Access, Circulation, and Parking Alternatives

Access and circulation component alternatives were developed to accommodate forecasted demand and proposed development, as well as consider circulation changes between the terminal, parking, multi-modal center, and development areas. The main goals of the access alternatives are to maintain or improve roadway operations and safety throughout the Airport, as well as provide access to properties identified for development potential.

Proposed Development

This Master Plan effort included a focused market scan and site suitability evaluation for hotel and commercial uses on two priority development areas – the economy/overflow parking lot and the site adjacent to the new Multi-Modal Center, shown in the picture to the right. See **Appendix H – Land Use Planning.**

The market scan included the consideration of regional overview and employment growth dynamics, development patterns and scale, demographics, traffic, and zoning, an inventory of non-aviation properties in the surrounding community, market research, benchmarking and research of potential development concepts, and planned improvements to Airport Road. As a result of the analysis, it was found that limited retail and hotel demand could be supported in the development area, as shown below.

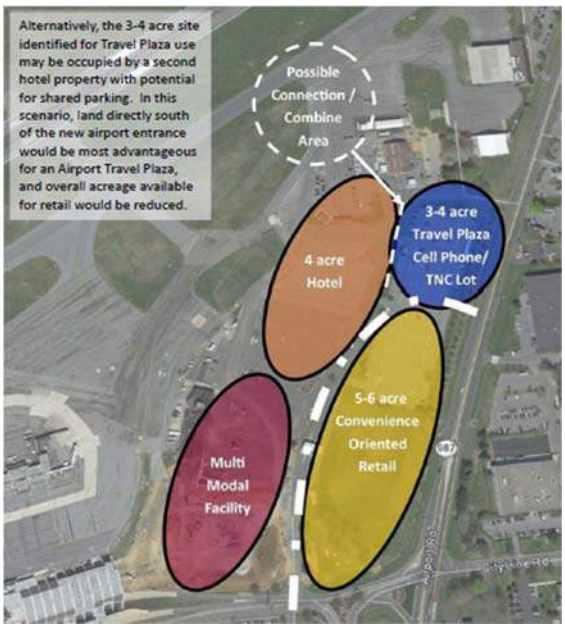
Subject Property

Key Characteristics

Approximately 16 acre site north of existing airport entry road	Frontage, access & visibility along high traffic Airport Road corridor
Proximity to terminal and multi-modal facility	Commercial corridor; light industrial and office uses across Airport Road
Airport Industrial (AI) zoning – Allows most aviation-related uses; some other uses allowed through Special Exception process	Increasing daytime employment population nearby

Source: C&S Engineers, Inc., see Appendix H

Potential Development



Source: C&S Engineers, Inc., see Appendix H

Airport land presents opportunities for commercial development to support airport operations through revenue production/diversification and serve community needs. However, the airport must deal with a number of unique challenges when looking to partner with the private market to bring development on-site which private, fee-simple properties do not face.

Advantages

- Location – strong visibility and access along Airport Road corridor, close proximity to passenger terminal, US 22, and established commercial areas
- Emerging employment centers like FedEx and well-traveled commercial corridor brings opportunities for new development to serve growing area
- Advances Smart Growth principles – airport site is part of existing commercial corridor, infill rather than greenfield development
- Airport is an interested and willing partner for on-airport development
- Opportunity to meet evolving airport customer needs such as cell lot and/or Transportation Network Company (TNC) users and operators

Challenges

- Surrounding market – reasonable inventory of competitive fee simple land (outparcel type) within area
- FAA requirements – airport must receive fair market value for land when leases; airport property available only on a ground lease, and can offer only with a limited term (50 years or less)
- Regulatory process can slow or stop development process – zoning issues and unknown timing can turn developers away
- Ground lease makes financing more challenging for developer

Appendix H – Land Use Planning includes the details associated with the market scan evaluation and findings.

