Appendix C – Terminal Area Plan

The existing passenger terminal building at Pullman – Moscow Regional Airport (PUW or the "Airport") was originally built in 1989. Since that time, the surrounding communities, businesses, and Universities have grown at a significant rate. Due to this growth, the existing passenger terminal does not have a sufficient space to accommodate existing and projected passenger demand. The Federal Aviation Administration (FAA) and the Airport view terminal improvements as necessary to support existing and future commercial airline activity at PUW.

The Airport is completing an Environmental Assessment (EA) for a proposed runway realignment to meet FAA design standards for C-III aircraft. The runway realignment project will improve the airports all-weather reliability, reducing the number of scheduled commercial flight cancelations, and increasing the number of charter aircraft utilizing the Airport. These changes will increase the demand on the passenger terminal, the aircraft parking apron, and vehicle parking. Therefore, the EA is considering passenger terminal improvement alternatives to accommodate existing and projected passenger demand.

This Terminal Area Plan (TAP) was completed to support the alternatives analysis within the EA. The purpose of the Terminal Area Plan is to identify the existing constraints of the passenger terminal, anticipated future demands, and to evaluate the feasibility, cost, and alternatives to expand or relocate the passenger terminal building and associated facilities.

No funding for terminal improvements has been identified at this time.

The Terminal Area Plan has been completed in compliance with FAA Advisory Circular (AC) 150/5070-6B. All elements of the Terminal Area Plan have been coordinated with the FAA.

The Terminal Area Plan includes the following sections:

1. Data Collection / Inventory
2. Passenger Enplanement Projections Technical Memorandum
3. Airside Demand/Capacity Analysis
4. Landside Demand/Capacity Analysis
5. Terminal Demand/Capacity Analysis
6. Alternatives Development
7. Cost Estimates for Preferred Alternative
8. FAA Forecast Approval Letter

Section 1 – Data Collection / Inventory

1. Introduction

An inventory of existing facilities establishes a baseline, which is required to evaluate existing facility performance and to compare future operational requirements and requirements. Ultimately, it will be determined if the terminal should be expanded and modified or if a new terminal should be built.

This section describes the terminal area existing conditions that have been observed through site visits. Additional references for this section include user meetings, examinations of record drawings, and a review of previous planning documents.

Exterior looking West

Exterior looking Northeast

2. Existing Terminal Building

Construction of the passenger terminal building was completed in 1989. The previous 1,500 square foot terminal building was located on the east end of the runway near Interstate Aviation. The building is located north of Runway 6/24 and is perpendicular to Airport Road. It is a one-story 8,785 square-foot structure. The central space runs along a north-south axis down the middle of the building. All amenities and back of house spaces run along the east and west sides of the building. The layout of the internal spaces within the building can be seen in **Figure 1**.

Figure 1: Existing Terminal Floor Plan

Source: Mead & Hunt, Inc.

A complete breakdown of the existing terminal spaces is shown on **Table 1.1**, and an analysis of space requirements is found in **Section 5** (Terminal Demand/Capacity Analysis). Recommended resolutions to deficiencies will be addressed in **Section 6** (Alternatives Development). This Portion of Section 1 will focus on the inventory of the existing terminal building, and the operational and physical building deficiencies related to the overall layout and to building systems. Data for this analysis was collected from record drawings, site investigations, and interviews.

Table 1.1: Area Description: Terminal Building

Description	Area (SF)
TSA Security Checkpoint	642
Checkpoint Queue	131
Public Circulation – Non-Sterile & Sterile	1,119
Public Restrooms	537
Public Waiting	933
Holdroom	1,170
Baggage Claim	168
Inbound Baggage	260
Outbound Baggage	537
Airline Ticket Office	357
Ticket Counter Area	212
Ticketing Queue	119
Rental Car Office	0
Rental Car Counter Area	278
Rental Car Queue	137
Sterile Concessions / Vending	50
Public Concessions / Vending	65
TSA Baggage Screening	894
Administrative Areas	367
Janitor / Storage	92
Plumb / Mech / Elec / Comm	188
Walls, Structure, Voids	529
Total Terminal Building Area	8,785

2.1 Terminal Building Code Analysis

A code analysis was performed on the building, using the 2012 International Building Code, (IBC), with Washington Amendments. Previous code analyses were completed under the 1985 Uniform Building Code (UBC). The existing passenger terminal is considered Type V-B construction and the primary occupancy is Assembly, group A-3. Exterior walls and openings are considered “unprotected.” Occupant load at the original construction was 100.

According to Table 508.4, *Required Separation of Occupancies*, there is a required 1 hour occupancy separation between the baggage handling areas, (classified S-1 occupancy), and the concourse areas surrounding it, (A-3 occupancy).

There are several accessibility issues throughout the terminal. The car rental counters and ticketing counters do not provide a minimum of one accessible service for transactions. The accessible restroom stalls in the men's and women's restrooms do not meet the standards of the Americans with Disabilities Act Accessibility Guidelines (ADAAG).

Restroom fixture counts are sufficient for code requirements, but not sufficient for the amount of passengers at peak usage times. At an airport terminal, actual restroom demand is driven by passenger activity. There are no restrooms or drinking fountains in the secure area at PUW. The secure area is the portion of the terminal that includes the security checkpoint and the holdroom. Passengers are unable to use the restrooms on the non-secure side, which causes more demand (more fixtures) on the non-secure side than the code actually requires.

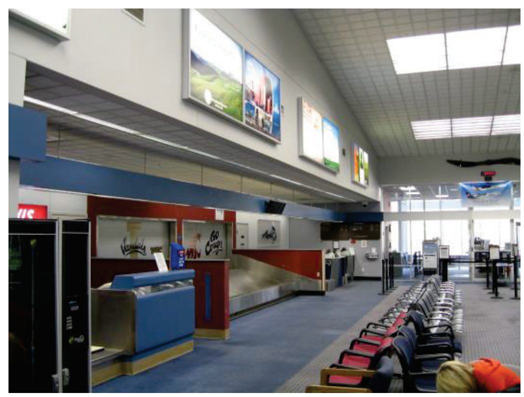
Terminal Building Exterior Brick

North Facade

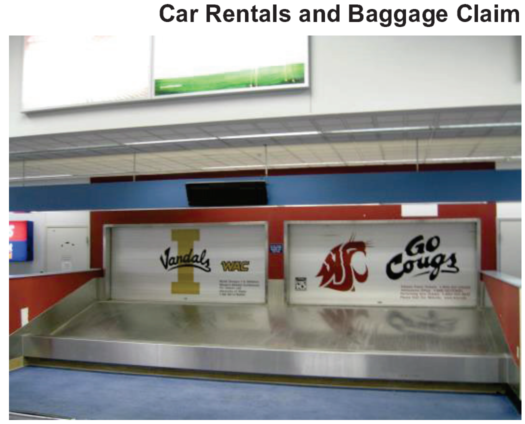
2.2 Terminal Building Exterior

The exterior cladding of the terminal is a combination of a medium red brick up to 12'-0" and metal panels above the brick façade. The metal panels are 4' x 8' in size and light gray in color. All window and door trims are a gray color similar to the metal panels. The brick wraps the entire building except the holdroom portion, which has a storefront window system that spans the south façade.

The building has a low slope standing seam metal roof. The higher portion has an overall height of 33'-0" and the lower portion has an overall height of 29'-0". Both roofs have the same slope, which slopes towards the south.



Car Rentals and Baggage Claim



Baggage Claim

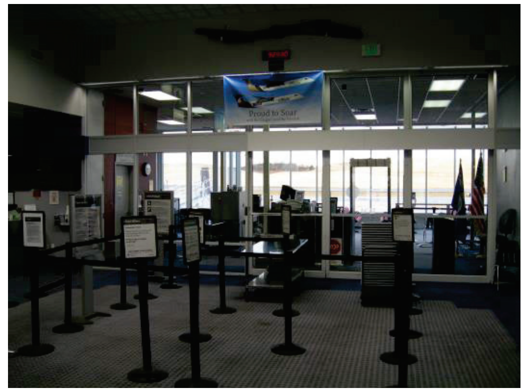
2.3 Terminal Building Interior

Upon entering the terminal building, the user enters directly into main portion of the building, the non-secure side of the terminal. The non-secure area refers to the facilities between the parking lot and the security checkpoint. This is the portion of the terminal that is accessible to both ticketed passengers and the general public. It also houses the airport terminal's primary functions and public amenities. Amenities within the non-secure area include two car rental offices, one ticketing counter, public seating area, restrooms, vending machine, and a baggage claim area. There is no dedicated concessions area other than the vending machines. The circulation spaces overlap the amenities causing bottlenecks throughout the room, especially at peak times. In general, the spaces are undersized for the number of users.

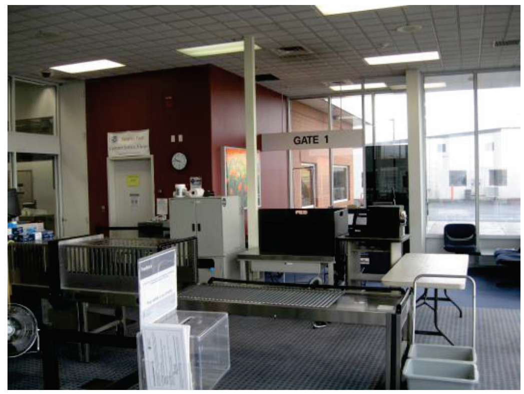
The waiting area is positioned along the central spine of the room with the car rental counters off to the right and left. The baggage claim area separates the car rental counter from the ticketing counter along the left side of the building. Interior finishes in this area consist of white painted walls with red accent walls and rubber base throughout. Carpeting is blue with blue and tan checkered accents along the center of the room. The ceiling is white acoustical tiles with fluorescent lights. The ceiling is sloped to follow the roof. A blue "band" runs around the room at roughly 8'-0" above the floor. Above this band is white painted gypsum board with advertisements. Seating is a mixture of blue, red, and gray beam seating. Several chairs and tables are positioned near the front door.

An interior storefront window system physically separates the secure area from the non-secure area. The Transportation Security Administration (TSA) security checkpoint is located at this area. The secure area is only accessible to ticketed passengers and staff with security clearance. The security checkpoint has insufficient space for the required activities that occur here. The checkpoint queuing is positioned in the main building area (non-secure) and is inadequate for both queuing and divesture. There is a single checkpoint lane and a small area for recomposure beyond the lane in the holdroom. The security checkpoint converges into the holdroom area, taking away seating area for the holdroom. The holdroom includes seating for passengers, and a vending machine. There are no restrooms in the secure area. Interior finishes include the same blue and tan carpet with white painted walls and a rubber base. The beam seating matches the seating in the non-secure area.

The facility is well-maintained, however many of the interior finishes are reaching the end of their expected life and therefore should be replaced in the near future. Most of the finishes were installed during the original construction in 1989. If the building were to be expanded, and the existing structure were to be reused, the interior finishes would need refreshing. The existing furnishings and millwork are mismatched and need several

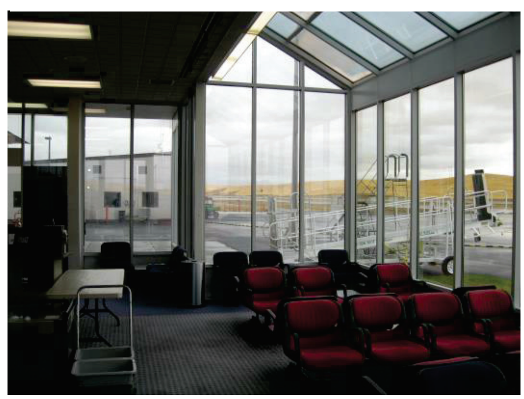


Secure Checkpoint Queue Area



Secure Checkpoint & Holdroom

Secure Checkpoint



Holdroom

repairs. The needs of the users are not met in terms on space, furnishings, and counter space. The beam seating is in poor shape.

3. Terminal Building Observations and User Surveys

Functional deficiencies in the terminal building have been documented through user comments and site observation.

3.1 Airlines Comments:

- Ground handling works sufficiently.
- Need more storage space for cones, coolers, spare tires, etc.
- A covered area for ground service equipment (GSE) would be considered.
- Current location cannot operate two flights simultaneously, due to size of facilities and staff.
- Alaska Airlines uses the Q400 aircraft (76 seats).
- Average flights have 20 checked bags and 40 carry-on bags.
- At seasonal peak (end of semester), a flight can have 80-90 large bags checked by international students. Often, these bags can't be accommodated on the flight and must be trucked.
- Passenger boarding bridges not usable with Q400s, but can be used for charters.
- A sheltered walkway for passengers from the holdroom to the aircraft would provide flexibility for loading the aircraft and passengers confined.
- Special services for passengers who require assistance to board the aircraft work well with air ramps rather than air stairs.
- PUW does not have a tower – an airline employee visually confirms that there are no aircraft in the vicinity.
- A rotating baggage belt would be beneficial when processing flights with many bags. More space for passengers to unload their bags.
- Signage with international symbols is needed for foreign students.
- Existing office space is sufficient; space as large as the office for a remote reservation area is needed.
- New ticket counters do not allow space for supplies. A storage closet is needed for office products. Areas for bag tags, etc are not large enough to accommodate the items.
- At the ticket counters, three agent positions and two bag wells are sufficient.
- The existing location for check-in kiosks (near front door) is often overlooked by passengers.

