CHAPTER THREE: FACILITY REQUIREMENTS

3.1 Introduction

The previous chapter forecasted the levels of aviation demand that could reasonably be expected to occur at Yellowstone Regional Airport through the planning period (2038). This chapter will assess whether or not existing facilities are adequate to meet that demand. This chapter will also identify what types and quantities of new facilities may be required as well as establish a time frame for when these facilities may be needed to accommodate the future demand. Further, an extensive analysis will be conducted to ensure that all airside facilities meet current FAA design standards and, if necessary, a list of all deviations from the current standards will be provided.

The FAA outlines the essential facilities into the following categories:

- Runways
- Taxiways
- Navigational Aids
- Aprons
- Terminal Building and Associated Facilities
- Airport Access and Automobile Parking
- Airport Support Facilities

This chapter will provide a complete assessment of these facilities at Yellowstone Regional Airport.

In this chapter, requirements for new facilities will be expressed in Planning Horizon Activity Levels rather than in years. This is because the need to develop facilities is determined by demand, rather than a point in time. Activity levels for short, intermediate and long-term planning horizons roughly correlate to five-year, ten-year, and twenty-year time frames in the forecasts. Future facility needs will be tied to these activity levels rather than a specific year in order to retain flexibility in the plan. **Table 3-1** summarizes the activity levels that define the planning horizons used in the remainder of this master plan.

Table 3-1: Planning Horizon Activity Levels

	Short Term Planning Horizon (2023)	Intermediate Term Planning Horizon (2028)	Long Term Planning Horizon (2038)
Enplanements	45,988	50,144	61,846
Based Aircraft	91	97	111
Annual Operations	60,866	63,658	71,389

3.2 WYDOT State Aviation System Plan Objectives

The 2016 Wyoming State Aviation System Plan (SASP) established a series of facility and service objectives for each Wyoming airport according to classification categories. The objectives are intended to maximize the performance of the State airport system. The objectives of the SASP are not intended to replace individual airport planning studies like this master plan, but to supplement this information to show how airport development would benefit the airport system as a whole.

YRA falls into the SASP "Commercial Service Airports" category. The SASP established 50 objectives and identified the following which had not, at the time, been met by the Yellowstone Regional Airport:

- Instrument Approach Type - Precision
- Primary Approach Lighting System (ALS) – ODALS, MALS, or MALSR
- Hangars – 100% of Based Aircraft in Hangars
- Snow Removal Equipment – Additional snow plow, broom and/or rotary plow
- 24-hour Fuel – 24-hour 100 LL
- Public Restrooms – GA Terminal: 24-hour restrooms
- Aircraft Deicing Containment System
- Current Master Plan
- RPZ Ownership – Fee and Title Ownership of All Existing RPZs
- Consistency, Reliability, and ON Time Performance – Increase/Maintain Consistency, Reliability and On Time Performance
- Flight Ops from WY Airports to Regional Airport Hubs – Increase/ Sustain Flight Operations from WY Airports to Regional Airport Hubs
- Competitive Airfare – Offer Competitive Airfare

3.3 Demand / Capacity Analysis

Based on the forecasts from Chapter 2, it is expected that within 20 years, the airport is likely to provide service for over 71,000 operations per year. Future development at the airport within this time frame will be necessary to accommodate this future demand. The next step in the Demand / Capacity Analysis is to determine the current capacity of the airfield.

The principal guidance for the analysis of airfield capacity is FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*. There are two key measurements of airfield capacity that assist planners in evaluating the adequacy of airfield facilities- hourly capacity and Annual Service Volume (ASV).

Hourly capacity considers the throughput during a typical busy hour. Factors such as percentage of arrivals, runway crossings, and taxiway exit locations are considered to arrive at an hourly number of aircraft that can use the airfield without undue delays.

Annual Service Volume (ASV) is an estimate of the number of aircraft operations that can be accommodated in one year. This measure is used to program additional runways, and/or modified taxiway exits. Airfield capacity improvements are typically

programmed when actual annual operations reach 60 percent of ASV and constructed when operations reach 80 percent of ASV.

This approach utilizes the projections of annual operations by the specified fleet mix as projected in the Aviation Activity Forecasts. It considers a variety of factors including airfield layout, meteorological conditions, runway conditions, runway use, aircraft mix, percent arrivals, percent touch-and-go's, and exit taxiway locations.

Weather also plays a key role in determining hourly capacity. When weather conditions are such that there are low clouds and/or reduced visibility, arriving and departing aircraft operate under different flight rules. The conditions for each set of rules are listed below:

Visual Flight Rules (VFR)

Conditions necessary to operate under VFR are a cloud ceiling that is equal to or greater than 1,000 feet above the ground level (AGL) and the visibility is equal to or greater than 3 statute miles. This does not cover every situation, but these are the most common criteria used at most commercial service airports with instrument approaches.

Instrument Flight Rules (IFR)

Conditions requiring operation under IFR are complicated, but in general are conditions that do not qualify as VFR. Weather that is worse than the minimum requirements for instrument approach procedures at an airport will preclude any operation at the airport and can cause cancellations or diversions to other airports. These conditions vary by operation type, type of aircraft, and aircraft equipment.

When operating in VFR conditions, pilots are responsible for the separation of their aircraft from other aircraft and obstacles. However, when IFR operations are required, Air Traffic Control is responsible for the separation of aircraft and obstacle clearance. This is done through the use of RADAR, where available, and through the use of Standard Instrument Procedures. Large margins are built into the system, which is what limits the capacity in the airspace surrounding the airport, as well as the hourly capacity of the airfield.

The demand characteristics that are relevant to calculating airfield capacity are the mix of aircraft types that utilize the airport in the busy hour along with the percentage of arrivals and the percentage of touch-and-go operations. Aircraft types are classified according to size as shown in **Table 3-2** below.

Table 3-2: Aircraft Classifications

Aircraft Class	Maximum Takeoff Weight (MTOW)	# of Engines	Wake Turbulence
A	< 12,500 lbs,	Single	Small (S)
B		Multi	Small (S)
C	12,500-300,000 lbs.	Multi	Large (L)
D	>300,000 lbs	Multi	Heavy (H)

Yellowstone Regional Airport has a single runway with a full length parallel taxiway, has no precision instrument landing system (ILS) and no aircraft in Class D. According to FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, this airfield configuration

should yield an hourly capacity of approximately 98 aircraft per hour in VFR conditions.

Per the advisory circular, the approximate annual capacity of this airfield configuration is estimated at 230,000 operations.

The Annual Service Volume and the hourly VFR capacity thresholds far exceed the demand projections for the 20 year period of 35 (31 GA + 4 Airline) aircraft operations per hour and 71,346 (68,601 GA + 2,745 airline) annual operations as forecast in Chapter 2.

3.4 Airfield Requirements

3.4.1 Design Standards Concepts and Terminology

The planning and design of airfield facilities is based primarily on the types of aircraft using the airport. The FAA has established the **Airport Reference Code (ARC)** for planning and design purposes that signifies the airport's highest **Runway Design Code (RDC)** minus the third (visibility) component of the RDC. The RDC is a code based on planned development and signifies the design standards to which the runway is to be built.

The Runway Design Code has three components. The first component, depicted by a letter, is the **Aircraft Approach Category (AAC)** and relates to aircraft approach speed. The second component, depicted by a Roman numeral, is the **Airplane Design Group (ADG)**. ADG is a function of the design aircraft's wingspan and tail height. The third component of the RDC is the **Visibility Minimums** and is used to establish runway to taxiway separation distances. The FAA has also introduced the Runway Reference Code (RRC) which is comprised of the same three components as the RDC, however, describes the current operation capabilities of a runway where no special operating procedures are necessary. For layout of airport facilities, the design aircraft is the most demanding aircraft or group of aircraft having, or forecast to have, more than 500 annual operations at the airport.

AAC is a grouping of aircraft based on 1.3 times their stall speed in their landing configuration at their maximum certificated landing weight. FAA design standards recognize the following Aircraft Approach Categories:

Table 3-3: Aircraft Approach Categories

Aircraft Approach Category (AAC)	
AAC	**Approach Speed (1.3 X Stall Speed)**
A	Less than 91 knots.
B	91 knots or more but less than 121 knots.
C	121 knots or more but less than 141 knots.
D	141 knots or more but less than 166 knots.
E	166 knots or more.

*A knot = 1.15078 miles per hour, therefore 91 knots is the equivalent of 104.72 miles per hour.

The ADG is a grouping of aircraft based on wingspan and tail height. FAA design standards recognize the following ADGs:

Table 3-4: Airplane Design Groups

Airplane Design Group (ADG)		
ADG	**Tail Height (ft.)**	**Wingspan (ft.)**
I	<20′	< 49’
II	20’ - < 30’	49’ - < 79’
III	30’ - < 45’	79’ - < 118’
IV	45’ - < 60’	118’ - < 171’
V	60’ - < 66’	171’ - < 214’
VI	66’ - < 80’	214’ - < 262’

It is important to note that it is not necessary to design all of the airfield system to the standards of the most demanding aircraft using the airfield. **Figure 3-1** on the follow page provides a visual representation of various aircraft and their associated ARC’s.

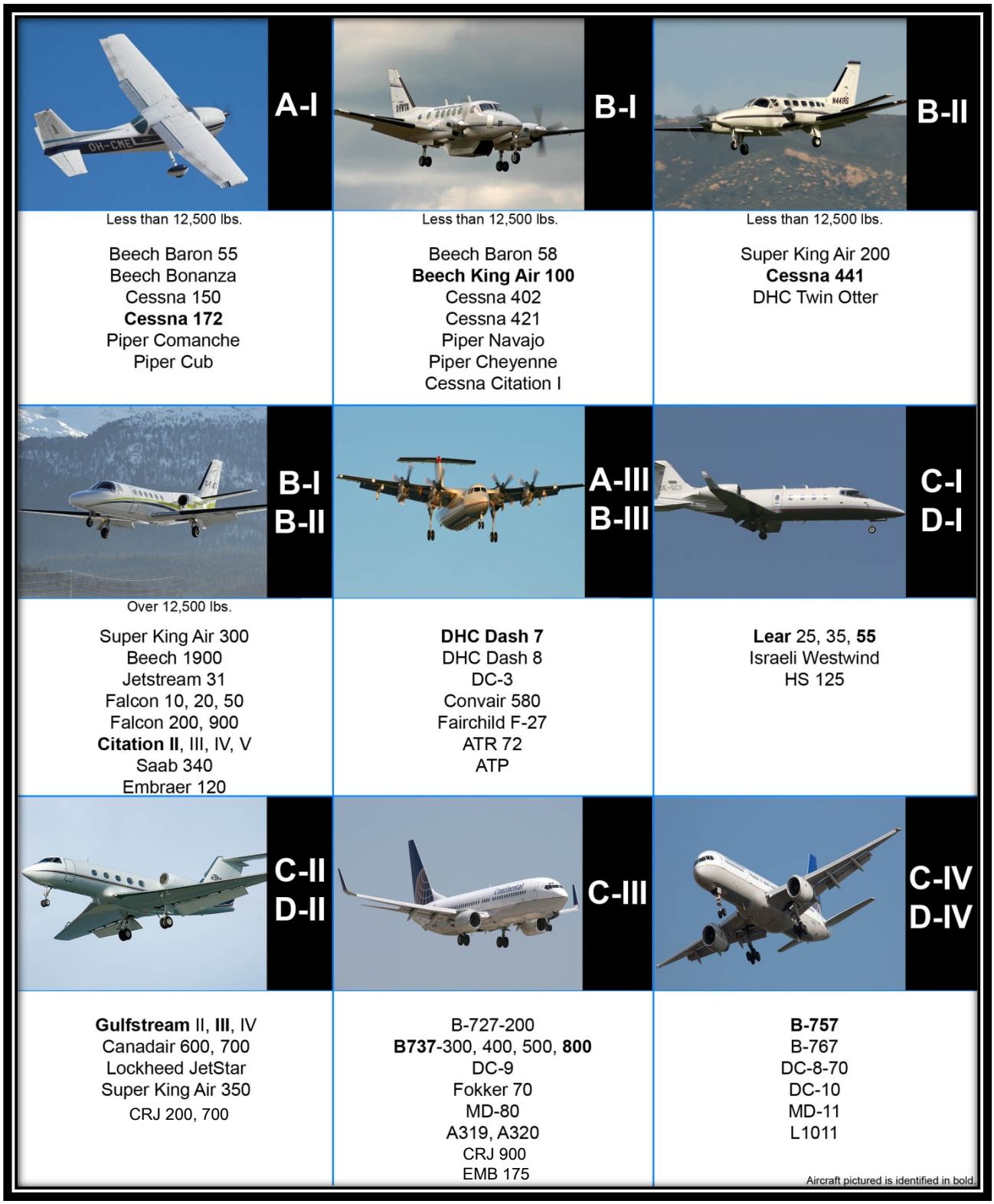


Figure 3-1 Airport Reference Codes

Visibility Minimums are expressed as **Runway Visual Range (RVR)** values in feet corresponding to the following Flight Visibility categories:

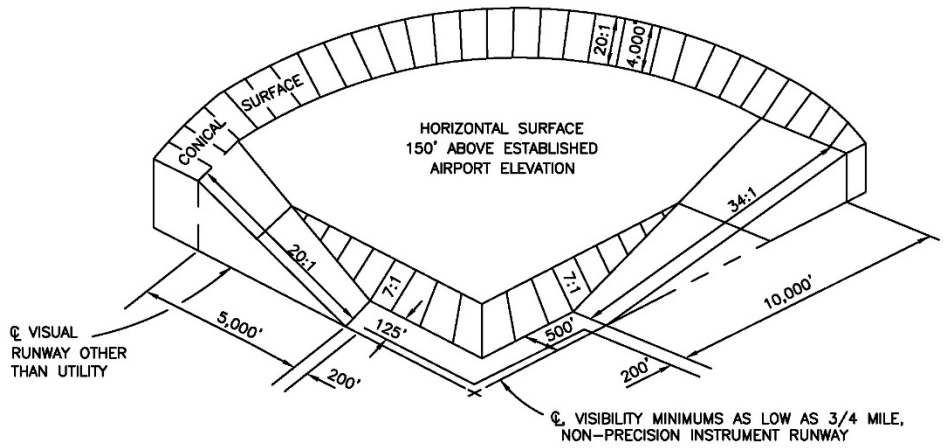
Table 3-5: Runway Visual Range

Runway Visual Range (RVR)	
4000 ft:	Lower than 1 mile but not lower than ¾ mile
2400 ft:	Lower than ¾ mile but not lower than ½ mile
1600 ft:	Lower than ½ mile but not lower than ¼ mile
1200 ft:	Lower than ¼ mile

Therefore, for example, RDC B-I/2400 is an aircraft meeting the requirements for Aircraft Approach Category B (91 knots or more but less than 121 knots) and Airplane Design Group I (wingspan up to but not including 49 feet, tail height less than 20 feet) with visibilities lower ¾ mile. Typically, increasing the Aircraft Approach Category or Airplane Design Group, and providing for lower approach visibility minimums will increase required airport geometric design standards.