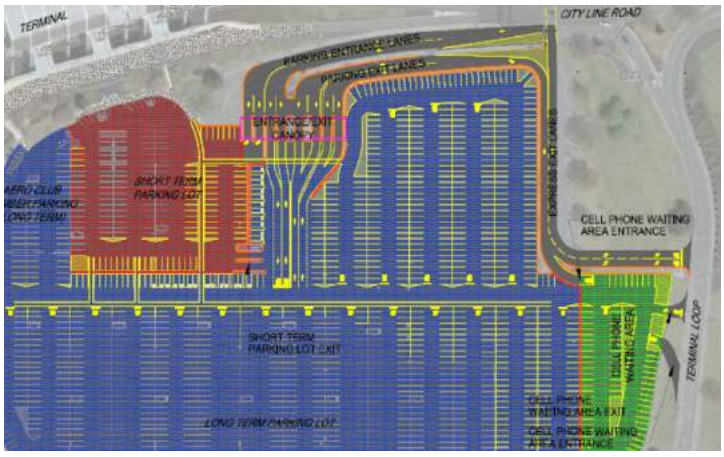
Common Elements for All Alternatives

The evaluation of the access alternatives focuses on the differences in operations of the internal roadways/intersections and the intersections along Airport Road, ease and convenience of travel for the airport customer, environmental impacts, impacts to future development, and estimated costs. Internal roadway/intersection operations were evaluated using VISSIM, while the intersections along Airport Road were evaluated using SYNCHRO as noted in previous sections. The 2040 projected PM peak hour volumes, identified in Section 5, served as a base for the analysis. The volumes were increased by the additional traffic generated by the potential development areas. They were then redistributed through the system based on the access and circulation changes associated with each alternative.

There are a number of elements common to all of the access alternatives and they are described below.

- Changes to public parking ingress/egress –To consolidate the utility needs of the parking access system and to move the entire system closer to the terminal building, the Airport is currently progressing plans to change the access to the public parking areas. Ingress for the short- and long-term parking areas would remain the same, but egress would now occur in the same location as ingress, as shown in **Figure 6.3.12**. It is recommended that the Airport consider relocating the access road in to the parking area further along the departures roadway, away from the main interior intersection, to reduce driver confusion and conflict points.

Figure 6.3.12: Proposed Parking Access Changes



Source: LNAA/Arora/ADCI, June 2017

- Reallocation of public parking spaces – As noted in Section 5, the public parking area adjacent to the terminal the number of spaces is sufficient to accommodate demands through 2040. Parking should be reallocated to provide at least 440 short-term spaces and no less than 1,100 long-term spaces.

- Signal at new access intersection with Airport Road – All three alternatives include the development of an additional access point from Airport Road to accommodate the proposed development on airport property north of the existing access road. Based on significant delays anticipated at this proposed intersection for any alternative, it is recommended a signal be installed. Because the existing two-way center left turn lane would become a dedicated northbound left turn lane and a dedicated southbound right turn lane would be installed. The eastbound approach (new access road approach to Airport Road) would consist of a dedicated left turn lane and dedicated right turn lane. It is recommended that a signal warrant analysis and coordination with the PennDOT be conducted prior to the construction of this access road to ensure the signal is justified. For the purposes of this analysis, the signal is assumed to include a span wire, full actuation, and pedestrian indications.

- Loss of overflow/economy parking areas, including demolition of parking booth – Based on the demand analysis, parking demands for the planning horizon should be accommodated with the existing public parking area near the terminal with a reallocation of parking from long-term to short-term. All ground access alternatives include the removal of the employee and public overflow parking areas, as well as the demolition of the existing parking booth. If additional parking is required in future years, the Airport could consider constructing structured parking on the existing public parking area. With impacts to parking associated with TNC operations, parking demand should be evaluated often to determine changes in parking trends that lead to changes in the future proposed development plan. If additional public parking is needed, a parking structure can be considered on the existing public parking lot.

- Incorporation of potential development on airport property along Airport Road – As noted previously and included in **Appendix H**, it was recommended that the Airport pursue market-supported concepts that enhance airport customer service such as a hotel and travel plaza. The optimal site layout and proposed land uses were incorporated into each ground access alternative. A summary of the development area and its components, are described below:

  - Travel plaza (gas station, convenience market, cellphone/TNC parking): 5,000 square foot convenience store with 10 gas pumps and a parking area for TNC parking
  - Retail plaza: 12,000 square foot shopping plaza divided into four 3,000 square foot spaces for convenience-oriented retail uses, as well as, a 4,000 square foot outparcel
  - Hotel: a select service hotel with limited meeting space approximately four stories high with up to 120 rooms.
  - New access between existing main access and small access near Rental QTA/hangar area: As stated previously, each alternative includes the development of a new access road north of the existing Airport access with a traffic signal. This access is located south of the travel plaza development area and north of the retail plaza area. This access location provides a 'hard corner' access for the travel plaza, which is valued by developers.
  - Trip generation by proposed development: PM peak hour trips were estimated associated with the proposed development area. Assumptions were made regarding the type of convenience-oriented retail uses to be included in the retail plaza. To be conservative, high traffic uses such as fast casual restaurant, bank, and coffee shop with drive thru were assumed. A more detailed analysis would be completed by the developer when a development plan is actually proposed for the area. It was assumed the trips associated with the proposed development use the new access roadway with signal and travel along Airport Road based on existing traffic distributions. **Table 6.3.2** summarizes the trip generation assumptions and calculations.