3.2 TSA Comments:

Security Checkpoint:

- The checkpoint is too small / short for the number of passengers.
- There is insufficient space for divesture and recomposure before and after the checkpoint.
- In 3 months to a year, an advanced imaging technology (AIT) will be installed at PUW depending on equipment availability. This installation will eliminate several seats in the holdroom area.
- There is insufficient space to expand the checkpoint.
- The holdroom often overheats when the sun is strong.
- PUW experiences seasonal intensive use, based on the university schedules.

- The existing security doors have reached the end of their life expectancy and have been discontinued by the manufacturer (parts for the rollers must be custom made). Doors are hard to open / close.
- The exterior turn style functions adequately; was installed as a temporary measure since it does not require monitoring.
- The existing private screening room has the only janitor sink. This needs to be changed as soon as feasible.
- The security camera system is located in a curtained area of the private screening room.
- There is insufficient space for the document checking podium.
- TSA provides 11 FTEs at PUW.
- The preferred checkpoint configuration at PUW includes two x-ray machines and 1 AIT; allows for a future additional lane / equipment in the future.

Baggage Screening:

- There is insufficient space for screening baggage; process is inefficient, especially at peak times.
- Foreign student passengers often travel with several large bags.
- The existing baggage screening room was formerly a baggage makeup garage. The temperature of the room is often too cold in the winter and too warm in the summer. Auxiliary fans have been provided, but only help marginally. In the winter, ceiling-mounted unit heaters temper the room but do not heat it to a comfortable temperature.
- The existing baggage claim slide does not provide enough space for passengers to access baggage when there are many bags.
- The existing baggage screening room doubles as the locker and storage room.
- An in-line baggage screening system is preferred over the existing system; it will provide improved separation between screened and unscreened bags.
- The preferred baggage screening equipment is three explosives trace detection (ETD) systems.

TSA Back of House:

- The existing resolution room will not be needed for future resolution use; also functions as a room for nursing mothers.
- The existing training room is too small; doubles as a break room.
- The supervisor’s office also houses TSA’s IT closet

3.3 Rental Car Comments (Hertz):

- Existing parking is adequate for current amount of usage.
- When it is cost effective, cars will come from Spokane on busy weekends. Often, it is not cost-effective and the existing fleet is utilized.
- A counter with two agent positions is sufficient.
- Half of the car rental business comes from the community, rather than passengers.
- The terminal mechanical (HVAC) system is currently not working well.
- The quick turnaround facility is too far away, making it difficult to use when only one person is on duty.
- A vacuum or exterior outlet near the terminal would be useful.
- Prefer an onsite gas pump. Currently, gas is bought from the fixed base operator (FBO), which

has higher quality / cost than necessary. The nearest gas station is a half hour round trip.

3.4 Airport Management Comments:

- There is limited space for screening baggage; process is inefficient, especially at peak times.
- Prefer an in-line baggage screening system.
- Foreign student passengers often travel with several large bags.
- The holdroom is too small to hold all passengers of a 76-seat Q400 comfortably. The existing Building Restriction Line (BRL) limits expansion of the holdroom to the air side. There is limited space inside the terminal building to expand the holdroom to the land side.
- The holdroom often overheats when the sun is strong.
- The existing glazing system is failing on the air side of the building, and several panes of glass have been replaced. Others are in need of replacement.
- There are no restrooms located in the existing holdroom (secure side).
- The drinking fountain in the holdroom is part of the checkpoint and is difficult for the public to access.
- The exterior turn style that is utilized to deplane passengers is disliked. Passengers perceive it as providing a low level of service and it is commonly referred to as a "cattle gate."
- The existing baggage claim slide does not provide sufficient space for passengers to access baggage when there are many bags.
- The Airport would like to use the terminal building to process athletic charters, (the largest charters are for the football teams) from both area universities.
- The mechanical system has been in need of repair. It is sometimes overwhelmed by heat from solar gain, passenger screening equipment, and occupants when the building is crowded.
- The existing airfield lighting vault is located in terminal mechanical / electrical room.
- The terminal building provides free WiFi.
- Cell phone service is often hard to use in the building, depending on the carrier.
- The existing building is not connected to a municipal sewer; uses a septic system.
- The terminal water supply is from WSU and provided via a 10" main.
- Storm water is managed on site.

3.5 Universities Comments:

- Baggage handling during charters is inefficient. Baggage is unloaded from buses onto a trailer that is brought to the aircraft, after passengers are unloaded at the terminal. Process takes 20-30 minutes.
- Baggage is sometimes shipped to the destination if it will not fit in the aircraft.
- "Cattle gate" slows down the deplaning process.
- University of Idaho (U of I) will have two buses at a time, while Washington State University (WSU) will have 3-4 buses. Both have administrators with personal vehicles. Buses have 56 seats with baggage.
- Current charter aircraft is a 737-800 – serves about 64 players and 14 administrators.
- Prefer to have a small gift shop to showcase the universities.
- Prefer an airport sign that says "Welcome to the Palouse – home of WSU & U of I" or similar.
- Prefer the airport to have visual appeal – good first impression for parents and prospective students.

- Showcase the community to the parents.
- Recruiters move potential athlete through the building as quickly as possible so the athlete doesn't look around.
- Prefer a small and cool airport terminal – stands out, is a little flashy and is technologically up-to-date. Possibly a TV for players to catch what's going on with other teams while they wait.
- If air service was more reliable, would like to bring in fans and alumni.
- Better cell phone service is needed.
- When enplaning, it takes about 35 minutes to get charter passengers through the checkpoint.
- Prefer to not schedule around commercial flights.
- Prefer a covered outside waiting space, separate from terminal, climate controlled.
- Additional aircraft parking for staging would be beneficial; the FBO often gets busy for games.

3.6 Mayors' Comments:

- Dislike the "cattle gate" or going around the building and entering after deplaning.
- Elderly and students use this airport – access is an issue.
- Prefer to see more pride and ownership (universities, international ties, local businesses) of the area in the terminal.
- Need improved ventilation in the building.
- Prefer a clean, easily navigable building. The existing building seems dated and utilitarian.
- Need restrooms and drinking fountains in the secure area.
- Prefer a terminal building that is respectable and will meet the users' needs, but not lavish.
- Prefer natural lighting and good ADA access.
- Current air side has too much glass.
- Showcase technologies from the universities and local businesses.
- Consider a LEED building.
- Need an efficient building
- Display space for the universities and local artists.
- Prefer a sales space for last-minute conveniences (souvenirs and local art).
- Play area for children. Playschool may have a program that provides this for a reduced price as a part of marketing.
- Water-efficient landscaping.

3.7 Chamber of Commerce Comments:

- Prefer to see the airport showcase the Palouse area, rather than only Pullman and Moscow.
    - Green, gold and amber rolling hills
    - "Palouse" is a Native American word for fertile.
- The terminal building is undersized for the current amount of use.
- Onsite airport representative is a plus.
- More amenities available at the airport – coffee shop, Red Sage Bakery, or improved vending.
- The area is short on conference room space and would benefit from two small conference rooms – especially in conjunction with a small food concession.
- Display flight information for passengers and people picking up passengers.
- Both universities are growing fast – an increase of more than 4,000 students this year.

- Schweitzer is growing – has increased number of employees by 1,000 this year.
- Walking from the aircraft to the terminal building in the summer is very hot.
- Install cellphone charging stations for travelers.
- A variety of seating options would be beneficial – standing tables, in addition to seated tables.
- Likes the option of having books for sale in the terminal building.
- The existing advertising is good but location is too high for see.
- Additional directional signage in the parking lot is needed for people who are not familiar with the terminal.
- The airport access road has snow drifting in the winter.

4. Structural Systems Analysis

The superstructure of the building consists of a sloped roof system with TJI joists bearing on a combination of glulam beams and trusses. The interior beams and trusses bear on steel columns. The interior columns rest on concrete piers which bear on spread footings. The exterior walls are supported by concrete foundation walls on continuous strip footings.
Any proposed additions are recommended to be of similar structure, or all steel. A small addition may be able to tie into the lateral system of the existing structure. A larger addition would likely be structurally separated from the existing structural system.

5. Building Systems Analysis

The building plumbing is on a septic system.
The original mechanical system has recently gone through a significant maintenance cycle.
The mechanical room is undersized.
The mechanical system continues to be a maintenance and cost burden on the airport. Any alteration or expansion of the existing structure should provide space for a new mechanical unit and distribution system.

6. Parking and Vehicle Access

Existing Parking Lot

PUW currently provides vehicle parking for the traveling public, airport employees, TSA agents, and rental cars.

Airport users and the Consultant have observed the capacity and functionality of the parking areas. These observations apply to mostly peak usage, which is critical because the parking areas must have the capacity to manage peak usage.

The existing pavements were part of the 1989 terminal project and are shown in **Figure 2.** Since the previous terminal building was at a different location, new pavements needed to be constructed. The 1989 construction consisted of 144 parking spaces, all pavements associated with parking and the apron. Airport Road, the taxiways, and the runways were previously constructed. The ARFF building was also built during the 1989 terminal project, but has been recently renovated / expanded. An additional parking lot was built for rental car parking with 66 spaces. When parking is at full capacity, overflow parking occurs in adjacent grassy areas.

6.1 Airport Management Comments:

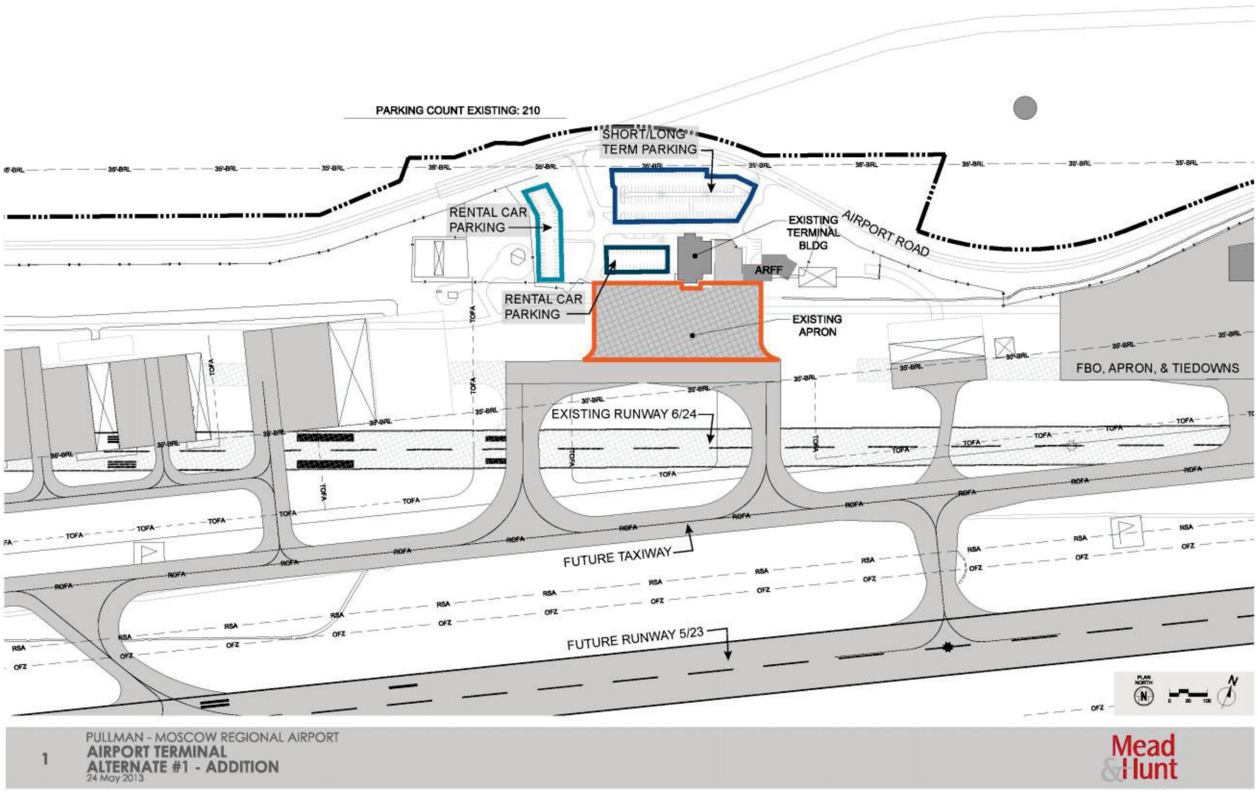
- Roughly 50% of passengers leave vehicles in the airport parking lot while traveling.
- The airport charges for parking, but this is based on the honor system and airport employees checking the lot daily. As more vehicles use the parking lot, it is more difficult for the staff to manage.
- The parking spaces usually fill up; therefore overflow parking occurs in adjacent grassy areas. The number of overflow parking vehicles is roughly 20.
- The airport needs minimum 30 more stalls.
- Existing parking is constrained due to the limited amount of space between the building and the main roadway. There is a significant elevation change in the terminal area, which limits options for parking improvements.
- Bicycles often use the airport access road, which has poor visibility and no shoulder.
- There are three pull-off taxi parking places on the approach drive near the terminal building.
- Hertz currently has 20 parking stalls. Avis currently has 10 parking stalls.
- There is insufficient space for athletic team buses and administrators using charters.
- Parking is insufficient for the current amount of use.
- Consider additional capacity and / or an additional carrier at the airport.