Additional design criteria are determined based on aircraft weight and type of approach. A small aircraft is defined in Advisory Circular 150/5300-13A, *Airport Design*, as "an airplane of 12,500 pounds or less maximum certificated takeoff weight". An aircraft weighing more than 12,500 pounds is considered a large aircraft.

Aircraft weight affects the required Part 77 surfaces, runway length requirements and pavement design strength. Part 77 of the Federal Aviation Regulations defines "Objects Affecting Navigable Airspace" and establishes imaginary surfaces around airfields and approach/departure slopes to and from runways. **Figure 3-2** shows the existing Part 77 airspace surface structure at Yellowstone Regional Airport.



TYPICAL CIVIL AIRPORT
IMAGINARY SURFACES DETAIL

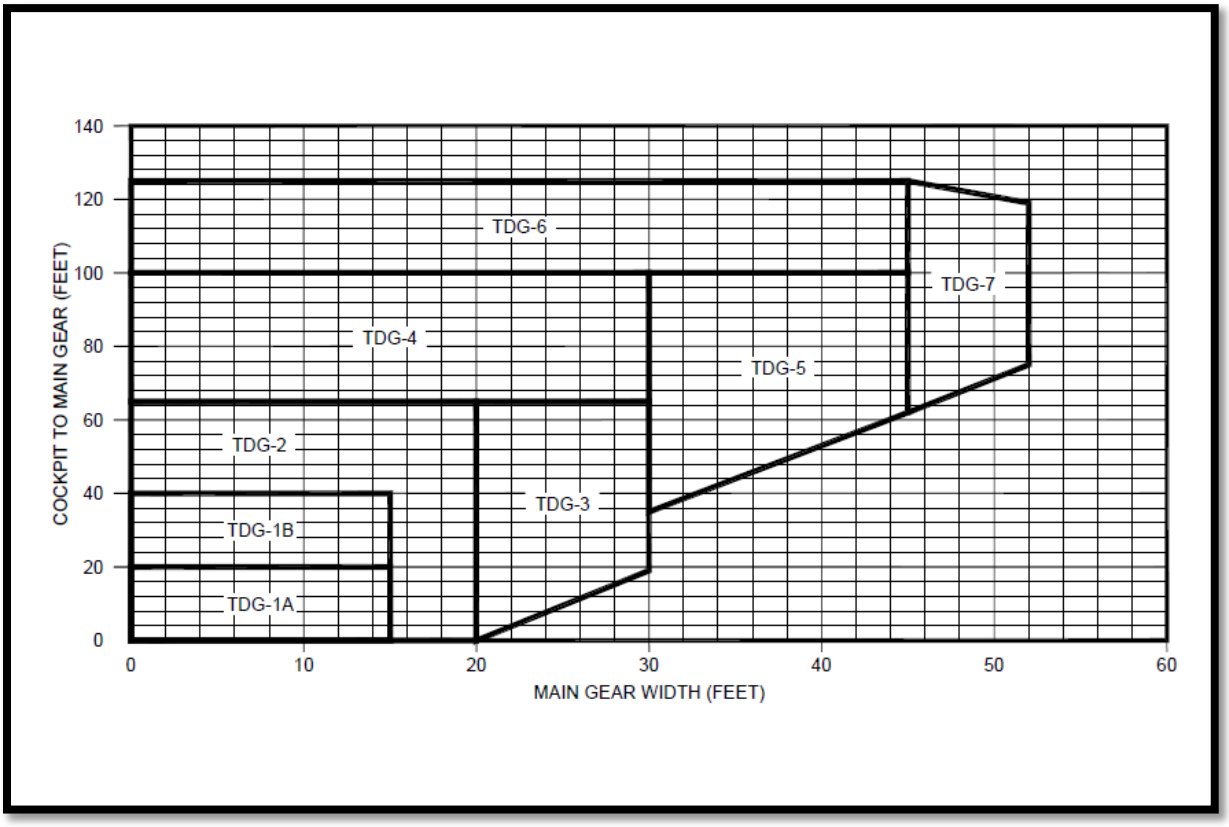
AIRPORT SURFACE DATA

ITEM	DIMENSIONAL STANDARDS (FEET)					
	VISUAL RUNWAY		NON-PRECISION INSTUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
	A	B	A	B		
				C	D	
WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
	VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
				B		
	A	B	A	C	D	
APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	a
APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	a

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY (EXISTING VISUAL)
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE (ULTIMATE)
a - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET

Figure 3-2 Typical Civil Aircraft Imaginary Surfaces Detail

Under former guidance, taxiway design was based on Airplane Design Groups (ADG). In the updated Advisory Circular AC 150/5300-13A, taxiway design is based on newly established **Taxiway Design Groups (TDG)**, which are based on the overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance. TDG classifications are presented in **Figure 3-3**.



Source: Figure 1-1 from AC 5300-13a, Change1

Figure 3-3: Taxiway Design Groups

Critical Aircraft

Federal Aviation Administration (FAA) Advisory Circular AC150-5325-4B, *Runway Length Requirements for Airport Design*, indicates that critical aircraft, upon which runway design is based, are required for federally funded projects to "have at least 500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations) for an individual airplane or a family grouping of airplanes." The AC also states that adjustments may be made to the 500 total annual itinerant operations threshold after considering the circumstances of a particular airport.

Based on the analysis in Chapter 2 - *Forecasts of Aviation Demand*, the current critical

aircraft at the Yellowstone Regional Airport is a family of airplanes with AAC – C and ADG-II, weighing more than 12,500 pounds. In the future, C-III aircraft are projected to be the most demanding type of aircraft with more than 500 operations at the Yellowstone Regional Airport. A small regional jet, such as the CRJ 200, fitting the current critical aircraft category of C-II, falls into the TDG 2 category, while an ADG-III aircraft associated with the airport's future design aircraft will typically fall into the TDG 3 or TDG 4 category. With respect to the current design standards, all runway lateral clearances should be planned for ARC C-III and all taxiway lateral clearances should be planned for ultimate TDG 4 on the Airport Layout Plan.

In summary, the Runway Reference Code and Taxiway Design Groups of the associated airside facilities are shown below in **Table 3-6.**

Table 3-6 Facility Classifications

	Existing Classification	Ultimate Classification
Runway 4-22	C-II	C-III
Taxiways	TDG 2	TDG 4

Runway Length

Adequate planning for runway configuration requirements is very important as runway projects can affect the community beyond the property line. Runway projects are large in magnitude and can require many resources and long lead times for planning, environmental review and funding allocation.

The design approach identified in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design* was used to determine runway length calculations for the Yellowstone Regional Airport.

Aircraft Less than 60,000 Pounds

Chapter 2 of FAA AC 150/5325-4B *Runway Length Requirements for Airport Design* provides the guidance to determine recommended runway lengths for aircraft of 12,500 pounds or less, while Chapter 3 provides the guidance to determine recommended runway lengths for aircraft weighing more than 12,500 pounds and less than 60,000 pounds (large aircraft). These recommendations are based on the assumption of no obstructions, zero wind, dry runway surfaces, and zero effective gradient. The runway lengths for large aircraft are increased at a rate of 10 feet for each foot of elevation difference between the high and low points of the runway centerline (26 X 10 = 260 feet).

Utilizing this information results in the recommended runway lengths summarized in **Table 3-7**.

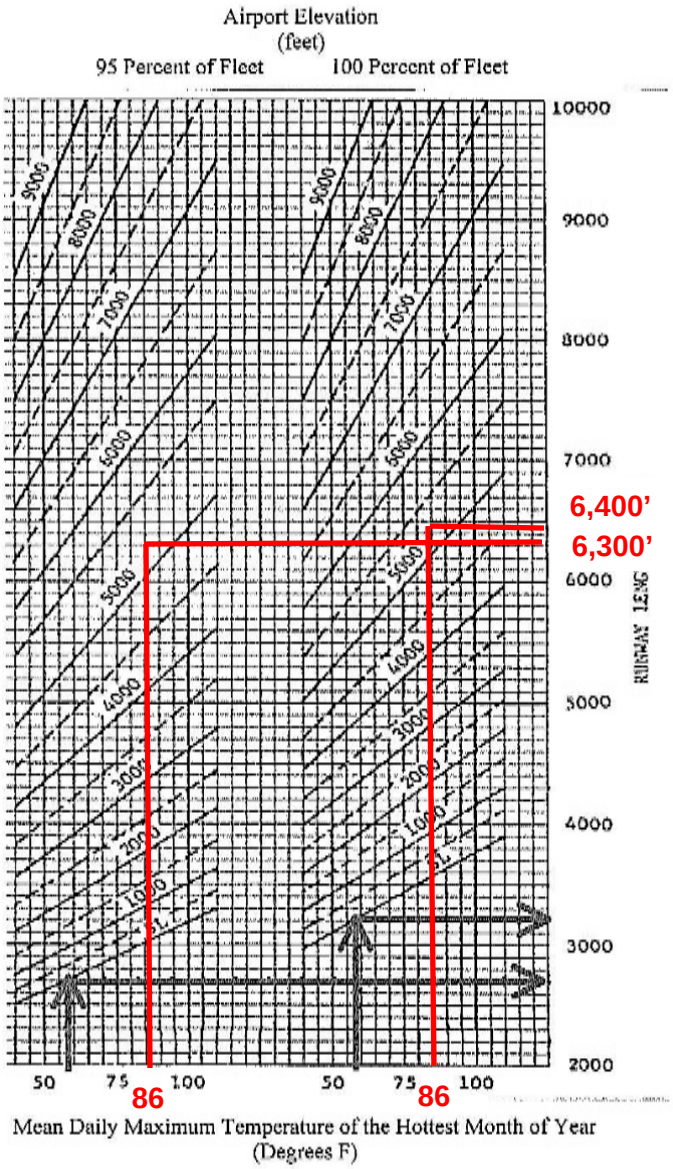
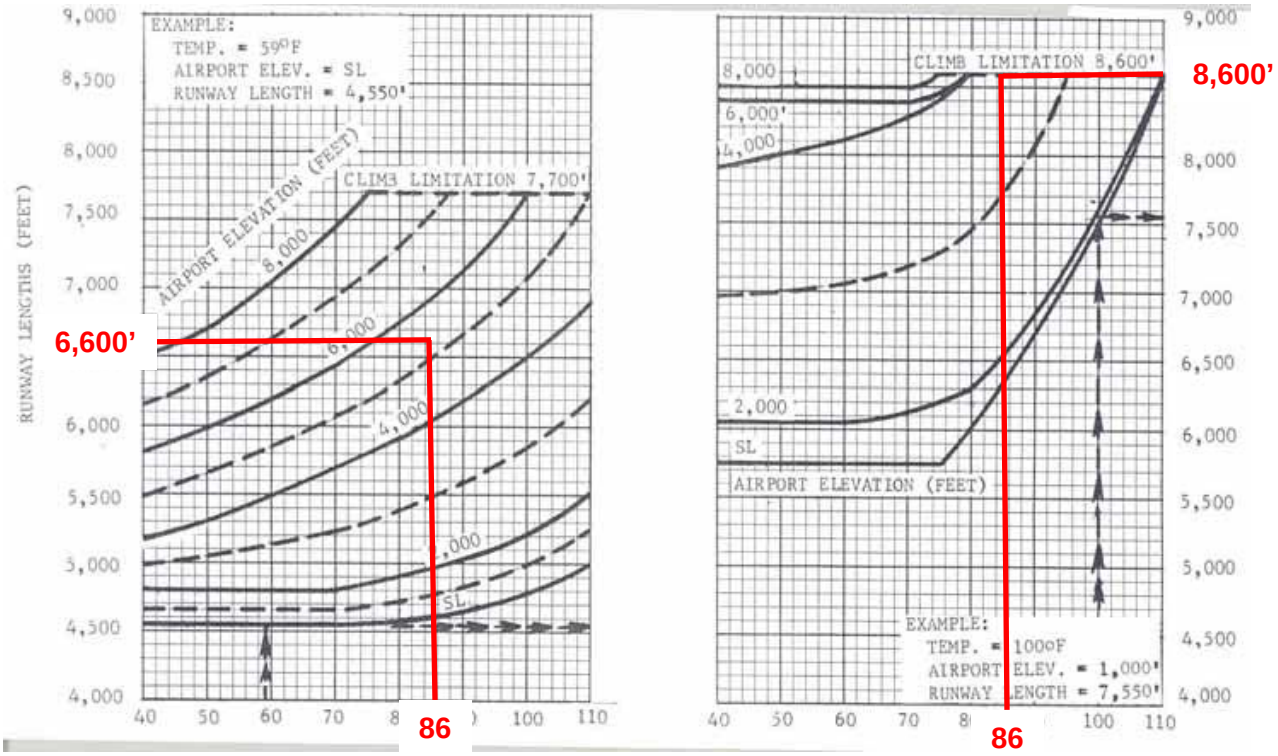


