

This chapter presents and analyzes alternatives for meeting the needs presented in the facility requirements chapter. These alternatives have considered the long-term development of the Central Wisconsin Airport (CWA or the Airport while also meeting immediate needs. For each need identified, several different scenarios have been considered in the development of the alternatives presented in the following sections of this chapter:

- Runway Alternatives
- Passenger Terminal
- Hangar Alternatives
- Aircraft Apron and Parking
- Snow Removal Equipment (SRE) Facilities
- General Aviation (GA) Terminal

- Aircraft Rescue and Firefighting (ARFF) Facilities
- Air Traffic Control Tower (ATCT)
- Fuel Farm
- Vehicle Parking and Rental Car Facilities
- NAVAIDs and Instrument Approaches

4.1 Runway Alternatives

As discussed in the previous chapters, the existing runway configuration presents several concerns and decoupling the Runway 17 and Runway 08 thresholds should be considered. This section analyzes alternatives to determine if changes to the runway configuration would be beneficial. Due to the significance of the runway thresholds, both from an operational and regulatory standpoint, this section is divided into four subsections, including:

- Alternatives Criteria This subsection summarizes the criteria used to evaluate the alternatives.
- Initial Runway Decoupling Alternatives This subsection presents an initial set of six alternatives that emphasize strict adherence to regulatory standards while also preserving airport utility.



Precision Obstacle Free Zone (POFZ) – The POFZ is a rectangular area immediately prior to the landing threshold that ensures unnecessary objects are clear from the operational environment. Unlike most surfaces, this is a temporary surface that is only in effect when all of the following conditions are met:

- The instrument approach to the runway includes vertical guidance;
- The reported ceiling is below 250 feet, or visibility is less than 3/4 statute miles; and
- An aircraft is on final approach within 2 miles of the runway threshold.

The only approaches that meet these conditions, and would be subject to POFZ requirements, are Runways 08 and 35. At 200 feet long and 800 feet wide, the POFZ may affect the location of the aircraft hold lines near these runways if a displaced threshold is employed.

Threshold Siting Surfaces (TSS) – The TSS consists of sloping approach and departure surfaces that should be clear of objects to protect aircraft arriving and departing the runway. The airfield at CWA is largely unencumbered by surrounding objects and structures, and so the controlling object for most situations analyzed by these alternatives is the tail of an aircraft using the other runway. Of the critical aircraft, the ERJ-175 has the tallest tail at a rounded height of 33 feet (32' 3"). Although the B737 is taller, it does not have more than 500 annual operations, and therefore, it does not meet the Federal Aviation Administration (FAA) criteria for a critical aircraft. **Table 4-2** shows the slopes for each approach and departure surface, as well as the distance required from the end of a runway to the opposing runway centerline in order to maintain clearance during ERJ-175 operations.

Runway	TSS Type	TSS Description	Slope	Required Separation from Opposing Runway Centerline				
Approach Surface								
Runway 08	Type 7	Approach end of runways expected to accommodate instrument approaches having visibility minimums <= ¾ mile	34:1	1,122'				
Runway 26	Type 6	Approach end of runways expected to accommodate instrument approaches having visibility minimums >= ¾ mile but <1 statute mile, day or night	20:1	660'				
Runway 17	Type 5	Approach end of runways expected to support instrument night operations serving greater than approach Category B aircraft	20:1	660'				
Runway 35	Type 7	Approach end of runways expected to accommodate instrument approaches having visibility minimums <= 3/4 mile	34:1	1,122'				
Departure S	urface							
All	Туре 9	Departure runway ends for all instrument operations	40:1	1,320'				

Table 4-2: Threshold Siting Surfaces

Source: AC 150/5300-13A, Airport Design, Change 1, Table 3-2 (February 26, 2014)



Declared Distances

Declared distances represent the maximum distances available and suitable for meeting takeoff, aborted takeoff, and landing distance performance requirements for turbine powered aircraft. Four declared distances may be employed by an airport owner: takeoff run available (TORA) and takeoff distance available (TODA), which apply to takeoff; accelerate-stop distance available (ASDA), which applies to aborted takeoff; and landing distance available (LDA), which applies to landing. These distances may be employed for the following purposes per FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*:

- To obtain additional RSA and/or ROFA prior to the runway's threshold (the start of the LDA) and/or beyond the stop end of the LDA and ASDA;
- To mitigate unacceptable incompatible land uses in the RPZ;
- To meet runway approach and/or departure surface clearance requirements, in accordance with airport design standards; or
- To mitigate environmental impacts.

As some of the alternatives incorporate a displaced threshold and/or declared distances, a brief discussion of each is provided below. Each of these distances is treated independently to address a different aspect of aircraft performance.

Start of Takeoff – The start of takeoff for the TORA, TODA, and ASDA will always be in the same location. Neither the threshold locations, the RPZs, nor the RSA and ROFA behind start of takeoff are considered in establishing the start of takeoff.

Takeoff Run Available (TORA) – The takeoff run of an aircraft is the distance required to accelerate from brake release to lift-off, plus safety factors. The start of takeoff, departure RPZ, and limitations resulting from a reduced TODA (see below) are considered in determining the TORA. In cases where there are incompatible land uses in the departure RPZ, such as buildings or other obstructions, the TORA may be reduced. The TORA may never be longer than the TODA when the TODA is shortened to less than the overall runway length to mitigate for departure obstacles.

Takeoff Distance Available (TODA) – The takeoff distance of an aircraft is the distance required to accelerate from brake release past lift-off to the start of takeoff climb, plus safety factors. The start of takeoff, departure surface requirements, and any clearway are considered in determining the TODA. As this alternatives analysis does not consider establishment of a clearway, departure surface requirements will determine TODA length.

Accelerate-Stop Distance Available (ASDA) – The accelerate-stop distance of an aircraft is the distance required to accelerate from brake release to the takeoff decision speed (V₁) and then decelerate to a stop, plus safety factors. The RSA and ROFA beyond the ASDA are considered in determining the ASDA length. When the standard RSA length beyond the end of the runway is not obtainable, additional RSA may be obtained by reducing the ASDA.

Landing Distance Available (LDA) – The landing distance of an aircraft is the distance from the landing threshold required to complete the approach, touchdown, and decelerate to a stop, plus safety factors. The threshold siting criteria, the approach RPZ, the RSA and ROFA prior to threshold, and the RSA and ROFA beyond the LDA are considerations in establishing the LDA.



When the RSA, ROFA, approach RPZ, and threshold siting requirements are met, the landing threshold is normally placed at the beginning of the runway. When these requirements are not met, the threshold may be displaced further down the runway. Known as a displaced threshold, this layout relocates the runway surfaces to avoid or mitigate existing conflicts. There are currently no displaced thresholds at CWA.

The RSA and ROFA length beyond the LDA are considered in determining the LDA end point. When the standard RSA length beyond the end of the runway is not obtainable, additional RSA may be obtained by reducing the LDA.

Table 4-3 summarizes criteria affecting the start and end points of each declared distance.

Declared Distance	Criteria Affecting Start Point	Criteria Affecting End Point
Takeoff Run Available (TORA)	Start of Takeoff	Departure RPZ, TODA
Takeoff Distance Available (TODA)	Start of Takeoff	Departure Surface
Accelerate-Stop Distance Available (ASDA)	Start of Takeoff	RSA, ROFA
Landing Distance Available (LDA)	RSA, ROFA, Approach RPZ, TSS	RSA, ROFA

Table 4-3: Declared Distances Controlling Surfaces

Source: FAA AC 150/5300-13A, Airport Design

Airport Utility

Airport utility refers to the Airport's ability to safely and efficiently accommodate aircraft activity. Airport utility is largely dictated by the length of its runways, as this can be a limiting factor that restricts the ability of aircraft to use the Airport. For instance, the CRJ-900 requires the full length of Runway 08/26 to operate at 100% useful load.

In addition to runway length, the taxiway system and its ability to allow for safe and efficient traffic circulation should be considered. For instance, decoupling the runways by shifting Runway 17/35 to the south would leave Taxiway B as the only access to Runway 17/35. If maintenance is required or an emergency occurs on Taxiway B north of Taxiway R, aircraft would not have access to Runway 17/35. In addition, aircraft rescue and firefighting (ARFF) and snow removal equipment (SRE) would have to drive off the pavement to reach Runway 17/35, which may not be possible during inclement weather such as heavy rain or accumulated snow. For improved circulation and safety, and to provide an alternate route during temporary closure of Taxiway B (such as during maintenance or emergencies), another route to Runway 17/35 would need to be provided. Several other methods were considered for Alternatives 1 through 4, including extending the parallel portion of Taxiway B across Runway 08/26 and including connections to the relocated Runway 17 threshold. However, as there is not sufficient space to construct a taxiway around the threshold of Runway 08, any taxiway connection would require aircraft to cross Runway 08/26. This is undesirable as it would limit capacity, create congestion, and increase the likelihood of a runway incursion. A primary objective of decoupling the runway thresholds would be to reduce the risk for runway incursions. Requiring aircraft to cross Runway 08/26 to use Runway 17/35 after decoupling the runways would greatly reduce the safety benefits of decoupling the runways.



Environmental Effects

Alternatives should attempt to avoid, minimize, or mitigate environmental impacts wherever possible. The primary environmental effects of the runway decoupling alternatives are related to wetlands. The high water table and level topography on the Airport result in extensive wetlands. The runways at CWA are bounded to the west, south, and east by wetlands that include freshwater forested, shrub, and freshwater emergent wetlands. Decoupling the runways may result in wetland impacts. Estimates of impacted wetlands are identified for each alternative, based on a wetland delineation conducted south of Runway 17/35 in October 2016. In addition to the wetlands located south of Runway 17/35, the National Wetland Inventory (NWI) database maintained by the U.S. Fish & Wildlife Service also shows a small area of wetlands to the immediate southeast of the runway intersection. These areas may be affected by several of the proposed taxiway systems connecting to the relocated threshold.

Navigational Aids (NAVAIDs)

NAVAIDs provide guidance and direction to pilots and are an integral part of any airport. The relocation of any runway threshold will likely require the reconfiguration of associated NAVAIDs. As noted in Chapter 1, Runways 08 and 35 both have an approach lighting system (Medium Intensity Approach Lights with Runway Alignment Indicators [MALSR]) and Instrument Landing System (ILS), while Runways 17 and 26 have Runway End Identifier Lights (REIL) and Precision Approach Path Indicators (PAPI). Both runways also have High Intensity Runway Lighting (HIRL) along the pavement edges. Equipment that must be relocated will be identified for each alternative.