7. Terminal Apron

The apron is used for storage, maneuvering, and taxiing of aircraft, and movement of on-airport vehicles, including ground service equipment. The terminal apron, constructed in 1989, is consists of 9 inches concrete, 15 inches crushed rock sub-base, and additional sub-base. It is 89,565 square feet. As a part of the Environmental Assessment, the runway will be realigned. See **Figure 2** below for the existing runways and the proposed realigned runway and associated new taxiways.

Currently aircraft access Runway 6/24 via Taxiways A, B, and C. Once the runway realignment is completed, aircraft will access Runway 5/23 via Taxiways A-1, A-2, A-3, A-4, A-5, A-6, and A-7.

Figure 2: Existing Terminal Building with Realigned Runway



Source: Mead & Hunt, Inc.

Terminal Area Apron Inventory:

User Surveys and Site Observations:

- Currently, the terminal apron has two aircraft parking positions.
- During athletic events, there is insufficient space for overflow airport parking.

Section 2 – Passenger Enplanement Projections

Note: This section, "Passenger Enplanement Projections Technical Memorandum" was originally titled "Aviation Activity Forecast Update" and submitted to the FAA on February 4th 2013. For purposes of formatting this document, the title has changed. The original text has not be altered. The FAA approval letter for this forecast can be found in Section 8 of the Terminal Area Plan.

1. Introduction

Commercial aviation activity forecasts will drive several elements of the environmental assessment (EA) for the runway realignment and extension project (Proposed Action) at the Pullman-Moscow Regional Airport (PUW or Airport). Expected activity levels will determine size and time of implementation of improvement projects associated with the Proposed Action, and will be used to evaluate potential environmental impacts of the Proposed Action compared to other alternatives considered, including a no-build option where the airfield remains as it is in 2012. Expected aircraft activity and aircraft fleet mix are used for noise analysis.

2012 Master Plan forecasts have a base year of 2010, and were approved by the FAA in March, 2011. Forecast elements included *passenger enplanements* (number of people who boarded an aircraft at PUW), *aircraft operations* (number of takeoffs and landings at PUW), and *based aircraft* (number of aircraft stored or parked at PUW). These forecasts are updated as part of the EA, and use 2011 as their base year. Updated forecasts presented in this memo will replace the 2012 Master Plan forecasts, and will be used during project analysis in the EA.

This technical memo pertains to aviation activity forecasts for scheduled and charter air carrier operations and passenger volumes. Activity forecasts for other commercial operators, general aviation and military activity are also updated as part of the EA, and are included in **Section 6** (Alternatives Development).

The FAA and the Airport view terminal improvements as necessary to support existing and projected commercial airline activity at PUW. This forecast is developed to support the Terminal Area Plan being completed as part of the EA. It focuses on passenger enplanement and commercial airline operations that will determine the size and timing of terminal improvements. The terminal area plan will identify a preferred alternative for terminal improvements and the EA will analyze the impact anticipated with the preferred alternative.

It is possible the Proposed Action will have a greater impact on scheduled and charter air carrier operations than indicated by the 2012 Master Plan forecasts. Increased reliability and improved runway length could help the community attract additional service from existing carriers, or attract a new carrier. Air carrier activity scenarios are developed and evaluated in this technical memo. Airport activity is forecasted for opening day (2018) and opening day plus five years (2023) as required for the EA impact analysis. To assist in timing passenger terminal improvements, forecasts are also presented for opening day plus ten years (2028), opening day plus 15 years (2033), and opening day plus 20 years (2038).

1.1 Existing Regional Scheduled Commercial Air Carrier Service

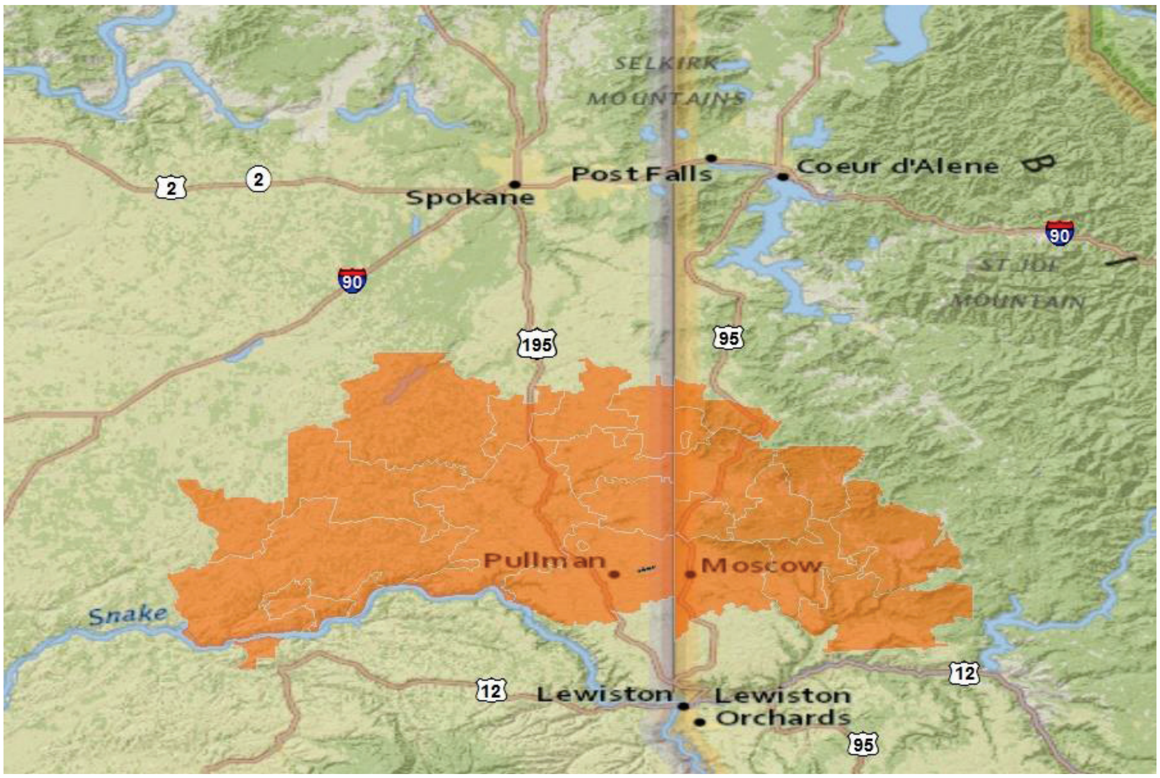
Existing regional scheduled commercial air carrier service considers flights operating at PUW and Lewiston Nez Perce County Airport (LWS), 40 miles south of PUW in Idaho. Alaska Airlines provides scheduled commercial flights between PUW and Seattle-Tacoma International Airport (SEA) using 76-seat Bombardier Q400 aircraft (Q400). On peak days (Saturday through Friday during the university academic year), the first flight of the day originates LWS, stops at PUW to load passengers, then continues on to SEA. The last flight of the day originates in SEA, and lands at PUW to offload passengers before continuing to LWS. Passengers originating in LWS can buy a ticket to PUW on the morning flight, but passengers originating in PUW cannot buy a ticket to LWS on the night flight. This type of service is referred to as a *tag service*. In addition to the tag service, Alaska Airlines operates two daily non-stop flights between PUW and SEA that do not originate or terminate in LWS.

Alaska Airlines operates two routes from LWS that do no operate via PUW. One flight per day goes to Boise Air Terminal/Gowen Field (BOI), and two flights per day go to SEA. These routes use the Q400. Delta Airlines operates two flights per day between LWS and Salt Lake City International Airport (SLC) that use 50-seat Bombardier Canadair Regional Jet 200 aircraft (CRJ200).

1.2 Catchment Area

Scheduled commercial passenger forecasts consider economic and demographic characteristics of PUW's catchment area. A catchment area is the geographic area where an airport's passengers live and work. The population inside of the catchment area is known as the airport's *true market*. Population outside the catchment area is more likely to use other airports, and is not included true market analysis. The 2010 Pullman-Moscow Regional Airport Market Outlook and Airline Assessment (2010 Outlook & Assessment) reviewed travel agent records to determine the extent of PUW's catchment area. The catchment area is presented in **Exhibit 1**.

Exhibit 1: PUW Catchment Area



Source: Mead & Hunt, 2010

The PUW catchment area consists of 30 zip codes, and had a population of 78,000 in 2009. The catchment area extent is determined by a drive-time analysis which captures the zip codes that are closer to PUW than another airport with commercial service. Passengers inside of the catchment area that do not use PUW are considered diverted. These passengers typically use Spokane International Airport (GEG), LWS, or SEA in lieu of PUW. The 2010 Outlook & Assessment found that 26 percent of the catchment area true market used PUW. Passenger diversion from PUW is shown in **Table 1**. Expected impact of the Proposed Action on catchment area retention is discussed in **Section 1.4**.

Table 1: Catchment Area Retention	
Airport	**% of True Market**
PUW	26.2%
GEG	52.7%
LWS	11.5%
SEA	7.2%
Other	2.4%

Source: 2010 Outlook and Assessment

1.3 Catchment Area Demographics

Success of air service depends on several factors. Business travel depends, in part, on growth of industry which supports trade between communities. Leisure travel depends, in part, on growth of disposable income. Air service as a whole depends on the population of the catchment area, and the amount that the population travels. Although the Airport is gateway to the scenic Palouse region; it is not nationally regarded as a tourist destination akin to Southern California, Florida, Hawaii, or New York City. It is expected that the bulk of travel demand from the Pullman-Moscow region will be driven by growth of industry, research and conferences at the universities, and the leisure travel demand of the local population.

Demographic indicators use 2012 forecasts by Woods & Poole Economics Inc. (Woods & Poole) for the Pullman and Moscow micropolitan statistical areas. Demographic indicators considered include total population, total employment, personal income per capita, gross regional product (GRP), and total retail sales. It is expected that these indicators will provide support for enplanement growth projections by demonstrating how population, industry, and economics are expected to improve in the Pullman-Moscow region over time. The compound annual growth rate (CAGR) shows the average annual rate of change for the select demographic indicators. Select demographic indicators are presented in **Table 2**.

Table 2: Pullman-Moscow Micropolitan Statistical Areas Demographic Indicators					
Year	**Population**	**Employment**	**Per Capita Income**[1]	**GRP (Millions)**[1,2]	**Retail Sales (Millions)**[1,2]
2011	82,364	42,859	$30,941	$2,680.80	$781.35
2018	84,428	46,596	$41,255	$3,172.93	$853.78
2023	86,029	49,960	$53,993	$3,693.66	$912.16
2028	87,623	54,010	$71,967	$4,356.73	$976.19
2033	89,171	59,000	$97,379	$5,214.33	$1,046.54
2038	90,710	65,094	$133,014	$6,307.48	$1,123.73
CAGR	0.36%	1.56%	5.55%	3.22%	1.35%

1 2012 $

2 Conversion to 2012 dollars calculated by U.S. Bureau of Labor Statistics Inflation Calculator

Source:2012 Woods & Poole

The select demographic indicators suggest that economic growth in the Pullman-Moscow region will outpace population growth. Increased trade to the region (retail sales) and from the region (GRP) will support business travel while increase per capita income will support leisure travel. These forecasts are used to support scheduled commercial airline service forecasts in **Section 3**.

1.4 2012 Master Plan

The 2012 Master Plan conducted an independent analysis that identified the primary demand influences within PUW's catchment area. Variables impacting demand included proximity to other airports with competing air carrier service (namely LWS and GEG), proximity to the employment centers in the Pullman-Moscow area, economic and demographic characteristics of the Pullman-Moscow area, existing airfield infrastructure at PUW, and airline trends.

The 2012 Master Plan used catchment area retention identified in the 2010 Outlook and Assessment, and generated three forecast scenarios. These scenarios analyzed how varying levels of catchment area retention would impact passenger enplanement levels as the economy and population of the Pullman-Moscow region grew. Scenarios were created for existing (2010) catchment area retention of 26 percent, a five percent growth in catchment area retention, and a ten percent growth in catchment area retention.

The 2012 Master Plan recommended that the existing retention rate of 26 percent be carried forward until airport improvements addressed reliability and accessibility issues. Upon implementation of airport improvements, passenger retention grew by five percent to 31 percent of the catchment area.

1.5 Charter Operations

Charter operations to the Pullman-Moscow region are primarily driven by local and visiting university athletic teams, with the football teams traveling with the greatest number of athletes and staff. Due to the number of players and staff involved, football teams generally organize a charter aircraft for transportation. Other athletic teams generally travel on scheduled commercial flights, or use automobile transportation. USDOT data indicates that basketball teams use charter flights on occasion. Athletic charter operations in and out of the Pullman-Moscow area occur on aircraft as large as a 183-seat Airbus A321, and as small as a 56-seat Boeing 737 in a business class configuration.