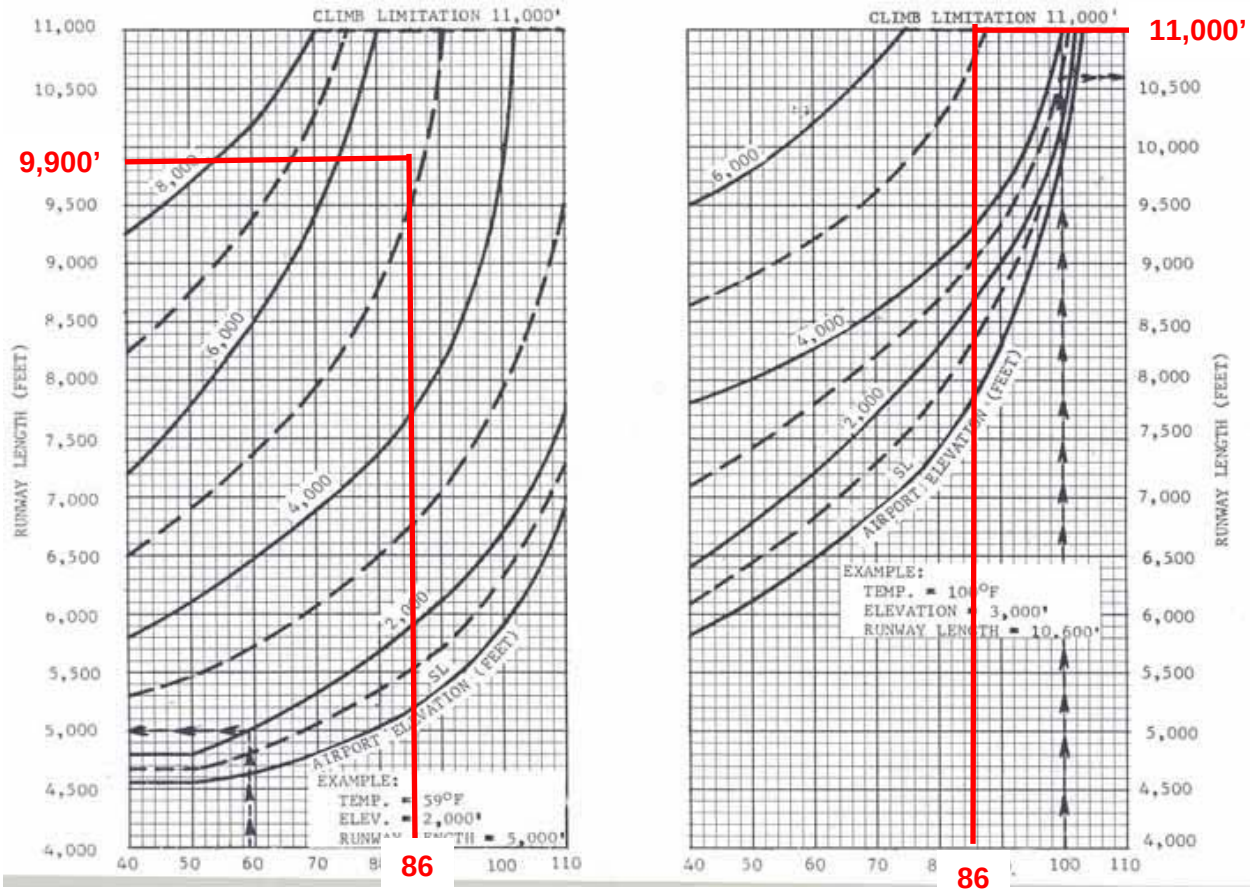
Figure 3-4: AC 150/5325-4B: Small Airplanes with Fewer than 10 Passenger Seats 95 or 100 percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

75 percent of feet at 60 percent useful load **75 percent of feet at 90 percent useful load**

Figure 3-5: AC 150/5325-4B: Large Airplanes Over 12,500 Pounds
75 Percent of Fleet at 60 or 90 percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

100 percent of feet at 60 percent useful load **100 percent of feet at 90 percent useful load**

Figure 3-6: AC 150/5325-4B: Large Airplanes Over 12,500 Pounds
100 Percent of Fleet at 60 or 90 percent Useful Load

Table 3-7 FAA Runway Lengths

AIRPORT AND RUNWAY DATA	
Airport elevation	5098.0 feet
Mean daily maximum temperature of the hottest month	86.0 F
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with approach speeds of less than 30 knots	1,830 feet
Small airplanes with approach speeds of less than 50 knots	4,880 feet
Small airplanes with less than 10 passenger seats	
95 percent of these small airplanes	6,300feet
100 percent of these small airplanes	6,400 feet
Small airplanes with 10 or more passenger seats	6,400 feet
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	6,860 feet
75 percent of these large airplanes at 90 percent useful load	8,860 feet
100 percent of these large airplanes at 60 percent useful load	10,160 feet
100 percent of these large airplanes at 90 percent useful load	11,260 feet
REFERENCE: Chapter 2 of *AC 150/5325-4B, "Runway Length Requirements for Airport Design",* no Changes included.	

At 8,266 feet in length, Runway 4-22 can accommodate 100 percent of the small aircraft and 75 percent of large aircraft under 60,000 pounds at 60 percent useful load. As indicated in the table, by altering the amount of useful load (i.e. passengers, cargo or fuel), large aircraft that, under full loading would require longer runways, could adjust their loads to operate on a shorter runway. Reduced loads translate into reduced fuel, passenger and/or cargo loads. Considering the limitations of the existing airport site, it is not likely that any additional length could be added to increase the usable runway length. Since the thresholds are already displaced to meet FAA standards for Runway Safety Area and Object Free Area, additional runway length would only increase the runway length behind the thresholds. Also, the landing threshold for Runway 22 is effectively limited by the instrument approach. This approach is hampered by high terrain and moving the threshold closer to the terrain would only increase the impact.

Aircraft More than 60,000 Pounds

Runway Length calculations for regional jets and aircraft over 60,000 pounds are based on the requirements of the most demanding aircraft that regularly uses the runway. Currently, the commercial aircraft that most regularly uses the airport is the Canadair

Regional Jet 200 (CRJ200). Nationally, regional airlines are in the process of transitioning from 50 seat CRJ200s to larger aircraft such as the CRJ700, CRJ900 and Embraer 175. It is anticipated that these larger regional jets will be incorporated into the commercial fleet mix at the Yellowstone Regional Airport within the planning period.

A runway length analysis was performed for Yellowstone Regional Airport using the manufacturer's Aircraft Planning Manuals and other available performance data. **Figure 3-7** shows takeoff length requirements for the Canadair Regional Jet CRJ200, as well as the CRJ700, and the CRJ900. Stage lengths within 600 nautical miles and 80 percent useful load are assumed for these aircraft. This accommodates Delta and United destinations of Salt Lake City (260NM), Denver (340NM) and Minneapolis (600NM).

As shown, the existing runway length at Yellowstone Regional Airport (8,268 feet) is adequate to accommodate the forecast aircraft under most conditions. Under the most stringent conditions, ie. hot day and long destination range, the CRJ900 may be required to reduce payload to depart from the airport. An increase in runway length is not recommended during the planning period based on currently anticipated conditions. However, should unanticipated conditions occur such as usage by aircraft with greater requirements, or the addition of longer stage length routes, such as Chicago, an increased runway length may become warranted in the future. It is recommended that provision for ultimate runway expansion be depicted on the Airport Layout Plan to preserve the option for extension beyond the planning period.

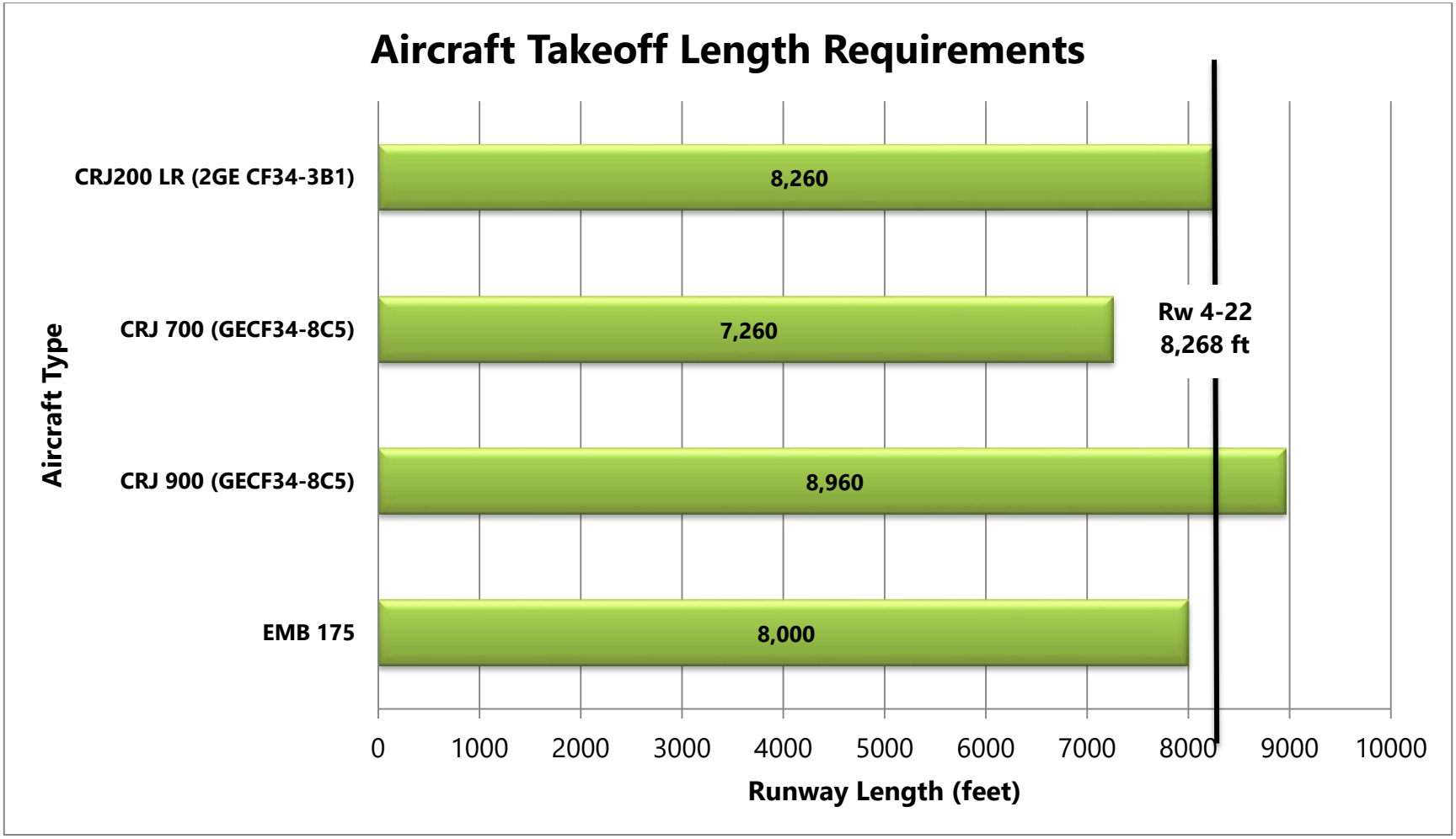


Figure 3-7: Aircraft Takeoff Length Requirements

Assumptions:
Takeoff weight assumes 80% useful load for 600 NM stage length
Runway Elevation 5098 feet MSL
Aircraft Manufactures Data
CRJ200, CRJ700, CRJ900 ISA+20C (80.78F)
EMB175 ISA + 15C (71.78F)

Runway Orientation, Additional Runways

FAA design standards recommend additional runway orientations when the primary runway orientation provides less than 95 percent wind coverage.

Crosswind limitations are a function of an aircraft's stall speed, pilot proficiency and other factors. For general planning purposes, the FAA has established crosswind limits of 10.5 knots for general aviation A-I and B-I aircraft, 13 knots for A-II and B-II general aviation aircraft and 16 knots for transport aircraft A-III, B-III and C-I through D-III. Aircraft in approach category IV (A-IV through D-VI) have a crosswind limit of 20 knots.

Prevailing winds are generally the primary factor in determining runway orientation. The most desirable orientation based on wind is one which has the largest wind coverage and minimum crosswind components.

Table 3-8 summarizes wind coverage based on wind data obtained from the Cody AWOS between 2008 and 2017. As shown, the wind coverage on the current runway orientation is greater than 95 percent for the 16 knot and the 13 knot crosswind components, however, at 93.75 percent, it is slightly lower than 95 percent for the 10.5 knot crosswind component for the smallest aircraft utilizing the airport. While this crosswind component does just meet the threshold of justifying planning for a crosswind runway, factors at Cody including availability of land, adjacent land use and existing terrain make consideration of a crosswind runway impracticable. Therefore, a crosswind runway is not recommended.

Table 3-8 All Weather Windrose

	10.5 Knots Crosswind	13 Knots Crosswind	16 Knots Crosswind
Runway 4-22	93.75%	97.03%	99.34%

Wind Data: Yellowstone Regional Airport AWOS, 2008 –2017

Runway Width

The width of the existing runway was also examined to determine if it meets the needs for aircraft that currently, and are forecasted to, use the airfield. Currently, Runway 4-22 is 100 feet wide. FAA design standards call for a minimum runway width of 100 feet for Runway Design Group (RDG) C-II. For C-III aircraft up to a maximum certificated takeoff weight of 150,000 pounds, the minimum runway width is also 100 feet (over 150,000 pound aircraft require a 150 foot runway width). Because the future critical aircraft, the CRJ 900 and the EMB 175 are less than 150,000 pounds, the 100 foot runway width should be sufficient for the planning period.

Runway Pavement Strength

The 2016 Wyoming State Aviation System Plan (SASP) recommends that airports in Cody's classification have a primary runway capable of supporting a CRJ700 at 75,000 pounds dual wheel (DW) gear loading.

The FAA Airport Master Record 5010 form indicates Runway 4-22 has a pavement strength rating of 95,000 pounds single wheel loading, 124,000 pounds dual wheel

loading and 193,000 dual wheel tandem loading.

This strength rating is sufficient to serve the aircraft currently serving and expected to serve the airport in the future.