Table 6.3.2: Trip Generation Summary

Land Use		ITE Code	Size		PM Peak Hour Trips Enter	PM Peak Hour Trips Exit
Hotel		310	120	Rooms	37	35
Travel Plaza		853	5	1000 SF	123	123
	Travel Plaza trips w/ pass-by trip reduction		*66% (ITE)*		*42*	*42*
Retail Plaza	Fast Casual Restaurant	930	4	1000 SF	31	25
	Walk-in Bank	911	3	1000 SF	40	39
	Fast Casual Restaurant	930	3	1000 SF	23	19
	Fast Casual Restaurant	930	3	1000 SF	23	19
	Coffee/Donut Shop w/ Drive Thru	937	3	1000 SF	65	65
	Coffee Shop trips w/ pass-by trip reduction		*assumed 50%*		*33*	*33*
	Total development generated trips with pass-by reduction				***229***	***212***
	Total development generated trips				**342**	**325**

Source: ITE Trip Generation Manual, 10th Edition, C&S Engineers, Inc.

- Assume no changes to curbside areas – While future analysis indicates congestion on the arrivals curb by 2040, no major changes are recommended at this time. The Airport may consider lengthening the available curbside parking area at the west end by narrowing existing sidewalk pavement or possibly widening the pavement width to add an additional travel lane towards the south (towards the parking areas). It is assumed that a cost-benefit analysis associated with either of these options would make them infeasible. The Airport should monitor curbside activity if congestion on the arrivals curbside area requires significant changes within the next 20 years.

- Utilities - Proposed circulation and development alternatives all include new structures, including new roadways, a travel plaza, retail area, and hotel. Although these facilities will require new utility connections and produce higher demand as they include new occupied buildings, their location along a busy, developed commercial and industrial corridor will likely require normal design coordination with local utilities.

The access and circulation alternatives are summarized below.

Alternative 1

The first alternative is most similar to current operations for airport customers heading to the terminal, parking, or multi-modal facilities. These customers would access the Airport via the main access road opposite City Line Road. The new access to the north would mainly serve those visiting the travel plaza, retail plaza, and hotel. A two-lane roadway would connect the two areas for easier internal circulation (see **Figure 6.3.13**).

The internal circulation model indicates there would be no significant delays or operational issues during the PM peak hour at the main internal intersection or at the new intersection were the new access road connects to the existing roadway connecting to the multi-modal center. While operations and delays are expected to be acceptable, this alternative does not eliminate the confusion or conflict points for drivers at the main internal intersection.

The Airport Road intersection analysis shows that the Ave A/Postal Road and City Line Road intersections on Airport Road will experience significant delays during the PM peak hour. As indicated in the 2040 future analysis (see Section 5), future traffic on Airport Road is expected to continue to result in significant delays and queuing by 2040. The addition of traffic associated with the proposed development of airport property along Airport Road will only add to that delay and queuing. **Table 6.3.3** on the following page shows the level of service (LOS), delay in seconds, volume to capacity (v/c) ratio, and 95th percentile queues for each lane group of each study intersection for the Alternative 1 2040 future condition (defined in the Existing Conditions chapter).

Table 6.3.3: Alternative 1 – Intersection Capacity Analysis (PM Peak Hour)