Feasibility

This criterion considers a variety of factors that may affect the feasibility of an alternative. This includes implementation cost, construction and funding timelines, and impacts to surrounding infrastructure. CWA is bounded by Interstate 39 to the west and State Highway 153 to the north, and relocation of these highways is not feasible, and therefore, was not considered. This criterion includes a cost estimate for each alternative including reconstruction of Runway 17/35.

4.1.2 Initial Runway Decoupling Alternatives

This subsection presents six initial alternatives for decoupling the runways at CWA. These alternatives were originally presented in a technical report dated June 9, 2017, and discussed with FAA staff in Chicago on June 21, 2017:

- Alternative 1: Shift Runway 17/35 South 1,740'
- Alternative 2: Shift Runway 17/35 South 830' and Displace Runway 17 Threshold 470'
- Alternative 3: Shorten Runway 17/35 to 5,671' and Displace Runway 17 Threshold 470'
- Alternative 4: Shorten Runway 17/35 to 4,761'
- Alternative 5: Shift Runway 08/26 East and Displace Runway 08 Threshold
- Alternative 6: No-Build with Alternative Mitigation Strategies



Alternative 1: Shift Runway 17/35 South 1,740'

This alternative would shift Runway 17/35 by 1,740 feet to the south to decouple the runways while maintaining its current 6,501-foot length. Shown in **Figure 4-1**, this alternative would provide separation of runway surfaces although the shifted surfaces south of the runway would extend beyond existing Airport property and require considerable land acquisition. Relocation of the Runway 35 RSA, RPZ, and MALSR would require closure and/or relocation of several minor roads to the south of the runway as well.

Design Standards – The Runway 17 threshold would require separation from Runway 08/26 based on the 40:1 departure surface, which requires a separation of 1,320 feet from the Runway 17 threshold to the Runway 08/26 centerline for aircraft departing Runway 35 to clear the tail of an ERJ-175 on the Runway 08 threshold. Currently, 420 feet of Runway 17/35 is located north of the Runway 08/26 centerline. Therefore, meeting departure surface requirements would require relocating the Runway 17 threshold 1,740 feet to the south. This would also separate the RSAs for the two runways.

Airport Utility – The 1,740 feet removed on the north end of Runway 17/35 would be replaced on the south end. As there would be no effective change in runway length, this would have no impact on the utility of Runway 17/35.

In the current configuration, aircraft taxi across the Runway 17 threshold to access Runway 08. As discussed previously, this is not ideal and would be corrected by this alternative. However, Taxiway B would become the sole access to Runway 17/35 under this alternative. This would create a bottleneck where aircraft would have to wait for other traffic to depart Runway 17/35 or exit Taxiway B before crossing Runway 08/26.

Environmental Effects – As the affected areas are dominated by wetlands, the runway and parallel taxiway extension and associated NAVAIDs would impact approximately 12.4 acres of wetlands south and east of Runway 17/35.

NAVAIDs – In addition to moving the runway threshold locations, supporting NAVAIDs must also be moved so they can continue to properly serve their function. As this alternative proposes changing the location of both thresholds for Runway 17/35, there would be impacts to NAVAIDs on both ends. NAVAIDs to be relocated at the Runway 17 end would include the REIL, PAPI, and HIRL systems. For Runway 35, there would be several considerations for the ILS. The MALSR would need to be relocated south, a move that would position the initial lights of the system beyond existing Airport property. FAA Order 6750.16E identifies a maximum standard distance of 2,000 feet between a localizer antenna and the runway stop end, and once the Runway 17 threshold is relocated to the south, this distance would be exceeded. Although the location of the localizer beyond the 2,000-foot limit is usually not recommended, the Order states "location beyond this distance is permissible where significant advantages can be obtained." Therefore, relocation of the Runway 35 localizer may not be necessary under this alternative.

Lighting would need to be added to the extended runway and parallel taxiway. Due to relocation of the MALSR system and associated access roads, this would involve significant cost and coordination, and would increase impacts to wetlands, surrounding private lands, and roads compared to other alternatives.











Source: USGS Earthstar Geographics, National Fish & Wildlife Service - National Wetland Inventory, 2016 Becher-Hoppe Airport Layout Base Map

Feasibility – Feasibility challenges for this alternative are threefold: road closures, land acquisition, and topography. In order to prevent conflicts with the RSA, MALSR, and RPZ, Cessna Road and portions of Ridge Road and Balsam Road would have to be closed. The closure of these roads would sever access to farms and rural residences in the area and affected parcels may have to be acquired. The total land to be acquired under this alternative is estimated at 203 acres. This does not include several large parcels that may no longer have access to local roads. Finally, the elevation beyond the existing Runway 35 end drops by approximately 50 feet. As runway grade may only change within specified tolerances, fill would have to be brought in to build up this area. For these reasons, the 1,740-foot runway shift would involve significant expense and impact. The total estimated cost for this alternative is \$60.9 million. This estimate includes reconstruction of any existing Runway 17/35 pavements, which would likely need to occur simultaneously.

Alternative 2: Shift Runway 17/35 South 830' and Displace Runway 17 Threshold 470'

This alternative would shift Runway 17/35 by 830 feet to the south to decouple the runways, while displacing the Runway 17 threshold by 470 feet and using declared distances to minimize environmental impacts and maximize usable runway. This alternative is shown in **Figure 4-2**.

Design Standards – As Runway 17/35 would have declared distances there are several design surfaces to consider. The paved runway surface would begin 400 feet south of the Runway 08/26 centerline, as this is the required separation for its accompanying taxiway. When this separation is combined with the runway to be removed north of the Runway 08/26 centerline, Runway 17/35 would be shifted 830 feet to the south. The RSA prior to the displaced Runway 17 threshold would be 600 feet long and 500 feet wide, and therefore, a distance of 850 feet would be required between the Runway 17 displaced threshold and the Runway 08 centerline to separate the RSAs.

There would be minor changes to operational distances for aircraft operating on Runway 17, as the LDA would be reduced to provide clearance for the RSA. However, declared distances for aircraft using Runway 35 would be significantly shorter for both takeoff and landing when compared to the existing runway. The Runway 35 TODA would be limited for the departure surface to clear the tail of an ERJ-175 on the Runway 08 threshold, and as the TORA may never be longer than the TODA, the TORA is equally restricted. Finally, the LDA and ASDA are limited by 1,000 feet of RSA required beyond their stop ends. The declared distances for this alternative are summarized in **Table 4-4**.

Bunway	Existing	Proposed Declared Distances (feet)						
Kunway	Length	TODA	TORA	ASDA	LDA			
Runway 17	6,501	6,501	6,501	6,501	6,031			
Runway 35	6,501	5,591	5,591	5,661	5,661			
Runway 08	7,648	No Change	No Change	No Change	No Change			
Runway 26	7,648	No Change	No Change	No Change	No Change			

Table 4-4: Alternative 2 Declared Distances

Finally, the runway shift would relocate the Runway 35 RPZ such that a corner of the RPZ would extend beyond Airport property.











Source: USGS Earthstar Geographics, National Fish & Wildlife Service - National Wetland Inventory, 2016 Becher-Hoppe Airport Layout Base Map

Airport Utility – This alternative would adversely affect Airport utility because it would reduce the Runway 17 LDA and all Runway 35 declared distances. The taxiway system proposed under the alternative would also introduce several complexities. Decoupling the Runway 17 and 08 thresholds will sever one of the taxi routes to Runway 17/35 and create a bottleneck, like Alternative 1. In addition, the proposed taxiway that connects to the relocated Runway 17 end would be located beneath the departure and approach surfaces. Although FAA guidance is unclear regarding hold position marking requirements related to these surfaces, previous consultant experience has shown that aircraft are often required to keep clear of these areas while waiting for departure. To ensure aircraft do not prematurely enter these areas, hold position markings would be placed on the taxiways outside of these zones. While this would be an effective way to ensure that aircraft remain clear of these surfaces it would result in unusual hold locations that pilots are not likely to anticipate.

Environmental Effects – Although not as extensive as Alternative 1, this alternative would have considerable impacts to the wetlands. Based upon the recent delineation and NWI data, approximately 11.1 acres of wetlands would be impacted by this alternative.

NAVAIDS – Similar to Alternative 1, the Runway 17 REIL, PAPI, and HIRL systems would need to be relocated. The MALSR, glideslope antenna, and associated Runway 35 facilities would have to be relocated under this alternative as well, although the localizer could remain in its current location based on FAA ILS siting criteria.

Feasibility – Several roads south of Airport property would need to be closed and/or relocated to accommodate the extended taxiway and MALSR. Due to remnants of inaccessible land created by closing these roads, approximately 174 acres of land would have to be acquired. This does not include several large parcels that may no longer have access to local roads. The total estimated cost for this alternative is \$53.4 million. This estimate includes reconstruction of any existing Runway 17/35 pavements, which would likely need to occur simultaneously.

Alternative 3: Shorten Runway 17/35 to 5,671' and Displace Runway 17 Threshold 470'

This alternative would shorten Runway 17/35 from 6,501 to 5,671 feet to decouple the runways while displacing the Runway 17 threshold and using declared distances to maximize usable runway, as shown in **Figure 4-3**.

Design Standards – This alternative would displace the Runway 17 threshold, the same as Alternative 2, but would not extend the runway to the south. The Runway 17 LDA of 5,201 feet would be less than the total runway length, as aircraft would be required to land beyond the displaced threshold to provide a compliant RSA. For Runway 35, the most significant change from its current length would be to the TODA and TORA. All declared distances associated with this alternative are summarized in **Table 4-5**.









Figure 4-3: Runway Alternate 3

Source: USGS Earthstar Geographics, National Fish & Wildlife Service - National Wetland Inventory, 2016 Becher-Hoppe Airport Layout Base Map

Bunway	Existing	Proposed Declared Distances (feet)						
Kuliway	Length	TODA TORA		ASDA	LDA			
Runway 17	6,501	5,671	5,671	5,671	5,201			
Runway 35	6,501	4,761	4,761	4,831	4,831			
Runway 08	7,648	No Change	No Change	No Change	No Change			
Runway 26	7,648	No Change	No Change	No Change	No Change			

Table 4-5:	Alternative	3 Declared	Distances
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Airport Utility – Displacing the Runway 17 threshold would preserve additional runway compared to shortening the runway alone (see Alternative 4), thereby allowing some larger aircraft to operate on Runway 17/35. The Runway 17 declared distances may preserve limited air carrier utility, but the Runway 35 declared distances would be reduced below a length usable by air carriers. This alternative would also create taxiway circulation issues similar to Alternative 2.

Environmental Effects – This alternative would take place entirely on existing Airport property and environmental impacts would be limited. Approximately 0.7 acres of the small wetland area east of Runway 17/35 would be impacted by the new taxiways required to access the relocated Runway 17 end.