The FAA began using the standardized International Civil Aviation Organization (ICAO) method to report airport runway strength in 2014. The standardized method is used to determine a Pavement Classification Number (PCN) which represents the load carrying capacity of a pavement for unrestricted operations. The PCN is a five-part code, describing the piece of pavement. The first part is the PCN numerical value which indicates the load-carrying capacity of the pavement in thousands of pounds. The second part calls out whether the pavement is rigid or flexible. The third part is a code that indicates the strength of the subgrade. The fourth part calls out the maximum tire pressure the pavement can support. The fifth part describes how the first part, the load-carrying capacity, was determined, either technical evaluation or a physical test. The PCN for Runway 4-22 is 38/F/D/X/T

Airfield Pavement Maintenance

A runway rehabilitation project was completed in 2014 which included milling, overlaying and remarking of the runway pavement. In 2016, the taxiway was rehabilitated which included remarking of all airport pavements. Wyoming Aeronautics Division completed an inspection of all airfield pavements in July, 2018 and found the runway and taxiway pavements to be in the Pavement Condition Index (PCI) range of 85 to 100, which is considered "good". The general aviation apron and a portion of the commercial apron were rated between 70 and 85, which is considered "satisfactory". Two taxiway segments, the eastern commercial apron access taxiway, the eastern general aviation apron access taxiway, and the general aviation hangar access taxilane were rated in "fair" condition, with PCI ratings between 55 and 70.

A regular series of pavement maintenance is recommended for all airfield pavements. Based on the current condition of existing pavements, a general schedule for major and preventative maintenance items is presented in **Table 3-9**. Actual project timing will depend on the availability of funding and actual wear on pavement. The primary elements are listed, followed by their typical useful life.

Table 3-9 Airfield Pavement Maintenance

Recommended Maintenance Program		Approximate Life Expectancy		
Asphalt Pavement Mill & Overlay Concrete Reconstruction Sealcoat Crack Sealing		15 to 20 years 40 years 4 years 4 years		
Pavement	Last Major Maintenance/ Construction	Mill & Overlay	Sealcoat / Spall Repair	Crack Sealing / Joint Repair*
Runway 4-22	2014	2029	2019	4 year cycle
Parallel Taxiway A	2016	2030	2023	4 year cycle
Commercial Apron – East (concrete)	2010	2025	2019	4 year cycle
Commercial Apron – West (concrete)	2018	2035	2023	4 year cycle
General Aviation Apron	2013	2028	2019	4 year cycle
Hangar Taxilanes -West	2007	2022	2019	4 year cycle
Hangar Taxilanes – East	2005	2020	2019	4 year cycle

Note: Maintenance on exit and connecting taxiways and taxilanes should be done as part of related runway, parallel taxiway, or apron projects.

Taxiway Requirements

Taxiways are constructed primarily to facilitate aircraft movement to and from the runway system. Some taxiways are necessary simply to provide access between aprons and runways, while other taxiways become necessary as activity increases and safer and more efficient use of the airfield is needed.

Under former guidance, taxiway design was based on Airplane Design Groups (ADG). In the updated Advisory Circular AC 150/5300-13A, taxiway design is also based on newly established Taxiway Design Groups (TDG), which are based on the overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance.

Runway 4-22 is served by one parallel taxiway located southeast of the runway. Taxiway A is located 400 feet from the runway centerline and is 50 feet wide. Connecting taxiways are 70 to 90 feet wide.

The existing 50 foot taxiway width of Parallel Taxiway A is adequate for the planned future Taxiway Design Groups 3 and 4.

Airport Design AC 150/5300-13A states that taxiway connectors that cross over a parallel taxiway from an apron and directly onto a runway are not recommended. In order to prevent runway incursion and promote good situational awareness by pilots, a staggered layout when taxiing from an apron onto a parallel taxiway and then onto a stub-taxiway or taxiway connector to a runway is recommended. Per FAA recommendations, the southwest general aviation apron access taxiway should be removed or shifted to create a staggered layout.

Holding aprons and bypass taxiways can improve the efficiency of the taxiway system. Holding aprons allow aircraft to prepare for departure in an area off of the taxiway. Bypass taxiways allow traffic ready for departure to bypass aircraft preparing for departure. There are currently no holding aprons or bypass taxiways on the airfield. Consideration should be given for holding aprons or bypass taxiways to serve the existing runway system.

Finally, as facilities are built to accommodate growing demand in the general aviation and executive hangar areas, taxiways and taxilanes will need to be extended to provide access from those areas to the airfield.

FAA Design Standards

One of the key considerations of any airport planning effort is to evaluate the dimensional standards for the airfield layout, established by the FAA. **Table 3-10** presents a summary of significant FAA design standards that need to be compared with existing conditions to evaluate whether Yellowstone Regional Airport meets criteria for the aircraft currently being served. The application of these design standards establishes airport geometry. The airport is currently classified as a C-II facility and is planned to ultimately be a C-III facility.

Table 3-10 FAA Design Standards

	Existing RW 4-22	FAA Standards for C-II	FAA Standards for C-III
Runway Object Free Area			
Width	800′	800′	800′
Length Beyond Runway End	600′	600′	1000′
Runway Safety Area			
Width	500′	500′	500′
Length Beyond Runway Departure Threshold	1,000′	1,000′	1,000
Runway Obstacle Free Zone			
Width	400′	400′	400′
Length Beyond Runway Departure Threshold	200′	200′	200′
Taxiway Object Free Area			
Width	131′	131′	186′
Taxiway Safety Area			
Width	79′	79′	118′
Runway Width	100′	100′	150′
Taxiway Width	50′	50′ (TDG 3/4)	50′ (TDG 3/4)
Runway Centerline to Parallel T/W Centerline	400′	300′	400′
Runway Centerline to Holdline	301′	250′	301′
Runway Centerline to Edge of Aircraft Parking	<500′	400′	500′
Taxiway Centerline to Fixed or Movable Object	>93′	65.5′	93′

Runway Object Free Area (OFA): The Runway Object Free Area is a two dimensional ground area surrounding the runway. The runway OFA clearing standard precludes parked airplanes and objects except those whose location is fixed by function such as a navigational aid. In order to meet the standard for the current RDC C-II Aircraft, the OFA for Runway 4-22 must be 800 feet wide and extend 600 feet beyond each runway end. To meet the standard for RDC C-III Aircraft, the OFA for must be 800 feet wide and extend 1000 feet beyond each runway end.

The existing OFA for Runway 4-22 meets RDC C-III design standards through the use of displaced thresholds. The displaced threshold results in different "declared distances" for arrivals and departures at each runway end. The OFA is established based on the declared Accelerate Stop Distance Available (ASDA) and Landing Distance Available (LDA) for both ends of Runway 4-22.

Runway Safety Area (RSA): The Runway Safety Area is a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway. The RSA should be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations. The RSA dimensions associated with C-II Aircraft standards are a width of 500 feet and an extension of 1000 feet beyond the runway end. The RSA associated with C-III is also 500 feet wide and extends 1,000 feet beyond the runway end.

The existing RSA for Runway 4-22 meets RDC C-III design standards through the use of displaced thresholds. The displaced threshold results in different "declared distances" for arrivals and departures at each runway end. The RSA is established based on the declared Accelerate Stop Distance Available (ASDA) and Landing Distance Available (LDA) for both ends of Runway 4-22.

Runway Obstacle Free Zone (OFZ): The runway OFZ is a defined volume of airspace centered above the runway centerline. It is the airspace above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. For all aircraft over 12,500 pounds the OFZ is 400 feet wide and 200 feet beyond the runway end.

Taxiway Object Free Area (TOFA): The TOFA is a two dimensional ground area adjacent to taxiways. The taxiway OFA clearing standard precludes vehicle service roads, parked airplanes, and objects except those whose location is fixed by function such as a navigational aid. The FAA standard TOFA for Group II aircraft is 131 feet and for Group III aircraft is 186 feet wide, centered on the taxiway centerline. This indicates that, for Group II, parked aircraft need to be at least 65.5 feet from the centerline of the nearest taxiway and for Group III, parked aircraft need to be at least 93 feet from the centerline of the nearest taxiway.

Taxiway Safety Area (TSA): The TSA is a defined surface alongside the taxiway prepared or suitable for reducing risk of damage to an airplane unintentionally departing the taxiway. The minimum

standard TSA width for Group II aircraft is 79 feet and the minimum standard TSA for Group III is 118 feet.

Design Criteria

Line of Sight: FAA line of sight standards require that two points five feet above the centerline of a runway, without a parallel taxiway, be mutually visible for the entire runway. For runways with a full parallel taxiway, the standard requires that two points, five feet above the centerline, be mutually visible for one half of the runway length. Further, there is a requirement that for intersecting runways, points five feet above the centerline must be mutually visible within the Runway Visibility Zone (RVZ).

Line of sight requirements are currently met at Yellowstone Regional Airport; however, care must be taken not to create a problem in the course of development.

Runway Centerline to Parallel Taxiway Centerline: This design criterion establishes the minimum separation between the centerline of the runway and the centerline of the parallel taxiway. The separation standard is 300 feet for C-II aircraft runways and 400 feet for C-III. The existing parallel taxiway is located 400 feet from the runway centerline and meets the separation standard for C-II and C-III aircraft.

Runway Centerline to Holdline: This standard provides for marking on pavement and placing signs at locations on taxiways where aircraft hold prior to entering the runway. These locations are chosen to ensure that aircraft are clear of the RSA and OFZ during operations by other aircraft on the runway. The standard holding position for C-II Aircraft is 250 feet from the runway centerline. For C-III the hold position distance is increased above 250 feet by 1 foot for every 100 feet above sea level. For the Yellowstone Regional Airport, this equates to 301 feet from the runway centerline.

A hold line position with 301 feet of separation is provided for Runway 4-22 on connecting taxiways. This exceeds the standard for BC aircraft and meets the standards for C-III aircraft.

Runway Centerline to Edge of Parking Area: This standard is designed to allow additional clearance between aircraft parking areas and aircraft operations on the runway, while protecting space between these areas for a parallel taxiway. The FAA standard for C-II aircraft is 400 feet. The standard for C-III aircraft is 500 feet. The airport's aircraft parking separation currently exceeds 500 feet and meets the required distance for C-III. No construction of aircraft parking aprons should be permitted within the designated area.

WYDOT Design Standards Inventory

In 2015, WYDOT Aeronautics conducted a detailed survey of conditions at the Yellowstone Regional Airport related to FAA design standards. The inventory noted a handful of non-standard items on the airfield to be corrected within future construction projects as feasible. The Design Standards Inventory (**Appendix A**) should be consulted as airfield construction projects move forward to identify opportunities to correct non-standard items.

3.4.2 Airfield Marking, Lighting and Signage

Pavement markings, lighting and signage facilitate the safe movement of aircraft about

the airfield by directing pilots to their destinations. Runway markings are designed according to the type of instrument approach available on the runway. FAA Advisory Circular (AC) 150/5340-1L, S*tandards for Airport Markings*, provides the guidance necessary to design an airport's markings.

Runway 4-22 has Precision Instrument markings which will accommodate future approaches below ¾ mile visibility minimums for the runway. Besides routine maintenance of the runway markings, these markings should suffice for the planning period.

Taxiway and apron areas also require marking. Yellow centerline stripes are currently painted on all taxiway and taxilane surfaces at the airport to provide guidance to pilots. Runway, taxiway and taxilane markings should be maintained in conjunction with the routine maintenance of the pavement surface.

Airport lighting systems provide critical guidance to pilots during nighttime and low visibility operations. Runway 4-22 is equipped with high intensity runway edge lighting (HIRL). The existing runway lighting systems, while adequate in intensity, will need routine maintenance during the planning period.

Effective ground movement at night is enhanced by the availability of taxiway lighting. The parallel taxiway is currently served by medium intensity taxiway lighting (MITL). Taxiway lights were upgraded to LED in 2016. The existing taxiway lighting systems, while adequate in intensity, will need routine maintenance during the planning period.

Airfield signage provides another means of notifying pilots as to their location on the airport. A system of signs placed at several airfield intersections on the airport is the best method available to provide this guidance. Signs located at intersections of runways and taxiways provide crucial information to avoid conflicts between moving aircraft. Directional signage instructs pilots as to the location of taxiways and terminal aprons.

Signage for the Yellowstone Regional Airport includes hold position signs and directional signs. The airfield signage system was replaced in 2014. Airfield signs are internally lighted and reflect current FAA standards. Airfield signage should be reviewed and replaced as needed with the next lighting improvement project at the airport.

3.4.3 Navigational and Approach Aids

Electronic and visual approach aids provide guidance to arriving aircraft and enhance the safety and capacity of the airfield. Such facilities are vital to the success of the airport and provide additional safety to passengers using the air transportation system. While instrument approach aids are especially helpful during poor weather, they are often used by commercial pilots when visibility is good.

Navigational Aids

Navigational aids are electronic devices that transmit radio frequencies which properly equipped aircraft and pilots translate into point-to-point guidance and position information. Global Positioning System (GPS), VHF omnidirectional range (VOR) and distance measuring equipment (DME) are available for pilots to navigate to and from

Yellowstone Regional Airport. These systems are sufficient for navigation to and from the airport; therefore, no other navigational aids are necessary at this time or projected to be necessary in the future. Advancements in technology may require improvements to navigational aids on the airport and should be monitored for appropriate implementation.

Instrument Approach Procedures

While instrument approach aids are especially helpful during poor weather, they are often used by commercial pilots when visibility is good. Instrument approaches are categorized as either precision or non-precision. Precision instrument approach aids provide an exact alignment and decent path for an aircraft on final approach to a runway while non-precision instrument approach aids provide only runway alignment information. Most existing instrument approaches in the United States are global positioning systems (GPS) or instrument landing systems (ILS).

With the advent of GPS, stand-alone instrument assisted approaches will eventually be established that provide vertical guidance down to visibility minimums currently associated with precision runways. As a result, airport design standards that formerly were associated with a type of instrument procedure (precision/non-precision) are now revised to relate instead to the designated or planned approach visibility minimums.

An RNAV GPS approach to Runway 22 has been established, which may be flown with visibility reduced to 1 mile for Category A or B aircraft, 1 ½ mile for category C aircraft and 1 ¾ mile for category D aircraft.

A published VOR approach makes use of the VHF Omnidirectional Range (VOR) which is located 6 miles northeast of the airport. This approach does not align the aircraft with the runway, so it is a "circling" approach. This means that after the aircraft makes visual contact with the runway, a circling maneuver is required to line up with the runway and execute the landing. This approach allows the aircraft to descend to approximately 700 feet above the threshold elevation for all but the fastest jets. Visibility minimums are between 1 and 2 ¾ statute miles.

