
Appendix C – RPZ Analysis



U.S. Department
of Transportation
**Federal Aviation
Administration**

**Detroit Airports District Office
Metro Airport Center
11677 South Wayne Road
Suite 107
Romulus, MI 48174**

March 2, 2022

Mr. Craig Williams, A.A.E.
Airport Director
Kalamazoo/Battle Creek International Airport
5235 Portage Road
Kalamazoo, MI 49002

Kalamazoo/Battle Creek International Airport (AZO), Kalamazoo, MI
Runway Protection Zone (RPZ) Alternatives Analysis Concurrence for the Runway 35 Extension
(1,000 feet)

Dear Mr. Williams:

The purpose of this letter is to provide the Federal Aviation Administration's (FAA) review and concurrence for the above referenced report.

Background

The Kalamazoo/Battle Creek International Airport (AZO) completed a RPZ Alternatives Analysis in accordance with FAA Memorandum, Interim Guidance on Land Uses Within a Runway Protection Zone, dated September 27, 2012. Based on the guidance, the triggering action requiring the analysis is, the proposed extension of Runway 35 by 1,000 feet. This proposed project will extend the RPZ for Runway 35 across Romence Road and onto the Pfizer-owned contractor parking lot.

Alternatives

The Airport Sponsor completed an alternatives analysis for the Kilgore Road Relocation and Runway 17/Taxiway C Runway Incursion Mitigation project. This RPZ alternatives analysis concurrence is for the proposed Runway 35 1,000-foot extension. The Kilgore Road Relocation was reviewed and concurred by the FAA under separate letter (July 13, 2021). Four alternatives were evaluated.

1. Alternative 1 – 1,000-foot extension of Runway 17/35 (150 feet on the Runway 17 end and 850 feet on the Runway 35 End), with a reconfigured intersection of Taxiway C and Runway 17

2. Alternative 2 – 1,150-foot extension of Runway 17/35 (150 feet on Runway 17 end and 1,000 feet on Runway 25 end), with a reconfigured intersection of Taxiway C and Runway 17
3. Alternative 3 – 1,000-foot extension of Runway 35 (2013 Master Plan Update Preferred Alternative)
4. Alternative 4 – 1,000-foot extension of Runway 17 with a reconfigured intersection of Taxiway C and Runway 17

The alternatives were evaluated with the following criteria:

- Provide at least 7,500 feet of usable runway length
- Provide a reconfigured Runway 17/Taxiway C intersection in compliance with current airport design standards for a 90 degree entrance to the runway environment
- Minimize impacts to Pfizer Corporation

The Airport’s preferred alternative is Alternative 2. This alternative enhances the safety and improves the geometry of intersection Taxiway C and Runway 17/35; provides adequate runway length for existing and future users; compliments the Kilgore Road Realignment; and minimizes impacts to Pfizer Corporation.

This alternative is more fully explained in the Airport Sponsor’s submittal “*FAA Great Lakes Region Runway Protection Zone – Alternatives Analysis* document”. See Section 11, Alternatives Analysis.

ADO Finding

The FAA has completed our review of the RPZ Alternatives Analysis. We concur the Airport Sponsor has done a sufficient level of analysis to make its own decision about the risks associated with the proposal.

This letter is not an environmental clearance to construct the project, nor a commitment of Federal funding. Any changes not expressly outlined in this letter will require the airport sponsor to perform a RPZ Alternatives Analysis for review and concurrence by the FAA.

Should you have any questions or comments, please do not hesitate to contact me at Katherine.S.Delaney@faa.gov.

Sincerely,

Katherine S Delaney Digitally signed by Katherine S Delaney
Date: 2022.03.02 13:07:30 -05'00'

Katherine S. Delaney
Community Planner
Detroit Airports District Office

Cc: AGL-610; S. Ward, M&H, Lansing

FAA GREAT LAKES REGION RUNWAY PROTECTION ZONE – ALTERNATIVE ANALYSIS

Instructions: Prior to completing this form, the RO/ADO staff must work with the Airport Sponsor to identify and document the full range of alternatives that could:

- 1) Avoid introducing the land use issue within the RPZ
- 2) Minimize the impact of the land use in the RPZ (i.e. routing a new roadway through the controlled activity area, move farther away from the runway end, etc.)
- 3) Mitigate risk to people and property on the ground (i.e. tunneling, depressing and/or protecting a roadway through the RPZ, implement operational measure to mitigate any risks, etc.)

BACKGROUND		
1. AIRPORT: Kalamazoo / Battle Creek International Airport	2. LOCATION (CITY, STATE): Kalamazoo, Michigan	3. LOC ID: KAZO
4. EFFECTED RUNWAY: Runway 17/35	5. APPROACH RPZ DIMENSION: LENGTH: Rwy 17 - 1,700 ft. Rwy 35 - 2,500 ft. INNER WIDTH: Rwy 17 - 500 ft. Rwy 35 - 1,000 ft. OUTER WIDTH: Rwy 17 - 1,010 ft. Rwy 35 - 1,750 ft. ACRES: Rwy 17 - 29.465 acres Rwy 35 - 78.914 acres	6. DEPARTURE RPZ DIMENSION: LENGTH: Rwy 17 - 1,700 ft. Rwy 35 - 1,700 ft. INNER WIDTH: Rwy 17 - 500 ft. Rwy 35 - 500 ft. OUTER WIDTH: Rwy 17 - 1,010 ft. Rwy 35 - 1,010 ft. ACRES: Rwy 17 - 29.465 acres Rwy 35 - 29.465 acres
7. DESIGN AIRCRAFT OF RUNWAY: Existing – CRJ-900 (C-III); Future – Embraer 190 (C-III)		
8. DATE OF LATEST FAA SIGNED ALP: June 2018		
9. TRIGGERING EVENT (i.e. what event caused the new or modified land use in the RPZ)		
<input checked="" type="checkbox"/>	An airfield project (e.g. runway extension, runway shift)	
<input type="checkbox"/>	A change in the critical design aircraft which increases the RPZ dimensions	
<input type="checkbox"/>	A new or revised instrument approach procedure that increases the RPZ dimensions	
<input type="checkbox"/>	A local development proposal in the RPZ (either new or reconfigured)	
<input type="checkbox"/>	Other (please describe):	
10. SELECT TYPE OF INCOMPATIBLE LAND USE IN RPZ:		
<input type="checkbox"/>	Buildings and structures (Examples include, but are not limited to: residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.)	
<input type="checkbox"/>	Recreational land use (Examples include, but are not limited to: golf courses, sports fields, amusement parks, other places of public assembly, etc.)	
<input checked="" type="checkbox"/>	Transportation Facilities. (Examples include, but are not limited to: rail facilities (light or heavy, passenger or freight), public roads/highways, vehicular parking facilities)	
<input type="checkbox"/>	Fuel storage facilities (above and below ground)	
<input type="checkbox"/>	Hazardous material storage (above and below ground)	

	Wastewater treatment facilities
	Above-ground utility infrastructure (i.e. electrical substations), including any type of solar panel installations.

Does the Airport Sponsor own or control the area where the above incompatible land uses is located? Yes _____ No X

ALTERNATIVES ANALYSIS

11. PROVIDE A DESCRIPTION OF EACH ALTERNATIVE INCLUDE A NARRATIVE DISCUSSION AND EXHIBITS OR FIGURES DEPICTING THE ALTERNATIVE:

The Kalamazoo/Battle Creek International Airport (AZO) is assessing its options for extending its primary runway, Runway 17/35, to better accommodate the aircraft using the airport. Runway 17/35 is 6,502 feet long and AZO needs to increase that to more than 7,500 feet to better serve the CRJ-900s that currently use the airport and the Airbus 320s that are expected to use the airport in the future. Additionally, AZO seeks to implement a recommended Runway Incursion Mitigation (RIM) program improvement that addresses the design issues of Taxiway C's access to Runway 17/35.

A RIM evaluation conducted for the geometry of the intersection of Runway 17/35 with Taxiway C (see the airport diagram in **Attachment A**) found that an extension of at least 150 feet north of the runway at the approach end of Runway 17 is needed in order for Taxiway C to intersect at a desired 90-degree angle. As a result, the approach and departure RPZs at the approach end of Runway 17 would shift at least 150 feet to the north.

Likewise, this RPZ alternative analysis also reviews a shift in the approach and departure RPZs at the approach end of Runway 35 to accommodate an extension of the runway. The proposed runway extension is needed to accommodate the runway length demands of the family grouping of C-III regional jet critical aircraft types conducting operations at AZO. With the proposed 1,000-foot runway extension, the approach and departure RPZs at the approach end of Runway 35 could shift as much as 1,000 feet to the south.

Four alternatives presented in this section provide options to mitigate the complex intersection geometry of Taxiway C with Runway 17/35 as well as accommodate various extensions to Runway 17/35.

Alternative 1 – 1,000-Foot Extension of Runway 17/35 (150 Feet on Runway 17 End and 850 Feet on Runway 35 End), with a Reconfigured Intersection of Taxiway C and Runway 17

To accommodate the demands of current and future aircraft and enhance safety, Alternative 1 proposes an extension of Runway 17/35 and parallel Taxiway B by 850 feet south at the approach end of Runway 35, as well as construction of a hold pad at the south end of Taxiway B. To implement the recommended 2017 RIM Study improvements that address the design issues of Taxiway C's access to Runway 17/35, this alternative also proposes to shift the threshold of Runway 17 by 150 feet to the north so that the alignment of Taxiway C can intersect either side of the runway at a 90-degree angle. Reconfiguration of the Taxiway C and Runway 17 intersection would involve the following improvements:

- Construction of new taxiway pavement intersecting either side of the threshold of Runway 17
- Improvement of formerly closed Taxiway B pavement to the west of Runway 17/35
- Removal of a portion of existing Taxiway C pavement to the east and west of Runway 17/35
- Removal of pavement for the former Taxiway B holding apron and former blast pad for Runway 17/35
- Construction of a new blast pad to align with the relocated threshold of Runway 17
- Relocation of the Precision Approach Path Indicator (PAPI), and localizer antenna for the Runway 35 approach and its associated critical area 150 feet to the north
- Relocation of the RPZs at the approach end of Runway 17 150 feet to the north
- Mitigation of tree obstructions on parcels within the Milwood neighborhood to the north of Interstate 94.

This alternative also proposes:

- Extension of Runway 17/35 and parallel Taxiway B by 850 feet south at the approach end of Runway 35
- Construction of a hold pad at the south end of Taxiway B
- Relocation of the routing of the Norfolk Southern railroad around the RPZs at the approach end of Runway 35
- Acquisition of easement over land within shifted RPZs at the approach end of Runway 35
- Relocation of the MALSR, glide slope antenna, and PAPI at the approach end of Runway 35.

This alternative would result in Runway 17/35 having a usable length of 7,502 feet, as shown in Attachment B.

Alternative 2 – 1,150-Foot Extension of Runway 17/35 (150 Feet on Runway 17 End and 1,000 Feet on Runway 35 End), with a Reconfigured Intersection of Taxiway C and Runway 17

Alternative 2 proposes improvements similar to Alternative 1, but this alternative accommodates existing and projected aircraft using the Airport by extending Runway 17/35 and parallel Taxiway B by 1,000 feet south at the approach end of Runway 35. The construction of a hold pad at the south end of Taxiway B is also proposed. This alternative includes the recommended 2017 RIM Study improvements that address the geometric deficiencies at the Taxiway C and Runway 17/35 intersection by shifting the threshold of Runway 17 by 150 feet to the north so that the alignment of Taxiway C can intersect either side of the runway at a 90-degree angle.

Like Alternative 1, reconfiguration of the Taxiway C and Runway 17 intersection would involve the following improvements:

- Construction of new taxiway pavement intersecting either side of the threshold of Runway 17
- Improvement of formerly closed Taxiway B pavement to the west of Runway 17/35
- Removal of a portion of existing Taxiway C pavement to the east and west of Runway 17/35
- Removal of pavement for the former Taxiway B holding apron and former blast pad for Runway 17/35
- Construction of a new blast pad to align with the relocated threshold of Runway 17
- Relocation of the PAPI, and localizer antenna for the Runway 35 approach and its associated critical area 150 feet to the north
- Relocation of the RPZs at the approach end of Runway 17 150 feet to the north
- Mitigation of tree obstructions on parcels within the Milwood neighborhood to the north of Interstate 94.