NAVAIDs – NAVAID relocations would consist only of the Runway 17 PAPI, REIL, and HIRL systems. Lighting would also need to be added for the proposed taxiway.

Feasibility – The construction of additional pavement would be limited when compared to other alternatives. Taxiway B would be extended, but the remaining modifications to the Airport would primarily be removing existing pavement. NAVAID relocation costs would also be reduced compared to other alternatives. The total estimated cost for this alternative is \$25.9 million. This estimate includes reconstruction of any existing Runway 17/35 pavements, which would likely need to occur simultaneously.

Alternative 4: Shorten Runway 17/35 to 4,761'

This alternative would shorten Runway 17/35 from 6,501 to 4,761 feet to decouple the runways, as shown in **Figure 4-4**. As there would not be an extension south of the runway to compensate for this loss of runway length, this alternative would be contained on existing Airport property and environmental impacts would be limited. However, as the runway would be shortened below 5,000 feet, Airport utility and reliability would be significantly impacted.

Design Standards – Like Alternative 1, the relocated Runway 17 threshold would require separation from Runway 08/26 based on the 40:1 departure surface. The threshold would have to be relocated 1,740 feet to the south for aircraft departing Runway 35 to clear the tail of an ERJ-175 on the Runway 08 threshold. This would also separate the RSAs for the two runways.











Figure 4-4: Runway Alternate 4



Source: USGS Earthstar Geographics, National Fish & Wildlife Service - National Wetland Inventory, 2016 Becher-Hoppe Airport Layout Base Map

Airport Utility – Relocation of the Runway 17 threshold would result in a significantly shorter runway length. The current runway length is sufficient to serve a portion of the air carrier fleet such as the ERJ-170, ERJ-175 and CRJ-700. However, at this reduced length, the runway could not be used by the air carrier fleet and would be dedicated to GA use. Air carrier operations would be limited to Runway 08/26. This would reduce options available to air carriers and thereby reduce the utility and reliability of the Airport as a whole. The proposed taxiways would also limit access to Runway 17/35 and create congestion, similar to the previous alternatives.

Environmental Effects – This alternative would take place entirely on existing Airport property and environmental impacts would be limited. Approximately 0.3 acres of the small wetland area east of Runway 17/35 would be impacted by the new taxiways required to access the relocated Runway 17 end.

NAVAIDs – NAVAIDs to be relocated would include the Runway 17 REIL, PAPI, and HIRL systems. Similar to Alternative 1, the localizer would not meet siting criteria but may be able to remain in its current location. Lighting would also need to be added to the proposed taxiway.

Feasibility – As this alternative proposes a minimal amount of new pavement and would not require the relocation of the Runway 35 NAVAIDs, there are few barriers to its implementation. The total estimated cost for this alternative is \$19.8 million. This estimate includes reconstruction of any existing Runway 17/35 pavements, which would likely need to occur simultaneously.

Alternative 5: Shift Runway 08/26 East and Displace Runway 08 Threshold

This alternative proposes relocating the Runway 08 end 475 feet to the east to decouple the runways; displacing the Runway 08 threshold an additional 1,250 feet from the new runway end to clear the precision Part 77 approach surface (50:1); and extending Runway 08/26 by 352 feet to the east using the existing prepared subgrade, as shown in **Figure 4-5**. This would reduce the overall Runway 08/26 length from 7,648 to 7,525 feet, and declared distances would be used to maximize usable runway length for all operations. Although the declared distances would have unacceptable impacts to Airport utility, this alternative would reduce the extent of new construction compared to Alternatives 1 and 2 while maintaining the current length of Runway 17/35.

Design Standards – Because Runway 08 has an ILS approach, the Part 77 precision approach surface should be considered the most demanding surface, as it slopes up for the first 10,000 feet into the approach at a ratio of 50:1. Given the shallow slope, the Runway 08 threshold would have to be placed 1,650 feet away from the Runway 17/35 centerline to clear the tail of an ERJ-175 on the Runway 17 threshold. The approach surface would overlap the surrounding taxiways, preventing use of these taxiways when Runway 08/26 is in use. Hold lines would be placed in several locations to prevent penetration of these surfaces, in addition to hold lines required to protect the Runway 08 ILS from interference during inclement weather. The numerous design surfaces would overlap crucial areas of the airfield environment, and complex taxiway markings and air traffic control procedures would be required to prevent aircraft incidents on the ground.





Figure 4-5: Runway Alternate 5



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Airport Utility – Proposed declared distances associated with this alternative are shown in **Table 4-6**. All of these declared distances would be less than the existing Runway 08/26 length, with Runway 08 landings and all operations on Runway 26 significantly affected.

Bupwoy	Existing	Proposed Declared Distances (feet)						
Kuliway	Length	TODA TORA		ASDA	LDA			
Runway 17	6,501	No Change	No Change	No Change	No Change			
Runway 35	6,501	No Change	No Change	No Change	No Change			
Runway 08	7,648	7,525	7,173	7,525	6,275			
Runway 26	7,648	6,605	6,605	6,675	6,323			

Table 4-6: Alternative 5 Declared Distances

While the declared distances would be sufficient to serve many commercial aircraft, the hold lines necessary to prevent aircraft from penetrating the Part 77 approach surface would severely disrupt traffic flow, resulting in unacceptable congestion on the aircraft parking aprons. Air carriers would have to wait on or near the apron when waiting for other aircraft to arrive or depart on Runway 08/26, which would create congestion and delay because aircraft would not be able to exit and enter the apron efficiently.

Environmental Effects – As new pavement proposed under this alternative would be contained entirely on Airport property in dry areas, there would be no wetland impacts for this alternative.

NAVAIDs – Runway 08 ILS facilities, including the glideslope antenna and MALSR, would have to be relocated. Although there is room for the glideslope antenna to be relocated without conflicting with existing facilities, the MALSR is currently split by Interstate 39, and relocation of the Runway 08 threshold would move several of the lighting fixtures to the east side of the Interstate and require some to be in-pavement.

Feasibility – This alternative would require less new pavement than Alternatives 1 and 2. Operational impacts make this alternative impractical. The total estimated cost for this alternative is \$29.3 million. This estimate includes reconstruction of any existing Runway 17/35 pavements, which would likely need to occur simultaneously.

Alternative 6: No-Build with Alternative Mitigation Strategies

This alternative would retain the existing runway and taxiway configuration. Although there are operational safety issues with the current configuration, as explained in the previous chapter, decoupling the runways is only one method of mitigating these issues. This alternative involves implementing various alternate methods of mitigating operational issues while retaining the existing configuration.

The 2007 Wrong Runway Departures study identified a variety of safety enhancements and scored them to determine their effectiveness at mitigating the potential for aircraft incidents at CWA. These scores were determined by a Joint Implementation Measurement Data Analysis Team (JIMDAT) based on an evaluation of the specific 1996 incident at CWA reviewed by the study. The JIMDAT score (often represented as a percentage) identifies the approximate portion of the risk that would have been eliminated by the specific mitigation strategy. These scores are tailored for the environment at each individual airport.



Each mitigation strategy listed by the 2007 study as applicable for CWA is included in **Table 4-7** beside its risk mitigation JIMDAT score.

Risk Mitigation JIMDAT Score	Mitigation Type
85%	Own-Ship Moving Map Display - Directed Path
85%	Own-Ship Moving Map Display - Directed Path and Runway Awareness and Advisory System (RAAS)
10%	Airport Surface Detection Equipment Model X (ASDE-X)
10%	Airport Movement Area Safety System (AMASS)
65%	Flight Crews – Cockpit Resource Management
45%	Air Traffic Control (ATC) Crew Resource Management
30%	Training Flight Crew – Special emphasis scenario based training
30%	Training ATC – Special emphasis scenario based training
75%	ATC Clearances – Policy Review of FAA Order 7110.65, Air Traffic Control
50%	Taxiway/Runway Configuration Changes
50%	Runway Safety Evaluation Team (RSAT) Evaluation – Wrong Runway Issues

Table 4-7: CWA Recommended Risk Mitigation Strategies

Source: 2007 Wrong Runway Departures Study RSAT: Runway Safety Action Team

As many of these technologies and practices are specialized or uncommon, a brief description of each is provided below.

- **Own-Ship Moving Map Display**: This technology displays an electronic map in the cockpit of an aircraft that assists in immediate orientation of the aircraft's position on the airport surface. This mitigation strategy was identified in the 2007 study as the most effective strategy to prevent wrong runway departures and runway incursion events at CWA. However, it is dependent on technology within the aircraft that is beyond the Airport's control.
- ASDE-X: This surveillance system is comprised of numerous subsystems, including radar and satellite monitors, which allow air traffic controllers to track surface movement of aircraft and vehicles. This system has been implemented at 35 major airports across the country although its complexity and cost make it prohibitive at most airports.
- **AMASS:** This is a software and hardware enhancement to ASDE-3 radar (the precursor to ASDE-X). This combination of systems will eventually be replaced by a common system, such as ASDE-X or a future replacement.
- Cockpit/Crew Resource Management (CRM): Training for flight crews and Air Traffic Control (ATC) personnel, such as CRM, includes standardized phrasing and positive confirmation of commands to help minimize heads-down time while aiding proper communication. CRM aids a group's ability to achieve a common goal in the most safe and efficient manner and is often conducted using scenario-based training.



- Scenario-Based Training (SBT): SBT is often used to train and test flight crews or ATC personnel by incorporating real world scenarios. For instance, training for CWA would include site specific concerns for flight crews and ATC personnel that would promote the identification of threat areas and enhance CRM practices.
- Runway/Taxiway Configuration: This strategy focuses on the layout of the airport and is the strategy used under the first five alternatives. Although altering the physical layout of an airport is often the most direct approach for addressing wrong runway departure issues, it is commonly one of the most expensive as it may require construction and changes to an airport layout. In addition, this method does not address the "soft" issues such as procedure adherence and training.
- ATC Clearances Review: This strategy entails a review of procedures for clearances that specify all runways to be crossed before reaching the departure runway and restricting early takeoff clearances before an aircraft reaches its departure runway. This review also applies to allowing an aircraft to taxi onto their departure runway and wait for further clearance before departure. Delaying takeoff clearance until an aircraft has arrived at their departure runway will aid in preventing confusion to pilots not familiar with the Airport.
- Runway Safety Evaluation Team (RSAT) Evaluation: An RSAT is a committee consisting of local Airport personnel and other Airport stakeholders that provides an opportunity to review and discuss prevailing runway safety issues and methods to address them. This may include Airport employees, air carriers, GA pilots, and other tenants. Currently, an RSAT meets at CWA annually to discuss runway safety issues.