An RNAV GPS –B approach is available to the airport from the southeast. This is also a circling approach and does not align the aircraft with the runway centerline. This approach allows the aircraft to descend to approximately 1,000 feet above the threshold for all but the fastest jets. Visibility minimums are between 1 ¼ and 3 statute miles.

An effort is currently underway to establish a new straight in RNAV GPS approach to Runway 4.

An Operational Capability Assessment was completed in July 2017. This study assessed different approach options to both runways, including both land based and GPS methods. Following review by FAA a request form was submitted to the FAA via the Instrument Flight Procedures Gateway for the establishment of a straight in RNAV GPS approach to Runway 4. FAA is currently in in the process of evaluating and developing standard instrument procedures. Publication with the appropriate landing and takeoff minima is anticipated near the beginning of 2020. It is expected that the new approach will reduce weather visibility minimums to

Runway 4 to as low as 1 mile horizontally and 400 feet vertically.

There are currently no precision instrument landing system (ILS) approaches to the airport. Terrain to the southwest of the Runway 4 precludes a straight-in instrument approach to that runway, however, addition of an ILS approach to Runway 22 could potentially reduce the visibility minimums to that runway in the future. The Runway 22 approach should be protected in the event it is developed for a precision instrument approach in the future. Consistent with this recommendation, the 2016 Wyoming State Aviation System Plan (SASP) recommends that airports in Yellowstone Regional Airport's classification provide a precision instrument approach.

Approach Lighting

Approach lighting systems provide the basic means to transition from instrument flight to visual flight for landing. **Table 3-11** compares the landing surface requirements which must be met in order to establish a GPS approach and a comparison of these standards to existing airport facilities. As reflected in the table, future improvement of visibility minimums to Runway 4-22 may require approach lighting such as a MALSR (Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights). The Runway 22 approach and lateral clearances should be protected to allow for the installation of approach lighting such as MALSR in the future. Consistent with this recommendation, the 2016 Wyoming State Aviation System Plan (SASP) recommends that airports in Yellowstone Regional Airport's classification provide an approach lighting system as appropriate.

Table 3-11: GPS Instrument Approach Requirements

Requirement	<3/4 Mile Visibility Less Than 250 - Foot Cloud Ceiling	¾ Mile to < 1 Mile Visibility Greater than 250 - Foot Cloud Ceiling	>One-Mile Visibility Greater than 250 – Foot Cloud Ceiling	Existing Conditions Runway 4-22
Minimum Runway Length	4,200 Feet	3,200 Feet	3,200 Feet	7,025 Feet
Runway Markings	Precision	Nonprecision	Visual	Nonprecision
Runway Edge Lighting	High / Medium Intensity	High / Medium Intensity	Medium / Low Intensity	High Intensity
Approach Lighting	MALSR, SSALR, or ALSF	ALS Recommended	ALS Recommended	None
Primary Surface	500 feet clearance on each side of runway	250 feet clearance on each side of runway	250 feet clearance on each side of runway	250 feet clearance on each side of runway

Source: AC150/5300-13A Table 3-4
MALSR: Medium intensity Approach Lighting System with Runway Alignment Lighting

Visual Approach Aids

In most instances, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual guidance information during landings to the runway electronic visual approach aids are

commonly provided at airports. The existing visual approach aids consist of four light precision approach path indicators (PAPI-4) on both approach ends of Runway 4-22. Due to terrain in the approach, the PAPI to Runway 4 is set to a 3.5 degree glidepath (normally PAPI's are set to a 3 degree glidepath) and is unusable beyond 4 nautical miles. PAPIs require routine maintenance and should be replaced at the end of their useful life. (FAA considers the minimum useful life for airfield lighting and signage to be ten years for grant eligibility under the Airport Improvement Program per Table 308 of FAA Order 5100.38D).

Runway end identifier lights (REILs) provide rapid and positive identification of the approach end of the runway. Runway ends at Yellowstone Regional Airport are equipped with REILs. Like other airfield equipment, REILs require routine maintenance and should be replaced at the end of their useful life.

Wind Indicators

Wind indicating devices provide pilots with information as to ground level wind conditions while segmented circles indicate airport traffic patterns. The Yellowstone Regional Airport has a lighted wind cone with segmented circle at midfield. Three unlit supplemental wind cones are provided near the 1000 foot mark from the end of each runway threshold and at midfield. This arrangement should be sufficient for the planning period.

Weather Observation

Yellowstone Regional Airport is equipped with an automated weather observing system (AWOS) which provides automated weather observations 24 hours per day. The system reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), thunderstorm activity, and density altitude (airfield elevation corrected for temperature). The AWOS is sufficient and should be maintained through the planning period.

Air Traffic Control

The Yellowstone Regional Airport does not currently have an air traffic control tower. The FAA is generally responsible for siting, constructing and maintaining an Airport Traffic Control Tower (ATCT) for an airport, therefore actions related to the ATCT are typically initiated by the FAA. The purpose of discussion within the context of this master plan is to protect land use and guide development so that future ATCT sites remain feasible should a tower prove warranted.

Remote and virtual tower (RVT) systems are currently under development and may offer an alternative to a traditional manned control tower in the near future. RVT systems utilize video-sensor based surveillance instead of the "out of the window" view from a traditional tower. A live feed to a Remote Tower Control (RTC) center enables ATC personnel to simultaneously monitor multiple medium and low traffic level airports. RVT systems offer cost savings through more efficient use of human resources serving multiple airports from a single location and by eliminating the need to build and maintain control tower buildings and facilities at local airports.

RUNWAYS AND TAXIWAYS		
EXISTING	**SHORT TERM**	**ULTIMATE**
Runway 4-22 **100' X 8,268'** **95,000 lbs SWL** **124,000 lbs DWL** **193,000 lbs DTL** **Full Length Parallel TW A – 50'W**	**Runway 4-22** 100' X 8,268' 95,000 lbs SWL 124,000 lbs DWL 193,000 lbs DTL Full Length Parallel TW A – 50'W	**Runway 4-22** 100' X 8,268' 95,000 lbs SWL 124,000 lbs DWL 193,000 lbs DTL Full Length Parallel TW A – 50'W
NAVIGATIONAL AIDS		
EXISTING	**SHORT TERM**	**ULTIMATE**
Runway 4-22 **VOR/DME** **RNAV** **GPS** **4- Box PAPI**	**Runway 4-22** VOR/DME RNAV GPS ILS (22) 4- Box PAPI	**Runway 4-22** VOR/DME RNAV GPS ILS (22) 4- Box PAPI
LIGHTING AND MARKING		
EXISTING	**SHORT TERM**	**ULTIMATE**
Runway 4-22 **Precision Markings** **HIRL, MITL** **REIL**	**Runway 4-22** Same	**Runway 4-22** Precision Markings HIRL, MITL REIL MALSR (22)

Figure 3-8 Airfield Facility Requirements

3.5 Terminal Area Requirements

Components of the terminal area complex include the terminal apron, airline gate positions, and the various functional elements within the terminal building. In addition, the terminal area is served by various access, auto parking, and rental car facilities. This section identifies the terminal area facilities required to meet the airport's needs through the planning period.

The terminal facility was constructed in 2010 and is comprised of a passenger ticketing area, hold rooms, for screened and unscreened passengers, airline operations, baggage pick-up, maintenance room, café, meeting room and airport administration offices. Since passenger demand is expected to increase over the planning period, the nature of airline service at the airport may

change during the next twenty years. Therefore, it is timely to examine terminal area needs within this planning effort.

The requirements for various terminal complex functional areas were determined with the guidance of Federal Aviation Administration AC 150/5360-13A, *Airport Terminal Planning*. This advisory circular combined and superseded two previous FAA ACs on this topic: AC 150-5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*, and AC 150/5360-9, *Planning and Design Guidelines for Airport Terminal Facilities at Non-hub Locations*. In addition, ACRP Report 25, *Airport Passenger Terminal Planning and Design*, and Transportation Security Administration's (TSA) *Recommended Security Guidelines for Airport Planning, Design and Construction* were consulted. These documents, along with updated forecasts, were used to prepare estimates of various terminal complex requirements.

Facility requirements were developed for the forecast years of 2023, 2028, 2033 and 2038. It should be noted that actual need for construction of facilities will be based upon enplanement levels and airline service characteristics, rather than a forecast year.

Based upon the enplanements forecasted in Chapter 2 the Yellowstone Regional Airport is projected to serve over 61,000 enplaned passengers annually.

The principal factors of parking air carrier aircraft at the terminal relate to the number of positions, and the apron layout.

Number of Aircraft Parking Positions

The terminal apron was expanded in the summer of 2018. At the present time, there are five marked positions on the terminal ramp.

Currently, three parking positions are necessary for air carrier aircraft, two positions for regularly scheduled flights and the other for the possibility of a delayed or off schedule flight. The additional two spaces should accommodate additional future required aircraft parking position(s) as the schedule grows to accommodate increasing demand.

Apron Design

The airport is currently served by United Express (operated by Trans States Airlines and Skywest) and Delta Connection (also operated by Sky West). Skywest flights operating for both airlines are currently utilizing 50 seat Canadair Regional Jets. Trans States flights serving United Express flights are currently utilizing 50 seat Embrear 145 aircraft. As noted in Chapter 2, *Forecasts*, regional carriers nationwide are in the process of phasing out smaller regional jets like the CRJ 200 and Embrear 145 in favor of larger, more fuel efficient and technologically advanced aircraft. While the exact timing is unknown, SkyWest plans to replace its fleet of CRJ 200s with larger Embrear 175 (reference code C-III), CRJ 700 (reference code C-II) and CRJ 900 (reference code C-III) regional jets. Q400 aircraft (reference code B-III) are also in regular operation by regional carriers and could potentially service the Yellowstone Regional Airport. Terminal apron design and layout should accommodate the dimensions of the current CRJ aircraft as well as potential future aircraft including the CRJ 700, CRJ 900, Embrear 175 and Q400. The terminal apron has been designed and constructed to meet the

weight and dimensional standards of these aircraft and should meet commercial aircraft parking requirements for the planning horizon.

Infrastructure & Lighting

Apron design must consider the utilities and infrastructure needed for servicing aircraft parked at the terminal. Examples include fueling, grounding systems, power, conditioned air, storm water, deicing, fire deluge systems and apron lighting.

AC 150-5360-13A provides the following guidance on terminal apron lighting:

> Most outdoor areas associated with the terminal apron require some degree of illumination during nighttime and low-visibility conditions. Lighting levels in the vicinity of aircraft parking areas and the terminal apron should be of sufficient intensity to provide a safe, secure, and efficient operating environment for airport operations during nighttime conditions and inclement weather (e.g. to permit deicing at the gate).

The commercial apron is equipped with mounted floodlights, which are the preferred method of lighting the apron area.

3.6 Terminal Auto Parking

AC 150-5360-13A indicates that terminal parking facilities are commonly planned to accommodate volume on an average day of a peak month. In 2018, there were 5,796 enplanements in the peak month of July, averaging 187 passengers per day. Assuming .85 parking spaces per passenger (accounting for a level of ride sharing) results in a current demand for 160 parking spaces. This is equivalent to the current number of public parking spaces in the main terminal parking lot. This is consistent with airport staff observation that the public lot is frequently at capacity and overflowing during peak periods. Assuming increased demand over the planning period proportional to forecast enplanements results in a future demand for 265 parking spaces by the end of the planning horizon (2038).

Employee spaces serve airport staff and tenants including the airline(s), rental car agencies, TSA, and the restaurant. The current need for employee parking is estimated at 50 spaces and is expected to grow proportionally with enplanements.

A rental car area or areas to store cars for customers renting or returning a car, store out-of-service vehicles for short periods, and perform washing, and light maintenance of the rental car vehicles is needed in proximity to the terminal. Paved parking for 93 rental cars is provided in front of the terminal, in the commercial parking lot that was paid for by state funds. Additional parking is located on milled surface parking areas as necessary. In addition, two car rental parent companies leased land and constructed two individual car wash facilities on the south side of the airport. This location requires staff to drive a relatively long distance on public roads, including Greybull Highway, to wash and service returned rental cars. . According to feedback from the current rental car agencies, a wash/service location closer to the ready return lot would be desirable. Overall parking requirements for rental cars

are anticipated to grow in proportion with enplanements.

Table 3-12 presents public, rental and employee parking requirements through the planning period as determined through the noted assumptions.

Table 3-12 Public Parking Requirements
Yellowstone Regional Airport

	Requirements at Annual Passenger Thresholds				
	Existing	2023	2028	2033	2038
Enplanements	39,383	46,947	52,336	58,455	65,330
Public Parking	160	191	213	237	265
Employee Parking	50	60	66	74	83
Rental Car Ready/Return	96	114	128	142	159
Overflow Lot	52	52	52	52	52
Total Parking	**358**	**417**	**459**	**506**	**560**

3.7 Terminal Curb

The terminal curb serves as the interface between the terminal building and the ground transportation system. The length of the curb at airports comparable to the Yellowstone Regional Airport is usually a function of the length of the building. The length of the curb available should preclude any congestion problems for the planning period. The sidewalk adjoining the curb is wide enough to allow for the swinging open of a car door plus circulation.

The terminal curb is lit to provide a safe and secure environment for passengers and airport operations at night and during inclement weather.