Facility requirements for charter operations vary depending on the air carriers operating certificate. Airlines performing charter operations and operating under (Federal Aviation Regulation) FAR Part 121 are subject to TSA passenger and cargo screening requirements. Part 121 charter operations generally operate from the passenger terminal building. Airlines performing charter operations and operating under FAR Part 135 are not subject to TSA passenger and cargo screening requirements. Part 135 charter airlines can operate from a fixed base operator or a parking apron in lieu of a passenger terminal building. This memo focuses on charter operations by Part 121 airlines due to the demand they place on the passenger terminal building.

Part 121 charter operations to the Pullman-Moscow region operate out of PUW and LWS. USDOT T-100 data is categorized by charter type and operating airport, and presented in **Table 3**.

Table 3: 2011 Part 121 Charter Activity

Charter Type	PUW			LWS		
	Enplaned	Deplaned	Ops.	Enplaned	Deplaned	Ops.
Football	1,033	1,215	23	1,483	1,729	26
Basketball	133	159	8	44	0	1
Casino	0	0	0	1,302	1,294	20
Reposition/Empty	0	0	12	0	0	17
Uncategorized	145	89	7	221	0	3
Total	1,311	1,463	50	3,050	3,023	67

Source: USDOT T-100, January 1- December 31, 2011

It is expected that all athletic charter operations are associated with the universities as Lewiston does not have a university. Casino charters are more difficult to assign to a region because it is possible that their passengers come from both the Pullman-Moscow and Lewiston-Clarkston regions. In total, the Airport loses 58 percent of Part 121 charter operations and 69 percent of Part 121 charter passengers to LWS. This loss of retention, particularly in regards to athletic charters, is due to facility constraints at PUW related to apron space, runway length, and instrument approach minimums. It is expected that the Proposed Action will allow the Airport to recapture many of the lost charter operations.

Part 121 charter forecasts re-assign all athletic charters from LWS to PUW after the proposed action is complete. Due to the uncertainty regarding the casino charters, 50 percent are assigned to PUW. Reposition/empty operations are assigned similarly, depending on if the aircraft was flown into or out of the airport as an athletic charter or a casino charter.

Unlike scheduled air carrier operations, which respond to market forces and are forecasted using economic models, charter demand is relatively inelastic. Athletic teams play a set number of games per year, and it not expected that this number will change greatly throughout the forecast period.

Uncategorized operations remain at 2011 levels throughout the forecast period due to the lack of information about their purpose.

Casino charters will likely respond to economic conditions and local demand, but are not expected to exceed more than two operations and 255 passengers per month. For these reasons, Part 121 charter operations have a flat growth rate. Part 121 charter forecasts for PUW are presented in **Table 4**.

Table 4: Athletic Charter Forecast

Year	Enplanements	Deplanements	Passengers	Operations*
2011	1,311	1,463	2,248	50
2018-2038	3,500	3,800	7,300	100

Source: USDOT T-100

3. Scheduled Commercial Airline Forecast Scenarios

Scheduled commercial passenger airline forecast scenarios consider air service growing at PUW due to the attractiveness of lower instrument minimums, increased runway length, and economic growth in the communities of Pullman and Moscow. Four scenarios are analyzed in this memo.

Baseline Forecast: Uses the same methodology as the 2012 Master Plan
Scenario 1: New service between PUW and BOI
Scenario 2: Increased service between PUW and SEA
Scenario 3: New eastbound service from PUW to an airlines hub.

Scenarios are supported using data from the 2011 FAA TAF, the 2012 Master Plan, 2011-2012 U.S. Department of Transportation (USDOT) T-100 database, the 2010 Outlook & Assessment, and demographic data from Woods & Poole.

3.1 Previous Studies

The EA forecast considers the possibility of improved reliability and a longer runway opening PUW up to new routes that were previously unviable. 2010 Outlook & Assessment evaluated the destinations travelers living and working near PUW frequently visited, and what percentage of these travelers chose to use other airports in the region. This study was used as part of the basis behind the scheduled commercial airline forecasts in the 2012 Master Plan.

The 2012 Master Plan suggests that PUW retains about 26 percent of air travelers within its catchment area. The remaining 74 percent use other airports with 53 percent going to Spokane International (GEG), 12 percent going to LWS, seven percent going to SEA, and the remaining two percent using other airports such as BOI and the Pasco-Tri-Cities Airport (PSC).

The 2012 Master Plan expects catchment area retention to increase from 26 percent to 31 percent following the implementation of the Proposed Action. Improved reliability is expected to increase community use of the Airport, and possibly attract new or expanded air service. The 2012 Master Plan presents two scheduled commercial airline forecast scenarios. In Scenario One where service continues as it exists today, and load factors and frequencies increase as retention improves. In Scenario Two, Alaska Airlines relocates LWS operations to PUW.

New routes outside of what operates from PUW and LWS were considered in the 2010 Outlook & Assessment. The true market assessment identified SEA, Los Angeles International Airport (LAX), Anchorage International Airport (ANC), BOI, and Portland International Airport (PDX) as the top five markets from PUW; however existing demand was unlikely strong enough to support non-stop routes outside of Seattle. Of the top 25 markets identified, all were served from PUW in one stop via SEA on Alaska Airlines and other airlines, and several were also served non-stop or one stop from GEG.

3.2 EA Scheduled Commercial Airline Forecast Scenarios

One baseline scheduled commercial passenger airline forecast (Baseline Forecast) and three scheduled commercial passenger airline forecast scenarios (Scenario 1, 2 and 3) have been prepared as part of the EA. These scenarios can occur independently or concurrently, and the preferred forecast is presented in **Section 4**.

3.2.1 Baseline Forecast PUW Improves Catchment Area Retention Rate

The Baseline Forecast uses the same methodology as the FAA-approved 2012 Master Plan forecast, and updates the base year using the most recent data available: June 2011 – May 2012. Operations counts and passenger numbers come from the USDOT T-100 database. The T-100 is a form air carriers submit to the USDOT that contains information about all flights that they operate that originate or terminate in the United States. The forecast assumes that catchment area retention at PUW will increase as a result of the Proposed Action, and accelerates growth of passenger enplanements and scheduled commercial airline operations after 2018. The Baseline Forecast is presented in **Table 5**.

Table 5: Baseline Forecast

Year	Enplanements	Deplanements	Passengers	Operations*
2011	38,005	39,188	77,193	1,854
2018	49,300	50,800	100,100	1,900
2023	60,200	62,100	122,300	2,000
2028	67,000	67,800	134,800	2,000
2033	75,000	75,700	150,700	2,000
2038	84,000	84,500	168,500	2,100

** Scheduled Commercial Passenger Airlines Only*

Source:2012 Master Plan, USDOT T-100

The Baseline Forecast expects that scheduled commercial operations will increase as needed to accommodate the forecasted level of demand. It is expected that Alaska will continue to use the Q400 on this route, or an aircraft of similar characteristics and capacity as the carrier renews its fleet over the forecast period.

3.2.2 Scenario 1 New BOI Service

The Scenario 1 Forecast expects that Alaska will begin twice daily BOI service from PUW after the Proposed Action is complete. The rationale behind this new service is that a direct link to BOI can be supported with improved reliability of the Airport, increased catchment area retention, and economic growth in Pullman, Moscow, and Boise. PUW had one-stop service to BOI via LWS until 2010, when Alaska restructured BOI's role in their route network. Scenario 1 does not consider changes to Alaska Airlines' LWS-SEA service, which is part of Scenario 2, and assumes that Delta Airlines will continue to offer LWS-SLC service.

According to the 2010 Outlook & Assessment, BOI was the fourth most popular destination for the PUW catchment area with a true market demand of 10,358 passengers. 49 percent of the true market demand drove to LWS for the non-stop flights, 37 percent flew west to SEA before flying back east to BOI, and 12 percent drove north to GEG before flying south to BOI.

Traffic demand between PUW and BOI is supported by several local and economic conditions. Moscow is the county seat and Boise is the state capital. Employees from the State, County, and local governments are expected to use the route for business travel. The presence of the two universities in the Pullman-Moscow area is expected to be another driver of commercial traffic as university employees, researchers, Idaho State Board of Education staff, and Boise –based vendors who contract with the two universities use the route.

The Scenario 1 Forecast uses passenger volumes experienced on the LWS-BOI route in 2011-2012 as a base. The forecast applies the Baseline Forecast growth rate to forecast future passenger demand on the PUW-BOI route. The Scenario 1 Forecast is included in **Table 5**. Forecast numbers represent Scenario 1 and the Baseline Forecast activity indicators from **Table 4** combined.

Table 5: Baseline + Scenario 1 Forecast

Year	Enplanements	Deplanements	Passengers	Operations*
2011	38,005	39,188	77,193	1,854
2018	67,200	65,900	113,100	2,500
2023	81,300	79,900	161,200	2,700
2028	89,500	92,300	181,800	2,700
2033	97,800	100,900	198,700	2,800
2038	107,000	110,400	217,400	2,800

** Scheduled Commercial Passenger Airlines Only*

Source:2012 Master Plan, USDOT T-100

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3.2.3 Scenario 2 Alaska Airlines Consolidates SEA service at PUW

Scenario 2 forecasts that Alaska will consolidate SEA service at PUW, and cancel the existing tag service. This will result in four round-trip flights per day between PUW and SEA. It is expected that PUW will capture the passengers that used the LWS tag service, and average load factors on the flights will increase to compensate for the two SEA-LWS flights that will be discontinued. Scenario 2 assumes does not consider changes to Alaska's LWS-BOI service, which is part of Scenario 1, and assumes that Delta will continue to offer LWS-SLC service.

Traffic demand on the SEA-PUW route already exists; however, the 2010 Outlook and Assessment questioned whether the service could be sustained without the tag to LWS. Overall economic conditions have improved since the 2010 Outlook and Assessment was written, and the 2011 FAA TAF shows that passenger enplanements at PUW have increased at an average annual rate of 10.8 percent since 2006. Increased fuel prices suggest that operating aircraft as large as the Q400 over distances as short as PUW-LWS may no longer be viable as aircraft are designed to excel at cruise efficiency, and burn significantly more fuel per mile traveled on takeoff and landing. It is expected that travelers on this route that originate in the Lewiston, ID Clarkston, WA metropolitan area would drive the 40 miles to PUW or use LWS's SLC service.

The Scenario 2 forecast bases passenger volumes on the two new non-stop trips on passenger volumes from PUW and LWS that used the tag service in 2011-2012. The forecast applies the Baseline Forecast growth rate to forecast future passenger demand on the two new non-stop trips. The Scenario 2 Forecast is included in **Table 6**. Forecast numbers represent Scenario 2 and the Baseline Forecast activity indicators from **Table 4** combined.

Table 5: Baseline + Scenario 2 Forecast

Year	Enplanements	Deplanements	Passengers	Operations*
2011	38,005	39,188	77,193	1,854
2018	55,500	57,200	112,700	1,900
2023	66,500	68,600	135,100	2,000
2028	73,600	75,900	149,500	2,000
2033	81,600	84,100	165,700	2,000
2038	90,400	93,200	183,600	2,100

** Scheduled Commercial Passenger Airlines Only*

Source:2012 Master Plan, USDOT T-100

Operations do not increase in Scenario 2 because the Baseline Forecast already accounted for these flights as part of the tag service. In Scenario 2, SEA-PUW flights return to SEA instead of continuing on to LWS as they did in the Baseline Forecast.

3.2.4 Scenario 3 Eastbound Service

Scenario 3 forecasts that an airline will offer eastbound service from PUW upon the completion of the Proposed Action. It is expected that this route will be to one of the Mountain Time Zone hubs, likely SLC or Denver International Airport (DEN). Passengers can connect to flights headed south or east from the hub. The top eastbound true markets from PUW's catchment area, excluding BOI, are shown in **Table 7**.

Table 7: Top Eastbound True Markets

Destination	Retention	True Market
Las Vegas	11.5%	7,059
Denver	10.0%	4,400
Minneapolis	10.0%	4,300
Washington DC	21.5%	3,960
Chicago	14.5%	3,182
Phoenix	18.8%	3,032
Atlanta	10.0%	2,400
New York (JFK)	10.0%	1,900
Salt Lake City	5.0%	1,800
Idaho Falls	10.0%	1,600
All Eastbound	16.05%	71,063

BOI not included

Source: 2010 Outlook and Assessment

Individually, these markets do not have enough demand to sustain direct service; however, one flight leaving from PUW can take passengers to all of these destinations and more via a hub. The low retention rates indicate that most passengers use other airports to access these markets. Improved airport reliability may encourage an airline to offer a flight from PUW to capture some of the true market passengers who prefer the convenience of local air service.