This alternative also proposes:

- Extension of Runway 17/35 and parallel Taxiway B by 1,000 feet south at the approach end of Runway 35
- Construction of a hold pad at the south end of Taxiway B
- Relocation of the routing of the Norfolk Southern railroad around the RPZs at the approach end of Runway 35
- Acquisition of easement over land within shifted RPZs at the approach end of Runway 35
- Relocation of the MALSR, glide slope antenna, and PAPI at the approach end of Runway 35.

With this alternative, the total usable length of Runway 17/35 would be extended to 7,652 feet (see **Attachment C**).

Alternative 3 – 1,000-Foot Extension of Runway 35 (2013 Master Plan Update Preferred Alternative)

Alternative 3, as shown in **Attachment D**, proposes to shift the threshold of Runway 35 to the south to accommodate current and future commercial aircraft types at AZO. To accomplish this, Alternative 3 proposes the following improvements:

- Extension of Runway 17/35 and parallel Taxiway B by 1,000 feet south at the approach end of Runway 35
- Construction of a hold pad at the south end of Taxiway B
- Relocation of the routing of the Norfolk Southern railroad around the RPZs at the approach end of Runway 35
- Acquisition of easement over land within shifted RPZs at the approach end of Runway 35
- Relocation of the MALSR, glide slope antenna, and PAPI at the approach end of Runway 35.

This alternative would result in Runway 17/35 having a usable length of 7,502 feet.

Alternative 4 – 1,000-Foot Extension of Runway 17 with a Reconfigured Intersection of Taxiway C and Runway 17

Alternative 4 proposes a 1,000-foot extension of Runway 17/35 to the north at the approach end of Runway 17 to meet the operational demands of existing and projected commercial aircraft. To address Taxiway C's access to Runway 17/35, this alternative would also construct Taxiway C parallel to the extended runway to connect at 90-degree angles from the east and the west at the relocated threshold. Improvements required to implement Alternative 4 are as follows:

- Improving and using formerly closed Taxiway B pavement at the approach end of Runway 17
- Constructing a 200-foot blast pad at the approach end of Runway 17
- Removing portions of existing Taxiway C pavement to the east and west of Runway 17/35
- Removing a portion of closed pavement used to tie Taxiway B into the former threshold of Runway 17.
- Shifting the location of the RPZs, localizer antenna, and PAPI at the approach end of Runway 17.
- Mitigating tree obstructions through the acquisition of easements on land to the north of Interstate 94 in the Milwood neighborhood

With this alternative, Runway 17/35 would have a usable length of 7,502 feet, as shown in **Attachment E**.

12. PROVIDE FULL COST ESTIMATES ASSOCIATED WITH EACH ALTERNATIVE REGARDLESS OF POTENTIAL FUNDING SOURCES:

The cost of each alternative is expressed in 2020 dollars. The cost for each alternative was estimated as follows.

<u>Alternative</u>	<u>Runway Length</u>	<u>Cost</u>	<u>Notes</u>
1	7,502 feet	\$39.2 million	
2	7,652 feet	\$40.0 million	
3	7,502 feet	\$36.5 million	
4 *	7,502 feet	\$13.9 million	*Alternative 4 does not consider the expense of possible land acquisition or rerouting of Kilgore Road or I-94, which would significantly increase costs.

Details of these cost estimates can be found in **Attachment F** through **Attachment I**.

13. PROVIDE A PRACTICABILITY ASSESSMENT BASED ON THE FEASIBILITY OF THE ALTERNATIVE IN TERMS OF COST, CONSTRUCTABILITY AND OTHER FACTORS:

Each alternative is assessed in the following section for its ability to enhance the safety of the Taxiway C/Runway 17/35 intersection and meet the runway length needs of current and future airport users. An alternative adequately corrects the Taxiway C design issue if it meets design standards identified in FAA AC 150/5300-13A, *Airport Design*. For AZO, this means revising the Taxiway C and Runway 17/35 intersection so that the taxiway intersects Runway 17/35 at a 90-degree angle from both the east and the west from the taxiway. This reduces the range of vision needed for pilots and ground vehicle operators to confirm Runway 17/35 is clear of aircraft activity before entering the runway environment from Taxiway C.

In addition, each alternative is evaluated on its cost, feasibility of implementation, environmental impacts, and incompatible RPZ land uses.

Alternative 1 – 1,000-Foot Extension of Runway 17/35 (150 Feet on Runway 17 End and 850 Feet on Runway 35 End), with a Reconfigured Intersection of Taxiway C and Runway 17

This first alternative adequately addresses the intersection of Taxiway C and Runway 17/35, as delineated in FAA AC 150/5300-13A, *Airport Design*. It also provides for 7,502 feet of runway length meeting the runway length requirements of the Airport's users. Alternative 1 does not, however, meet planning objectives from the 2013 master plan update in which AZO has been preserving space for a 1,000-foot extension of runway length at the approach end of Runway 35. In reviewing runway length needs by AZO's users, the FAA has concurred with the need for an additional 1,000-feet of runway length as presented in the 2013 master plan update and reconfirmed in the 2018 RIM evaluation.

The shifting of the Runway 17 threshold by 150 feet to the north introduces additional tree obstructions within the approach of Runway 17, but beyond the RPZ, that would require mitigation in the Milwood neighborhood north of Interstate 94. Shifting of the threshold also requires changes to approach procedures and the locations of the RPZ and NAVAIDs. This includes the runway end identifier lights (REILs) and PAPI for Runway 17 as well as the localizer antenna for Runway 35. Changes to the runway threshold also require the development of new approach procedures which would require a timely process for their creation and implementation.

As seen in Attachment C, at the approach end of Runway 17, the primary incompatible land use within the approach and departure RPZs is the routing of Kilgore Road and Kilgore Service Road. Other roads within the RPZs at this end of the runway include an on-airport perimeter access road and a service road to the Runway 35 localizer structure. A portion of the parking lot and building for a Ryder Truck Rental service facility located north of Kilgore Road are also located within the RPZ. Finally, a portion of the right-of-way associated with Interstate 94 is located within the corner of the outer edge of the approach and departure RPZs to Runway 17. While the right-of-way of Interstate 94 is located within this area, the expressway itself is not located within the RPZs.

With the shift of the Runway 35 approach RPZ to the south from the proposed 850-foot runway extension, the RPZ moves beyond airport property and encroaches on Pfizer-owned land to the south. The primary incompatible land use within the approach and departure RPZs is the routing of Romence Road. An on-airport perimeter access road and future service road for the Runway 35 approach lighting system would also be located within the shifted RPZs at this end of the runway. A contractor vehicle parking lot for the Pfizer manufacturing facility to the south of Romence Road would also be located within the shifted RPZs. The Norfolk Southern rail line would be routed around the RPZ and would not be a factor. Relocation of the Runway 35 approach lighting system as well as associated navigational equipment would be necessary with the implementation of this alternative.

Extension of the runway may impact a small wetland area located approximately 500 feet southeast of the existing approach end of Runway 35, though any disturbance of this area is anticipated to be minimal and can be easily mitigated. An increase or additional noise impacts are not anticipated as a result of the runway extension since most land south of AZO is not for residential use.

In summary, considerations of Alternative 1 consist of:

- Mitigation of tree obstructions in the Milwood neighborhood.
- Possible impacts on a wetland area southeast of the approach end of Runway 35; however, any impact is anticipated to not be significant and able to be mitigated.
- Incompatible land uses in the Runway 17 RPZ consist of part of a Ryder Truck Rental facility, Kilgore Road, airport service roads, and the right of way of Interstate 94; however, AZO has easements over these land uses.
- Relocation of the Norfolk Southern Railroad outside of the RPZ.
- Shifting of the Runway 35 approach lighting system.
- Incompatible land uses in the Runway 35 RPZ consisting of Romence Road, part of a Pfizer parking lot, an on-airport perimeter access road, and a future service road for the relocated Runway 35 approach lighting system.

Alternative 1 is estimated to cost \$39.2 million, making it the second most expensive alternative.

Alternative 2 – 1,150-Foot Extension of Runway 17/35 (150 Feet on Runway 17 End and 1,000 Feet on Runway 35 End), with a Reconfigured Intersection of Taxiway C and Runway 17

This alternative is like Alternative 1 in that it enhances the safety of the intersection of Taxiway C and Runway 17/35, to meet airfield taxiway geometry design standards as delineated in FAA AC 150/5300-13A, *Airport Design*. It also provides for 7,652 feet of runway length, which meets the requirements of the Airport's users. This alternative also meets the planning objectives from the 2013 master plan update, and reconfirmed in the 2018 RIM evaluation, which preserves space for a 1,000-foot extension of runway length at the approach end of Runway 35.

Extending the runway to a length of 7,652 feet would meet the takeoff and landing distance requirements of existing and anticipated commercial aircraft types at AZO. The 7,652 feet of runway length also provides an additional margin of safety for landing distance assessments when the runway is contaminated with water, snow, or ice, which is frequently experienced during the winter season. This would help to maintain airfield capacity since the number of flight delays and cancellations that may result from contaminated airfield conditions due to available increased aircraft braking distances would lessen.

This alternative has the same considerations summarized for Alternative 1, namely:

- Mitigation of tree obstructions in the Milwood neighborhood.
- Possible impacts on a wetland area southeast of the approach end of Runway 35; however, any impact is anticipated to not be significant and able to be mitigated.
- Incompatible land uses in the Runway 17 RPZ consist of part of a Ryder Truck Rental facility, Kilgore Road, airport service roads, and the right of way of Interstate 94; however, AZO has easements over these land uses.
- Relocation of the Norfolk Southern Railroad outside of the RPZ.
- Shifting of the Runway 35 approach lighting system.
- Incompatible land uses in the Runway 35 RPZ consisting of Romence Road, part of a Pfizer parking lot, an on-airport perimeter access road, and a future service road for the relocated Runway 35 approach lighting system.

Furthermore, this alternative encroaches on more Pfizer land than does Alternative 1. It would also require a slightly longer rerouting of the Norfolk Southern rail line. However, the additional costs for these items are marginal when compared with Alternative 1. At an estimated cost of \$40.0 million, this is the most expensive option.

Alternative 3 – 1,000-Foot Extension of Runway 35 (2013 Master Plan Update Preferred Alternative)

This alternative increases the length of Runway 17/35 but does not enhance the safety of the intersection of Taxiway C with Runway 17/35. While it avoids any impacts to the Milwood neighborhood to the north of Interstate 94, this alternative does not implement the recommended action from the RIM evaluation study that enhances the safety of the intersection of Taxiway C with Runway 1/35 and is not considered a preferred course of action. This alternative has the additional following considerations:

- Requires relocation of the Norfolk Southern Railroad outside of the RPZ.
- Requires a shift of the Runway 35 approach lighting system.
- Requires a shift in navigational equipment at the approach end of Runway 35.
- Potentially impacts a wetland area southeast of the approach end of Runway 35, although any impact is anticipated to not be significant.
- Romence Road, part of a Pfizer parking lot, an on-airport perimeter access road, and a future service road for the relocated Runway 35 approach lighting system would be located within the RPZ at the approach end of Runway 35.

While this alternative does not exacerbate issues to the north of AZO, it also does not address the Taxiway C geometry with Runway 17/35 identified in the RIM study, which means this is not a preferred alternative.

Alternative 4 – 1,000-Foot Extension of Runway 17, with a Reconfigured Intersection of Taxiway C and Runway 17

This alternative implements the recommended taxiway geometry improvements to enhance the safety of the intersection of Taxiway C and Runway 17/35 and provides additional runway length to meet the needs of existing and future users. However, this has significant impacts to the north which includes moving the threshold of Runway 17 closer to I-94, shifting the runway safety area (RSA) so that Kilgore Road and Kilgore Service Road both penetrate the RSA, and bringing the interstate inside the RPZ. Under this alternative, closure or rerouting of Kilgore Road and Kilgore Service Road could be necessary to meet the safety standards associated with the RSA. The cost estimates shown earlier do not include the expense of shifting I-94 or Kilgore Road. Such costs would significantly increase the overall price of Alternative 4.