3.8 Public Areas

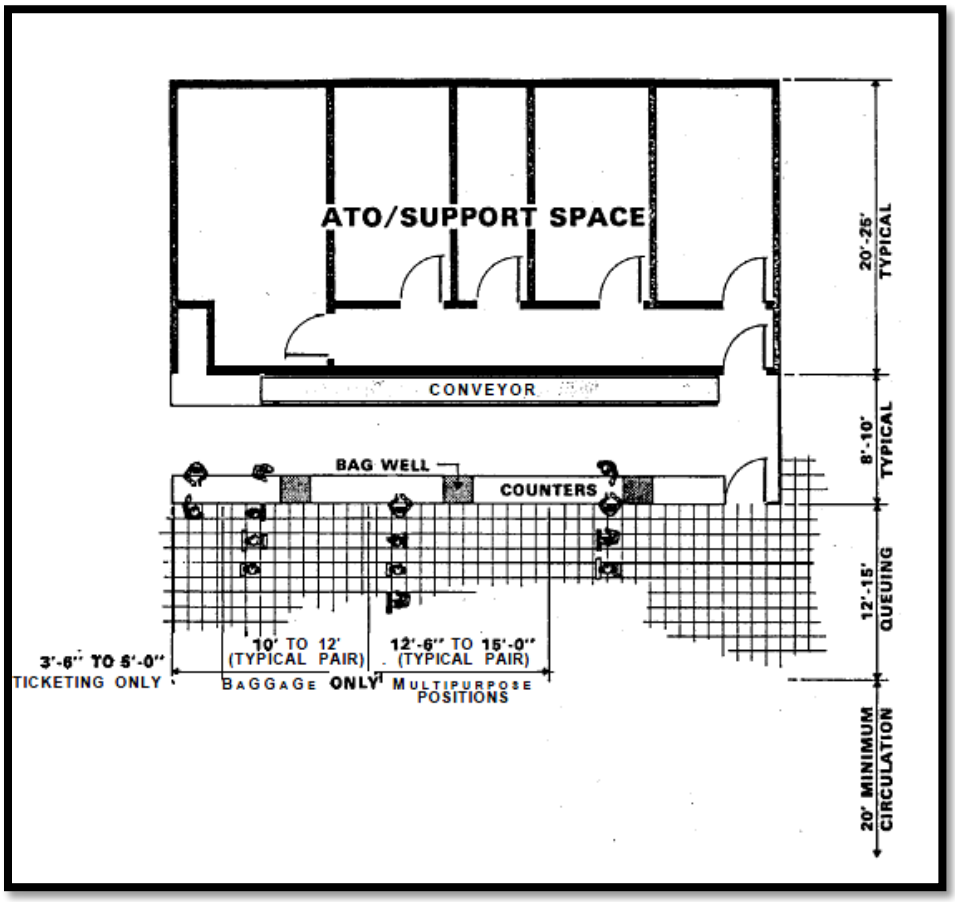
Public spaces, including most of the non-revenue producing areas of the terminal include queuing areas, restroom facilities, seating and waiting area, and circulation corridors. Some of the areas are functions of passenger volumes, whereas others are functions of specific facility requirements.

3.8.1 Ticketing /Check-in Area

The Ticket Lobby includes ticket queuing area, cross circulation, entrance vestibules and general circulation at the main entrance to the building. AC 150-5360-13A notes that since 2001, technology and evolved security requirements have significantly changed the way passengers and airlines use the check-in lobby. Computers and personal electronic devices allow passengers to check-in off-airport, interacting with airline personnel only to drop off bags or to resolve problems. At some large hub airports, self-service check-in and baggage drop kiosks allow passengers to bypass the traditional check-in counters. While these options may reduce the building space allocated to the check-in lobby in large hub airports, the ticket/check-in lobby at an airport with activity levels comparable to the Yellowstone Regional

Airport is typically a function of the counter width, combined with cueing and circulation area.

Former guidance in AC 150-5360-13 provided the illustration, shown in **Figure 3-9**, of a typical linear counter layout for ticketing agent area and ATO area. This arrangement is typical and still appropriate for a facility like the Yellowstone Regional Airport. As shown, the minimum distance from the face of the ticket counter to any obstruction should be 40 to 45 feet. This includes queuing depth of 20 to 25-feet and the remainder in cross circulation. **Table 3-3** summarizes airline ticketing area requirements based on these assumptions. It was assumed that a third airline would enter the market in the long term timeframe. The analysis indicates that, with four ticket counters currently available, the ticketing lobby and airline ticket counter frontage should be adequate through the planning period. Each of these requirements may vary, however, depending upon the number of airlines serving Cody in the future, the manner in which they are operated and individual airline needs.



Source: AC 150/5360-13 Figure 5-6

Figure 3-9: Linear Counter

Figure 3-10: Current Ticket Counter Arrangement

3.8.2 Public Lobby

A public lobby with space for waiting and seating is typically provided adjacent to the ticketing area to accommodate passengers who arrive early, passengers with delayed flights, and people who accompany passengers to/from the airport. The lobby should be located with easy access to concessions, rest rooms, the security check point and the baggage claim area. Because the public lobby is the hub of the circulatory route through the terminal, the seating should not conflict with passengers' queuing at the ticket counters or with passenger traffic flow.

To provide a place of convenience, comfort, and relaxation for aircraft passengers, large open, light-filled spaces with Wi-Fi connectivity, televisions, comfortable lounge seating, easily accessible power connections, and concessions have become the norm in terminal lobbies.

As noted in AC 150-5360-13A, airports can offer in-terminal art or museums to enhance the airport experience, including displays and other installations that describe or acknowledge local culture and history. As a focal point of the terminal, the public lobby provides an opportunity to highlight the regional character of the region. A large photographic display spanning the public space of the terminal and sculptural displays at terminal curbside convey a connection to Yellowstone National Park, local history and other local and regional amenities.

The public lobby is currently of an appropriate size and functioning well. As passengers spend less time on the non-secure side of the terminal due to increasing security requirements, this space is considered adequate for the planning period.

3.8.3 Circulation Space

Public circulation includes open areas from the entry vestibules to the check-in zones, and from the check-in zones to the security checkpoints that allow passengers and others to efficiently move throughout the lobby. The amount of circulation space with respect to the gross terminal area generally varies from approximately 20% to as much as 30%, depending upon the layout, degree of centralization of facilities, and size. A general minimum corridor width standard of 15 feet is considered minimally acceptable for public circulation. The terminal corridor at Yellowstone Regional Airport is 15 feet wide and is currently functioning adequately. Recognizing that this is a minimal width for adequate circulation, care should be taken to keep the corridor open and free of clutter.

Allowances for circulation space are factored in to the space requirements shown in **Table 3-13**.

Figure 3-11: Terminal Circulation

3.8.4 Passenger Security Screening

The security screening checkpoint area is used by TSA to screen commercial airline passengers and carry-on baggage to ensure that prohibited or harmful items are not carried onto aircraft.

AC 150-5360-13A identifies the primary components of security screening checkpoints in passenger terminals as follows:

- Queuing area – area reserved for passengers waiting to enter the screening area.
- Document check – location where TSA employees examine a passenger's bonafides (boarding pass and government issued identification) to confirm authenticity and allow them to proceed to screening.
- Divestiture area – zone where passengers must divest items such as metal objects, electronic devices, coats, belts, shoes, and baggage onto a conveyor belt for screening. This is also the area where passengers queue for screening.
- Screening area – location where passengers pass through screening equipment (advanced imaging technology or magnetometers). Baggage is screened through advanced technology machines. Secondary baggage screening is located adjacent to the primary screening. Private, manual passenger screening is provided remotely.
- Recomposure area – seating area or vacant space at the end of the screening checkpoint for passengers to gather and re-pack divested items.
- Administrative space –areas within or adjacent to the security screening checkpoints where security operates and monitor the security screening equipment. Space for detention rooms, training rooms, break rooms, and other administrative functions can be located remotely from the screening checkpoint.

The TSA's Checkpoint Design Guide shows a standard size for a one-lane checkpoint of about 1,200 square feet, Based on projected passenger demand, the Yellowstone Regional Airport will need one security checkpoint lane in 2038. In addition, space should be provided in the checkpoint area for a private search room and other functions associated with security screening. In order to meet current requirements, 1,200 square feet is recommended for the complete checkpoint, which includes space for divesture and recomposure. Queuing space should be provided to avoid queues extending into circulation elements. Approximately 300 square feet is recommended based on methodology described in ACRP Report 25, *Airport Passenger Terminal Planning and Design*.

At a current size of 950 square feet, the existing security checkpoint is undersized. The future layout of the security checkpoint will need to be closely coordinated with the TSA. Space requirements for a passenger security checkpoint are shown in **Table 3-13**.

Figure 3-12: Current Security Queuing

3.8.5 Departure Area Lounge (Sterile seating)

Holdrooms or departure lounges are where passengers wait to board aircraft after they have been processed through security. These are the principal areas of the "secure" or "sterile" side of the terminal and must be

designed to maintain security through monitored or controlled entrances and exits.

Figure 3-13: Current Departure Lounge

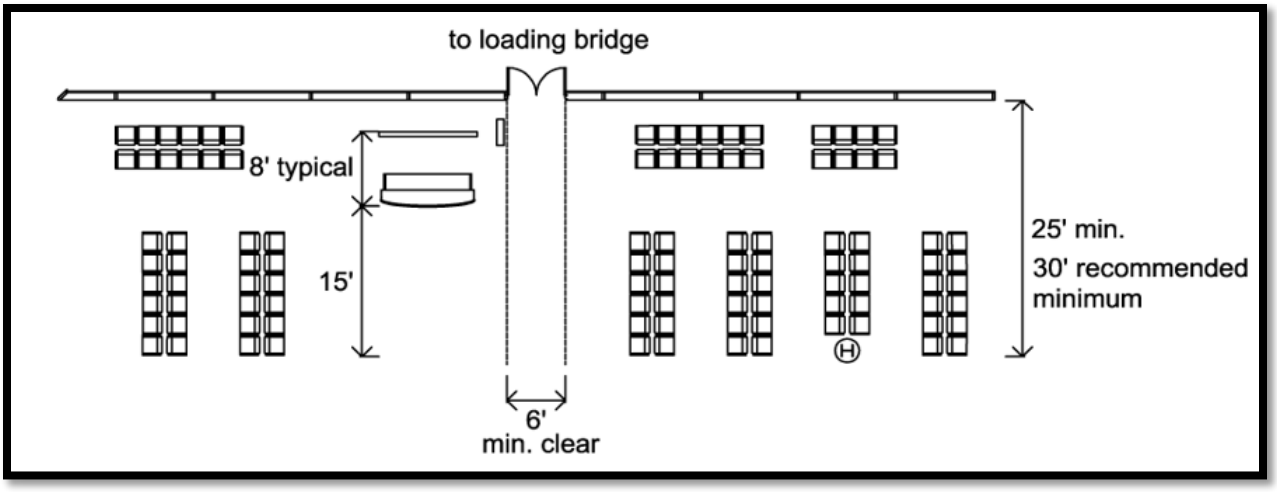
As noted in AC 150-5360-13A, the primary components of a departure area holdroom include:

- Waiting area – designated airline-specific space where passengers wait to board a flight. The area includes seating for passengers.
- Airline gate podium and queuing – area where passengers queue and ultimately communicate with airline representatives.
- Boarding and egress corridor – designated area near the gate used for queuing passengers to board the aircraft, and for passenger egress from the aircraft when it arrives at the gate. Individual airlines have differing boarding and egress procedures.

The minimum number of gates at an airport is based on the peak hour activity. Additional contingency metrics are also used to determine the required gates. Currently, at peak hour, there is one scheduled aircraft loading for departure. One contingency gate is added to accommodate unscheduled charter flights or long-term delayed flights. It is recommended that three gates (two for regular departures and one contingency gate) be provided by the end of planning horizon.

The forecasted peak hour enplanement numbers are used to estimate the holdroom requirements. The airport is currently served by a 50 seat CRJ 200. According to the forecast, the CRJ 200 will transition to larger 70 seat CRJ 700, 90 seat CRJ 900 or EMB 175 aircraft over the planning horizon.

ACRP Report 25, *Airport Passenger Terminal Planning and Design* provides recommendations for holdroom facilities. It recommends sizing the holdroom based on the average seating capacity of the largest aircraft expected to use each gate. Design load factors for the aircraft between 78 percent and 90 percent in the peak season of 2018. **Figure 3-14** shows typical minimum design parameters for a single gate holdroom from the ACRP Report.



Source: ACRP Report 25, Airport Passenger Terminal Planning and Design

Figure 3-14: Typical Single Gate Holdroom Parameters

Holdroom space requirements based on ACRP Report 25 and a design load factor of 85 percent are shown in **Table 3-13.** These numbers include holdroom floor area, gate podium area and public circulation.

Recent airline schedule proposals suggest that the holdroom will likely need to accommodate passengers for two simultaneous departures during the peak hour in the near term. This is assumed in the analysis.

Secure side restrooms and concessions are shown in separate sections of the table.

Since 2001, increased security requirements have resulted in passengers checking in earlier and spending more time in the secure side holdroom prior to boarding aircraft. For this reason, amenities for passenger comfort have become increasingly important for secure side holdrooms. The design of the secure holdroom should include considerations for passenger comfort such as:

- Restroom facilities (Separate mens / womens or unisex. Handicapped accessible)
- Concessions (Staffed retail or vending)
- Wi-Fi connectivity
- Televisions
- Easily accessible power connections
- Attractive viewing of the airfield (panoramic windows)

3.8.6 Restrooms

Public restrooms should be at locations convenient to the ticket lobby, restaurant facilities, and baggage claim area. In most small terminal buildings, rest room facilities can be grouped in one centralized location. As noted above, additional rest rooms should be provided in the secure area departure lounge. Private toilet facilities are sometimes provided in nonpublic-use areas in conjunction with operational and administrative facilities.

Restroom facilities must be developed per local building codes and Americans with

Disabilities Act (ADA) standards. *See* 42 U.S.C. § 1201, *et seq*.