Eastbound routes from communities of similar size to Pullman-Moscow are typically operated by aircraft with 50 or fewer seats. Recent spikes in fuel prices have caused some airlines that operate 50-seat aircraft to start to retire the aircraft and replace them with larger aircraft. SkyWest, a dominant regional airline on the West Coast, has ordered aircraft available in 70- and 90- seat variants to replace aging regional jets. Bombardier's 2012 20-year market outlook forecasts that 2,700 aircraft with 60-99 seats will be delivered compared to 150 aircraft with 20-59 seats. In order to sustain viable eastbound scheduled commercial air service, the Pullman-Moscow Region will need to be able to fill the larger aircraft.

Scenario 3 uses the LWS-SLC route operated by a CRJ-200 as a baseline for route performance. The aircraft size was increased from 50 to 90 seats in 2018, and load factor grows over time. The 2010 Outlook and Assessment found that, excluding passengers headed to BOI, the PUW catchment area loses an estimated 11,553 eastbound passengers per year to LWS. It is reasonable to assume that some passengers that use the LWS-SLC route live or work in the PUW catchment area. The low retention rate for all eastbound travelers suggests that there is market potential for eastbound service from the PUW catchment area.

The LWS-SLC route operated at an average load factor of 82 percent between June 2011 and May 2012, which is equivalent to 41 passengers on a 50 seat aircraft. The same number of passengers per flight would mean a 63 percent load factor on a 65 seat CRJ-700, and a 54 percent load factor on a 76-seat CRJ-900. These load factors would be considered below industry average for a regional jet at 2012 fuel prices. For comparison, USDOT T-100 figures for January to June 2012 show that on CRJ-700 and CRJ-900 routes, GEG averaged an 81.9% load factor, and PSC averaged an 81.7% load factor.

Provided that PUW's reliability improves and given that PUW's runway length will increase as a result of the proposed action, and given the eastbound traffic indicated in the true market analysis, it is possible for PUW to attract eastbound scheduled commercial passenger airline service. Eastbound service would benefit travelers who do not want to backtrack to SEA to fly east. The Scenario 3 Forecast is included in **Table 8**. Forecast numbers represent Scenario 3 and the Baseline Forecast activity indicators from **Table 4** combined.

Table 8: Baseline + Scenario 3 Forecast

Year	Enplanements	Deplanements	Passengers	Operations*
2011	38,005	39,188	77,193	1,854
2018	81,500	84,000	165,000	2,900
2023	94,000	96,900	190,900	3,000
2028	102,500	105,700	208,200	3,000
2033	112,000	115,500	227,500	3,000
2038	122,500	126,300	248,800	3,000

** Scheduled Commercial Passenger Airlines Only*

Source:2012 Master Plan, USDOT T-100

Scenario 3 adds 32,200 passengers and 1,000 operations in 2018, and 33,800 passengers and 1,000 operations in 2023 to the Baseline Forecast.

4. Preferred Scheduled Commercial Airline Service Forecast

The forecast scenarios may occur simultaneously or independently of one another. One of the outcomes of the Proposed Action is that the Airport improves low visibility reliability and parking apron space. Increased runway length is intended to meet the needs of existing users of the Airport; however, it is possible that the proposed 7,100 foot long runway could make the Airport more attractive to more demanding aircraft, or allow longer routes.

Forecast year 2018 is based on the FAA-approved methodology from the 2012 Master Plan, known as the Baseline Forecast in this document. This scenario expects that Alaska will continue to operate service to SEA with a tag to LWS on some flights. Flights will be operated by 76-seat Q400 aircraft.

Forecast year 2023 expects that improved reliability at PUW will motivate Alaska Airlines to consolidate service to SEA in PUW and eliminate the tag service with LWS. It is also expected that the route to BOI previously operated by Alaska will return as economic conditions improve. The enplanement and operations forecast for 2023 includes the Baseline Forecast, Scenario 1 and Scenario 2. Flights will be operated by 76-seat Q400 aircraft.

Forecast year 2028 expects that the Airport will continue to see traffic growth to the SEA and BOI markets. The preferred scheduled commercial airline service forecast expects that eastbound service forecasted as Scenario 3 can only be viable in 2028 if it captures passengers that would have otherwise used the SEA service to make an eastbound connection. Due to the expectation that an eastbound service would be operated by a larger regional jet than what is operating today, implementation of an eastbound service in 2028 would reduce the viability and frequency of service to SEA. If eastbound service exits in 2028, it will likely be at the expense of passenger demand on the SEA service unless the Pullman-Moscow area dramatically improves its catchment area retention rate. Scenario 3 is not included in Forecast year 2028 projections.

It is expected that Alaska Airlines will begin to replace aging Q400 aircraft with larger, more fuel efficient models around 2028. It is expected that seat capacity will grow to 80 seats.

Forecast Year 2033 expects that sustained levels of passenger demand and economic growth in the Pullman-Moscow area will support an eastbound service from PUW. It is expected that Scenario 3 will occur in conjunction with the Baseline Forecast, Scenario 1 and Scenario 2 in 2033. Flights to SEA and BOI will continue to operate on 80-seat aircraft, and it is expected that eastbound service will operate on 90-seat regional jets.

Forecast year 2038 expects that PUW will have westbound service to SEA, offering connections throughout the Pacific Northwest, west coast, Canada, Asia, Alaska, and Hawaii. PUW will also have service to BOI, and eastbound service offering connections to the central, southern, and eastern parts of the country, as well as Europe and Latin America. Other international destinations, including markets in Africa, India, and the Middle East, could be reached with connections via SEA or the eastbound service.

Service to BOI and SEA will operate with 80-seat aircraft, and eastbound service will operate with 115-seat regional aircraft. The preferred scheduled commercial airline service forecast is presented in **Table 9**.

Table 9: Preferred Scheduled Commercial Airline Service Forecast

Year	Scenarios	Enplanements	Deplanements	Operations
2011	Existing	38,005	39,188	1,854
2018	Baseline	49,300	50,800	1,900
2023	Baseline, 1 & 2	87,700	90,400	2,500
2028	Baseline, 1 & 2	96,000	99,000	2,700
2033	Baseline, 1, 2 & 3	141,500	146,000	3,800
2038	Baseline, 1, 2 & 3	152,700	157,400	3,700

1-Service to BOI 2-Additional SEA service 3-East Coast Service

** Scheduled Commercial Passenger Airlines Only*

Source:2012 Master Plan, USDOT T-100

The preferred scheduled commercial airline service forecast and the athletic charter forecasts are combined to represent the passenger volumes expected that PUW through 2038. As stated in **Section 1.4**, athletic charter operations are expected to remain consistent after the Airport recaptures operations currently using LWS. The preferred forecasts are used for a peaking analysis, presented in **Section 5**. The peaking analysis is used to determine the facility requirements of the passenger terminal building. Facility requirements will be presented in the **Terminal Area Plan**, which will be completed as a separate document. Combined scheduled and athletic charter passenger volume and operations forecasts are presented in **Table 10.**

Table 10: Scheduled Commercial Airline Service and Athletic Charter Forecast

Year	Enplanements	Deplanements	Passengers	Operations
2011	39,038	40,403	79,441	1,877
2018	52,000	53,500	105,500	1,950
2023	90,400	93,100	183,500	2,550
2028	101,400	104,400	205,800	2,750
2033	144,200	148,700	292,900	3,850
2038	155,400	160,100	315,500	3,750

Sources:2012 Master Plan, USDOT T-100

5. Passenger Terminal Peaking Tendencies

Passenger terminal peaking tendencies are used to size various components of the passenger terminal building. Peaking tendencies are highly dependent on airline scheduling. In 2011, PUW generally had one commercial aircraft on the ground at a time unless there was an athletic charter. Several assumptions are factored in to peaking tendencies, and listed below.

- 2011 peaking tendencies have been collected by analyzing USDOT T-100 data, and interviewing Alaska Airlines staff based at PUW. Hourly peaking tendencies are based on seat capacity and typical load factor.
- In 2011, the peak month is October, with 10.15 percent of annual enplanements and 9.3 percent of scheduled operations.
- Scheduled commercial airlines offer more frequencies when the universities are in session (August 20-December 14/15, January 7/9-May 3/10).
- Business travelers generally prefer morning and evening flights. Future scheduled commercial service will be timed to coincide with these preferences. Flight times are sourced from nearby airports (GEG, LWS, and PSC) with similar service.
- Airlines typically time flights from airports like PUW to maximize the number of connections passengers can make at a hub airport. Future service to SEA, BOI, and the eastbound hub (DEN or SLC) will be timed to coincide with the peaking tendencies of the hub airport.
- Peaking tendencies must look beyond the time aircraft arrive or depart the airport. Passengers enplaning at PUW are expected to begin arriving in the terminal building up to an hour before the flight departs. Passengers deplaning at PUW are expected to have collected their baggage and left the terminal building within 45 minutes the flight's arrival. Arrival and departure timing was collected through first-hand observation, and discussion with Airport and Alaska Airlines staff.
- Part 121 athletic charter flights are not included in peaking tendencies due to their limited frequency throughout the year. The Terminal Area Plan will address extra demand placed on terminal facilities by Part 121 athletic charter flights.

Passenger terminal peaking tendencies are included in **Table 11** and shown in **Exhibit 2**.

Table 11: Passenger Terminal Peaking Tendencies				
Year	Enplanements (time)	Deplanements (time)	Passengers (time)	Aircraft on the Ground (time)
2011	62 (0645, 1130, 1900)	47 (1045, 1830, 23:15)	99 (1100, 1845)	1 (1045-1115, 1830-1900, 2300-0645)
2018	65 (0645, 1130, 1900)	61 (1045, 1830, 23:15)	103 (1100, 1845)	1 (1045-1115, 1830-1900, 2300-0645)
2023	68 (0700, 1130 1900)	117 (2300)	178 (2300)	2 (0645-0715)
2028	74 (0700,1130, 1900)	128 (2315)	198 (2315)	2 (0645-0715, 2315-2345)
2033	118 (0630)	133 (2315)	203 (2315)	3 (2315-2345)
2038	137 (0630)	137 (2315)	207 (2315)	3 (2315-2345)

Sources:2012 Master Plan, USDOT T-100

6. 50-Year Environmental Assessment Aviation Activity Forecast

Certain airfield facilities use 50-year activity forecasts during design and layout. 50-year forecasts assume unconstrained growth at PUW, and expect that the Airport has sufficient property to construct facilities as needed to keep pace with demand. 50-year forecasts use the compound annual growth rates of the Environmental Assessment Aviation Activity Forecast.

The 50-year Environmental Assessment Aviation Activity Forecast is presented in **Table 12**.

Exhibit 2: PUW Passenger Terminal Peaking Tendencies

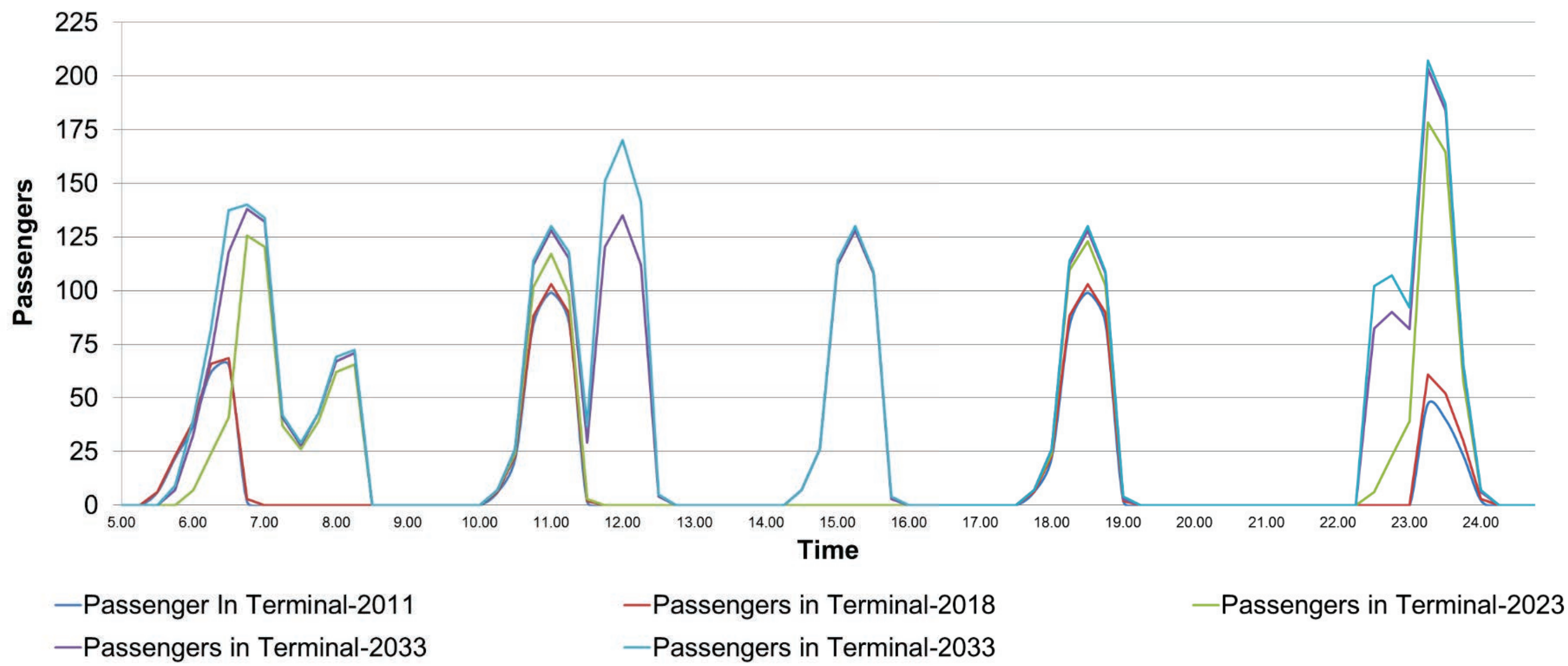


Table 12: 50-Year Environmental Assessment Aviation Activity Forecast							
Year	**2011**	**2018**	**2023**	**2028**	**2033**	**2038**	**2061**
Annual Passenger Enplanements	39,038	52,000	90,400	101,400	144,200	155,400	504,100
Annual Aircraft Operations	29,547	32,680	35,980	38,980	43,480	47,080	77,580
Commercial Operations	4,000	4,200	4,300	4,600	6,400	6,200	11,100
-Scheduled Commercial Airline	1,854	1,900	2,500	2,700	3,800	3,700	6,700
-Other Commercial	2,096	2,200	1,700	1,800	2,500	2,400	4,300
-Part 121 Air Charter	50	100	100	100	100	100	100
Itinerant Military	80	80	80	80	80	80	80
General Aviation	25,467	28,400	31,600	34,300	37,000	40,800	66,400
-Itinerant	13,457	16,300	19,500	22,100	24,700	28,400	53,700
-Local	12,010	12,100	12,100	12,200	12,300	12,400	12,700
Based Aircraft	71	76	79	83	88	92	132
Single-engine piston	57	59	61	63	65	67	77
Multi-engine piston	7	7	7	7	7	7	7
Turbo jet	4	5	6	7	9	12	30
Turbo prop	2	3	3	3	4	5	12
Helicopter	1	1	2	2	2	3	6