			LOS	Delay (sec)	v/c Ratio	95th % Queue (ft.)
Airport Road & Ave A/Postal Road						
Airport Road	Northbound	Left	*E*	66.4	0.83	#265
		Thru	*F*	107.1	1.14	#1304
		Right	B	10.2	0.24	93
	Southbound	Left	*E*	71.5	0.48	m23
		Thru	*F*	72.9	1.01	#776
		Right	B	14.5	0.22	m44
Postal Road	Eastbound	Left/Thru	*F*	178.3	1.25	#623
		Right	*E*	58.1	0.93	#655
Ave A	Westbound	Left	*F*	250.0	1.46	#703
		Thru/Right	C	29.0	0.32	215
		Average Intersection	***F***	***97.1***		
Airport Road & City Line Road						
Airport Road	Northbound	Left	*E*	67.2	1.00	m279
		Thru/Right	*F*	51.6	1.07	m266
	Southbound	Left	D	45.5	0.48	m42
		Thru	*E*	56.3	0.73	598
		Right	C	20.0	0.24	135
LVIA Driveway	Eastbound	Left/Thru	*F*	178.4	1.20	#333
		Right	D	49.8	0.90	248
City Line Road	Westbound	Left	*E*	67.1	0.72	223
		Thru/Right	*F*	158.4	1.14	#498
		Average Intersection	***E***	***67.0***		
Airport Road & New Access Road						
Airport Road	Northbound	Left	B	17.5	0.69	m65
		Thru	C	23.6	0.82	m873
	Southbound	Thru/Right	B	15.0	0.63	267
New Access Road	Eastbound	Left	D	37.1	0.64	144
		Right	A	7.3	0.36	42
		Average Intersection	***C***	***20.0***		
Airport Road & Existing North Access						
Airport Road	Northbound	Left	D	25.2	0.07	0.2
		Thru	-	-	-	-
	Southbound	Thru/Right	-	-	-	-
Existing North Access	Eastbound	Left/Right	*F*	74.7	0.55	2.6

- 95th % volume exceeds capacity, queue may be longer

m - volume for 95th % queue is metered by upstream signal

Source: C&S Engineers, Inc.

Compared to the 2040 future analysis, the LOS for the Ave A/Postal Road is very similar, but delays increase slightly at the City Line Road intersection for the northbound and southbound traffic. The operations at the new access road intersection with Airport Road would result in acceptable LOS. See **Appendix I** for more detailed PM peak hour volume information and modeling results.

The preliminary construction cost for Alternative 1 is estimated at $1,340,000. This includes the demolition of the parking booth near the bus commuter parking, the reuse of pavement within the existing economy/overflow parking lot, a traffic signal at the intersection of the new access road and Airport Road, and other items associated with the changes to the roadway system. This estimate does not include any costs associated with the development of the retail areas or the relocation of the public parking access control system.

Alternative 2

Alternative 2 closes the existing main airport access to all traffic except exiting southbound traffic and relocates airport traffic to the new access road with traffic signal adjacent to the development area. The pavement associated with existing inbound and outbound (through/left turn) movements would be removed and the existing traffic signal at the City Line Road intersection would need to be altered. A dedicated southbound right turn lane would be constructed at the new access road intersection. The new access road would consist of two inbound lanes from Airport Road past the development area and multi-modal facility. Internal intersections would be designed such that the inbound movement from Airport Road towards the terminal area would be considered the main movement with no stops and minimal delays (see **Figure 6.3.14**).

The internal circulation model indicates that there would be no delays or operational issues during the PM peak hour at the main internal intersection or at the new intersection created where the new access road connects to the existing roadway connecting to the multi-modal center. Alternative 2 minimizes confusion at the main internal intersection by eliminating the short weave and decision time needed to find the desired lane before approaching the terminal, parking, or multi-modal areas, but it creates more of a circuitous route for terminal and parking area travelers. It also increases potential conflicts for airport customers, forcing them to drive past busy retail areas and the various driveways associated with the multi-modal center.

The Airport Road intersection analysis shows that some movements at each signalized intersection (Ave A/Postal Road, City Line Road, and the new access road) will experience significant delays during the PM peak hour. As indicated in the 2040 future analysis (see Section 5), future traffic on Airport Road is expected to continue to result in significant delays and queuing by 2040 before redirecting traffic or adding any traffic generated by proposed developments. **Table 6.3.4** on the following page shows the level of service (LOS), delay in seconds, volume to capacity (v/c) ratio, and 95th percentile queues for each lane group of each study intersection for the Alternative 2 2040 future condition.