Significant socio-economic impacts are included with the implementation of this alternative. Land acquisition likely would be required for residential areas north of I-94 that would relocate several residents as homes would be removed to clear objects within the relocated Runway 17 RPZ. Extension of the runway would shift the Runway 17 approach path further north, extending AZO's noise contours farther north. Significant public controversy is anticipated to implement this alternative because of the required acquisition of land and relocation of residents.

In summary, considerations of Alternative 4 consist of:

- Not meeting the planning objectives of the 2013 master plan update of adding 1,000 feet to the Runway 35 end.
- Closing or rerouting Kilgore Road and Kilgore Service Road to comply with RSA requirements.
- Introducing I-94 as a non-conforming land use in the Runway 17 RPZs.
- Requiring significant land acquisition to the north, including the Ryder Truck Rental facility.
- Relocation of residents from portions of the Milwood neighborhood.
- Clearance of obstacles in the Milwood neighborhood.

The need for significant land acquisition, including residential properties and the Ryder Truck Rental facility, make this an expensive alternative. Costs would be increased further by the need for obstruction clearance in the Milwood neighborhood along with easement acquisitions. As a result of the level of impact, this alternative is not recommended.

14. DESCRIBE THE PREFERRED ALTERNATIVE THAT WOULD MEET THE PROJECT PURPOSE AND NEED WHILE MINIMIZING RISK ASSOCIATED WITH THE LOCATION WITHIN THE RPZ:

Alternative 2 is the preferred alternative because it adequately enhances the safety of the intersection of Taxiway C and Runway 17/35 and it implements the recommended alternative from the RIM evaluation. It also meets the needs of current and future airport users by providing a runway length that meets planning objectives identified from the 2013 master plan update to implement a 1,000-foot extension at the approach end of Runway 35. By having additional runway length, an additional benefit is that safety margins are increased for aircraft taking off and landing. Alternative 1 also meets these two criteria but sacrifices 150 feet of runway while still incurring the costs necessary to relocate the Norfolk Southern Railroad.

Alternative 3 does not enhance the safety of the intersection of Taxiway C and Runway 17/35. Alternative 4 meets the two primary criteria but does so by significantly impacting the Milwood neighborhood at great socio-economic and financial cost. Furthermore, it introduces Interstate 94, a busy expressway, into the RPZ.

Alternative 2 does have incompatible land uses within Runway 17/35's RPZs. For the roads that pass through the RPZ, possible mitigation measures include:

- Installing signs along Kilgore Road and Romence Road alerting vehicle operators to the presence of aircraft on final approach over the road.
- Declared distances are considered a less viable option since they would have to be employed for both landing and takeoff distances to move RPZs at both runway ends. Doing so would negate any benefit derived from extending the runway.
- Closing Kilgore Road would significantly impact access to businesses along Kilgore Road, so this is an unlikely option. Rerouting Kilgore Road and Kilgore Service Road could mitigate some or all of the impacts of having the roads in the RPZ.
- Closing Romence Road seems unlikely given the access it provides to Pfizer and other businesses. Rerouting it around the future RPZ would require cutting through Pfizer's facilities, which is also very unlikely.
- Tunneling Kilgore Road and/or Romence Road under their respective RPZs would address the concerns of having the road in the RPZ but would likely be cost prohibitive, assuming this is even possible within the constraints of existing roads and development. Further study would be needed to fully assess this idea.
- Purchasing Pfizer-owned land would give AZO control over its RPZs to the south. Pfizer has stated that it is not willing to sell this land but will grant an easement over this area to control objects of height from impacting approaching aircraft and airport design surfaces.

15. IDENTIFY ALL FEDERAL, STATE AND LOCAL TRANSPORTATION AGENCIES INVOLVED OR INTERESTED IN THE ISSUE:

Coordination has occurred with the following Federal, State, and Local transportation agencies as a part of this RPZ analysis:

- Federal Aviation Administration, Detroit Airports District Office
- Michigan Department of Transportation, Office of Aeronautics

16. PROVIDE AN ANALYSIS OF THE SPECIFIC PORTION(S) AND PERCENTAGES OF THE RPZ AFFECTED, DRAWING A CLEAR DISTINCTION BETWEEN THE CENTRAL PORTION OF THE RPZ VERSUS THE CONTROLLED ACTIVITY AREA, AND CLEARLY DELINEATING THE DISTANCE FROM THE RUNWAY END AND RUNWAY LANDING THRESHOLD.

The RPZ for Runway 17, as seen in Attachment B, has 1,000 feet of Kilgore Road cutting across it, along with Kilgore Service Road, which connects with Kilgore Road in the RPZ. The four-lane road and its shoulders occupy approximately 66,000 square feet (sq. ft.) of the RPZ, or 5 percent of the area of the RPZ. The road penetrates the RPZ on its west side approximately 300 feet from the outer width of the RPZ and penetrates on the east side of the RPZ approximately 800 feet from the outer width. The Kilgore Service Road has 250 feet inside the RPZ, taking up 16,500 sq. ft., or approximately 1 percent of the RPZ.

While the service road does not penetrate the central portion of the RPZ, Kilgore Road is in the central portion of the RPZ. Approximately 41,250 sq. ft. of the road is in the central portion of the RPZ, which comprises approximately 3 percent of the central portion area. The remainder of the road, 24,750 sq. ft., is in the controlled activity area and takes up 34 percent of that area. The closest the road approaches the proposed Runway 17 end and its threshold is approximately 1,120 feet.

The approach RPZ for Runway 35 has 1,667 feet of Romence Road penetrating it. The mostly two-lane road (it gains a left-turn lane just west of the western-most entrance to the Pfizer parking lot) and its shoulders take up 110,000 square feet in the RPZ, or 3 percent of the total RPZ area. The road crosses the west side of the RPZ approximately 800 feet from the outer width and the east side of the RPZ 550 feet from the outer width. Romence Road has approximately 870 feet of roadway located in the central portion of the RPZ, or 58,000 square feet, which accounts for 4 percent of the total central portion area. The closest the road approaches the proposed Runway 35 end and its threshold is approximately 1,930 feet.

17. PROVIDE AN ANALYSIS OF (AND ISSUES AFFECTING) SPONSOR CONTROL OF THE LAND WITHIN THE RPZ.

Both future RPZs for the preferred improvements of Alternative 2 have portions that fall outside the airport boundaries. AZO does not own approximately 13 percent of the approach and departure RPZs for Runway 17, due to Kilgore Road and the Ryder Truck Rental facility inside the RPZ. However, AZO does control the land through aviation easements from the various property owners.

With the 1,000-foot extension of the runway to the south, approximately 35 percent of the approach RPZ will be located outside of the existing AZO property line. Most of the uncontrolled portion of the RPZ is over Pfizer-owned land, with the remainder consisting of Romence Road. Pfizer has indicated that the land is not for sale, but aviation easements are planned to control height and land use in this area.

Current use of the land in this area is focused predominately on automobile parking. Pfizer use of land in this area includes a contractor employee personal vehicle parking lot, a contractor vehicle parking lot, an unoccupied storage building, and a guard shack (**Attachment J**). A fence separates the contractor employee personal vehicle parking lot from the contractor vehicle parking lot. Pedestrian access between these two parking lots is provided by an unattended turnstile and automobile access is provided via the on-demand guard shack. Typically, when contractors perform work at Pfizer, the contractor employees park their personal vehicles in the contractor employee personal vehicle parking lot located on the public side of the fence and enter through the turnstile. Contractor vehicles, required to perform work at Pfizer, are screened for access, then driven through the guard shack area, and subsequently parked within the secured area, often staying inside the fence for days or weeks at a time. The contractor employees access these vehicles by parking on the unsecured side of the fence, use the turnstile and then use their screened vehicle. If there is a need for a contractor vehicle to enter or exit the Pfizer site this is done so through the guard shack access gate that is not regularly staffed and only done so when there is a need for contractor vehicles to enter or exit the site. These two parking areas are rarely filled to capacity and when there are vehicles parked here, they are most often parked to the western side of the lot, near the pedestrian turnstile, which places the personal vehicles outside the fence and the contractor vehicles, inside the fence, farther away from the extended runway centerline and within the outer area of the RPZ. There is limited area available to relocate these uses from the RPZ unless a reconfiguration of the fence, guard shack and pedestrian turnstile is undertaken due to the limited area between the existing railroad at the east and existing Pfizer facilities to the west.

Consequently, the preferred alternative will result in parking spaces from these two lots (the unoccupied storage building, and the guard shack) being located within the RPZ area. Several meetings have already occurred with Pfizer communicating the purpose of the RPZ and its intent to limit the occupation of people and property (vehicles) within this area. Control of land use within the RPZ will ultimately be the responsibility of Pfizer; however, AZO will coordinate with Pfizer, both to acquire easements over their land that is under the RPZ, and to realign the Norfolk Southern railroad outside of the RPZ and onto Pfizer property while minimizing interruption of the delivery of the raw materials Pfizer needs.

Should FAA deem it necessary, there may be a couple of options that could be considered, however, none of these have been reviewed with Pfizer at this time. Signs can be placed in the parking lots identifying that the area is located within the RPZ, this would simply be a notification effort. Pfizer can direct contractors to limit use of parking spots located within the RPZ unless absolutely necessary, however, there may be instances where use of the eastern side may be necessary.

Since several spaces within the lot will be lost to the lights as part of the MALSR light lane, maintaining as many parking spaces as possible is desired by Pfizer.

18. ANY OTHER RELEVANT FACTORS FOR HEADQUARTERS CONSIDERATION:

Discussions between AZO and the Michigan Department of Transportation have occurred concerning a possible realignment of Kilgore Road and Kilgore Service Road. A separate concurrent land use request has been submitted to the FAA for review. **Figures 1-4 in Attachment K** at the end of this document illustrate the changes this relocation would provide with regards to the existing condition of both the roadway and the exiting RPZ area, as well as the future roadway and future RPZ area. It is expected that this relocation would be beneficial to the overall operations of both the roadway and the airport. Straightening the roadway creates a safer operational environment for the automobiles while the relocation also reduces the amount of roadway in the RPZ and removes the raised overpass that is currently used, thus eliminating tall objects from the RPZ and the approach surface.

To elaborate on the roadway safety aspects, we note that, based on engineering estimates, Kilgore Service Drive/Road is anticipated to carry approximately 16,000 vehicles per day with 3% commercial traffic east of Portage Road. The traffic signal at Portage Road/Kilgore Service Drive is anticipated to have only minor queueing during peak-hours (7-9AM or 3-6PM) as traffic on westbound Kilgore Service Drive uses the signal to turn onto Portage Road. These queues are not anticipated to be more than 250 feet long, extending back from Portage Road. These queues will in no way ever come close to reaching the section of Kilgore Road that will be straightened. A study of truck traffic completed during the design showed most of the truck activity on Kilgore Road east of Portage Road occurs during overnight and other non-peak times, so truck activity is not anticipated to contribute significantly to queueing.

On the topic of net improvement to the road safety, straightening Kilgore Road would eliminate three (3) horizontal curves designed for 30-mph traffic. Eliminating these reverse curves would undoubtedly reduce the number of fixed-object, sideswipe, and head-on crashes that might otherwise occur, particularly during poor weather conditions such as rain or sleet/ice. A straight section of road is naturally more efficient and meets driver expectation, further reducing the potential for crashes.

To further explain this, curves are geometric features that change the alignment of a roadway, wherein motorists are required to alter their direction of travel, thus increasing the potential of leaving the road or being involved in a crash with another vehicle. Crashes on horizontal curves are three (3) times more likely to occur than on straight roadway segments and cause 25% of all fatal roadway crashes.

Flattening a horizontal curve helps to reduce total crashes, including run-off-the-road crashes, single motor vehicle crashes, and wet/icy road crashes. Crash Modification Factors (CMFs) can be used to help quantify the safety impact of eliminating the Kilgore Road horizontal curves. CMFs are compiled in the "Crash Modification Factors Clearinghouse", which is a web-based repository of actual "before and after" studies that examined the actual impact of various types of safety countermeasures (such as the flattening of horizontal curves). The American Association of State Highway and Transportation Officials (AASHTO) recommends using the Clearinghouse to obtain CMFs for use in data-driven safety analyses.