Source: 2012 Master Plan, 2012 FAA TAF

Numbers may not add exactly due to rounding.

Section 3 – Airside Demand / Capacity Analysis

1. Introduction

The aircraft parking apron in front of the passenger terminal building (the apron) at the Pullman-Moscow Regional Airport (PUW or Airport) was identified as undersized by the *2012 Airport Master Plan,* and the *Passenger Enplanement Projects Technical Memorandum* (Forecast Update Memo) found in **Section 2**. The apron becomes congested when charter aircraft and scheduled commercial passenger aircraft are present simultaneously. In its existing configuration, the apron is too close to the runway centerline to the south, and it cannot be expanded or moved to the north due to the location of the passenger terminal building. The *2012 Airport Master Plan* proposes a runway realignment that will allow an apron expansion to accommodate existing and forecasted demand.

This section presents facility requirements for the apron and identifies considerations for alternative development.

2. Existing Conditions

The existing apron is 470 feet wide and 175 feet deep. The apron provides 82,250 square feet of parking space and has two parking spaces marked on the pavement. Other apron areas are used for vehicle and equipment storage by Alaska Airlines. Alaska Airlines' scheduled Q400 service is the primary user of the apron; however, the apron is also used by charter aircraft, particularly during the college football season. Currently, neither the Airport nor the airlines that use the apron have an aircraft tug to push aircraft back from the parking spots. Aircraft arrive and depart from the apron under their own power, which is referred to as *powering in* and *powering out.* This practice requires more apron space than being *pushed back* by a tug. Apron area requirements are presented for both options later in this section.

The *2012 Airport Master Plan* identified non-compliance with Federal Aviation Administration (FAA) design standards regarding the distance from runway centerline to aircraft parking area. FAA design standards are determined by the aircraft design group of the *critical aircraft*, which is the most demanding scheduled aircraft to use the Airport. At PUW, the critical aircraft is the Bombardier Q400, which is in design group III. FAA Advisory Circular (AC) 150/5300-13A, *Airport Design,* requires a separation distance of 500 feet. The existing separation distance at PUW is 265 feet. The proposed realignment of Runway 6-24 noted above is expected to bring the Airport into compliance with FAA design standards for separation between runway centerline and aircraft parking positions.

3. Passenger Terminal Demand Forecasts and Peaking Tendencies

Passenger terminal demand forecasts are used to identify the number of scheduled and charter aircraft that may be on the ground at one time. Alaska Airlines' Q400 service requires apron space in front of the passenger terminal building to load passengers, luggage and cargo. When loading and unloading, Alaska Airlines passengers walk across the apron to and from the terminal building. For this reason, the distance from the Alaska Airlines parking position to the terminal building doors should be kept as short as possible to minimize passenger exposure to weather elements and the amount of time passengers spend on the apron.

Airport management staff has observed that during the college football season, it is not uncommon for two charter aircraft (typically Airbus A319/320/321 and Boeing 737 series) to be on the apron at one time. In instances where the University of Idaho and Washington State University both have home football games, there can be two charter aircraft on the ground at one time from Friday evening to Saturday evening, depending on the game time. These aircraft take up space that would otherwise be used for scheduled commercial aircraft and require space to power out of the parking positions. A key difference between scheduled and charter aircraft is that the charter aircraft tend to be larger, with more powerful engines and a larger turning radii. This means that the charter aircraft require more apron space for both parking and maneuvering.

The *Forecast Update Memo* analyzed existing peaking trends in aircraft activity. The peak number of aircraft of the ground at one time is used to determine appropriate apron size. The forecast window considers the 2011 baseline, 2018 opening day, and then five-year reporting intervals for 2023, 2028, 2033, and 2038.

Peak hour aircraft on the ground for the forecast years were determined by looking at possible scheduling times for flights to and from PUW to Seattle and a hub airport to the east. The hub to the east would likely be Denver International or Salt Lake City International. Over time in the aviation industry, changes to commercial passenger airline schedules are to be expected. As a result, assumptions made in the *Forecast Update Memo* should be reevaluated prior to apron expansion implementation.

The peak demand analysis presented in the *Forecast Update Memo* anticipated that the peak number of charter aircraft on the ground at one time will be two, and that the peak number of scheduled commercial aircraft on the ground at one time will be three, for a total of five aircraft on the ground at one time. Passengers on scheduled commercial and charter aircraft need to access the terminal. The terminal redesign at PUW is not expected to incorporate passenger boarding bridges (PBBs) because the scheduled commercial aircraft that use the Airport most frequently do not require PBBs to load passengers.

Two peaking factors are taken into consideration when looking at the peak number of aircraft on the ground: the seasonal nature of charter operations and the time of day scheduled commercial aircraft are on the ground.

The football season lasts from September to December, leaving eight months of the year without the regular appearance of charter jets. Charter jets generally appear between Friday and Sunday, and are unlikely to operate during other days of the week. Luggage that goes on to charter aircraft is not subject to the same Transportation Security Administration (TSA) screening requirements as luggage that goes on scheduled commercial aircraft. When the destination airport does not have scheduled commercial service, the charter airlines bring their own security screeners and the charter passengers do not need to pass through the TSA checkpoint. It is recommended that development alternatives consider these differences when planning apron facilities.

The *Forecast Update Memo* indicates that beginning in 2033, the peak number of scheduled commercial aircraft on the ground will be three. This peak period is expected to occur between 11:15 pm and 6:45 am the following day. The three aircraft on the ground are from late night arrivals that will overnight at PUW for departures the next morning. Once passengers deplane, these aircraft could be relocated to a remote parking apron to make space for other aircraft.

Charter aircraft do not need to be parked near the passenger terminal except in instances when passengers need to go through TSA screening. As a result, apron alternatives should consider remote parking stands for idle aircraft that can also be used by other airport tenants when not needed for scheduled commercial and charter aircraft.

4. Spacing Requirements

Aircraft spacing requirements are used to determine ramp sizing. A simulation was run using Transoft Solution's AeroTurn software to map the expected apron space needed for power out under tight turning conditions. It is possible that aircraft may need additional power out area under some turning conditions. Power out analysis considered maneuvering the aircraft from the taxiway to a parking position on the apron outside of the taxiway object free area, then back on to the taxiway. Existing buildings and above-ground objects were considered for conflict detection. The *Forecast Update Memo* explains how some charter aircraft use the Lewiston Airport (LWS) or Spokane International Airport (GEG) instead of PUW due to existing facility constraints. It is expected that airport improvement projects. Including the proposed runway realignment, will return these operations from LWS to PUW. Charter operations by aircraft are presented in **Table 1**.

Table 1: 2011 Scheduled and Charter Commercial Aircraft Apron Demands					
Aircraft	ADG	Apron Area (Square Feet)		PUW Operations[1]	LWS Operations[2]
		Push Back	Power Out		
A319/20/21	III	21,500	65,800	2	6
B737 Series	III	21,200	62,700	42	44
B757-2[3]	IV	28,100	59,300	0	0
B767-3[3]	IV	38,200	97,100	0	0
DC9/MD83	III	21,100	52,400	4	18
Q400	III	16,200	36,000	2,816	0

Source: Dimensions - Aircraft Manufacturers; Operations - USDOT T-100

1: Scheduled and Charter Operations

2: Charter Operations Only

3: Aircraft typically operate out of Spokane International

Given the existing apron area of 82,250 square feet, the existing power out method of aircraft departure presents challenges when there are multiple aircraft on the ground. Ground handling techniques can help effectively increase the capacity of the apron; however, the relatively brief amount of time scheduled commercial aircraft spend on the apron compared to how long charter aircraft spend on the apron can complicate parking layouts.

Turning simulation results are included in **Exhibit 1.**


Boeing 767-3
Boeing MD-83
Bombardier Q40
Pow

5. Summary and Next Steps

This section presents information about the existing apron and how it is used. Information is also provided to anticipate future needs within the planning period. The next step is to determine how to most efficiently size the apron, which will be documented in the *Terminal Area Plan*. Considerations will include how many aircraft the apron needs to hold at one time; whether the aircraft will power out or be pushed back; what the fleet mix on the ground will be at one time; and how charter and scheduled commercial activities will be separated.

The *Terminal Area Plan* includes terminal development alternatives, and will select a preferred alternative to be used in the *Environmental Assessment*. The preferred building footprint from the *Terminal Area Plan* will influence how the apron will be laid out.

Section 4 – Landside Demand / Capacity Analysis

1. Introduction

Pullman-Moscow Regional Airport (PUW or Airport) is located in the Palouse region of the northwest United States, a picturesque area known for its fertile rolling hills. The PUW passenger terminal is located on the south side of Airport Road, between the university cities of Pullman, Washington and Moscow, Idaho. Airport Road is a narrow, winding road with no shoulder, cut into the rolling hillsides. Public parking is provided in one main parking lot with a landscaped median and an overflow lot. Both lots are located on the north side of the terminal building. The two lots are broken into several pieces in an effort to carve out relatively flat places for parking in the hilly terrain. The area is home to two major university athletic teams: the Washington State University Cougars and the University of Idaho Vandals. As a result, athletic team buses often use the parking lots in conjunction with charter flights. The employee parking lot is used by airport, airline, car rental and TSA employees. It is located directly to the west of the terminal building, while the car rental fleet parking lot is located west of the employee lot.

2. Parking Demand / Capacity Analysis

Planning for parking is critical for determining future airport terminal area needs, since the terminal building calls for a large amount of vehicle parking spaces and circulation routes. Estimating the future parking needs at an airport is typically based on historic parking data provided by the Airport. The historic parking data is then compared to enplanement data over the same time period in order to determine a ratio between the number of enplaned passengers and the amount of occupied parking stalls. Once established, this ratio is then used to determine future public vehicle parking requirements by applying them to projected enplanement data.

Inventory of Existing Parking – At PUW, an inventory of existing public parking currently shows 125 public parking stalls. Airport staff reports that they have been insufficient to meet the current peak demand for parking because at times of peak use, up to 40 vehicles park in the irregularly-shaped overflow parking lot. The resulting total number of existing public vehicle parking stalls is 165. Additionally, the parking lots can appear full to drivers even if there are a few open stalls available, since the last few available stalls are often difficult to locate in a busy lot. For this reason, a busy parking lot is effectively full, even if a few stalls are still available.

The existing configuration of the PUW parking lot does not allow for access control in the future, and it is not physically separated into short- and long-term parking areas. The amounts of short- and long-term parking stalls shown on **Table 1** have been estimated based on discussions with the Airport. The current method of revenue collection for parking fees relies primarily on the honor system. Currently, the amount of vehicle circulation in the existing parking lots uses approximately 45 percent of the parking lot area, not including the main vehicle circulation lanes.

A complete parking inventory at an airport includes public parking, parking for the employees of the airport and parking for other employees working in the terminal building. At PUW, employees park in the parking lot west of the terminal building that has 34 parking stalls. Peak staff parking is estimated to be 20-25 at times of changing shifts or during athletic team charters. Two rental car offices, Avis/Budget and Hertz, currently operate from the terminal building. The rental car fleet utilizes up to 50 parking stalls in a lot designated specifically for rental car parking. In addition, three curbside parking stalls are provided for taxis and an area is reserved in the overflow lot to park two or three university athletic team buses. The number of occupied rental car stalls, taxi stalls and bus parking spaces is equal to the existing amounts provided, since these stalls are typically rented, or a certain amount is provided by agreement. Additional privately owned vehicle (POV) parking is anticipated with the charter operations. For planning purposes, it is assumed that 20 percent of two 737 university charter flights will arrive in POVs. **Table 1** shows the historic amounts of occupied parking stalls at PUW.