Based on the JIMDAT scores shown in **Table 4-7**, modifying the runway/taxiway configuration would reduce risk associated with the 1996 incident by approximately 50%. Several other strategies may more effectively mitigate risk or be combined with other strategies to further mitigate risk. An RSAT evaluation is equally effective and does not entail the costs associated with reconfiguring the runways and taxiways. Several of these technologies and practices, though helpful, are either beyond the control of the Airport, cost prohibitive, or both. While coordination with air carriers and ATC is possible and beneficial, the Airport does not have direct control over these entities. However, coordination with air carriers, ATC, Airport tenants, and other pertinent personnel can be equally as effective as decoupling the runways and would not reduce runway length or incur the same costs.

Additional mitigation strategies not considered for CWA by the 2007 study may also be beneficial. Two lighting systems in use at various airports are runway status lights (RSLs) and Final Approach Runway Occupancy Signal (FAROS) systems. Both systems use automated radar and computer logic systems to signify when a runway is occupied through either illuminated red lights built into the runway or causing the PAPI to flash. However, these systems rely on ground radar and other surveillance systems to track aircraft movements. As several of these systems are not available at CWA, and smaller aircraft are often not equipped to participate, implementing these systems would be expensive and have limited functionality. However, there are other strategies that do not require complex supporting systems.

The current runway markings near the intersecting thresholds of Runway 17 and 08 include three hold position markings. One is located on Taxiway C east of the Runway 17 threshold, one is located on Runway 08/26 to the immediate east of Runway 17/35, and the third is located on Runway 17/35 to the south of the Runway 08 threshold. These markings signal to aircraft that clearance is needed before entering this area, and they are used to control traffic more effectively. However, it is noteworthy that an aircraft taxing to



Runway 08 via Runway 17, such as occurred in the 1996 incident, will cross a holding position marking at Taxiway C to access Runway 17, but there is not a holding position marking when approaching Runway 08 from the north. This may create ambiguity for aircraft when using this taxi route to Runway 08 as there is not a distinction when aircraft are crossing onto Runway 08. Providing additional markings and signage would help create situational awareness and alert pilots of the runway intersection.

Design Standards – This alternative meets all design standards described in Section 4.1.1.

Airport Utility - This alternative would not adversely affect Airport utility.

Environmental Effects - This alternative would not have any environmental impacts.

NAVAIDs - This alternative would not require changes to NAVAIDs.

Feasibility – This alternative would be considerably less difficult and expensive to implement than the previous alternatives.

Runway Decoupling Alternatives Conclusion

This section provides a summary and comparison of the initial set of alternatives presented above and their reception by Airport users and neighbors. **Table 4-8** on the next page compares the various considerations associated with each alternative. Due to site constraints, these alternatives have numerous drawbacks. Extending the runways significantly beyond their existing footprint would entail considerable cost, wetland impacts, and land acquisition, while shortening the runways and modifying the taxiway configuration would have undesirable impacts to Airport utility.

As noted previously, these alternatives were discussed with FAA staff in Chicago on June 21, 2017. Discussion with FAA at that time indicated that each build alternative would create new operational safety concerns, such as new runway crossings and potential hot spots that may outweigh the operational safety benefits of decoupling the runways. These alternatives were also presented to the Airport's Technical Advisory Committee (TAC) on June 28, 2017, and to Airport neighbors during an open house on July 20, 2017. The TAC consists of various tenants on the Airport including business leaders, local tenants, and airport employees. Concern was expressed over any alternative shortening the runway, as it would have a negative impact on their operations. Conversely, any alternatives that attempt to maintain runway length by shifting Runway 17/35 have adverse impacts to residents, as expressed by several Airport neighbors during the open house. This is in addition to the cost and wetland impacts mentioned above.

Because none of the build options represented by Alternatives 1 through 5 are acceptable to the Airport, the TAC, the public, or the FAA, four additional alternatives were developed to address the intent of the 2014 Part 139 inspection remarks and safety concerns of the 2007 Wrong Runway Departures Study. These alternatives, which are presented below in **Section 4.1.3**, focus on enhancing the existing runway intersection, while minimizing changes to the existing runway configuration when compared to the initial set of alternatives.



Crite	Criteria Alterr		Alternative Two		Alternative Three		Alternative Four	Alternative Five		Alternative Six	
Total Runway Length Change		Rwy 17/35 No Change	Rwy 17/35 No Change		Rwy 17/35 830' Reduction		Rwy 17/35 1,740' Reduction	Rwy 08/26 123' Reduction		No Change	
F	Rwy		17	35	17	35		08	26		
	TODA		6,501	5,591	5,671	4,761		7,525	6,605		
Declared Distances	TORA	N/A	6,501	5,591	5,671	4,761	N/A	7,173	6,605	N/A	
Diotarioco	ASDA		6,501	5,661	5,671	4,831		7,525	6,675		
	LDA		6,031	5,661	5,201	4,831		6,275	6,323		
Runway Utilit	y Impact ¹	1	:	2	;	3	4		4	1	
Taxiway Impact		Single Access to Runway 17/35	Single Access to Runway 17/35		Single Access to Runway 17/35		Single Access to Runway 17/35	Each runway would have largely separate taxiway systems		No Change	
Wetland Impacts ²		12.4 Acres	11.1 Acres		0.7 Acres		0.3 Acres	None		None	
Land Acquisit	tion	203 Acres	174 Acres		None		None	None		None	
Impacted Roads		Cessna Road Ridge Road Balsam Road	Cessna Road Ridge Road Balsam Road		None		None	None		None	
Cost Estimate	9 ³	\$60.9 Million	\$53.4 Million		\$25.9 Million		\$19.8 Million	\$29.3 Million		Unknown ⁴	
Impacted NAVAIDs		Rwy 17 REIL, PAPI, HIRL Rwy 35 MALSR and GS	Rwy 17 REIL, PAPI, HIRL Rwy 35 MALSR and GS		Rwy 17 REIL, PAPI, HIRL		Rwy 17 REIL, PAPI, HIRL	Rwy 20 Rwy 08 and	6 REIL, MALSR I GS	No Impact	
Other Factors		 Significant fill & grading required Taxiway congestion 	and GS• Significant fill & grading required • Complex hold positions • Taxiway congestion • Taxiway airspace surface• Limited air carrier utility • Complex hold positions • Taxiway congestion • Taxiway airspace surface• Limited air carrier utility • Complex hold positions • Taxiway congestion • Taxiway airspace surface		 Runway unusable by air carriers Taxiway congestion 	 Completive taxiway position Taxiwa aproniconges Taxiwa airspaciconfliction 	ex v hold ns y and tion y e surface s	Alternative mitigation to be used in lieu of runway decoupling			

Table 4-8: Comparison of Initial Runway Decoupling Alternatives

Notes: ¹For reference, each alternative has been assigned a score of 1 to 4, with 1 being the least adverse impact to utility and 4 being the most adverse impact to utility.

²Wetland impacts may vary based on the wetlands impacted by relocated taxiways.

³Estimates include Runway 17/35 pavement reconstruction.

⁴Costs are dependent on selected strategies and may be borne by Airport users instead of the Airport directly.

4.1.3 Runway Intersection Modification Alternatives

This section presents four additional alternatives for mitigating wrong runway departure contributing factors at CWA. Each alternative involves relatively minor modification of the runway and taxiway configuration. The first three alternatives were originally presented in a technical report dated September 27, 2017, and were discussed with FAA staff in Chicago on October 26, 2017. The fourth alternative was developed after the October 26 meeting and after additional discussion with local ATC personnel. The alternatives presented in this section incorporate comments received by FAA. As the proposed changes to the airfield are minor the following alternatives should be considered in combination with other mitigation strategies presented as part of Alternative 6 in Section 4.1.2. Therefore, they are designated as Alternatives 6A, 6B, 6C, and 6D and were provided to the FAA in the report dated December 11, 2017. These alternatives include the following:

- Alternative 6A: Shorten and Shift Runway 08/26 East
- Alternative 6B: Extend Runway 08/26 West
- Alternative 6C: Extend and Shift Runway 08/26
- Alternative 6D: Extend Runway 08/26 East with Intersection Departures

Based on feedback received from the Airport, local community, and FAA, the evaluation criteria for this set of alternatives are similar to those identified in Section 4.1.1. However, "risk mitigation" was added as a new criterion, which examines each alternative's ability to improve safety by addressing the four wrong runway departure contributing factors identified at CWA by the 2007 FAA study.

Alternative 6A: Shorten and Shift Runway 08/26 East

This alternative would mark the westernmost 370 feet of Runway 08 as unusable. This would relocate the Runway 08 threshold 370 feet east, remove the overlap of the two runways, and provide a non-standard separation of 325 feet between the Runway 17/35 centerline and centerline of the proposed new connector taxiway to the relocated Runway 08 threshold. When combined with a Runway 26 extension of 352 feet, the new runway length would be 7,630 feet. This is shown in **Figure 4-6**.

Risk Mitigation – Physically separating the runways would correct the overlapping runway thresholds and provide separate taxiway paths to each runway end. A taxiway connector would be constructed between Taxiway C and the relocated Runway 08 threshold to provide aircraft with a clear taxi route to each runway. Separate taxi paths to each runway threshold would prevent either runway being used as a taxiway, and aircraft would not be required to cross either runway to depart Runway 08 or 17, as is necessary in the existing configuration. This alternative would also increase the taxi distance to both thresholds from some gates when portions of Taxiways A and B are closed as proposed. Although Taxiway C would remain a single taxiway leading to multiple runways, each runway would have clearly designated holding positions and markings, an improvement over the current configuration.

This alternative would improve three of the four contributing factors identified by the 2007 study: using the runway as a taxiway, the short taxi distance, and close proximity of multiple runway departure ends. However, a single taxiway would continue to provide access to multiple runways.





Figure 4-6: Runway Alternate 6A





Design Standards – This alternative would provide 325 feet of separation between the Runway 17/35 and proposed connector taxiway centerlines, and the RSAs of each runway would continue to overlap. This is a non-standard separation intended to allow the MALSR lights to begin west of all runway pavement and avoid in-pavement lighting, thereby reducing costs while presenting less interference with snow removal efforts. FAA AC 150/1300-13A, *Airport Design*, states that overlapping RSAs are not desirable, as work in the RSA will require temporary closure of both runways. However, overlapping RSAs are allowed in some circumstances, but "this condition should exist only at existing constrained airports where non-overlapping safety areas are impracticable." CWA is constrained by Interstate 39 to the west and State Highway 153 to the north, while areas to the south and east present topographic and wetland challenges. Due to site constraints at CWA, overlapping RSAs are a practical way of maximizing the runway lengths within the available space.