CMF #9525 is the factor used when the safety countermeasure involves flattening a horizontal curve, like what is proposed for Kilgore Road. CMF #9525 indicates that flattening the horizontal curves would reduce total crashes by 68.5% and reduce K (fatal), A (serious injury), B (minor injury), and C (possible injury) crashes by up to 74.1%. Ultimately, the elimination of the horizontal curves and construction of a tangent section of roadway will meet driver expectations and result in an overall increase in roadway safety.

Romence Road, located at the approach end of Runway 35 is currently in the approach to Runway 35 and with the preferred alternative would cross through the RPZ at this end of the runway. Romence Road is an east-west transportation route through Portage that intersects with Sprinkle Road to the east and Portage Road and Westledge Avenue to the west. Romence Road is used as a primary access point for employees, visitors, and deliveries of Pfizer. Traffic count data for 2019 was obtained from the Kalamazoo Area Transportation Study which indicates Romence Road had an average annual daily traffic (AADT) count of 13,905 vehicles.

Any possible closure of this road would create significant interruptions to the access of the Pfizer facility and traffic patterns of the local community; as such, closure of this road is not recommended. Relocation of the road to the south is not practical due to the proximity of the existing rail yard as well as the Pfizer ponds to the south. Additionally, trying to intersect the exiting intersection of Romence Road and Sprinkle Road would likely not be feasible with the space available and the travel speeds that the Kalamazoo County Road Commission and the City of Portage would require.

Finally, above ground power lines run along the north side of Romence Road and would traverse through the future RPZ at the approach end of Runway 35. As a part of the design for the Runway 17/35 extension project, these above ground power lines are planned to be removed and placed either underground or routed around the RPZ for Runway 35 so that the power line poles are not an obstruction to runway design surfaces.

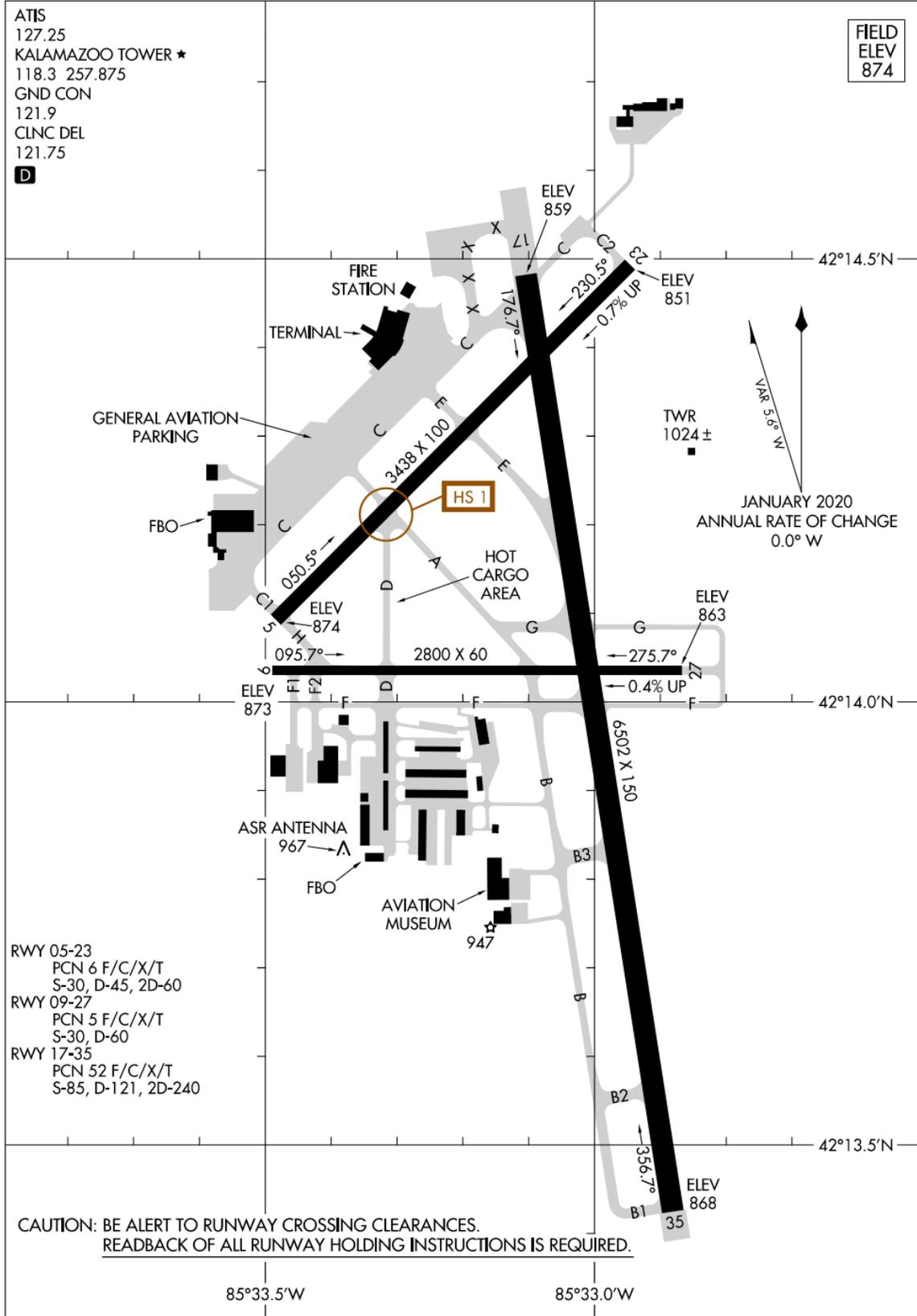
19. SIGNATURE OF ORIGINATOR 	20. PRINTED NAME OF ORIGINATOR Eric Laing	21. DATE 3 November 2020 Updated 5 May 2021 to include additional info on the Kilgore Road project (Section 18). Updated 8 July 2021 to include additional info on the Pfizer Parking lot area and Romence Road (Section 17 & 18)
22. ORIGINATOR'S TITLE Senior Aviation Planner	23. TELEPHONE 513-347-1190	24. E-MAIL Eric.Laing@meadhunt.com

Attachment A – Existing Airfield Configuration

20086

AIRPORT DIAGRAM

AL-717 (FAA) KALAMAZOO/BATTLE CREEK INTL (AZO) KALAMAZOO, MICHIGAN



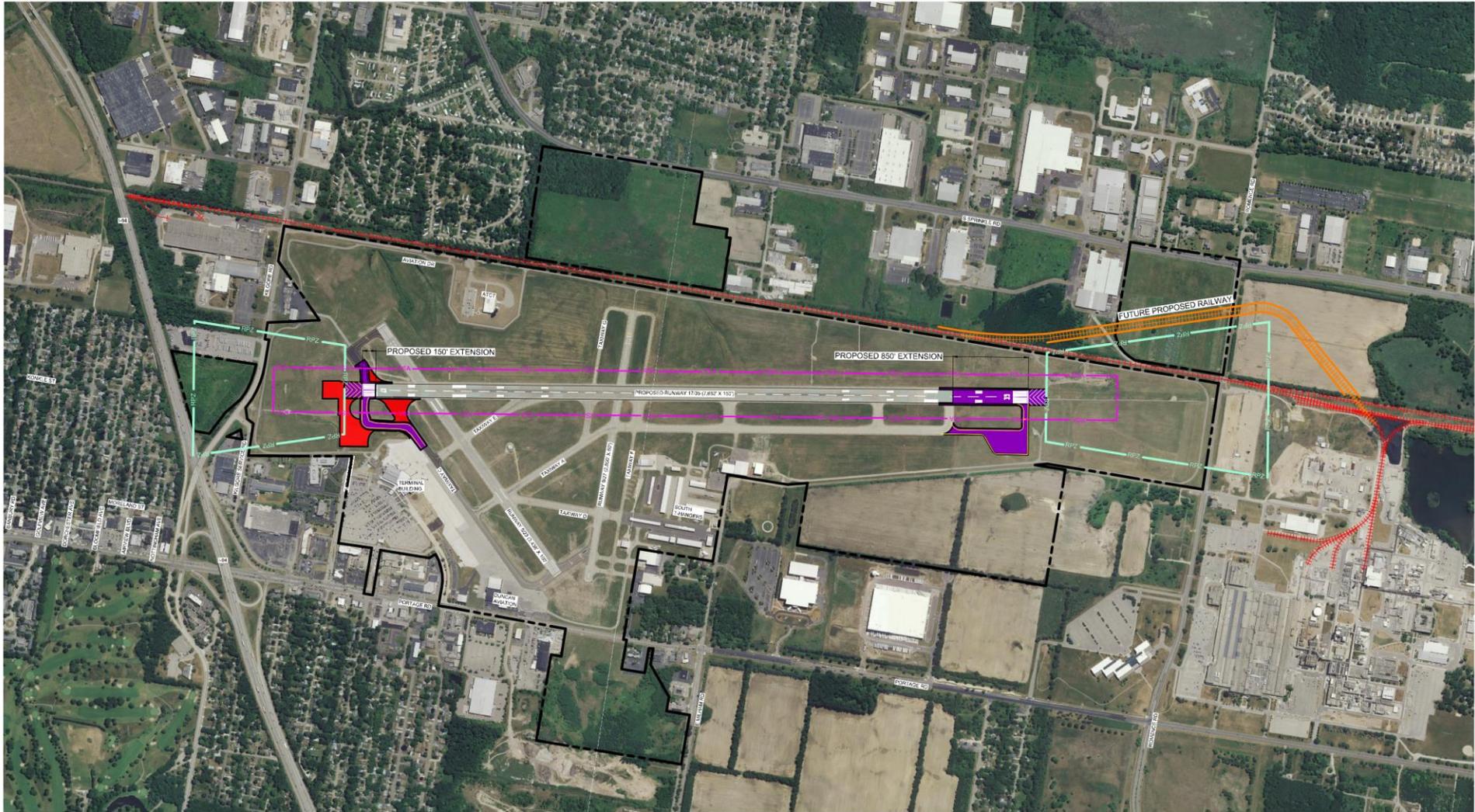
AIRPORT DIAGRAM

20086

Source: FAA

KALAMAZOO, MICHIGAN
KALAMAZOO/BATTLE CREEK INTL (AZO)

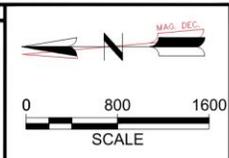
Attachment B – Alternative 1: 1,000-Foot Extension of Runway 17/35 (150 Feet on Runway 17 End and 850 Feet on Runway 35 End), with a Reconfigured Intersection of Taxiway C and Runway 17