Table 1: PUW Existing Parking Inventory

Type of Parking Stall	Number of Stalls Available	Peak Number of Stalls per Day	Ratio of Stalls per PAX per Day
Peak Monthly Enplanements, (October)	3,858		
Average Daily Enplanements for Peak Month	124		
Public Parking - Long Term	150	138	1.11
Public Parking - Short Term	15	14	0.11
Public Parking Subtotal	**165**	**152**	
Staff Parking	34	20	0.16
Rental Car Parking	50	50	0.40
Taxi Parking	3	3	0.02
Airport Support Subtotal	**87**	**73**	
Charter POV Parking	12	12	
Total of Parking Stalls	**264**	**237**	
Charter Bus Parking	3	4	

Source: Mead & Hunt, Inc.

3. Facility Requirements

In order to determine future parking requirements, the historic relationship between occupied parking stalls for each type of parking and enplaned passengers was observed. These amounts were then divided by the average number of daily enplanements from the peak month providing a ratio to be used in determining future parking needs. There were 3,858 monthly enplanements in October 2012, and the daily average number of passengers was 124 (3,858 passengers in 31 days). The daily average number of public parked vehicles for the peak month was 152. This represents the demand for both short- and long-term public parking stalls, since there are no physical barriers separating them. The number of public vehicles parked exceeds the number of enplaned passengers each day because some cars remain parked at the airport while passengers are gone for several days.

Short-term parking at airports typically turns over faster and is located closer to the terminal building than long-term parking. The consultant's experience at regional airports is that the proportion of public short-term parking to long-term parking is roughly 1:10. Using this ratio, it is estimated that 15 stalls are typically used for short-term parking and 145 stalls are used for long-term parking. This resulted in ratios of 1.17 long-term parked vehicles to each enplanement and 0.12 short-term parked vehicles to each enplanement. This method of estimation assumes that the correlation of future parking trends to enplanement levels will remain proportionally the same over time. Even if the future parking lot configuration at PUW does not separate short- and long-term parking, tracking these parking categories separately is a useful metric in determining the length of stay for vehicles, and is helpful in planning for the types and locations of related parking facilities.

The ratio for parking stalls required for staff and the rental car fleet was calculated in a similar manner to those generated for public parking, since the number of stalls needed for these types of parking will increase with the number of passengers the terminal serves. This number, however, will be smaller compared with the number of public parking stalls needed. With the future growth of the Airport, it is anticipated that a car rental ready facility or remote rental car overflow parking lot will be used in the future. For planning purposes, however, these numbers are not separated from the total numbers of stalls necessary. Additionally, future parking demand may be generated by a restaurant in the terminal building used both by travelers and the local public. This would increase the number of public short-term and employee parking stalls required. The amount of charter bus parking stalls is provided based on interviews with university administrators and Airport staff. **Table 2** shows the number of future parking stalls that will be required, based on forecasted enplanement growth.

Table 2: PUW Future Parking Requirements

Type of Parking Stall	Ratios	2012	2018	2023	2028	2033	2038
Peak Monthly Enplanements, (October)		3,858	5,004	8,902	9,744	14,362	15,499
Average Daily Enplanements for Peak Month		124	161	287	314	463	500
Public Parking - Long Term	1.11	138	180	320	350	516	556
Public Parking - Short Term	0.11	14	18	32	35	52	56
Public Parking Subtotal		**152**	**198**	**352**	**385**	**568**	**613**
Staff Parking	0.16	20	26	46	51	75	81
Rental Car Parking	0.40	50	65	116	127	187	202
Taxi Parking	0.02	3	4	7	8	11	12
Airport Support Subtotal		**73**	**95**	**169**	**185**	**273**	**294**
Charter POV Parking		12	56	56	56	56	56
Total of Parking Stalls		**237**	**349**	**577**	**626**	**897**	**963**
Charter Bus Parking		4	8	8	8	8	8

Source: Mead & Hunt, Inc.

Typically, more vehicle stalls are provided than ultimately needed so that drivers are not circling the lots in search of the last available stall. **Table 3** shows the amounts of future parking stalls that will be required, based on forecasted enplanement growth, with an additional 10 percent of stalls.

Table 3: PUW Future Parking Requirements with Additional 10%

Type of Parking Stall	Ratios X 1.10%	2012 X 1.10%	2018	2023	2028	2033	2038
Peak Monthly Enplanements, (October)		3,858	5,004	8,902	9,744	14,362	15,499
Average Daily Enplanements for Peak Month		124	161	287	314	463	500
Public Parking - Long Term	1.224	152	198	352	385	567	612
Public Parking - Short Term	0.124	15	20	36	39	58	62
Public Parking Subtotal		**167**	**218**	**387**	**424**	**625**	**674**
Staff Parking	0.177	22	29	51	56	82	89
Rental Car Parking	0.444	55	72	127	139	205	222
Taxi Parking	0.027	3	4	8	8	12	13
Airport Support Subtotal		**80**	**105**	**186**	**204**	**300**	**324**
Charter POV Parking		13.2	56	56	56	56	56
Total of Parking Stalls		**261**	**378**	**629**	**683**	**981**	**1,054**
Charter Bus Parking		4.4	8	8	8	8	8

Source: Mead & Hunt, Inc.

Table 3 estimates the public parking needs that PUW is expected to experience in the future, based on forecasted enplanements and a continuation of the current method of parking revenue collection. If parking revenues are collected more regularly in the future, the airport's parking demand may experience slower growth as passengers choose to get rides to the airport or use alternate forms of transportation.

4. Vehicle Access

The sense of arrival experienced by drivers as they approach an airport passenger terminal will make a lasting impression on both local residents and visitors to the area. An efficient vehicle arrival sequence for the Airport will employ a series of visual cues that will inform drivers of the most expedient path to their destination and reduce driver confusion and traffic congestion. The arrival sequence will consist of a portal announcing arrival at the Airport, followed by a drive corridor showing views to important landmarks in the terminal area including the front doors of the terminal building, the parking areas and pedestrian walkways.

At Pullman-Moscow Regional Airport, as at most regional airports in the United States, vehicle access is the primary way that users will access the Airport. Two access roads provide vehicular access to the terminal building and parking areas from Airport Road. Return circulation to the terminal requires a loop through the parking lot or Airport Road. In contrast, a one-way loop road dedicated to vehicle return circulation will reduce traffic congestion and improve wayfinding.

Airport terminal design reference material and the consultant's experience were combined to produce the following recommendations for vehicle access to airports:

- Use a single access point from the public roadway system to the airport terminal building and parking facilities
- Minimize the number of vehicles that pass directly in front of the passenger terminal building
- Provide ample distance between driver decision points, with no more than two choices at any location
- Provide clear routes for vehicles to major parts of the terminal complex including parking, curbside areas and terminal building entrances
- Provide clear, well-marked routes for pedestrians in the terminal area
- Provide sufficient curbside length for the loading and unloading of passengers, adjacent to the passenger terminal building
- Provide sufficient public parking stalls within a walking distance of less than 1,000 feet between parked vehicles and the terminal entrances
- Provide sufficient parking for ancillary services, employees and tenants
- Provide a recirculation roadway loop to enable drivers to return to the airport roadway system
- Provide changes to parking that allow for a future separation into short-term and long-term parking areas
- Arrange the terminal curbside in a manner that allows for charter bus loading and unloading
- Provide an area for charter bus parking for university athletic events at PUW to accommodate eight buses
- Provide POV parking associated with university charter operations

5. Summary

Planning for vehicle access and parking are critical considerations for determining the future airport passenger terminal area needs, since a large amount of space near the terminal building is needed for these functions. The existing parking lot at PUW has been evaluated to assess its ability to meet both current and future parking and vehicle access requirements. It was determined that the existing parking is deficient in both numbers and types for current parking needs, and that the forecasted increase in airline operations will put more strain on existing parking facilities in the future. It is also recommended to provide an area for dedicated charter bus parking. In addition to the parking stalls, the analysis finds that vehicle access, wayfinding, vehicle circulation and pedestrian circulation are all in need of improvement. Overcoming these shortcomings is a challenge that is compounded by the hilly topography and the limited amount of space available between Airport Road and the passenger terminal.

Section 5 – Landside Demand / Capacity Analysis

1. Introduction

Facility requirements for a passenger terminal building are based on the number of people and aircraft it is expected to serve. While they are not required in a statutory sense, they are needed to provide an adequate level of service to meet passenger demand. The demand is calculated from the forecasted peak enplanements and the planned commercial fleet and charter operations. Annual enplanements at Pullman-Moscow Regional Airport (PUW or Airport) were 38,005 in 2011 and are projected to increase at a rate of 5.82 percent over a 20-year planning period. This increase will result from a rise in the number of flight operations and an increase in the average aircraft size, as the commercial airline industry changes its fleet mix. As the number of commercial and charter passengers using this facility increases, a corresponding rise in peaking activity will occur in the terminal building.

Facilities in the airport terminal are evaluated based on "peak hour" passenger activity, which is the time that the terminal building experiences the most concentrated public use. According to the FAA Advisory Circulars listed below, all terminal facilities should be capable of adequately meeting the demands of a peak hour capacity. Many of the recommendations for changes to the facilities made in this section are the result of undersized areas in relation to the expected amount of use, while other recommendations will improve operational performance. In addition to meeting current demand projections, it is beneficial for the airport terminal design to be adaptable to future changes and unexpected growth. This will extend the life of the facility further into the future and maximize the return on investment. These recommendations have been developed using the following references for airport terminal design:

- FAA's Advisory Circular (AC) 150/5360-9, *Planning and Design of Airport Terminal Building Facilities at Non-Hub Locations*
- FAA's Advisory Circular (AC) 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*

More recent references have been developed to address current airport terminal facility requirements. These references include:

- Transportation Security Administration's *Checkpoint Design Guide*
- Airport Cooperative Research Program (ACRP) *Report 25: Airport Passenger Terminal Planning and Design*

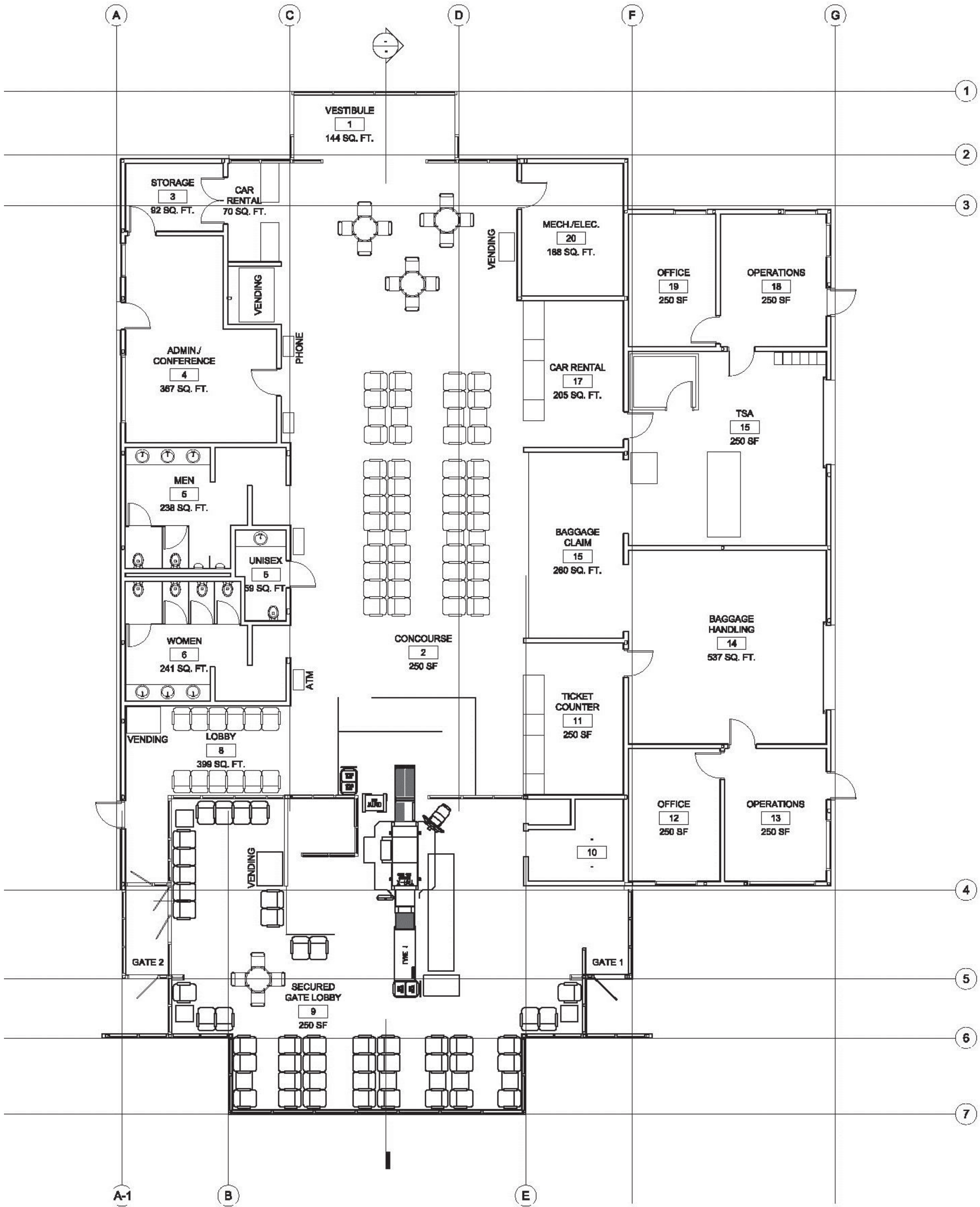
The following text will compare the size of existing areas in the terminal building with the recommended facility requirements to meet current usage and with the recommended facility requirements to meet projected facility demand for the year 2038.