As Runway 08 has an ILS approach, there would not be enough space for the 50:1 approach surface and 40:1 departure surface to clear an aircraft positioned on Runway 17/35. The Runway 08 departure surface and POFZ would also overlap a section of Taxiway C. As the fuselage or tail of an aircraft may not penetrate the POFZ, the Runway 17 hold line would be positioned on Taxiway C outside the POFZ.

Airport Utility – This alternative would reduce the overall Runway 08/26 length by 18 feet, as the reduction on the Runway 08 end would be offset by the extension of Runway 26. This reduction in runway length would have a minor impact on existing runway utility. In addition, the taxiway configuration proposed under this alternative would allow aircraft to taxi to either runway without interfering with traffic departing the other runway, which would increase airfield capacity in most situations.

Because the POFZ and departure surface would overlap Taxiway C, a hold line would prevent aircraft from entering this area before cleared for departure but would need to be located near the new taxiway connector to the relocated Runway 08 threshold. This means that aircraft holding east of Runway 17 and waiting to depart on either Runway 08 or 17 would block access to both runways. However, this would likely only be an issue during busy times, such as when multiple departures are occurring in the morning, during which the tower would be operational, and ATC would be able to direct traffic and mitigate congestion. Therefore, this would likely be a minor impact on capacity and traffic circulation.

Discussion with ATC personnel indicates that of the three new alternatives presented in the September 27, 2017, technical report, this was their preferred option. The physical separation of the runways would allow each runway to operate with less dependence on the other and improve traffic flow during busy periods. ATC personnel estimated the Airport would likely benefit from this configuration two to three times a week at its current operational levels.

Retaining the pavement between the two runways and marking it as unusable would aid in snow removal efforts. This would have the indirect effect of allowing the Airport to recover from snow events more rapidly and resume normal operations, thereby increasing Airport utility. However, this alternative would also preclude any future alterations or extensions to Runway 08/26, which may limit the Airport's ability to meet user needs.

Environmental Effects – Physical changes to the Airport are minimal under this alternative. The Runway 08 threshold would be relocated, a new connector taxiway would be constructed, and the MALSR would be relocated. As these changes do not significantly impact the footprint of the Airport, environmental effects



under this alternative would be minimal. There may be very minor wetland impacts to the west of Interstate I-39 associated with realignment of the MALSR.

NAVAIDs – As the Runway 08 threshold would be relocated, the MALSR would need to be adjusted accordingly. However, the MALSR would be relocated to begin 50 feet beyond the new runway pavement end, to avoid the need to install in-pavement MALSR light stations in front of the displaced threshold. This non-standard MALSR layout would require a modification of standards (MOS), which the Airport would request from FAA prior to installation.

The required position of the glideslope antenna is determined by formula based on the threshold crossing height, glideslope angle, and slope of the terrain. Each of these criteria must be kept within permissible parameters. According to FAA Order 6750.36, the permissible range for a glideslope on an ILS approach without a waiver is from 2.75 degrees to 3.04 degrees. Likewise, FAA AC 120-29A, *Criteria for Approval of Category I and Category II Weather Minima for Approach*, stipulates that instrument approaches with vertical guidance, such as an ILS, usually have a threshold crossing height (TCH) in the range of 50 to 55 feet although heights of 48 to 60 feet are permissible. The glideslope antenna could be relocated to the east while adhering to these standards. Finally, the proposed connector taxiways would require new taxiway lighting.

Feasibility – Due to the minor change to the airfield footprint, this alternative presents far fewer challenges than all build alternatives considered in the initial set of alternatives presented in Section 4.1.2, while preserving most of the available runway length. The primary challenge associated with this alternative would be the relocation of NAVAIDs. The total estimated cost for this alternative is \$11.2 million, with an additional \$19.0 million required to reconstruct Runway 17/35.

Alternative 6B: Extend Runway 08/26 West

This alternative would separate the overlapping runway ends by extending Runway 08 to the west and converting the existing Runway 08 threshold into a displaced threshold, as shown in **Figure 4-7**. This alternative does not include extending Runway 26 to the east as proposed by Alternative 6A. Taxiway C would be extended so that aircraft would cross, rather than taxi on, Runway 17/35 to access Runway 08/26. Minimal NAVAID modifications would be required, as the landing threshold locations would not change.

Risk Mitigation – Although the landing thresholds for each runway would remain in their current locations, Runway 08 departures would originate from a new location independent of Runway 17/35. The extended Taxiway C would provide a separate taxi path to Runway 08, and Runway 17/35 would no longer be used a taxiway. This taxiway extension would have the added benefit of providing flight crews additional time to complete checklists. Although Taxiway C would remain a single taxiway leading to multiple runways, each runway would have clearly designated hold positions and markings. Like Alternative 6A, this alternative would improve three of the four contributing factors identified by the 2007 study but would introduce a runway crossing.

Design Standards – Similar to Alternative 6A, the Runway 08 POFZ and approach/departure surfaces would partially overlap Taxiway C. To prevent penetration of these surfaces, aircraft departing Runway 08 would have to hold on Taxiway C east of Runway 17/35 before departure. As this alternative does not relocate the threshold of either runway, the design surfaces would remain in their existing locations.





Graphic Scale in Feet

Figure 4-7: Runway Alternate 6B





Airport Utility – This alternative would extend Runway 08 by 355 feet for a new total runway length 8,003 feet. Although this would only increase runway length by approximately 5%, it would be a sufficient extension for the CRJ-900 and ERJ-145 to operate at or near maximum takeoff weight (MTOW). The ERJ-145 is a common aircraft at CWA, with 2,168 operations in 2015, and the CRJ-900 is expected to become more common as the air carrier fleet increases in size. Therefore, this relatively minor runway extension would benefit existing and future air carrier aircraft and may enhance Airport utility disproportionate to the length of the extension. As stated previously, aircraft waiting to depart Runway 08 would have to hold east of Runway 17/35. Similar to Alternative 6A, this is undesirable but would be mitigated by ATC.

Environmental Effects – As there are no wetlands near the proposed runway extension and connecting taxiway, there are not likely to be any significant environmental effects under this alternative.

NAVAIDs – The pavement extension proposed by this alternative would not require relocation of the Runway 08 glideslope antenna, as the Runway 08 landing threshold location would not change. However, the MALSR would be relocated to begin 50 feet beyond the new runway pavement end, to avoid the need to install in-pavement MALSR light stations in front of the displaced threshold. Like Alternative 6A, this non-standard MALSR layout would require a MOS, which the Airport would request from FAA prior to installation.

Feasibility – This alternative has several advantages. The extension would separate the runway ends while extending Runway 08/26 enough to allow the CRJ-900 and ERJ-145 to takeoff near MTOW. Due to the minor modifications of the runway ends, there are minimal impacts to the NAVAIDs or environment. The total estimated cost for this alternative is \$8.7 million, with an additional \$19.0 million required to reconstruct Runway 17/35.

Alternative 6C: Extend and Shift Runway 08/26

This alternative is a hybrid of Alternatives 6A and 6B, as it would relocate the Runway 08 landing threshold to the east so that it would not overlap with Runway 17/35, while also extending Runway 08 to the west. This alternative is shown in **Figure 4-8**. The proposed threshold displacement is the maximum amount possible while allowing the glideslope antenna to remain in its existing location. Although this is a relatively minor change compared to Alternative 6B, it would more clearly differentiate the Runway 08 and Runway 17 thresholds while keeping the glideslope antenna in its existing location.

Risk Mitigation – Mitigation for this alternative would be similar to Alternative 6B given the similar footprint, with the primary difference being that the additional displacement of the threshold would provide clearer separation of the landing thresholds. The Runway 08 threshold would be relocated to the east by 165 feet providing a separation of 20 feet between the Runway 08 threshold and the edge of Runway 17/35. This alternative would improve three of the four contributing factors but introduce a runway crossing.

Design Standards – Similar to previous alternatives, several of the Runway 08 surfaces would overlap Taxiway C and require aircraft to hold east of Runway 17/35 when departing Runway 08.

Airport Utility – This alternative would extend Runway 08 by 355 feet and Runway 26 by 352 feet, for a new total runway length 8,355 feet. Like the previous alternatives, aircraft waiting to depart on Runway 08 would prevent access to Runway 17. This is only likely to occur during tower hours, and ATC would be able to direct traffic and mitigate congestion.





Figure 4-8: Runway Alternate 6C





Environmental Effects – As there are no wetlands impacted by the proposed runway extension and connecting taxiway, there are not likely to be any significant environmental effects under this alternative.

NAVAIDs – The Runway 08 threshold displacement is positioned so that glideslope antenna relocation would not be necessary. To provide the maximum separation of the Runway 08 threshold from the Runway 17/35 pavement without relocating the glideslope antenna, a glideslope angle of 3.04 degrees and a TCH of 48 feet would allow for a threshold displacement of 165 feet from its current location, sufficient to separate the Runway 08 threshold from Runway 17/35 pavements. However, the MALSR would be relocated to begin 50 feet beyond the new runway pavement end, to avoid the need to install in-pavement MALSR light stations in front of the displaced threshold. Like Alternatives 6A and 6B, this non-standard MALSR layout would require a MOS, which the Airport would request from FAA prior to installation.

Feasibility – Feasibility considerations are similar to those for Alternative 6B, although the construction costs would be higher primarily due to the Runway 26 extension. The total estimated cost for this alternative is \$11.1 million, with an additional \$19.0 million required to reconstruct Runway 17/35.

Alternative 6D: Extend Runway 08/26 East with Intersection Departures

Like Alternative 6A, this alternative would construct a new connector taxiway from Taxiway C to Runway 08/26 with a non-standard separation of 325 feet between the Runway 17/35 centerline and centerline of the proposed new connector taxiway, as shown in **Figure 4-9**. It would also extend Runway 08/26 to the east by 352 feet, for a new length of 8,000 feet. However, unlike Alternative 6A, it would not mark the westernmost 370 feet of Runway 08 as unusable and would not relocate the Runway 08 threshold to remove the overlap of the two runways. Instead, the new connector taxiway would be utilized for intersection departures to eliminate the need for aircraft to taxi on Runway 17/35 to depart Runway 08/26.