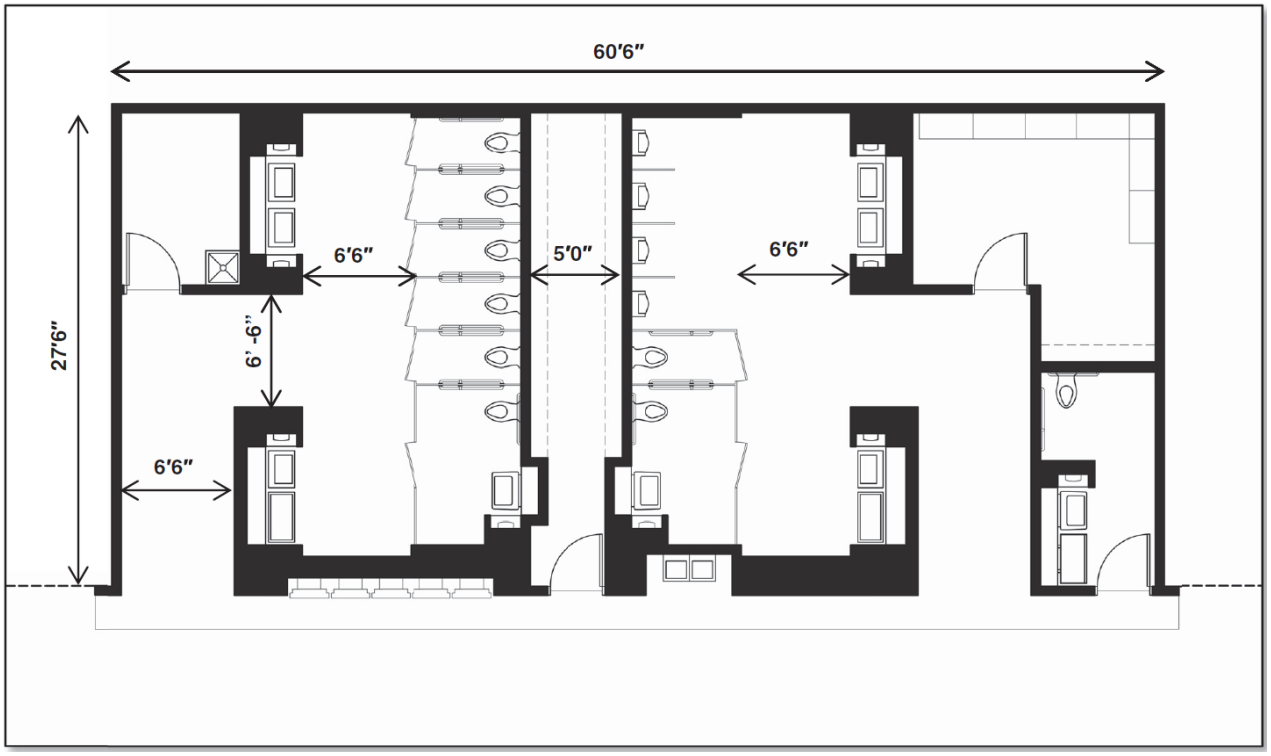
ACRP Report 130, *Terminal Restroom Planning* provides recommendations for programming restroom space.

Typical restroom components include:

- Entry area
- Sink area
- Baby diaper changing area
- Toilet stall
- Wheelchair-accessible stall
- Urinal area
- Family room
- Plumbing chase
- Janitor's closet/storage

The guidance recommends a minimum fixture count of six per gender and provides basic prototype layouts (**see Figure 3-15**).

Secure and non-secure side restroom space requirements are estimated based on recent experience with terminal restroom design. Additional secure and non-secure restroom space will be required in the planning period to accommodate peak period demand as shown in **Table 3-13**. Ultimate space requirements will depend upon included amenities (ie. family room) and facility design.



Source: ACRP Report 130, Guidebook for Airport Terminal Restroom Planning and Design

Figure 3-15: Restroom Prototype Layout

3.9 Airline Space Requirements

3.9.1 Ticket Counter

AC 150-5360-9 indicates that counters for the sale of tickets and check-in of baggage should be situated near the entrance, clearly visible and readily accessible from the terminal curb and the lobby areas. Curbside baggage check-in facilities are rarely provided at nonhub sized terminals. Airline equipment at the counter often includes computer terminals that provide reservation data, seat assignment data, inventory control, and flight information. Counters are normally placed in a continuous line with space provided for expansion as shown in **Figure 3-9**.

Airline Ticket Counter (ATO Counter) length is based on the needs of the airline serving the airport, and expansion capability for future entrants to the market. The ticket counter length that is required for a two-position ticketing counter with bag well is approximately 10 linear feet. At nonhub airports, a two-position counter is standard for most commuter airlines. The depth of each position is approximately 8 to 10 feet to the back wall to provide space for counter airline personnel and baggage conveyors.

Typical ticket counter standards include:

- Location: Direct access to public ticket lobby and ATO areas, with baggage transfer access to operations area.
- Counter depth: 3′-3″ typical.
- Double position counter length: 10′ typical
- Bagwell width: 2′-6″ typical.
- Pass-thru opening width: 3′-0″ minimum, for ADA requirements.
- Ticket counter-to-backwall depth: 8-10′ typical.
- TSA checked baggage processing to be located in outbound baggage area or behind ticket counters.
- Outbound baggage conveyor: 33″ (30″ belt) typical width on a 36″ bed (39″ total), T-merge or power turn, varying by airline. Airline tenants may choose not to install conveyors initially.
- Equipment: Shells require conduits for power, telephone and communications. Airlines typically supply and install all counter inserts, cable and equipment.
- Lighting: Continuous, direct lighting above ticket counters and wall-wash lighting on backwall, typical.

Airline ticket counter space requirements are shown in **Table 3-13.** The Yellowstone Regional Airport currently has four airline ticket counter positions. This should be adequate to accommodate future demand including the potential for entry of new airlines into the Cody market.

3.9.2 Airline Offices and Operational Spaces

At most medium and small airport terminal buildings, airline office space is provided behind the ticket counters. Airline ticketing offices (ATOs) are typically located here and are often used by staff to handle related administrative and operational duties while monitoring the ticket counter for passengers. It is also common for airline storage and break rooms to be included in the ATOs. This office area should have access to the ticket counter and baggage makeup area. It is used

primarily by the agents as a work space, and space is frequently needed for a lounge and training purposes. Sometimes a multipurpose room is used for all these functions. The airline manager's office may also be in this location.

The amount of airline leased space behind the counter is largely dependent on the length of the ticket counter with a typical overall depth of 25 to 30 feet. The area leased by airlines will largely be impacted by the number of air carriers.

Currently there is office space to accommodate two air carriers. Should a third carrier enter the Cody market, additional office space will be required.

Airline office space requirements are shown in **Table 3-13.**

3.9.3 Outbound Baggage Make-up

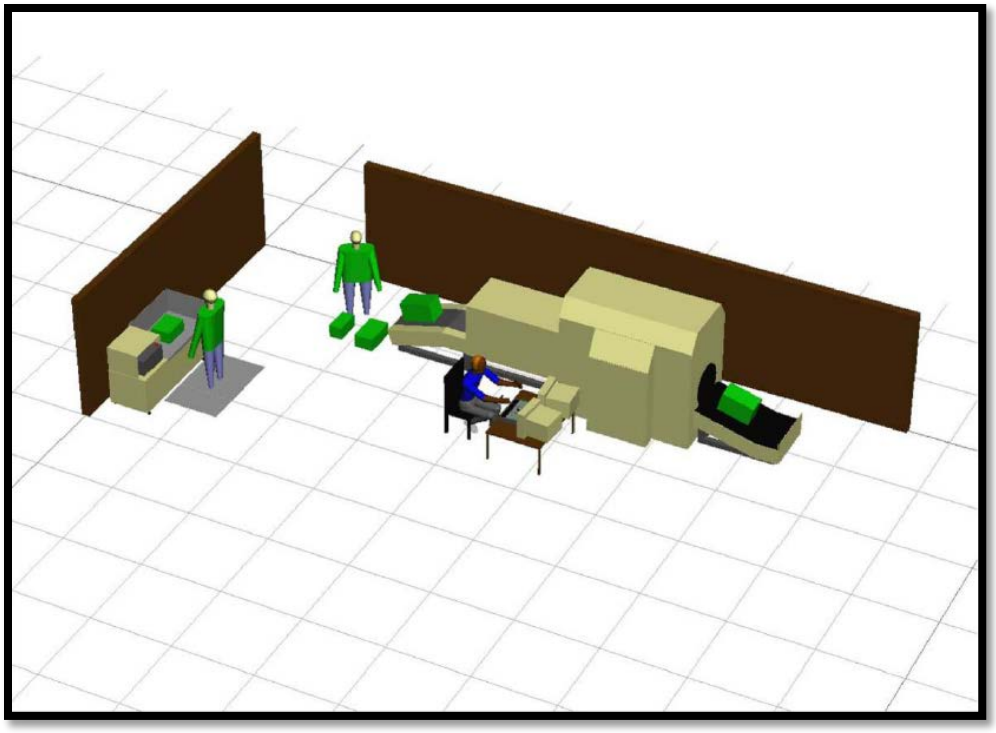
After baggage is tagged at the ticket counter, it is conveyed to a baggage make-up area that is used for the sorting and loading of checked baggage onto carts. Once the carts are loaded, they are brought to the enplaning aircraft. In the past, baggage was manually carried or mechanically conveyed from the ticketing counter directly to the baggage make-up area. Currently, TSA requires all baggage to be screened by the TSA prior to being brought into the baggage make-up area and loaded onto an aircraft. In order to improve efficiency, the TSA is encouraging the use of a centralized bag screening area at almost all airports. This practice results in a single outbound baggage room shared by all airlines, instead of individual baggage make-up areas in the ATOs.

The size recommendations provided here are based on the size and maneuverability of baggage tugs, as well as the sizes of baggage conveyance equipment and staging areas. Approximately 1,300 square feet is recommended based on methodology described in ACRP Report 25, *Airport Passenger Terminal Planning and Design*. The approximately 1,800 square feet baggage make-up space currently provided is anticipated to be adequate for the planning period provided baggage makeup continues to be operated by a single ground handler. Should operations expand to two or more ground handlers, expansion may be required.

3.9.4 Outbound Baggage Screening

TSA requires that all baggage be screened before it is brought into the baggage make-up area and loaded onto an aircraft. The screening typically occurs in a single location in the terminal with a consolidated baggage handling system.

Figure 3-16 depicts a TSA image of a stand-alone Explosives Detection System (EDS) with Explosive Trace Detection (ETD) station that would be typical at an airport terminal comparable to the Yellowstone Regional Airport.



Source: TSA Planning Guidelines and Design Standards for Checked Baggage Inspection Systems

Figure 3-16: Stand Alone EDS with ETD Station

The size for the TSA baggage screening room is based on the expected size of the bag screening and conveying equipment. Approximately 940 square feet is recommended based on the methodology described in ACRP Report 25, *Airport Passenger Terminal Planning and Design*. Yellowstone Regional Airport currently provides approximately 800 square feet for passenger baggage screening.

3.9.5 Inbound Baggage Handling

The recommended size for the inbound baggage room is based on the size and maneuverability of baggage tugs, as well as the size of the baggage off-load areas and stationary baggage conveyance equipment.

Approximately 1,300 square feet is recommended based on methodology described in ACRP Report 25, *Airport Passenger Terminal Planning and Design*.

The approximately 1,375 square feet baggage handling area currently provided is anticipated to be adequate for the planning period.

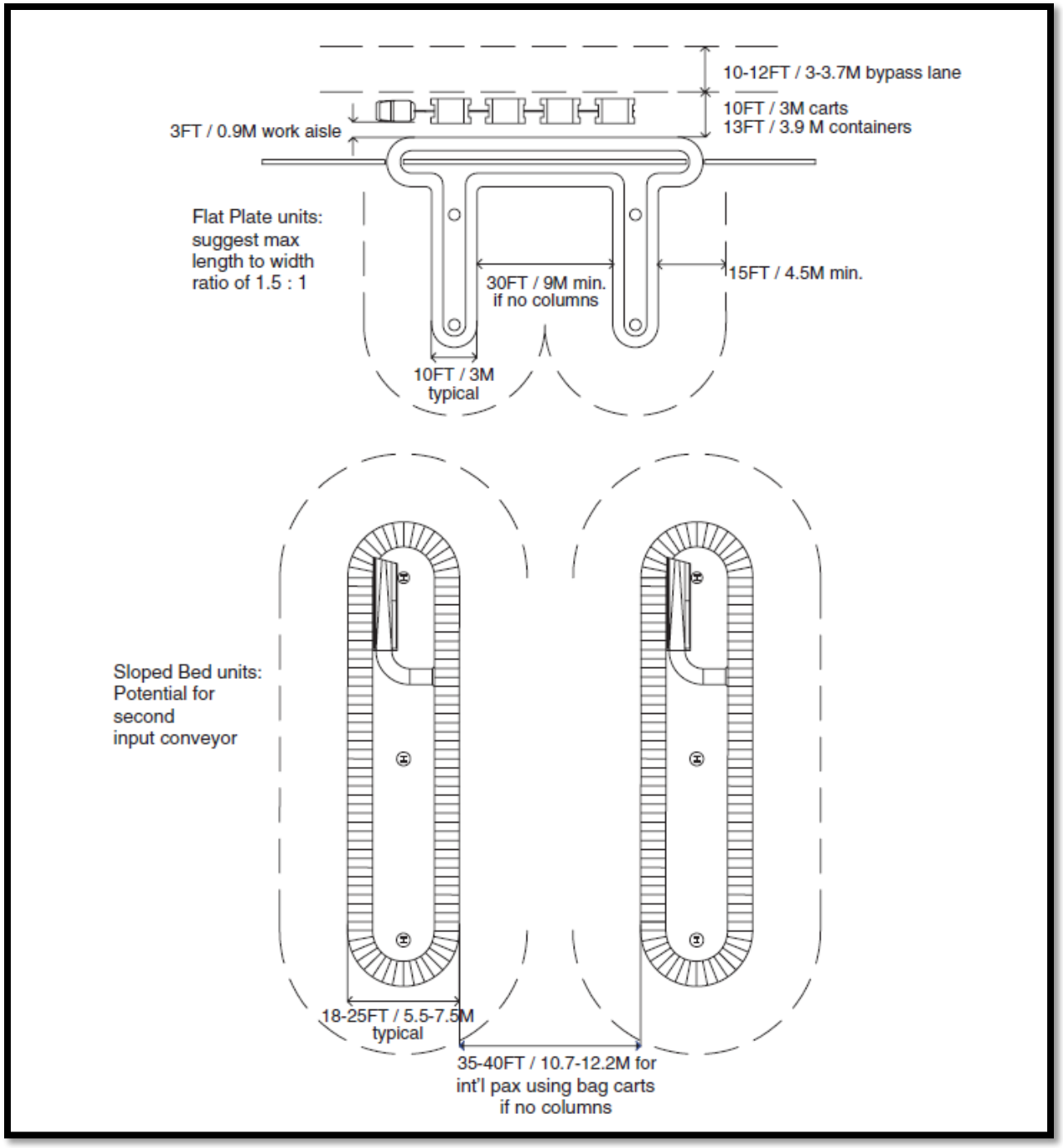
3.9.6 Baggage Claim

Baggage claim length requirements can vary from location to location and are influenced by the types of passengers who use the facility, and by changes in airline policy relating to baggage fees. The claiming facility should be situated convenient *to* the deplaning passenger flow patterns and in proximity to the terminal curb. Car rental counter space should be provided adjacent to the claim area. In addition, the length of belt should accommodate TSA and airline

operational requirements that all baggage must be in the non-sterile area prior to turning the claim device off.