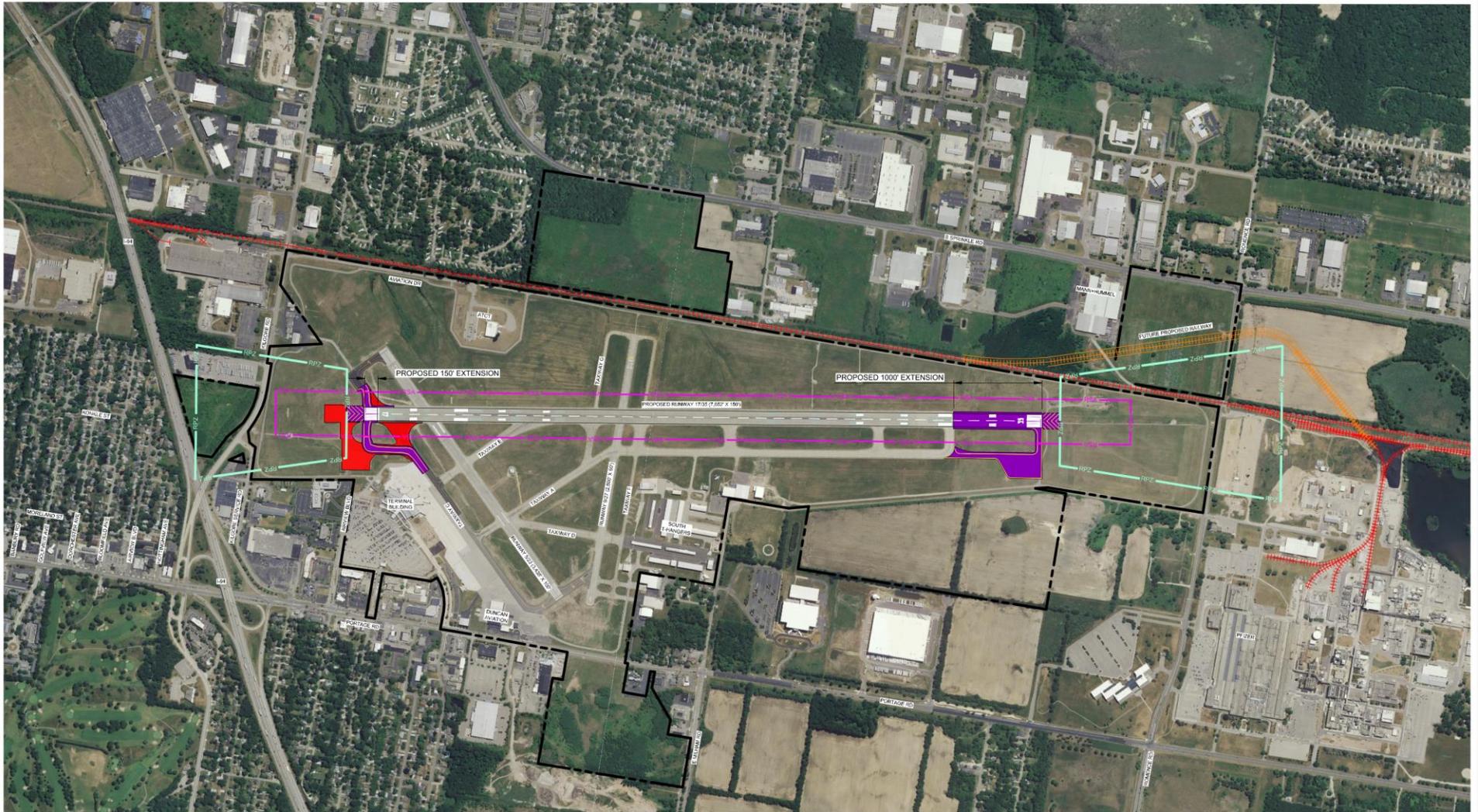
KALAMAZOO/BATTLE CREEK
INTERNATIONAL AIRPORT RUNWAY
BUILD ALTERNATIVE 1
17-35 - 1,000' EXTENSION
KALAMAZOO, MICHIGAN

	RUNWAY PROTECTION ZONE
	RUNWAY SAFETY AREA
	EXISTING RAILROAD
	PROPOSED RAILROAD
	EXISTING AIRPORT PROPERTY LINE

	PROPOSED PAVEMENT
	PAVEMENT REMOVED
	POTENTIAL OBSTRUCTIONS



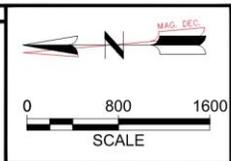
Attachment C – Alternative 2: 1,150-Foot Extension of Runway 17/35 (150 Feet on Runway 17 End and 1,000 Feet on Runway 35 End), with a Reconfigured Intersection of Taxiway C and Runway 17



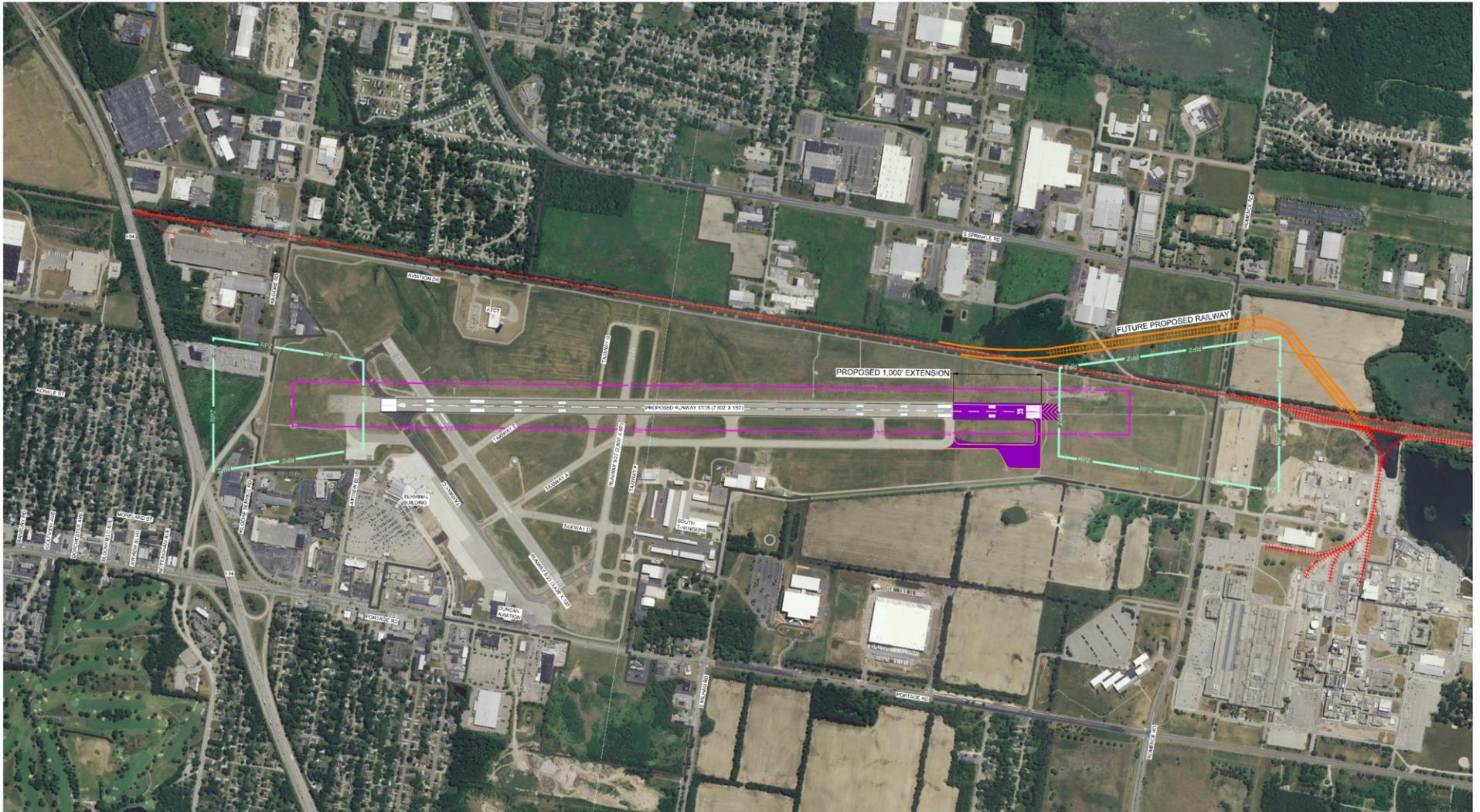
KALAMAZOO/BATTLE CREEK
INTERNATIONAL AIRPORT RUNWAY
BUILD ALTERNATIVE 2
17-35 - 1,150' EXTENSION
KALAMAZOO, MICHIGAN

	RUNWAY PROTECTION ZONE
	RUNWAY SAFETY AREA
	EXISTING RAILROAD
	PROPOSED RAILROAD
	EXISTING AIRPORT PROPERTY LINE

LEGEND	
	PROPOSED PAVEMENT
	PAVEMENT REMOVED
	POTENTIAL OBSTRUCTIONS



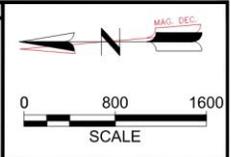
Attachment D – Alternative 3: 1,000-Foot Extension of Runway 35 (2013 Master Plan Update Preferred Alternative)



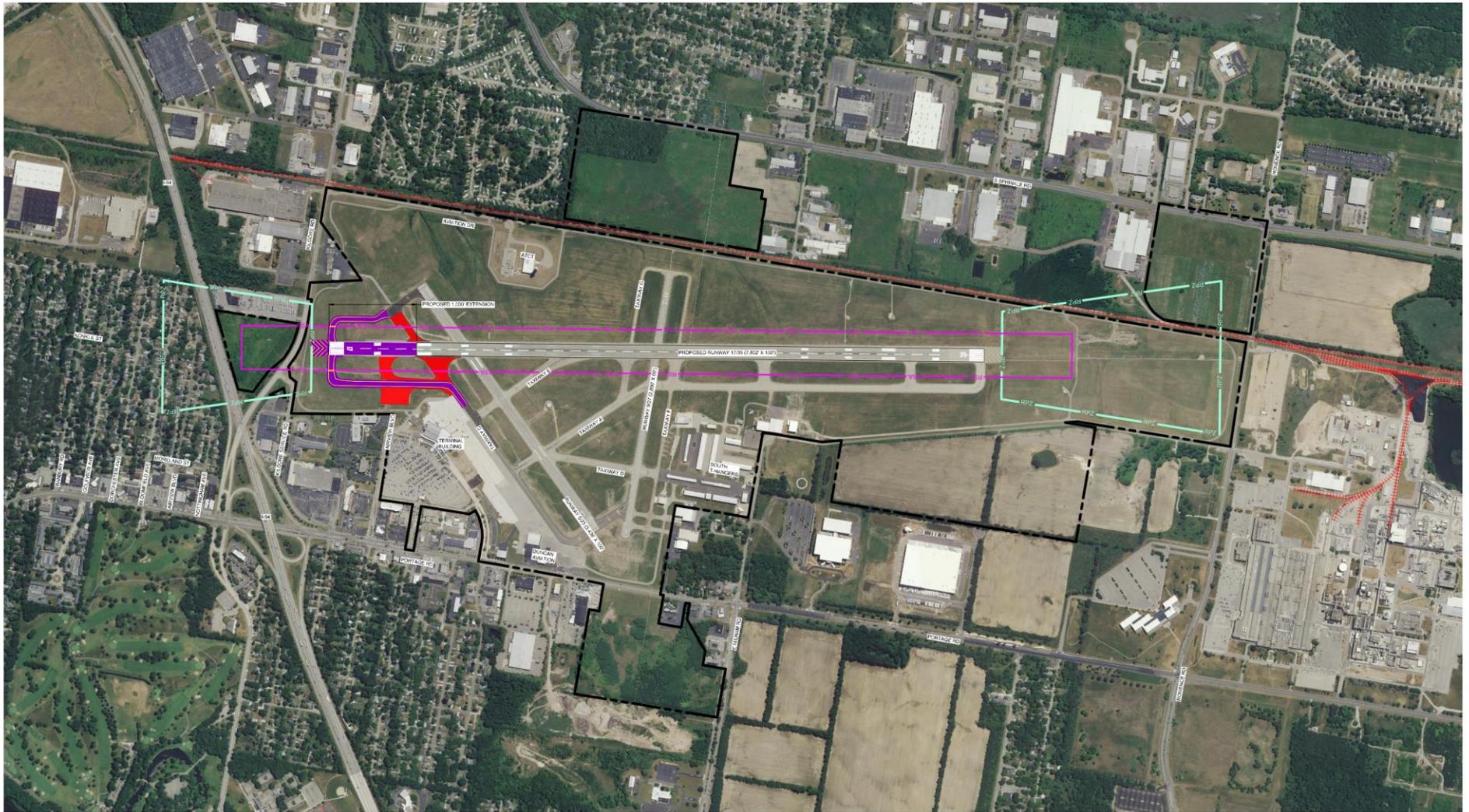
**KALAMAZOO/BATTLE CREEK
INTERNATIONAL AIRPORT RUNWAY
BUILD ALTERNATIVE 3
17-35 - 1,000' EXTENSION
KALAMAZOO, MICHIGAN**

- LEGEND**
- RUNWAY PROTECTION ZONE
 - RUNWAY SAFETY AREA
 - - - - - EXISTING RAILROAD
 - - - - - PROPOSED RAILROAD
 - - - - - EXISTING AIRPORT PROPERTY LINE

- PROPOSED PAVEMENT
- PAVEMENT REMOVED
- POTENTIAL OBSTRUCTIONS



Attachment E – Alternative 4: 1,000-Foot Extension of Runway 17, with a Reconfigured Intersection of Taxiway C and Runway 17