Risk Mitigation – This layout would provide separate taxi paths to each runway. The new taxiway connector would provide access to Runway 08/26, while Taxiway C will continue to provide access to Runway 17/35. Separate taxi paths to each runway threshold would prevent either runway being used as a taxiway, and aircraft would not be required to cross either runway during taxiing to depart Runway 08 or 17, as is necessary in the existing configuration. When portions of Taxiways A and B are closed as proposed, the taxi distance to both thresholds would increase from most gates. Although Taxiway C would remain a single taxiway leading to multiple runways, each runway would have clearly designated holding positions and markings, an improvement over the current configuration. This alternative would improve three of the four contributing factors identified by the 2007 study: using the runway as a taxiway, the short taxi distance, and close proximity of multiple runway departure ends. However, a single taxiway would continue to provide access to multiple runways.





Figure 4-9: Runway Alternate 6D





Design Standards – Unlike Alternatives 6A, 6B, and 6C, the Runway 08 POFZ and approach/departure surfaces would not overlap Taxiway C, and therefore, special hold positions and procedures would not be required. As this alternative does not relocate the threshold of either runway, the design surfaces would remain in their existing locations. This is only true for Alternatives 6B and 6D.

Airport Utility – This alternative would extend Runway 08/26 by 352 feet for an extended runway length of 8,000 feet. However, TORA, TODA, and ASDA for Runway 08 departures would only be 7,630 feet due to use of intersection departures using the new connector taxiway. Similar to the previous alternatives, aircraft waiting to depart on Runway 08 would prevent access to Runway 17 though ATC would mitigate this concern.

Environmental Effects – As there are no wetlands impacted by the proposed runway extension and connecting taxiway, there are not likely to be any significant environmental effects under this alternative.

NAVAIDS – This alternative would not require relocation of either the Runway 08 glideslope antenna or MALSR, as the Runway 08 landing threshold location would not change. Unlike Alternatives 6A, 6B, and 6C, the MALSR would not have a non-standard layout, and therefore, would not require a MOS from FAA.

Feasibility – Because it would not require relocation of any airfield design surfaces or NAVAIDs, this alternative would likely be easier to implement than Alternatives 6A, 6B, or 6C. The total estimated cost for this alternative is \$7.7 million, with an additional \$19.0 million required to reconstruct Runway 17/35.

Intersection Modification Alternatives Conclusion

Table 4-9 summarizes and compares the various considerations associated with each of the four intersection modification alternatives. Each of these alternatives limits impacts to Airport property and maintains runway lengths similar to the current configuration, which greatly reduces impacts to the surrounding community and Airport users. However, these alternatives introduce a new set of concerns related to runway utility and risk mitigation. Alternative 6A is the only alternative of the four that fully decouples the runways, which may increase capacity and reduce runway interdependence. However, the taxiway configuration limits access to Runway 17, while also decreasing the length of Runway 08/26. Alternatives 6B and 6C prevent Runway 17 from being used as a taxiway, but would introduce a Runway 17 threshold crossing for aircraft to reach Runway 08. Alternative 6D would have similar benefits to Alternative 6A, with the added benefit of more Runway 08/26 length and no NAVAID relocations.



Criteria		Alternative 6A		Alternative 6B		Alternative 6C		Alternative 6D		
Total Runw Char	ay Length nge	Runway 08/26 18' Reduction		Runway 08/26 355' Extension		Runway 08/26 707' Extension		Runway 08/26 352' Extension		
	Rwy	08	26	08	26	08	26	08	26	
	TODA	7,630	7,630	8,003	7,648	8,355	8,000	7,630	8,000	
Declared Distances	TORA	7,630	7,630	8,003	7,648	8,355	8,000	7,630	8,000	
Diotanoco	ASDA	7,630	7,630	8,003	7,648	8,355	8,000	7,630	8,000	
	LDA	7,630	7,630	7,648	7,648	7,835	8,000	8,000	8,000	
Contributin	g Factors	Addresse	d*							
Taxiway Dis	tance	, ,	/	``	/	``	/	,	/	
One Taxiwa Multiple Rur	iy to nways									
Close Proxi Multiple Run Departure E	Close Proximity of Multiple Runway Departure Ends		✓		~		~		~	
Runway Uso Taxiway	Runway Used as a Taxiway		\checkmark		\checkmark		~		~	
Cost Estim	ates									
Runway 17/ Reconstruct	Runway 17/35 Reconstruction		\$19.0 million		million	\$19.0	million	\$19.0	million	
Other costs		\$11.2	million	\$8.7 million		\$11.1 million		\$7.7 million		
Other Facto	ors									
Impacted NAVAIDs		 Rwy 08 MALSR, GS and HIRL Rwy 26 REIL 		 Rwy 08 MALSR and HIRL 		 Rwy 08 MALSR and HIRL Rwy 26 REIL 		• None		
Other Factors		 Increase hourly departure capacit Reducte Runwa length MALSF require 	 Increased hourly departure capacity Reduction of Runway 08/26 length MALSR MOS required 		 Runway 08/26 extension allows improved air carrier performance MALSR MOS required 		 Runway 08/26 extension allows improved air carrier performance MALSR MOS required 		 Increased hourly departure capacity Runway 08/26 extension allows improved air carrier performance 	

Table 4-9: Comparison of Alternatives

Notes: Where a proposed alternative improves the situation compared to existing conditions a "" is shown.



4.1.4 Final Preferred Runway Alternative

The runway intersection modification alternatives presented in Section 4.1.3 were provided to FAA in a report dated December 11, 2017. On May 31, 2018, the FAA provided comments on the new alternatives and expressed support for Alternative 6A. However, FAA also expressed concerns about the nonstandard MALSR and glideslope antenna relocation on the Runway 08 end and requested additional information about the Runway 26 changes. To address these concerns, two further variations on Alternative 6A were developed.

Due to their similarities to Alternative 6A and the use of the same evaluation criteria used in Section 4.1.3, a detailed analysis of these alternatives would be largely redundant. Therefore, the following narrative highlights the differences between the alternatives. The primary differences between the two options are the Runway 08 threshold location, the separation between the Runway 17/35 centerline and the new Runway 08 connector taxiway centerline, and the MALSR configuration.

Both options differ from the original version of Alternative 6A in that both would:

- 1) Remove the runway pavement between the Runway 08 threshold and Runway 17/35,
- 2) Maintain the existing Runway 08/26 length by replacing all lost runway pavement on the Runway 26 end, and
- 3) Relocate the localizer on the Runway 26 end approximately 200 feet to the east and install a third localizer on the Runway 08 end to allow LOC approaches to Runway 26 (the third localizer would replace the existing Runway 26 backcourse approach, and both localizers would meet grading criteria for unidirectional systems). Due to cost considerations, this improvement would not occur in the foreseeable future but could be undertaken in the future when circumstances warrant.

Preferred Alternative 1

Like Alternative 6A, this alternative would relocate the Runway 08 threshold 370 feet to the east and replace the 370 feet of lost runway pavement by extending on the Runway 26 end. This alternative would provide a standard 400-foot separation between the Runway 17/35 centerline and the new Runway 08 connector taxiway centerline by incorporating a diagonal connector taxiway segment on the runway side of the hold line. The Runway 08 glideslope antenna and MALSR would need to be relocated. This alternative provides for a standard MALSR configuration beginning 200 feet from the new Runway 08 threshold and light stations straddling Runway 17/35 at 25 feet from the runway edge. The full runway modifications for this alternative are shown in **Figure 4-10**, with details of the intersection shown in **Figure 4-11**.

Preferred Alternative 2

This alternative would relocate the Runway 08 threshold 445 feet to the east and replace the 445 feet of lost runway pavement by extending on the Runway 26 end. This alternative provides a standard 400-foot separation without the need for a diagonal connector taxiway segment. As under Preferred Alternative 1, the Runway 08 glideslope antenna and MALSR would need to be relocated. However, this alternative would require spacing of the MALSR light stations in a manner that exceeds tolerances allowed by the FAA standard. The full runway is shown in **Figure 4-12** and in detail in **Figure 4-13**.







Figure 4-10: Preferred Alternate 1

Source: USGS Earthstar Geographics, National Fish & Wildlife Service - National Wetland Inventory, 2016 Becher-Hoppe Airport Layout Base Map







Graphic Scale in Feet

Figure 4-11: Preferred Alternate 1 - Intersection









Figure 4-12: Preferred Alternate 2

Source: USGS Earthstar Geographics, National Fish & Wildlife Service - National Wetland Inventory, 2016 Becher-Hoppe Airport Layout Base Map



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Figure 4-13: Preferred Alternate 2 - Intersection





4.1.5 Final Preferred Runway Intersection Alternative

The two options described above were provided to the FAA in an email dated November 1, 2018. On November 15, 2018, a meeting was held with FAA to discuss these options. For Preferred Alternative 1, FAA expressed concerns regarding the non-typical connector taxiway geometry and stated that this configuration would prevent simultaneous operations on both runways. For Preferred Alternative 2, FAA suggested that a standard MALSR configuration could be provided by installing one of the light stations in the Runway 17/35 pavement; however, the Airport would prefer to avoid in-pavement lights due to the potential for damage to the equipment during snow removal operations.

To address concerns with the non-typical connector taxiway geometry and associated air traffic control issues, the two options were merged as shown in **Figure 4-14** and in greater detail in **Figure 4-15**. This final preferred alternative would:

- 1) Relocate the Runway 08 threshold and MALSR system as shown for Preferred Alternative 1.
- 2) Construct a typical 90-degree connector taxiway to Runway 08 at a 400-foot offset from the Runway 17/35 centerline and extend the runway 445 feet on the Runway 26 end, as shown for Preferred Alternative 2. This would result in a total runway length of approximately 7,723 feet. FAA noted that this length has acceptable justification based on the runway length analysis developed for the Master Plan.
- 3) Implement declared distances on Runway 08/26 such that Runway 08 departures would be limited to the existing 7,648-foot length, but all other operations could make use of the full 7,723 feet.

The preceding sections identify and evaluate a wide range of approaches for decoupling and/or modifying the runway intersection at CWA. The initial set of alternatives presented in Section 4.1.2 adhere closely to design standards while attempting to maintain airport utility. However, this results in undesirable impacts to the local community and Airport users, often at a high financial cost. Therefore, additional alternatives were developed that require minimal modification to the Airport environment to reduce cost and limit adverse impacts.

Following close coordination between the Airport, FAA, and Wisconsin Department of Transportation Bureau of Aeronautics, the final preferred alternative depicted in Figures 4-14 and 4-15 was identified as the best solution. This alternative would resolve runway intersection issues in a manner that meets runway-taxiway geometry and MALSR configuration standards while also providing enough runway length to serve the Airport for the duration of the 20-year planning period. For these reasons, this alternative is the preferred runway intersection alternative. The FAA agrees with the required length and roles of these runways via two letters of support. In a letter dated February 7, 2019 the FAA confirms 7,723 as an appropriate length for Runway 08/26 and the ERJ-145 as its critical aircraft. In addition, the FAA agrees with the role of Runway 17/35 as a Secondary Runway, in that it is required for the operation of the airfield, in a letter dated November 27, 2019.