The recommendations for baggage claim device lengths in this report are based on guidance from ACRP Report 25, *Airport Passenger Terminal Planning and Design*. The recommended overall length of claim device public frontage at the airport is determined by estimating the number of peak hour terminating passengers with bags, and then applying a multiplier to account for the sizes of bags and numbers of passengers having more than one bag.

Based on this calculation, the recommendations for overall baggage claim frontage is for approximately 70 lineal feet currently and 90 feet in the 20 year planning horizon. **Figure 3-17** shows a typical linear and circular belt arrangements for baggage claim devices.



Source: ACRP Report 25, Airport Passenger Terminal Planning and Design

Figure 3-17: Typical Baggage Claim Units

ACRP Report 25 recommends a space around the claim device that is approximately 15 feet wide to allow sufficient space for passengers to unload bags from the baggage claim device.

The baggage claim public area provides space to accommodate a variety of ancillary and shared uses. For example, this portion of the building can provide space for information kiosks, hotel boards and other related conveniences for passengers. Design of the baggage area should also accommodate meeters and greeters, who will often meet passengers in the baggage claim area. Passengers and meeters and greeters should have access to seating (including minor business center improvements - 110V charging and bar top type infrastructure) and restrooms since they generally arrive in the bag claim area before their baggage is off-loaded from the aircraft. Further, the baggage claim area should be designed to be expandable to accommodate increasing demand over time.

The amount of baggage claim area needed to meet terminal requirements over the planning horizon are shown in **Table 3-13**.

3.10 Concessions

Terminal concessionaire services provide food, beverage and retail options to travelers on both sides of the security checkpoint. Concession services on the secure side of the checkpoint contribute to passenger convenience since passengers are often unable to leave the secure portion of the area once they have passed through the security checkpoint. In addition, airlines have reduced inflight meal services. It is therefore important for future airport terminal design to allow passengers to have food and beverage options available on both sides of the security checkpoint. Vending areas can replace or supplement staffed facilities, especially when flight times do not coincide with the operating hours of the concessions.

Concession areas should be strategically located in both the sterile and nonsterile portions of the terminal. The size of the concession area(s) varies from airport to airport, depending on individual concessionaire needs.

The following concession area functions were considered in determining the concessions space requirements shown in **Table 3-13**.

- Restaurant - The Yellowstone Regional Airport terminal currently includes a 1,200 square foot café type restaurant with table seating and a separate 900 square foot kitchen. The restaurant has historically served not only passengers, but patrons from the local community. A typical size of such a facility ranges from 1,000 to 3,000 square feet.
- Secure Side Vending / snack & beverage bar – 200 square feet of space is assumed to be provided for passengers who have passed through the security checkpoint.
- News/Gifts/Lease - Space category includes newsstands, gift, retail and specialty shops, business services and other miscellaneous services. Space within the terminal could be leased for revenue generation to businesses desiring a location on the airport including retail, aeronautical and non-aeronautical related. There should be adequate locations on the secured and non-secured side for these functions. A minimum area of 200-300 square feet should be provided, preferably adjacent to food service to maximize the potential for cross-utilization of personnel.

- Other services consist of miscellaneous revenue producing areas, including automated teller machines and related customer services. Specific areas for advertising should be identified and included in the terminal design.
- Concessions storage – 200 square feet non-secure side and 100 square feet secure side are assumed for concessionaires storage needs.

Concessions spaces should be designed cooperatively with concessionaires to meet the size and space needs of the industry.

3.11 Rental car counters

Car rental facilities at terminals generally include an office area with a front counter and queuing space in front of counters. Counters for car rental transactions are typically located in or near the baggage claim area and located to provide easy access to the car rental parking area.

Three counters currently serve five rental car companies currently operating at the airport. Provision for a fourth counter is assumed within the planning horizon.

3.12 Airport Administration

The Airport Administration terminal areas includes a 1,350 square foot office and conference room space. This space is currently adequate. Administration space needs are expected to grow with enplanements over the planning horizon, therefore, additional administrative space will be required.

3.13 Special Considerations

Special building considerations identified for the Yellowstone Regional Airport include:

- Need for emergency power at the terminal
- Need for cover for passengers walking to airplanes

3.14 Summary

Space requirements for the key functional areas of the terminal are summarized in **Table 3-13.**

Table 3-13 Terminal Requirements by Functional Area
Yellowstone Regional Airport

	Existing	2023	2028	2033	2038
Annual Enplanements	33,367	46,947	52,336	58,455	65,330
Ticketing					
Counter positions	4	4	4	4	4
Counter (LF)	40	40	40	40	40
Counter Area (SF)	400	400	400	400	400
Queuing Area (SF)	650	600	600	600	600
Circulation	420	420	420	420	420
Airline Office (SF)	1,400	1,400	1,400	1,400	2,100
Baggage Make up (SF)	1,800	1,300	1,300	1,300	1,300
Baggage Screening (SF)	800	940	940	940	940
Hold Room					
# of Gates	2	2	2	3	3
Hold Room Waiting (SF)	2,908	3,600	4,100	4,600	6,000
Baggage Claim					
Baggage Claim Frontage (LF)	75	70	70	90	90
Claim Lobby Area (SF)	1,550	1,400	1,400	1,800	1,800
Baggage Handling Area (SF)	1,375	1,300	1,300	1,300	1,300
Rental Cars					
Counters	3	3	3	4	4
Counter Frontage (LF)	51	51	51	68	68
Counter Area (SF)	408	408	408	544	544
Queuing Area (SF)	510	510	510	680	680
Office/Storage (SF)	918	918	918	1,224	1,224
Concessions					
Food/Gifts non-secure (SF)	2,100	2,600	2,600	2,600	2,600
Food/Gifts secure (SF)	0	600	600	600	600
Public Restrooms					
Public Restrooms non-secure (SF)	729	700	700	900	900
Public Restrooms secure (SF)	420	700	700	900	900
Public Lobby (seating)					
Total - includes exhibits and displays (SF)	1,800	1,800	1,800	1,800	1,800
Security					
Passenger Screening (SF)	950	1,200	1,200	1,200	1,200
Security Queuing (SF)	390	300	300	300	300
TSA Office Support (SF)	1,320	1,320	1,320	1,320	1,320
Administration					
Office/Conference (SF)	1,400	1,400	1,400	1,800	1,800

Expansion Areas

3.15 General Aviation Facilities

The purpose of this section is to determine the space requirements for general aviation (GA) facilities including, FBO, hangar and apron parking facilities, during the planning period.

3.15.1 General Aviation Terminal Facilities

A general aviation terminal can serve several functions including providing space for passenger waiting, pilot's lounge, flight planning, concessions, line service, and airport management offices.

These functions, aside from airport management offices, are currently served by the FBO, Choice Aviation.

As demand at the Airport dictates, it may be advisable to provide a public terminal facility. A terminal facility could provide areas for passenger/pilot lounge, and airport management offices. For planning purposes, at least one area should be designated as a reserve for a future terminal building. The terminal should also be sited with easy access and visibility from the airfield, with adjacent land for possible expansion.

3.15.2 Hangars

The 2016 Wyoming State Aviation System Plan (SASP) recommends that airports in Cody's classification provide enough hangars to store 100 percent of based aircraft.

The demand for hangar facilities typically depends on the number and type of aircraft expected to be based at the airport. For planning purposes, it is necessary to estimate hangar and apron facilities based on peak design periods. However, hangar and apron development should be based on actual demand trends and financial investment conditions.

Typical utilization of hangar space varies across the country as a function of local climate conditions, airport security and owner preferences. Nationwide trends for general aviation aircraft, whether single or multi-engine, are toward larger, more sophisticated and expensive aircraft. Owners of these types of aircraft normally desire hangar space to protect their investment. Due to climatic and security issues, it is believed that the vast majority of based aircraft owners at the Yellowstone Regional Airport will desire enclosed hangar storage facilities.

Demand forecasts prepared in Chapter 2 of this study concluded that 27 new based aircraft would locate at the Yellowstone Regional Airport during the planning period. An area for the development of new hangars will be identified and long range development concepts for these hangars will be options developed the in *Chapter 4 Alternatives*.

3.15.3 Aircraft Parking Apron

Aircraft parking should be provided for locally-based aircraft which are not stored in hangars and transient aircraft visiting the airport. Nationwide trends for general aviation aircraft, whether single or multi-engine, are toward larger, more sophisticated and expensive aircraft. Owners of these types of aircraft normally desire hangar space to protect their investment.

FAA AC 150/5300-13A, *Airport Design* suggests a methodology by which itinerant parking requirements can be determined from knowledge of busy-day operations. At Cody, the number of itinerant spaces was estimated to be approximately 30 percent of busy day itinerant operations. Additionally, total space requirements also assume 10 percent of the based aircraft are located on the apron for transient purposes.

Aviation forecasts were applied to project future fleet mix. Aircraft types were then split by Airplane Design Group (ADG) classification to determine the necessary parking area with required FAA setbacks. Size requirements were planned for each aircraft type as follows:

Single/Multi-Engine Piston (ADG-I) – 800 square yards per aircraft
Turboprop (ADG-II) – 2,000 square yards per aircraft
Business Jet (ADG-II) – 2,000 square yards per aircraft
Business Jet (ADG-III) – 4,100 square yards per aircraft

The results of this analysis are presented in **Table 3-11.** There is currently approximately 80,600 square yards of parking apron in the general aviation area. The results shown in the table indicate that adequate apron space and parking positions are available through the planning period, however, additional apron areas may be functionally required as new hangar areas are developed.

The pavement strength on the existing GA apron varies. Sections along the north portion of the ramp have a strength of 80/100/150 (80,000 lbs single wheel loading, 100,000 lbs dual wheel loading and 150,000 lbs dual tandem wheel loading). The pavement on the southern sections of the ramp has strength ranging from 50/65/100 to 75/100/150. The apron routinely serves large business jets such as the Gulfstream IV (74,600 lb. dual wheel loading) and the Gulfstream V (90,500 lb. dual wheel loading) Ultimately the full apron should be brought to a consistent strength of 80/100/150. Future apron construction intended to serve large aircraft should be constructed at this strength as well.

Table 3-11: Aircraft Parking Apron Requirements

	Currently Available	Current Need	Short Term	Intermediate Term	Long Term
Based Aircraft		84	91	97	111
10% Utilizing Apron Space *		10	11	12	13
Tie-down Area (s.y.)		8,570	9,146	9,922	11,109
Transient Aircraft					
Busy Day Itinerant Operations		73	78	79	85
Transient Parking Positions		22	24	24	26
GA Apron Area		38,733	42,254	42,254	45,776
Total Parking Apron Positions	45	32	35	36	39
GA Apron Area (s.y.)	80,600	47,303	51,401	52,176	56,884

* Includes added contingency of 2 aircraft

3.16 Support Requirements and Facilities

Various facilities that do not logically fall within classifications of airfield, terminal building or general aviation areas have also been identified. These other areas provide certain functions related to the overall operation of the airport and include: aircraft rescue and firefighting, fuel storage, snow removal equipment and airport maintenance facilities.

3.17 Aircraft Rescue and Firefighting and Airport Maintenance Facilities

The Federal Aviation Regulation (FAR) Part 139 regulates the minimum standards. FAR Part 139 specifies that airports such as the Yellowstone Regional Airport provide Airport Rescue and Firefighting (ARFF) capabilities for Index "A". This identification is for airports serving aircraft less than 90 feet in length.

The airport has two ARFF engines, the newest of which was purchased in 2012. Both engines were built by Oshkosh, provide 1,500 gallons of water and meet fire-fighting capabilities for Index "B". Index "B" standards are required for airports that serve aircraft up to 126 feet in length and should accommodate all of the likely future air carrier aircraft that the airport can expect. ARFF vehicles are considered to have a fifteen year life, which would require replacement of the Airport's primary ARFF vehicle during the planning period.

The Airport's ARFF/Maintenance building was constructed in accordance with FAA design guidance to meet the existing storage requirements, while at the same time considering the future needs of the airport. The facility has six climate controlled vehicle bays - three for maintenance equipment storage and three for ARFF equipment. In addition to the vehicle bays, the building contains an office space and storage to accommodate the airport's maintenance needs.

The airport's maintenance facilities are also located in the ARFF building. The airport currently has a maintenance fleet that consists of a mower, a tractor, a utility vehicle and a bobcat and several pickups. As this equipment ages, new purchases will be required.

3.18 Snow Removal

The FAR Part 139 specifies the adequate snow removal equipment needs that airports provide. For a commercial service airport the airport must have enough equipment to remove one inch per hour from the primary runway, primary taxiway, and the commercial service apron. The airport upgraded the SRE in 2016 with the purchase of a snow plow / broom. The airport's existing snow blower was purchased in 1997 and has reached the end of its useful life. It is due for a replacement in the short-term. As airport surfaces are expanded and existing equipment ages, new purchases will be required.

The existing storage facility is expected to provide the necessary storage for the new SRE equipment. Should conditions dictate, or new equipment is obtained, consideration for wider overhead door openings and additional bay storage may be necessary.

3.19 Fuel Storage

The airport fuel farm is currently located inside the airport perimeter fence east of the general aviation apron. The fuel storage and dispensing system includes 22,000 gallons of avgas storage and 40,000 gallons of jet fuel storage. A 24-hour credit card payment system is available for self fueling. The fuel farm has sufficient capacity for the planning horizon.

3.20 Security

An eight foot animal control fence with an additional foot of three-strand barbed wire and a seven foot chain link fence with an additional foot of three-strand barbed wire encloses the airport operating area and serves as an animal control / security fence. This fence has reached its useful life and is in need of replacement in the near term. Improvement of the perimeter road with an all-weather surface is also recommended.