollars)		2012 Study Stage 2 Plan - w/o Airport Trail widening	\$71,550,000 (2012 dollars) from 2012 report \$75,915,000 (2016 dollars) factored up for inflation
Updated Stage 2 Plan - with Airport Trail widening	\$87,030,000 (2016 dollars)		The 2012 Study did not present cost figures for an interim or Stage 2 plan with the Airport Trail widening included	

LRT Connection Planning

The 2012 Study showed a single line representation of a future LRT connection, running north-south and “stubbed” into the passenger terminal building; a similar schematic representation has also been shown in previous airport master planning studies (e.g., see the “LRT Corridor” labelled in the figure to the right, from the *“Calgary International Airport Master Plan 2004”*). The 2012 Functional Planning Study included a very preliminary profile showing how a below-grade east-west LRT line along Airport Trail (in open cut median) could be connected to a north-south line to/from the terminal area; subsequent to that plan, there does not appear to have been any further specific or detailed planning for the future LRT service. Calgary Transit (CT) has not advanced the planning for the airport connection; for example, CT has not yet completed a “technology assessment” to establish what specific type of service might best be employed along Airport Trail between the Blue and Green Lines and to/from the airport. As of the writing of this report, The City is in the process of awarding a study (currently negotiating the contractual details) for preliminary design for an extension of the Blue Line northward from Saddletowne Station and for “*Airport Trail NE Functional Planning and Transit Technology Studies.*”



AECOM's proposed LRT connection is shown in **Figure ES-7**, including an overall plan view and an enlarged view of the terminal area station concept. The key elements of the proposed conceptual LRT alignment for the connection between the centre median of Airport Trail and the proposed passenger terminal station are as follows:

- LRT service (assumed to be the existing high-floor train technology for the purposes of this study) generally running at-grade in the centre median of Airport Trail between the tunnel and the west end of the study area (just west of 19 Street), with vertical grade separation developed for both eastbound and westbound trains, passing over eastbound Airport Trail.
- After crossing over the eastbound Airport Trail carriageway, dual LRT tracks continue on elevated guideway across multiple existing surface parking lots and internal circulation roadways, with the horizontal alignment generally swinging to the west and then curving back to align with the gap between the Airport Corporate Centre and a services/utility building, terminating at the proposed LRT station area located in the gap between Parkade P2 and the Delta Hotel. The elevated guideway concept will have minimal impact on the airport's surface parking lots and internal circulation system.
- The elevated LRT platform is set at about the level of the fourth floor of Parkade P2 and its existing pedestrian bridge linkage to the passenger terminal building. The platform stops short of the elevated Departures level roadway, rather than spanning across the roadway, as allowance has not been made in the Departures level structure, or at ground/Arrivals level below, for the structural elements that would be needed to support the elevated station.
- This study establishes only a basic LRT alignment and footprint for the station area; significant additional work is needed in future stages of planning regarding station design, including pedestrian linkages, and the structural details relative to supporting the elevated station in particular given the existing development and major utility tunnel in the area.

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