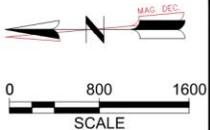
 <p>KALAMAZOO/BATTLE CREEK INTERNATIONAL AIRPORT</p>	<p>KALAMAZOO/BATTLE CREEK INTERNATIONAL AIRPORT RUNWAY BUILD ALTERNATIVE 4 17-35 - 1,000' EXTENSION KALAMAZOO, MICHIGAN</p>	<p>LEGEND</p>		 <p>MAC DEC SCALE</p>
		<p>— RUNWAY PROTECTION ZONE</p> <p>— RUNWAY SAFETY AREA</p> <p>— EXISTING RAILROAD</p> <p>— PROPOSED RAILROAD</p> <p>— EXISTING AIRPORT PROPERTY LINE</p>	<p>— PROPOSED PAVEMENT</p> <p>— PAVEMENT REMOVED</p> <p>● POTENTIAL OBSTRUCTIONS</p>	

Figure F – Cost Estimate for Alternative 1: 1,000-Foot Extension of Runway 17/35 (150 Feet on Runway 17 End and 850 Feet on Runway 35 End), with a Reconfigured Intersection of Taxiway C and Runway 17

ENGINEERING COST ESTIMATE - ATERNATIVE 1

PROJECT: Extend Runway 17/35
 LOCATION: Kalamazoo/Battle Creek International Airport
 CITY: Kalamazoo, MI
 DATE: 5/7/2020
 PREPARED BY: JMM

FINAL DESIGN
 PROJECT PROGRAMMING
 FEASIBILITY STUDY
 STATE PLANNING
 BASED ON FY 2020 DOLLARS

WORK DESCRIPTION: Extend Runway and Taxiway 850' South and 150' North, Rehab shoulders on existing runway, Construct blast pad, light, paint, and relocate NAVAIDS

ITEM DESCRIPTION	UNIT	QTY	UNIT PRICE	ITEM COST
Mobilization and General Conditions	LS	1	\$ 1,200,000.00	\$ 1,200,000
Safety and Security	LS	1	\$ 600,000.00	\$ 600,000
Permits	DLR	10,000	\$ 1.00	\$ 10,000
Remove and Dispose of Bituminous Pavement	SYD	36,000	\$ 2.00	\$ 72,000
Excavation (36")	CYD	66,000	\$ 5.00	\$ 330,000
Subgrade Undercutting	CYD	3,000	\$ 35.00	\$ 105,000
Pulverize (Shoulders for Lights)	SYD	29,000	\$ 1.00	\$ 29,000
Fine Grade (Shoulders for Lights)	SYD	29,000	\$ 1.50	\$ 43,500
P-154 Sand Subbase	CYD	33,000	\$ 15.00	\$ 495,000
P-209 Aggregate Base Course	CYD	14,000	\$ 50.00	\$ 700,000
P-401 Bituminous Aggregate Pavement	TON	48,000	\$ 105.00	\$ 5,040,000
Runway Grooving	SYD	14,300	\$ 2.50	\$ 35,750
Underdrain	LFT	6,000	\$ 4.00	\$ 24,000
Storm Sewer	LFT	1,500	\$ 60.00	\$ 90,000
Catch Basins	EA	8	\$ 6,000.00	\$ 48,000
Vault Modifications	LS	1	\$ 50,000.00	\$ 50,000
Remove Light	EA	100	\$ 200.00	\$ 20,000
Install Elevated HIRL	EA	82	\$ 1,500.00	\$ 123,000
Install Inset HIRL	EA	10	\$ 2,000.00	\$ 20,000
Install Elevated MIRL	EA	80	\$ 1,500.00	\$ 120,000
Guidance Signs LED	EA	8	\$ 4,000.00	\$ 32,000
Distance Remaining Signs	EA	1	\$ 3,000.00	\$ 3,000
Cable, 5KV	LFT	39,500	\$ 3.00	\$ 118,500
Counterpoise	LFT	34,000	\$ 2.00	\$ 68,000
Duct Bank, 1BK2"	LFT	39,500	\$ 10.00	\$ 395,000
Duct Bank, 4BK3" concrete encased	LFT	200	\$ 40.00	\$ 8,000
Electrical Handholes	EA	2	\$ 5,000.00	\$ 10,000
Relocate MALSR	LS	1	\$ 450,000.00	\$ 450,000
Relocate Glideslope	LS	1	\$ 150,000.00	\$ 150,000
Relocate PAPI	LS	1	\$ 50,000.00	\$ 50,000
Relocate REIL	LS	1	\$ 15,000.00	\$ 15,000
Relocate Windcone on New Base	LS	1	\$ 10,000.00	\$ 10,000
Runway Approach Markers and Centerline Monuments	EA	5	\$ 300.00	\$ 1,500
Drainage Improvements (Underdrain, Cleanouts, Pipe, MH's)	LS	1	\$ 150,000.00	\$ 150,000
Pavement Marking (includes removal of existing and new marking)	LS	1	\$ 150,000.00	\$ 150,000
Restoration (Seed and Mulch)	LS	1	\$ 65,000.00	\$ 65,000
Soil Erosion Control Measures	LS	1	\$ 80,000.00	\$ 80,000
Land Acquisition	LS	1	\$ 7,000,000.00	\$ 7,000,000
Relocate Railroad	LS	1	\$ 10,000,000.00	\$ 10,000,000
ALCMS Update	LS	1	\$ 30,000.00	\$ 30,000

CONSTRUCTION TOTAL = \$ 27,941,250
 CONSTRUCTION CONTINGENCIES (20%) = \$ 5,588,250
 CONSTRUCTION TOTAL = \$ 33,529,500

 ENGINEERING DESIGN = \$ 2,347,065
 CONSTRUCTION ADMIN = \$ 3,352,950
 \$ 39,229,515

PROJECT YEAR BUDGET ESTIMATE = \$ 39,230,000

Note: These costs were developed without the benefit of field surveys or soils investigation. A final cost estimate will be dependent upon development of these items and further design.



Figure G – Cost Estimate for Alternative 2: 1,150-Foot Extension of Runway 17/35 (150 Feet on Runway 17 End and 1,000 Feet on Runway 35 End), with a Reconfigured Intersection of Taxiway C and Runway 17

ENGINEERING COST ESTIMATE - ALTERNATIVE 2

PROJECT: Extend Runway 17/35
 LOCATION: Kalamazoo/Battle Creek International Airport
 CITY: Kalamazoo, MI
 DATE: 5/7/2020
 PREPARED BY: JMM

FINAL DESIGN
 PROJECT PROGRAMMING
 FEASIBILITY STUDY
 STATE PLANNING
 BASED ON FY 2020 DOLLARS

WORK DESCRIPTION: Extend Runway and Taxiway 1000' South and 150' North, Rehab shoulders on existing runway, Construct blast pad, light, paint, and relocate NAVAIDS

ITEM DESCRIPTION	UNIT	QTY	UNIT PRICE	ITEM COST
Mobilization and General Conditions	LS	1	\$ 1,300,000.00	\$ 1,300,000
Safety and Security	LS	1	\$ 650,000.00	\$ 650,000
Permits	DLR	10,000	\$ 1.00	\$ 10,000
Remove and Dispose of Bituminous Pavement	SYD	4,500	\$ 2.00	\$ 9,000
Excavation (36")	CYD	70,000	\$ 5.00	\$ 350,000
Subgrade Undercutting	CYD	3,000	\$ 35.00	\$ 105,000
Pulverize (Shoulders for Lights)	SYD	29,000	\$ 1.00	\$ 29,000
Fine Grade (Shoulders for Lights)	SYD	29,000	\$ 1.50	\$ 43,500
P-154 Sand Subbase	CYD	35,000	\$ 15.00	\$ 525,000
P-209 Aggregate Base Course	CYD	15,000	\$ 50.00	\$ 750,000
P-401 Bituminous Aggregate Pavement	TON	51,000	\$ 105.00	\$ 5,355,000
Runway Grooving	SYD	16,400	\$ 2.50	\$ 41,000
Underdrain	LFT	6,000	\$ 4.00	\$ 24,000
Storm Sewer	LFT	1,500	\$ 60.00	\$ 90,000
Catch Basins	EA	8	\$ 6,000.00	\$ 48,000
Vault Modifications	LS	1	\$ 50,000.00	\$ 50,000
Remove Light	EA	100	\$ 200.00	\$ 20,000
Install Elevated HIRL	EA	84	\$ 1,500.00	\$ 126,000
Install Inset HIRL	EA	10	\$ 2,000.00	\$ 20,000
Install Elevated MIRL	EA	82	\$ 1,500.00	\$ 123,000
Guidance Signs LED	EA	8	\$ 4,000.00	\$ 32,000
Distance Remaining Signs	EA	1	\$ 3,000.00	\$ 3,000
Cable, 5KV	LFT	39,800	\$ 3.00	\$ 119,400
Counterpoise	LFT	34,100	\$ 2.00	\$ 68,200
Duct Bank, 1BK2"	LFT	39,800	\$ 10.00	\$ 398,000
Duct Bank, 4BK3" concrete encased	LFT	200	\$ 40.00	\$ 8,000
Electrical Handholes	EA	2	\$ 5,000.00	\$ 10,000
Relocate MALSR	LS	1	\$ 450,000.00	\$ 450,000
Relocate Glideslope	LS	1	\$ 150,000.00	\$ 150,000
Relocate PAPI	LS	1	\$ 50,000.00	\$ 50,000
Relocate REIL	LS	1	\$ 15,000.00	\$ 15,000
Relocate Windcone on New Base	LS	1	\$ 10,000.00	\$ 10,000
Runway Approach Markers and Centerline Monuments	EA	5	\$ 300.00	\$ 1,500
Drainage Improvements (Underdrain, Cleanouts, Pipe, MH's)	LS	1	\$ 150,000.00	\$ 150,000
Pavement Marking (includes removal of existing and new marking)	LS	1	\$ 150,000.00	\$ 150,000
Restoration (Seed and Mulch)	LS	1	\$ 65,000.00	\$ 65,000
Soil Erosion Control Measures	LS	1	\$ 80,000.00	\$ 80,000
Land Acquisition	LS	1	\$ 7,000,000.00	\$ 7,000,000
Relocate Railroad	LS	1	\$ 10,000,000.00	\$ 10,000,000
ALCMS Update	LS	1	\$ 30,000.00	\$ 30,000

	CONSTRUCTION TOTAL =	\$ 28,458,600
	CONSTRUCTION CONTINGENCIES (20%) =	\$ 5,691,720
	CONSTRUCTION TOTAL =	\$ 34,150,320
	ENGINEERING DESIGN =	\$ 2,390,522
	CONSTRUCTION ADMIN =	\$ 3,415,032
		\$ 39,955,874
PROJECT YEAR BUDGET ESTIMATE =		\$ 39,960,000

Note: These costs were developed without the benefit of field surveys or soils investigation. A final cost estimate will be dependent upon development of these items and further design.