Graphic Scale in Feet

Figure 4-14: Final Preferred Alternative

Source: USGS Earthstar Geographics, National Fish & Wildlife Service - National Wetland Inventory, 2016 Becher-Hoppe Airport Layout Base Map







Graphic Scale in Feet

Figure 4-15: Final Preferred Alternative - Intersection

Source: USGS Earthstar Geographics, National Fish & Wildlife Service - National Wetland Inventory, 2016 Becher-Hoppe Airport Layout Base Map





4.2 Passenger Terminal

A 2009 Addendum to the 2006 Terminal Area Master Plan (TAMP) re-evaluated two alternatives for meeting terminal area needs. These included a new mid-field terminal facility or expansion at the existing terminal site. Discussions between the Airport and FAA determined that improvement of the existing facility would be the most cost-effective option. Although the non-secure portion of the terminal underwent several renovations, the secure pier concourse has had minimal changes since it was first constructed in 1997. The concessions area is undersized, passenger boarding bridges (PBBs) are beyond their useful life, and their configuration could be changed to better accommodate larger air carrier aircraft. The two alternatives re-evaluated by the 2009 TAMP Addendum are summarized in the following sections.

4.2.1 Passenger Terminal Alternative 1: Second Pier

A future second pier concourse and expansion to the east of the existing terminal were proposed by the 2009 TAMP Addendum, as shown in **Figure 4-16**. This alternative would require reconfiguration of the surrounding area, as the FBO and the ARFF/Maintenance facilities would likely need to move to allow air carrier aircraft to maneuver around the second pier. A significant expansion to the air carrier apron would also be required. This alternative also considered providing an indoor storage facility for airline ground service equipment (GSE) on the west edge of the air carrier apron. Discussions between the Airport and FAA have since determined that improvement and expansion of the existing pier concourse would be the most cost-effective option. For these reasons, this alternative is no longer being considered.

4.2.2 Passenger Terminal Alternative 2: Existing Pier Extension

For near-term concourse growth, the 2009 TAMP Addendum proposed lengthening the existing concourse along its current axis. Because the expected increase in gate and concourse space needs are moderate for the 20-year planning period, this is an effective way of meeting near-term needs while not impeding future growth. However, opportunities for expansion are limited by the layout of the existing concourse and associated equipment. A large portion of the concourse is ramped due to its higher elevation and the spacing of the gates also presents a challenge. In addition, the location of Gate 2 limits the size of aircraft able to access the gate, and Gate 5 would need to be demolished if the concourse is extended. This alternative would also require a significant expansion to the air carrier apron for aircraft maneuvering and parking around the extended concourse.

4.2.3 Conclusion

Airport staff determined that replacement of the PBBs near their current locations is the most cost-effective option for addressing current concourse needs in the near-term and as of this writing all PBBs were replaced in 2019. The phased concept described below has been partially implemented but is intended as a long-term plan to be completed in response to growing needs. Phased concourse improvements and eventual concourse extension may occur as needed to accommodate passenger growth and changes in commercial fleet mix. The recommended phasing for the concourse extension to accommodate expected growth is shown in **Figure 4-17** and described below.



- Project 1 This project would replace PBBs in order to optimize the existing concourse. The apron
 surrounding the concourse would also be extended to allow large aircraft to pass others parked at the
 new PBBs. The building interior layout would be renovated to provide more efficient space by modifying
 the concessions area layout and potentially reducing ramps and stairs. Associated building systems
 would also be improved to support the project.
- **Project 2** This project would likely be undertaken to meet gate and concourse requirements near the end of the 20-year planning period. Gate 5 would be demolished and a 12,000-15,000 square foot building addition, with a minimum of two new PBB gates, would be provided. Project 2 is a step toward a complete long-term concourse extension that would meet growth needs beyond the end of the planning period.
- **Project 3** Project 3 would take place beyond the planning period and provide continued concourse growth as needed.







Figure 4-16: 2009 TAMP Terminal Expansion Concept









Figure 4-17: Concourse Project Phasing

4.3 Hangar Alternatives

Two T-hangar structures located behind the FBO and ATCT provide storage space for GA aircraft, with smaller units to the west and larger units to the east. Although the total number of units matches projected demand presented in Chapter 3, there are currently vacant small units while larger units have a waitlist because the smaller units do not meet tenant needs. In addition, access to the area is limited, piston and turbine aircraft operate near one another, and there is little potential for expanding surrounding facilities. This section presents several alternatives for addressing these issues and meeting future hangar needs.

4.3.1 GA Hangar Alternative 1: T-Hangar Expansion in Existing Area

One option to meet piston-powered GA demand is to extend or replace the smaller T-hangars with larger units that would satisfy the existing demand and waitlist. The proposed hangars would be intended for piston driven aircraft in the airplane design group (ADG) I and taxiway design group (TDG) 1A/B category and provide enough space to allow ADG II aircraft to continue to use the corporate box hangars in the area. Although this would be a simple solution for meeting tenant demand in the short-term it has several disadvantages. This alternative would not correct the bottleneck access to the T-hangars, piston and turbine aircraft would continue to operate near one another, and there would not be enough room for additional T-hangars to be built in this area. As it often desirable to separate corporate and other GA traffic for safety and efficiency, the existing and future T-hangars should be collocated in an area away from existing box hangars. Therefore, it is recommended T-hangars be removed from this area and reconstructed elsewhere.

4.3.2 GA Hangar Alternative 2: T-Hangar Relocation to the East

Although there are several existing corporate facilities in the current hangar area, space is limited and relocating the T-hangars would provide room for further expansion of corporate hangars. One potential configuration for additional box hangars in this area is shown in **Figure 4-18**, which assumes demolition and/or relocation of the existing T-hangars. As the entrance to this location is constrained by the ATCT, aircraft within the ADG III category, such as a Gulfstream G550 or other large corporate aircraft, would not be able to enter this area. Although it maximizes use of available space, this configuration is limited to four 60-by-60-foot hangars and ten 45-by-45-foot hangars. These hangars are shown connected to maximize capacity; standalone hangars would necessarily reduce potential box hangar capacity in this area.

T-hangars and additional box hangars could be constructed to the east along the unoccupied area north of Taxilane E. Other than a few corporate hangars this area is largely undeveloped and is a prime development area as it offers existing utilities and easy access from Flightline Drive. Based on its partially isolated location, direct access, and ability to build per tenant needs this area would be an ideal location for hangar development geared towards both corporate and other GA tenants. One potential layout for this area is shown in **Figure 4-19** and would add 23 box hangars, some of which are connected, and three T-hangar structures, meeting demand. As this area is currently unoccupied by other infrastructure, no demolition would be required for construction. In addition, gate access from State Highway 153 is available to this area, which would allow direct access for tenants. As large turbine aircraft are becoming more common the designation of taxilanes meeting specific aircraft sizes should be considered. The westernmost taxilane would be meet ADG III requirements while facilities to the east would be scaled down in stages to meet smaller aircraft standards, with the easternmost taxilane accommodating series of T-hangars to meet small GA aircraft needs.





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Figure 4-18: GA Hangar Alternative 2: Existing Hangar Area

Graphic Scale in Feet



Source: Google Earth, 2016 Becher-Hoppe Airport Layout Base Map



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Figure 4-19: GA Hangar Alternative 2: Greenfield Site

fly CWA first central wisconsin airport

Source: Google Earth, 2016 Becher-Hoppe Airport Layout Base Map

Although this area is the only greenfield site with existing utility and vehicle access, it is currently constrained to both north and south. To the north, the site is constrained by State Highway 153 and the fence line located approximately 300 feet south of the highway. The area north of the fence is occupied by Flightline Drive but is otherwise unused. To the south, this site is constrained by Taxilane E, which provides dedicated airfield access to GA aircraft traveling west or east. Consideration was given to relocating the fence, Flightline Drive and/or Taxilane E to allow for eventual expansion in this area.

Taxilane E meets the object free area requirements for ADG III aircraft, with a separation of 81 feet from the taxilane centerline in these future concepts but is intended for ADG II aircraft. ADG II aircraft require a separation of 57.5 feet from the taxilane centerline to fixed or moveable objects, such as hangars. Removing this taxilane would not only allow expansion in the area currently occupied by the pavement but remove associated taxilane object free area restrictions. However, the taxilane object free area is located inside the building restriction line and removing the taxilane would not increase the ability to expand to the south. Furthermore, the fuel farm is located near the east end of Taxilane E and fuel trucks must be able to drive to and from this area without interfering with aircraft circulation, as they are not permitted on external roads such as Flightline Drive. If self-fueling is added to the fuel farm, aircraft will need to travel to and from this location as well. Therefore, Taxilane E should not be removed unless relocating the fuel farm is also considered. For these reasons, removal of Taxilane E is not a viable option and it should remain in place.

The area between State Highway 153 and Flightline Drive could be used for two different long-term uses. One option is to expand the hangar area to the north by relocating the perimeter fence and Flightline Drive to the north. A frontage road, such as Flightline Drive, is beneficial as it allows existing and future tenants to exit State Highway 153 before reaching an access gate. If this area is developed into hangars for corporate and GA tenants, it is reasonable to expect an increase in traffic in this area. A frontage road could be incorporated between the perimeter fence and State Highway 153 to support vehicle traffic and access to parking and hangars, and taxilanes could be extended to the north to provide access through secure gates to the relocated Flightline Drive.

The second long-term use option for this area is to reserve it for non-aeronautical development. As this area is currently undeveloped and has easy access to the airfield and highway, it is an ideal location for commercial development. Demand for the 20-year planning period can be met without relocating Flightline Drive or the perimeter fence and the business nature of GA activity at CWA makes commercial development well suited for this location. **Figure 4-20** compares the two long-term use alternatives described above.

4.3.3 GA Hangar Alternative 3: Relocation to the South of Runway 08/26

This alternative would construct new T-hangars to the south of Runway 08/26. As this area is currently unoccupied, T-hangars in this area would not interfere with surrounding structures and aircraft would have easy access to the runways. However, several issues exist with development in this area. This area is marked as an ultimate apron and terminal on the 2008 ALP and constructing hangars in this area may obstruct the long-term expansion of the Airport. In addition, aircraft hangered in this area or FBO vehicles must cross Runway 08/26 to provide fueling and other services. Because this alternative may interfere with long term expansion of the Airport and increase the frequency of runway crossings, this alternative was dismissed from further consideration.