Table 6.3.4: Alternative 2 – Intersection Capacity Analysis (PM Peak Hour)

			LOS	Delay (sec)	v/c Ratio	95th % Queue (ft.)
Airport Road & Ave A/Postal Road						
Airport Road	Northbound	Left	*E*	66.4	0.83	#265
		Thru	*F*	122.5	1.18	#1398
		Right	B	11.8	0.24	102
	Southbound	Left	*E*	55.9	0.48	m#51
		Thru	*F*	61.7	1.01	#808
		Right	A	5.4	0.2	m52
Postal Road	Eastbound	Left/Thru	*F*	134.2	1.12	#545
		Right	*E*	58.1	0.93	#655
Ave A	Westbound	Left	*F*	201.6	1.34	#649
		Thru/Right	C	29.1	0.32	215
Average Intersection			***F***	***92.2***		
Airport Road & City Line Road						
Airport Road	Northbound	Thru/Right	*F*	52.7	1.06	m#293
	Southbound	Left	C	24.8	0.69	m58
		Thru	B	16.0	0.38	m577
LVIA Driveway	Eastbound	Right	B	11.2	0.36	42
City Line Road	Westbound	Left	*E*	74.5	0.77	255
		Right	C	32.2	0.77	198
Average Intersection			**D**	**50.9**		
Airport Road & New Access Road						
Airport Road	Northbound	Left	*F*	62.4	1.05	m#756
		Thru/Right	A	4.5	0.72	m42
	Southbound	Thru	*E*	57.1	0.89	541
		Right	C	25.0	0.52	225
New Access Road	Eastbound	Left	*F*	97.6	0.96	#513
		Right	A	9.2	0.52	80
Average Intersection			**D**	**36.1**		
Airport Road & Existing North Access						
Airport Road	Northbound	Left	B	14.9	0.03	3
		Thru	-	-	-	-
	Southbound	Thru/Right	-	-	-	-
Existing North Access	Eastbound	Left/Right	D	33.5	0.32	33

- 95th % volume exceeds capacity, queue may be longer
m - volume for 95th % queue is metered by upstream signal

Source: C&S Engineers, Inc.

Alternative 2 improves operations at the City Line Road intersection to an acceptable LOS. While there are some movements that experience delay during the PM peak hour, the overall average intersection LOS at the new access intersection is a LOS D. Overall, operations on Airport Road should improve slightly with the changes associated with Alternative 2 compared to the 2040 future analysis and Alternative 1 operations.

The preliminary construction cost for Alternative 2 is estimated at $1,545,000. This includes the demolition of the parking booth near the bus commuter parking, the removal of pavement at the intersection of Airport Road and City Line Road, the reuse of pavement within the existing economy/overflow parking lot, a traffic signal at the intersection of the new access road with a southbound right turn lane, and other items associated with the changes to the roadway system. This estimate does not include any costs associated with the development of the retail areas or the relocation of the public parking access control system.

Alternative 3

Alternative 3 is similar to Alternative 2 in that it also closes the existing main airport access to all traffic except exiting southbound traffic and relocates all airport traffic to the new access road with traffic signal adjacent to the development area. The difference is the roadway that connects the development area to the terminal via past the multi-modal center is a one-way roadway that circulates counterclockwise around the proposed retail plaza area. This circulator road would consist of two inbound lanes from Airport Road past the development area and multi-modal facility but contain only one lane as it circles back to the new access road. Internal intersections would be designed such that the inbound movement from Airport Road towards the terminal area would be considered the main movement with no stops and minimal delays (see **Figure 6.3.15**).

The internal circulation model indicates there would be no delays or operational issues during the PM peak hour at the main internal intersection or at the new intersection created were the new access road connects to the existing roadway connecting to the multi-modal center. There would be delays (resulting in a LOS E) for vehicles that were driving around the circulator roadway and wanted to proceed back into airport property instead of exiting towards Airport Road. With the number of vehicles traveling to and from Airport Road on the new access road, there would be high volumes of opposing traffic for vehicles to make a left turn off the circulator roadway. This is not a high volume movement and these delays would not significantly impact flows throughout the internal airport roadway network.

Alternative 3 minimizes confusion at the main internal intersection by eliminating the short weave and decision time needed to find the desired lane before approaching the terminal, parking, or multi-modal areas, but it creates more of a circuitous route for airport customers, forcing them to drive past busy retail areas and the various driveways associated with the multi-modal center. It also minimizes conflicts since vehicles cannot be turning left into and out of the multi-modal center areas or the retail plaza area across terminal area-bound traffic. As noted previously, the circulator roadway does create a longer route and delays for those that might be exiting the parking area or coming from the terminal area and wanting to go to the multi-modal center, development area, or the Rental Car QTA section of the Airport.

The Airport Road intersection analysis associated with Alternative 3 is the same as noted in Alternative 2. The internal one-way circulator roadway does not change the access to Airport Road via City Line Road or

the new access road. See **Table 6.3.4.** for the level of service (LOS), delay in seconds, volume to capacity (v/c) ratio, and 95th percentile queues for each lane group of each study intersection for the Alternative 3 2040 future condition.