**Figure H – Cost Estimate for Alternative 3: 1,000-Foot Extension of Runway 35
(2013 Master Plan Update Preferred Alternative)**

ENGINEERING COST ESTIMATE - ALTERNATIVE 3

PROJECT: Extend Runway 17/35
 LOCATION: Kalamazoo/Battle Creek International Airport
 CITY: Kalamazoo, MI
 DATE: 5/7/2020
 PREPARED BY: JMM

FINAL DESIGN
 PROJECT PROGRAMMING
 FEASIBILITY STUDY
 STATE PLANNING
 BASED ON FY 2020 DOLLARS

WORK DESCRIPTION: Extend Runway and Taxiway 1000' South, Rehab shoulders on existing runway, Construct blast pad, light, paint, and relocate NAVAIDS

ITEM DESCRIPTION	UNIT	QTY	UNIT PRICE	ITEM COST
Mobilization and General Conditions	LS	1	\$ 1,000,000.00	\$ 1,000,000
Safety and Security	LS	1	\$ 500,000.00	\$ 500,000
Permits	DLR	10,000	\$ 1.00	\$ 10,000
Remove and Dispose of Bituminous Pavement	SYD	2,250	\$ 2.00	\$ 4,500
Excavation (36")	CYD	48,000	\$ 5.00	\$ 240,000
Subgrade Undercutting	CYD	3,000	\$ 35.00	\$ 105,000
Pulverize (Shoulders for Lights)	SYD	29,000	\$ 1.00	\$ 29,000
Fine Grade (Shoulders for Lights)	SYD	29,000	\$ 1.50	\$ 43,500
P-154 Sand Subbase	CYD	24,000	\$ 15.00	\$ 360,000
P-209 Aggregate Base Course	CYD	11,000	\$ 50.00	\$ 550,000
P-401 Bituminous Aggregate Pavement	TON	37,000	\$ 105.00	\$ 3,885,000
Runway Grooving	SYD	14,300	\$ 2.50	\$ 35,750
Underdrain	LFT	6,000	\$ 4.00	\$ 24,000
Storm Sewer	LFT	1,500	\$ 60.00	\$ 90,000
Catch Basins	EA	8	\$ 6,000.00	\$ 48,000
Vault Modifications	LS	1	\$ 50,000.00	\$ 50,000
Remove Light	EA	100	\$ 200.00	\$ 20,000
Install Elevated HIRL	EA	82	\$ 1,500.00	\$ 123,000
Install Inset HIRL	EA	10	\$ 2,000.00	\$ 20,000
Install Elevated MIRL	EA	52	\$ 1,500.00	\$ 78,000
Guidance Signs LED	EA	8	\$ 4,000.00	\$ 32,000
Distance Remaining Signs	EA	1	\$ 3,000.00	\$ 3,000
Cable, 5KV	LFT	39,500	\$ 3.00	\$ 118,500
Counterpoise	LFT	34,000	\$ 2.00	\$ 68,000
Duct Bank, 1BK2"	LFT	39,500	\$ 10.00	\$ 395,000
Duct Bank, 4BK3" concrete encased	LFT	200	\$ 40.00	\$ 8,000
Electrical Handholes	EA	2	\$ 5,000.00	\$ 10,000
Relocate MALSR	LS	1	\$ 450,000.00	\$ 450,000
Relocate Glideslope	LS	1	\$ 150,000.00	\$ 150,000
Relocate PAPI	LS	1	\$ 50,000.00	\$ 50,000
Relocate REIL	LS	1	\$ 15,000.00	\$ 15,000
Relocate Windcone on New Base	LS	1	\$ 10,000.00	\$ 10,000
Runway Approach Markers and Centerline Monuments	EA	5	\$ 300.00	\$ 1,500
Drainage Improvements (Underdrain, Cleanouts, Pipe, MH's)	LS	1	\$ 150,000.00	\$ 150,000
Pavement Marking (includes removal of existing and new marking)	LS	1	\$ 150,000.00	\$ 150,000
Restoration (Seed and Mulch)	LS	1	\$ 65,000.00	\$ 65,000
Soil Erosion Control Measures	LS	1	\$ 80,000.00	\$ 80,000
Land Acquisition	LS	1	\$ 7,000,000.00	\$ 7,000,000
Relocate Railroad	LS	1	\$ 10,000,000.00	\$ 10,000,000
ALCMS Update	LS	1	\$ 30,000.00	\$ 30,000

CONSTRUCTION TOTAL = \$ 26,001,750
 CONSTRUCTION CONTINGENCIES (20%) = \$ 5,200,350
 CONSTRUCTION TOTAL = \$ 31,202,100

ENGINEERING DESIGN = \$ 2,184,147
 CONSTRUCTION ADMIN = \$ 3,120,210
 \$ 36,506,457

PROJECT YEAR BUDGET ESTIMATE = \$ 36,510,000



Note: These costs were developed without the benefit of field surveys or soils investigation. A final cost estimate will be dependent upon development of these items and further design.

Figure I – Cost Estimate for Alternative 4: 1,000-Foot Extension of Runway 17, with a Reconfigured Intersection of Taxiway C and Runway 17

ENGINEERING COST ESTIMATE - ATERNATIVE 4

PROJECT: Extend Runway 17/35
 LOCATION: Kalamazoo/Battle Creek International Airport
 CITY: Kalamazoo, MI
 DATE: 5/7/2020
 PREPARED BY: JMM

FINAL DESIGN
 PROJECT PROGRAMMING
 FEASIBILITY STUDY
 STATE PLANNING
 BASED ON FY 2020 DOLLARS

WORK DESCRIPTION: Extend Runway and Taxiway 1000' North, Rehab shoulders on existing runway, Construct blast pad, light, paint, and relocate NAVAIDS

ITEM DESCRIPTION	UNIT	QTY	UNIT PRICE	ITEM COST
Mobilization and General Conditions	LS	1	\$ 1,100,000.00	\$ 1,100,000
Safety and Security	LS	1	\$ 550,000.00	\$ 550,000
Permits	DLR	10,000	\$ 1.00	\$ 10,000
Remove and Dispose of Bituminous Pavement	SYD	40,000	\$ 2.00	\$ 80,000
Excavation (36")	CYD	54,000	\$ 5.00	\$ 270,000
Subgrade Undercutting	CYD	3,000	\$ 35.00	\$ 105,000
Pulverize (Shoulders for Lights)	SYD	29,000	\$ 1.00	\$ 29,000
Fine Grade (Shoulders for Lights)	SYD	29,000	\$ 1.50	\$ 43,500
P-154 Sand Subbase	CYD	27,000	\$ 15.00	\$ 405,000
P-209 Aggregate Base Course	CYD	12,000	\$ 50.00	\$ 600,000
P-401 Bituminous Aggregate Pavement	TON	42,000	\$ 105.00	\$ 4,410,000
Runway Grooving	SYD	14,300	\$ 2.50	\$ 35,750
Underdrain	LFT	6,000	\$ 4.00	\$ 24,000
Storm Sewer	LFT	1,500	\$ 60.00	\$ 90,000
Catch Basins	EA	8	\$ 6,000.00	\$ 48,000
Vault Modifications	LS	1	\$ 50,000.00	\$ 50,000
Remove Light	EA	100	\$ 200.00	\$ 20,000
Install Elevated HIRL	EA	82	\$ 1,500.00	\$ 123,000
Install Inset HIRL	EA	10	\$ 2,000.00	\$ 20,000
Install Elevated MIRL	EA	50	\$ 1,500.00	\$ 75,000
Guidance Signs LED	EA	8	\$ 4,000.00	\$ 32,000
Distance Remaining Signs	EA	1	\$ 3,000.00	\$ 3,000
Cable, 5KV	LFT	39,500	\$ 3.00	\$ 118,500
Counterpoise	LFT	34,000	\$ 2.00	\$ 68,000
Duct Bank, 1BK2"	LFT	39,500	\$ 10.00	\$ 395,000
Duct Bank, 4BK3" concrete encased	LFT	200	\$ 40.00	\$ 8,000
Electrical Handholes	EA	2	\$ 5,000.00	\$ 10,000
Relocate MALSR	LS	1	\$ 450,000.00	\$ 450,000
Relocate Glideslope	LS	1	\$ 150,000.00	\$ 150,000
Relocate PAPI	LS	1	\$ 50,000.00	\$ 50,000
Relocate REIL	LS	1	\$ 15,000.00	\$ 15,000
Relocate Windcone on New Base	LS	1	\$ 10,000.00	\$ 10,000
Runway Approach Markers and Centerline Monuments	EA	5	\$ 300.00	\$ 1,500
Drainage Improvements (Underdrain, Cleanouts, Pipe, MH's)	LS	1	\$ 150,000.00	\$ 150,000
Pavement Marking (includes removal of existing and new marking)	LS	1	\$ 150,000.00	\$ 150,000
Restoration (Seed and Mulch)	LS	1	\$ 65,000.00	\$ 65,000
Soil Erosion Control Measures	LS	1	\$ 80,000.00	\$ 80,000
ALCMS Update	LS	1	\$ 30,000.00	\$ 30,000

CONSTRUCTION TOTAL = \$ 9,874,250
 CONSTRUCTION CONTINGENCIES (20%) = \$ 1,974,850
 CONSTRUCTION TOTAL = \$ 11,849,100
 ENGINEERING DESIGN = \$ 829,437
 CONSTRUCTION ADMIN = \$ 1,184,910
 \$ 13,863,447

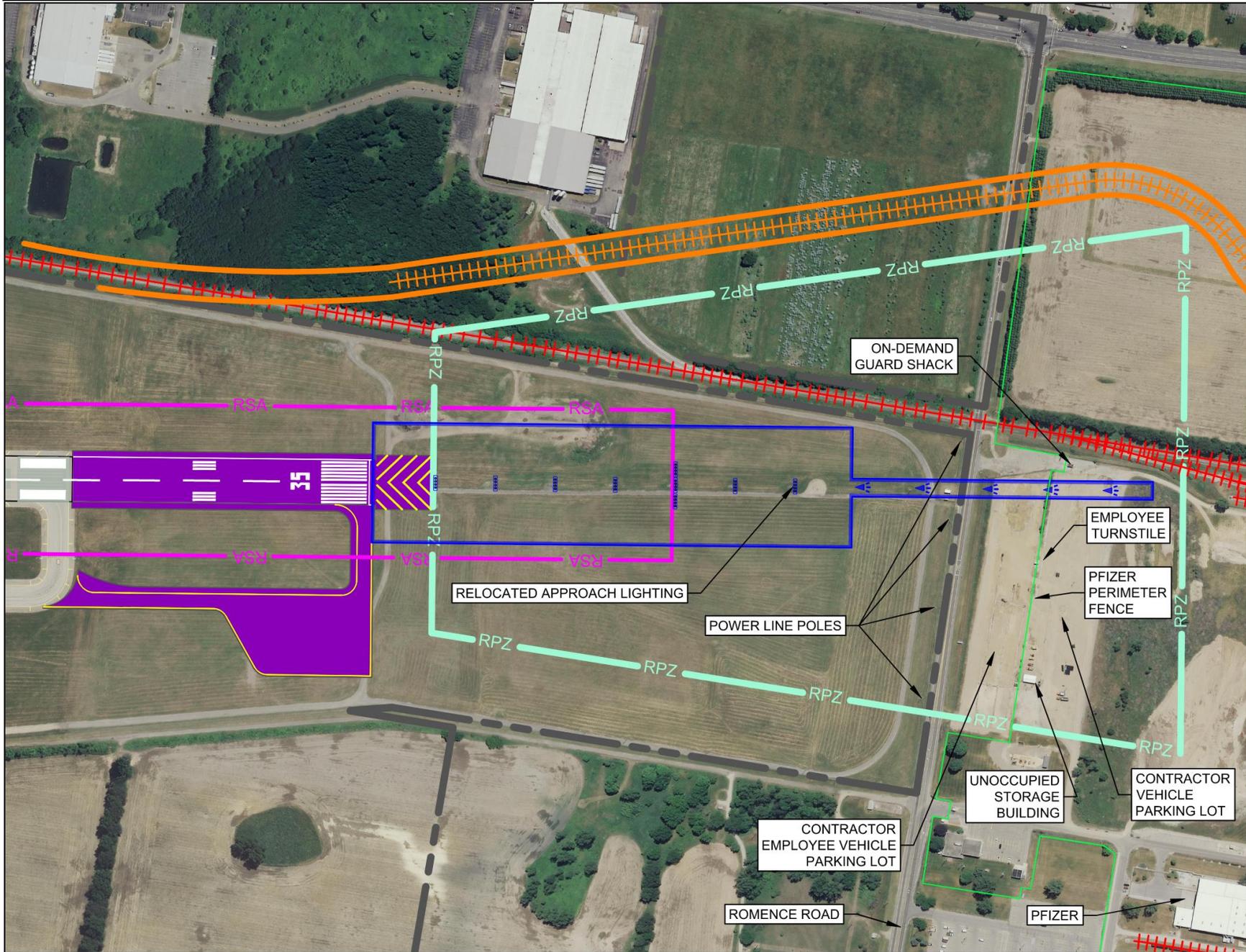


***Alternative 4 does not consider the expense of possible land acquisition or rerouting of Kilgore Road or I-94, which would significantly increase costs.**

PROJECT YEAR BUDGET ESTIMATE = \$ 13,870,000

Note: These costs were developed without the benefit of field surveys or soils investigation. A final cost estimate will be dependent upon development of these items and further design.