CENTRAL WISCONSIN AIRPORT

Source: Google Earth, 2016 Becher-Hoppe Airport Layout Base Map

4.4 Aircraft Apron and Parking

As stated in Chapter 3, the amount and configuration of apron space should be based on local conditions and not on a standard planning metric. The layout of the GA apron at CWA supports SRE/ARFF operations, aircraft parking and access from various hangars, and FBO operations, while also providing access to the taxiway system. Approximately 35,000 square feet of aircraft parking is located near the GA terminal and ATCT. CWA facilities are well suited for corporate or other turbine powered GA traffic. The longer runways, instrument approaches, and accessible FBO all benefit and support the unique needs of the Airport. Turbine aircraft benefit from the apron space in front of the FBO and surrounding terminal area as it provides room for fueling, loading and unloading passengers, preflight checks, and maneuvering while providing a safety buffer from other aircraft. For these reasons, it is recommended that the location and size of the shared GA apron remain the same for the duration of the 20-year planning period.

4.5 Snow Removal Equipment (SRE) Facilities

As discussed in Chapter 3, existing SRE space is insufficient based on vehicle storage and maintenance needs, and many of the existing cold storage facilities are in poor condition. This section provides a discussion of alternative locations for a new consolidated SRE building. **Figure 4-21** shows the general location of each of these alternatives.

4.5.1 SRE Alternative 1: Expand in Existing Location

This alternative proposes expanding the main SRE facility in its existing location. As the area to the north is occupied CWA Drive and provides vehicle circulation for parking, and other facilities are positioned to the immediate west and east, proposed expansion would occur to the south. There is sufficient space from the SRE building to the building restriction line to complete this expansion. However, as the building is expanded to the south it would make it more difficult for air carriers to maneuver and use the eastern passenger terminal gates. Providing a pull-through area for large SRE equipment would also be difficult given site constraints. For these reasons this alternative was removed from consideration.

4.5.2 SRE Alternative 2: Relocate West

This alternative would relocate the SRE facility to the west of the passenger terminal and south of existing vehicle parking. This area is currently unoccupied and located near the terminal. An SRE building in this location would provide easy access for personnel to the terminal, ARFF building, and other surrounding facilities. This location would also provide access from the landside and airside. However, SRE vehicles would have to maneuver in the vicinity of air carriers to enter and exit the facility on the airside. While another taxiway could be built to provide additional access for SRE vehicles, the proximity to air carrier operations is not ideal. In addition to circulation issues, an SRE facility greater than 20 feet tall in this location would penetrate the Runway 35 40:1 departure surface. Due to the circulation and departure surface issues, this alternative was removed from further consideration.







6 500 1000 1500

Figure 4-21: SRE Alternative Locations



Source: Google Earth, 2016 Becher-Hoppe Airport Layout Base Map

4.5.3 SRE Alternative 3: Relocate North

If the T-hangars are relocated to the east as described in Section 4.4.2, this would leave the area immediately north of the ATCT vacant. This alternative would construct a new SRE building in this location with attached sand storage, as shown in **Figure 4-22**. This alternative would difficult to phase due to existing hangars in the area and its potential for long-term expansion would be limited. The existing taxilanes on either side of the ATCT would allow vehicles to circulate freely through the area and allow room for three 50-by-50-foot box hangars, relocated fuel facilities, and a dedicated access road and parking. Locating the fuel storage here would be beneficial as it would be centrally located and accessible to FBO, ARFF, and SRE vehicles. The dedicated access road and parking for the SRE and FBO buildings would better separate traffic in the area. Although the presence of box hangars would require aircraft circulation in this area, the limited number of hangars and expansion of the apron would provide enough room to prevent interference. Additional space may be occupied by vehicle parking or supporting rental car facilities between the access road and State Highway 153.

4.5.4 SRE Alternative 4: Locate Combined Storage East

The area surrounding the existing cold storage units on the east side of the Airport is primarily vacant. As previously stated, the cold storage buildings are in poor condition. This alternative would remove several of the existing buildings and construct a large heated storage building in their place. This would provide storage for sand, chemicals, and equipment, while personnel and some vehicles would continue to operate out of the existing facility near the passenger terminal. The central location of the current SRE/ARFF facility allows quick response for personnel to snow events while also satisfying the three-minute response window allotted by FAR 139.319, *Aircraft rescue and firefighting: Operational requirements*. Heated storage would prevent sand from freezing and prolong the life of equipment, as it would not be exposed to the elements. Equipment maintenance activities would continue to be performed in the SRE/ARFF building. Keeping this existing building as the center of operations and constructing a heated storage facility would also reduce costs compared to constructing a new SRE building that combines these functions.

4.5.5 SRE Alternative 5: Relocate South

The area south of Runway 08/26 is currently unoccupied except for various access roads and perimeter fencing. However, there are two main drawbacks to development in this area. This first is that personnel would have to cross Runway 08/26 from the main terminal area, although a separate entrance road could be constructed. Second, the lack of existing roads and utility service in this area would significantly increase the cost of development.

The 2008 ALP shows this as the ultimate terminal location with accompanying facilities. Although a new terminal is not expected to be needed within the 20-year planning period, the potential for expansion of the existing terminal is limited and long-term growth over the life of the Airport should be considered. However, an SRE building could be constructed in this location without interfering with the potential ultimate terminal location. Relocation of the SRE facility to this area would provide direct access to both runways during snow events, but would require personnel to cross or travel around Runway 08/26 when moving between the new facility and most other Airport facilities. This would add to personnel travel time and increase the likelihood of a runway incursion. Due to the difficulties in developing this area, conflicts with long term plans, and operational challenges, this alternative was not considered further.





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Figure 4-22: SRE Alternative 3: Relocate North



4.5.6 SRE Facilities Conclusion

Although the existing SRE building is insufficient for storage and maintenance of the entire SRE fleet, its central location is a major advantage. Alternative 4 would permit personnel and some vehicles to remain centrally located while the new heated storage facility would allow chemicals and equipment to be stored elsewhere. This would free up space in the current facility for maintenance and ease of access while also protecting equipment elsewhere. This alternative would also be less expensive than other alternatives as it would not require a facility that combines these functions. For these reasons, Alternative 4 is selected as the preferred long-term SRE facility alternative.

4.6 General Aviation (GA) Terminal

Although the GA terminal facility and layout are outdated, it has several advantages. The location of the building is central to the Airport, easily accessible via nearby parking, and located near the GA hangars. As shown in Figure 4-18, a dedicated access road should be provided to separate GA terminal traffic from passenger terminal traffic and enhance the GA terminal front door. While the overall size of the GA terminal meets Airport needs, the layout of the space is not efficient. The public area should be expanded and/or reconfigured to improve circulation and the crew rest area should be moved further from high traffic areas to increase isolation and decrease noise. However, specific layouts will depend on tenant needs as demand increases and were therefore not developed for this Master Plan.

4.7 Aircraft Rescue and Firefighting (ARFF) Facilities

The ARFF facility is constrained and currently shares functionality with SRE operations, vehicle storage, and maintenance. However, the central location of the building is ideal and the relocation of much of the SRE to the heated storage facility proposed in Section 4.6 would allow more space for maintenance and storage of vehicles in the existing facility. Therefore, no changes are proposed for the ARFF building.

If SRE operations and storage functions are relocated entirely from the current ARFF/SRE facility, the building could serve as an emergency operations center (EOC) for surrounding local government jurisdictions during a crisis. The Federal Emergency Management Agency (FEMA) provides a checklist of items to consider when determining a location for an EOC. The checklist assists in determining whether the facility can provide the capability needed while demonstrating survivability, security, interoperability and other important elements to a successful and resilient EOC. Although more thorough coordination with local governments and FEMA will need, the current ARFF facility offers several advantages for an EOC as it is an accessible building with existing security features.

4.8 Air Traffic Control Tower (ATCT)

The ATCT is centrally located in the terminal area, has good line-of-sight to all aircraft movement areas, and currently meets Airport needs. Therefore, alternatives for the ATCT were not considered although any future expansion of the passenger terminal should consider how ATCT line-of-sight may be impacted.



4.9 Fuel Farm

As stated in Chapter 3, the aviation fuel tanks were recently refurbished but there was no change to capacity or location. However, the Airport intends to relocate the unleaded and diesel fuel near the SRE/ARFF facility for more convenient vehicle fueling. The Airport also intends to install an additional 20,000-gallon Jet A tank and reduce 100LL fuel capacity at the existing fuel farm. These actions would separate aviation and non-aviation fuel while also improving the Airport's ability to meet the needs of turbine aircraft operators.

4.10 Vehicle Parking and Rental Car Facilities

The current T-hangar area is designated as future vehicle parking on the 2008 ALP. However, a parking expansion was recently completed that is anticipated to satisfy demand throughout the 20-year planning period. However, if the current T-hangar area is designated for other future facilities, such as a new SRE facility or corporate box hangars, alternative long-term parking solutions should be considered. In addition, while the recent passenger terminal renovation project also added a consolidated rental car facility for servicing customers just north of the terminal building, the rental cars must be serviced and staged off site. Ideally, rental cars would be serviced on site which would reduce demand on personnel and improve efficiency.

Parking expansion to the west would conflict with the Runway 17 RPZ. Vehicle parking located in an RPZ may create a safety hazard based on the 2012 FAA memorandum, *Interim Guidance on Land Uses Within A Runway Protection Zone.* Coordination with the FAA would be needed to construct vehicle parking in this location. Parking expansion to the north and south is not possible due to State Highway 153 and the passenger terminal building, respectively.

If the T-hangars currently east of the parking area are relocated and a new SRE building and/or new corporate box hangars are constructed in this location, some of the area would remain available for another use. A vehicle parking area and/or rental car service facility could be located to the north of the proposed box hangars, as shown in **Figure 4-18**.

4.11 NAVAIDs and Instrument Approaches

The Airport has two ILS approaches with 1/2-mile visibility minimums and all four runway ends have a GPS RNAV approach. These approaches meet Airport needs and instrument approach improvements are not anticipated to be needed during the 20-year planning period. Replacing the inoperative Runway 08 approach lighting system will allow aircraft to utilize the ½-mile visibility minimums. Precision approach path indicators (PAPIs) should also be added to Runways 08 and 25 to enhance visual and instrument approaches to these runway ends.

4.12 Summary

CWA is well positioned to continue serving the surrounding communities and has several advantages for continuing to develop its strong business aviation presence. The proximity to Interstate 39 and State Highway 153 provide the Airport and its tenants with direct ground access to communities in all directions. The key to the continued efficient operation of CWA will primarily be tailoring existing facilities to support evolving demands. Modifying or tailoring existing facilities to meet anticipated needs, as discussed in this chapter, will be the primary method of meeting anticipated needs over the next 20 years.