The preliminary construction cost for Alternative 3 is estimated at $1,980,000. This includes the demolition of the parking booth near the bus commuter parking, the removal of pavement at the intersection of Airport Road and City Line Road, the construction of the circulator roadway adjacent to Airport Road, the reuse of pavement within the existing economy/overflow parking lot, a traffic signal at the intersection of the new access road and Airport Road, and other items associated with the changes to the roadway system. This estimate does not include any costs associated with the development of the retail areas or the relocation of the public parking access control system.

Evaluation Summary

Table 6.3.5 identifies the evaluation criteria used to evaluate the ground access and circulation alternatives, as well as the correlated scoring for each one based on the discussion in Section 6.2.

Table 6.3.5: Access & Circulation Alternative Evaluation Summary

	Alternatives		
Access & Circulation Criteria	**1**	**2**	**3**
Economic/Strategic Factors	**6**	**5**	**4**
Compatible with LNAA strategic goals	3	3	3
Order-of-magnitude costs	3	2	1
Operational/Maintenance Factors	**4**	**5**	**5**
Operational efficiency of internal roadways during LVIA peak conditions	2	2	2
Operational efficiency of Airport Rd during peak conditions	1	2	2
Ability to accommodate terminal area demands	2	2	2
Natural Resources/Sustainability	**5**	**5**	**4**
Impacts to the environment	2	2	1
Low need for off-airport improvements to make alternative feasible	1	1	1
Potential for long-term sustainability/not impact future development	2	2	2
Social/Community Impacts/Passenger Experience	**4**	**5**	**6**
Ability to accommodate needs for other land use developments	3	3	3
Safety of internal roadways during LVIA peak conditions	1	2	3
Total Score	**20**	**21**	**20**
Ranking	**2**	**1**	**2**

Source: C&S Engineers, Inc.

Alternative 2 is the highest ranked alternative. Alternative 2 improves operations on Airport Road during the PM peak hour, reduces the confusion and short weave for vehicles approaching the terminal and parking areas, is compatible with the LNAA strategic goals by helping to accommodate potential non-aeronautical development, and is an economically efficient alternative.

Rental Area

Bus Commuter Parking

Proposed Hotel

Proposed Cell Phone Waiting Area

Proposed Retail Area

Proposed Gas Station/ TNC Station

Airport Road

Legend

- Existing Property Line
- Arrivals Circulation
- Departures Circulation
- Parking Circulation
- Proposed Traffic Signal

N

Not To Scale

Lehigh Valley International Airport
Master Plan Update

Circulation Alt. 1

Figure 6.3.13

May 17, 2018 – 9:36am
F:\Project\183 – Lehigh–Northampton Airport Auth\183012001 ABE Airport Master Plan Update\Planning–Study\CADD\Exhibits\Chapter 7\Circulation Alternatives.dwg

Rental Area

Bus Commuter Parking

Proposed Hotel

Proposed Cell Phone Waiting Area

Proposed Retail Area

Proposed Gas Station/ TNC Station

Southbound Exit Only

Airport Road

Legend

- Existing Property Line
- Arrivals Circulation
- Departures Circulation
- Parking Circulation
- Proposed Demolition
- Proposed Traffic Signal

N

Not To Scale

Lehigh Valley International Airport
Master Plan Update

Circulation Alt. 2

Figure 6.3.14

May 17, 2018 – 9:33am
F:\Project\183 – Lehigh–Northampton Airport Auth\183012001 ABE Airport Master Plan Update\Planning–Study\CADD\Exhibits\Chapter 7\Circulation Alternatives.dwg

Rental Area

Bus Commuter Parking

Proposed Hotel

Proposed Cell Phone Waiting Area

Proposed Retail Area

Proposed Gas Station/ TNC Station

Southbound Exit Only

Airport Road

Legend

- Existing Property Line
- Arrivals Circulation
- Departures Circulation
- Parking Circulation
- Proposed Traffic Signal

N

Not To Scale

Lehigh Valley International Airport
Master Plan Update

Circulation Alt. 3

Figure 6.3.15

May 17, 2018 – 9:34am
F:\Project\183 – Lehigh–Northampton Airport Auth\183012001 ABE Airport Master Plan Update\Planning–Study\CADD\Exhibits\Chapter 7\Circulation Alternatives.dwg