Attachment J – Future RPZ at Approach End of Runway 35



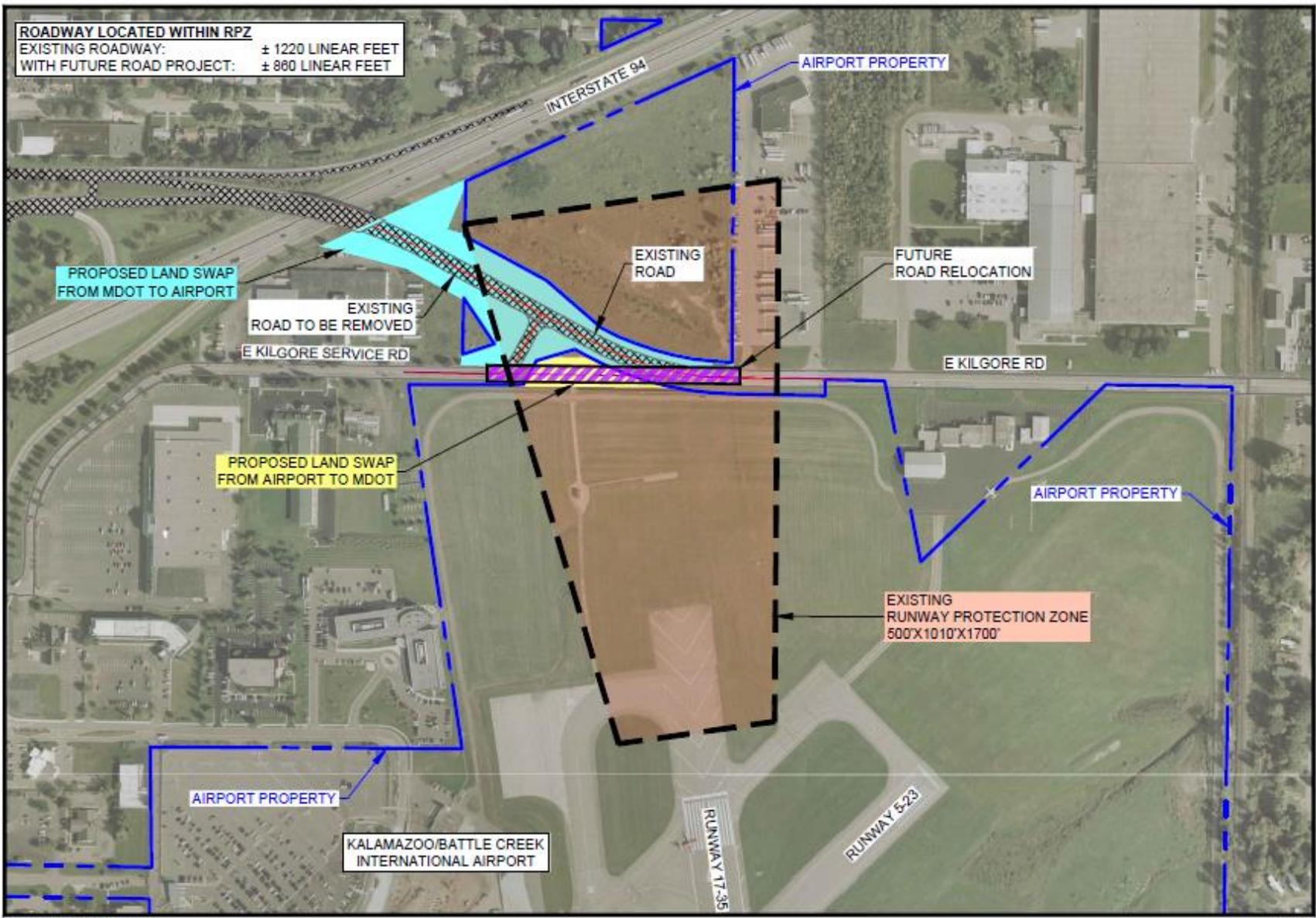
Attachment K – Future RPZ at Approach End of Runway 17

FIGURE
1

KALAMAZOO/BATTLE CREEK INTERNATIONAL AIRPORT

PROPOSED KILGORE ROAD RELOCATION - EXISTING RPZ WITHOUT RUNWAY EXTENSION

SCALE: 1"=400'
N ↑



PREPARED BY: MEAD & HUNT

02/15/21

PROPOSED KILGORE ROAD RELOCATION - FUTURE RPZ WITH RUNWAY EXTENSION

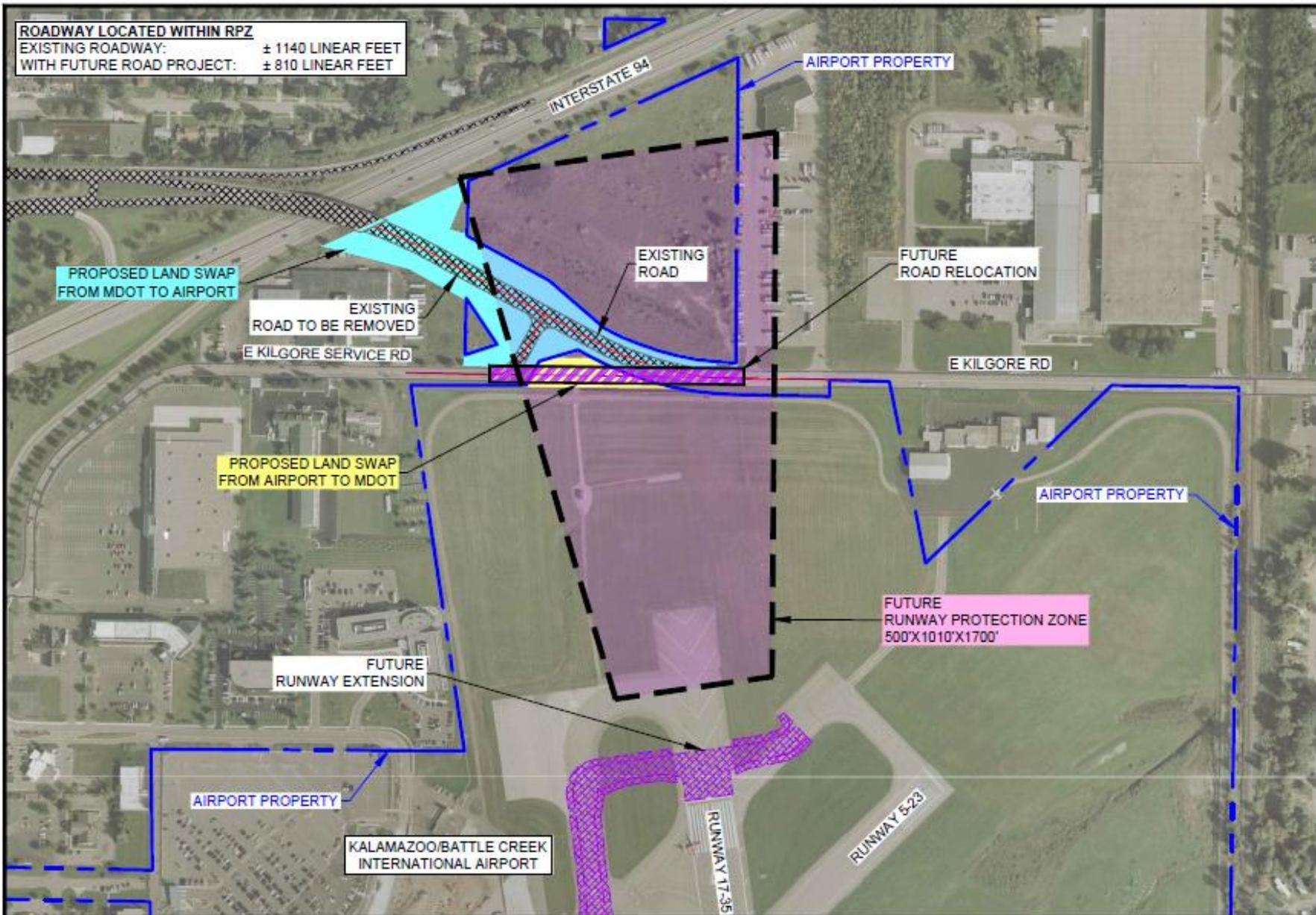
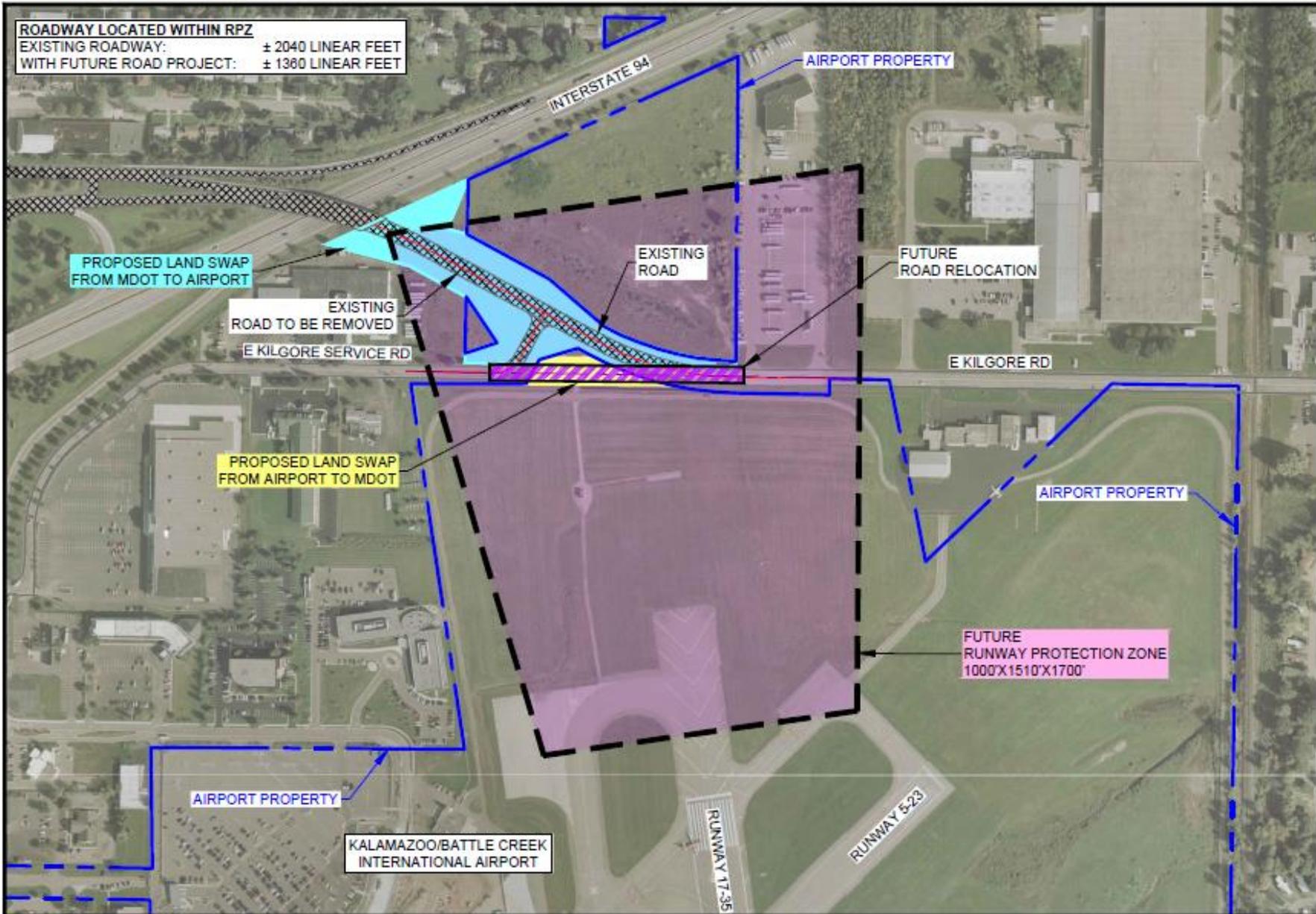


FIGURE
3

KALAMAZOO/BATTLE CREEK INTERNATIONAL AIRPORT

PROPOSED KILGORE ROAD RELOCATION - FUTURE RPZ WITHOUT RUNWAY EXTENSION

SCALE: 1"=400'
N



PREPARED BY: MEAD & HUNT

02/15/21

PROPOSED KILGORE ROAD RELOCATION - FUTURE RPZ WITH RUNWAY EXTENSION