2. Existing Terminal Building

The terminal building is 8,435 square feet in overall area and was built in 1989 (**Figure 1**).

It is a one-story structure with public seating as passengers enter the building. Car rentals are left and right of the entry, while baggage claim and the ticket counter are to the left. Airline operations and TSA offices and baggage screening are behind these areas. Restrooms and Airport administration are located to the right of the main entry. The security checkpoint has one lane that feeds directly into the holdroom. The holdroom has two gates with seating and a small vending area. Passengers deplane through a turnstile gate in the security fence, and then enter the terminal building on the non-sterile side of the checkpoint.

Figure 1: Existing Terminal Floor Plan



Source: Mead & Hunt, Inc.

Overall Size of Terminal Building – The objective of establishing facility requirements is to determine the amount of space and type of facilities that are required for the airport to operate efficiently through the planning period. Time is an important factor in determining facility requirements. The amount of time required for the design and construction of a significant terminal renovation will take several years. As a result, "current requirements" in this document will target facility needs for the year 2018.

A preliminary analysis of the terminal building's overall size will determine if it is adequate for the number of passengers it services today. FAA Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities,* estimates 150 square feet of terminal space for each peak hour enplaned passenger. It should be noted that this guideline generally applies to terminal buildings that have at least 250,000 annual enplanements. Advisory Circular 150/5360-9, *Planning and Design of Airport Terminal Building Facilities at Non-Hub Locations*, which applies to smaller airports, provides a recommendation for minimum terminal building size, but does not provide a guideline based on enplanement numbers. Applying the terminal space guideline to growth projections shows a year 2018 passenger terminal size of 18,900 square feet and the projected size for the year 2038 of 41,100 square feet (Table 1). This information provides an overview of the appropriate terminal size to meet FAA guidelines and to provide an adequate level of service for passengers.

When planning for airport terminal facility requirements, it is important to consider the aircraft fleet mix since both the number of passengers and the size of aircraft will affect building size and equipment needs.

The preliminary analysis in **Table 1** shows a significant shortfall in the overall size of the terminal building for current and future demand. The following sections analyze the size of internal space needs based on their specific uses. All of the areas in the terminal building are analyzed for their ability to serve both current and projected future passenger demand.

Table 1: PUW Forecasted Enplanements Relationship to Overall Terminal Floor Area

	Existing	2018	2023	2028	2038
Peak Hour PAX	X	126	185	202	274
Floor Area (SF)	8,435	18,900	27,750	30,300	41,100
% Growth	X	124%	229%	259%	387%

Source: Mead & Hunt, Inc.

3. Terminal Space Requirements by Area

The airport terminal building space is divided into categories in order to identify the facility requirements of each space. The first division of space is between non-usable and usable areas. The parts of the building that are considered non-usable are those components that are required for the building to function such as building structure, mechanical chases and building utilities. Usable areas are those parts of the facility that are occupied or used by people. They include areas of the building that are accessible to the public, as well as those areas with limited access. In order to determine FAA funding participation in future projects, these areas are further divided into revenue generating and non-revenue generating areas. Revenue generating areas generally refer to portions of the building that are leased to other entities such as the Transportation Security Administration (TSA) and the airlines. Non-revenue generating spaces are those areas that are not leased. The current draft of the AIP Handbook Order 5100.38D further defines eligible space within a terminal development project as public-use areas that are directly related to the movement of passengers and baggage in terminal facilities within the boundaries of the airport. For non-hub airports, revenue generating spaces are eligible if they are public use and if the spaces do not defer the development of airport safety, security or capacity. Additionally, an airport is divided into non-sterile and sterile areas. Sterile areas are those parts of the building that are accessible only to ticketed passengers who have been screened at a security checkpoint and to authorized personnel with security clearance. Non-sterile areas are the parts of the building accessible to the public.

Usable Area: Non-Revenue Generating Space

Non-revenue generating areas are those portions of the terminal building that directly support the function and operation of the airport in its primary purpose, which is the conveyance of passengers and baggage. These areas include the parts of the terminal building that are accessible to both the public and to ticketed passengers. They include the lobby and seating areas, general circulation, public restrooms, passenger queuing areas and the security checkpoint.

Circulation – The circulation areas of a building are those parts that allow pedestrian access to each area within the building and that tie the functional elements of the building together. They include building entries, hallways and corridors. In an airport terminal building, the circulation areas often have ancillary uses which can impede the flow of pedestrians through the area and reduce the effective width of the circulation area including queuing, seating, drinking fountains, vending machines and Flight Information Display System (FIDS) monitors. For this reason, the width of main circulation areas should be generous enough to support ancillary activities in addition to their primary function of allowing people to move through the building. **Figure 2** illustrates the existing PUW passenger terminal circulation.

The existing amount of circulation area in both the sterile and non-sterile parts of the airport terminal is 932 square feet. This includes the front entrance lobby and a corridor along the public waiting area connecting the interior public spaces. The circulation space for the ticket counter and the security checkpoint entrance is shared with the general circulation area causing congestion. There is minimal space in front of the ticket counter and the car rental counter, which also causes congestion. The holdroom does not have a designated public circulation corridor.

The need for general circulation in an airport terminal building will be affected by the overall layout of the facility and by the flow of passengers though the various processing points. Advisory Circular 150/5360- 9, *Planning and Design of Airport Terminal Building Facilities at Non-Hub Locations*, notes that 20-30 percent of overall terminal area is typically used for circulation. This ratio for circulation space is common for airports since all of the corridors are ideally designed to accommodate peak use, even though high-volume traffic is sporadic. Using lower ratios compromises the efficiency of building egress and public circulation at times of peak use. The recommended amounts of circulation space are concurrent with the guidelines provided in the Advisory Circular. The current recommended amount of overall circulation area is 3,969 square feet. The amount of recommended overall circulation area for the year 2038 is 8,631 square feet. In most cases, 24 percent is a good rule of thumb for circulation, however, for this discussion, public circulation in the holdroom will be considered in the holdroom square footages. Therefore, these numbers represent 21 percent of the overall terminal area.

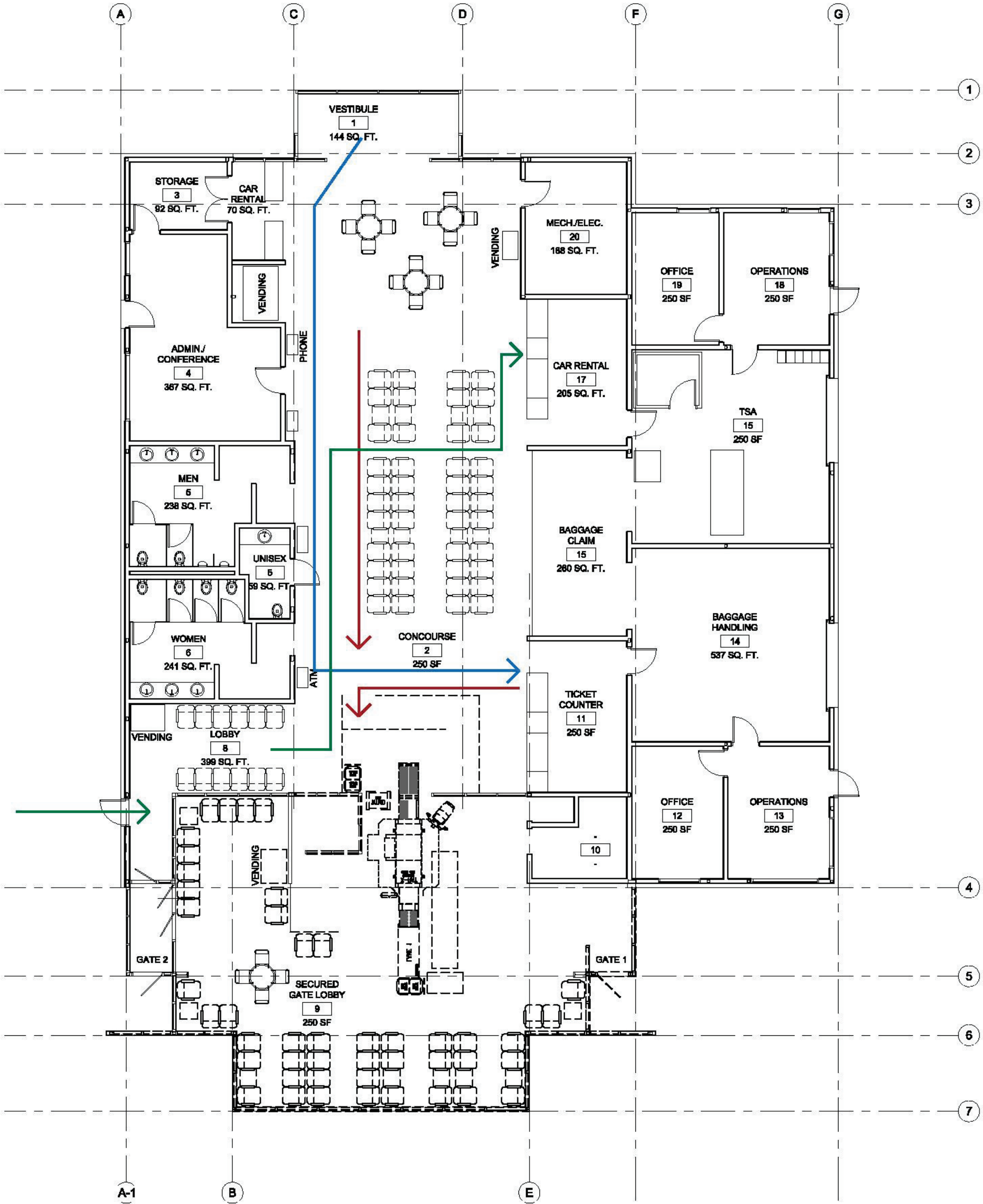
Public Seating or Waiting – Space for public seating is provided on the non-sterile side of the terminal in the entry lobby and immediately before the checkpoint area. These spaces are provided for passengers and associated visitors, including meeters and greeters. Ancillary functions located in this space, such as a hotel or local information kiosk, provide pertinent information to deplaning passengers.

The existing public seating and ancillary area is 1,147 square feet. The recommendation for the amount of area for public seating in Advisory Circular 150/5360-9, *Planning and Design of Airport Terminal Building Facilities at Non-Hub Locations* is 7.5 square feet per peak hour *enplaned* passenger. Current facility requirements recommend 488 square feet and 1,027 square feet for the year 2038 facility requirements. The existing public seating and ancillary area is oversized for current facility demands.

Security Checkpoint – Location and design are critical factors in the performance of the security checkpoint, and the efficiency with which it operates often leaves a lasting impression on passengers. The existing checkpoint has a single lane and occupies 790 square feet. TSA typically opens the checkpoint shortly before a flight. As a result, passengers queue in the lobby area.

Existing space limitations do not allow sufficient space for divesture and recomposure of personal belongings before and after the checkpoint. The TSA's Checkpoint Design Guide shows a standard size for a two-lane checkpoint of about 1,500 square feet, though additional space at the divest table, which occurs prior to screening, and at the recomposure area, which occurs after screening, will improve the checkpoint's operational efficiency. Based on projected passenger demand, PUW will need two security checkpoint lanes 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, 1,837 square feet is recommended for the complete checkpoint, which includes space for divesture and recomposure. While it is not necessary for the terminal to accommodate the university athletic charters, the passengers on the departing charters will be required to pass through the security checkpoint before boarding the aircraft. The layout of the security checkpoint will need to be closely coordinated with the TSA.

Figure 2: Passenger Traffic Patterns
Checkpoint Queue (red arrow), Entrance Traffic (blue arrow), Path to Car Rental (green arrow)



Source: Mead & Hunt, Inc.

Passenger Holdroom – Holdrooms, or departure lounges, are the principal areas of the sterile portion of the passenger terminal. These are the parts of the terminal building in which the passengers wait for flights after clearing the security checkpoint. Holdrooms also provide ancillary space for airline agent podiums, last minute baggage check-in, deplaning aisles, and enplaning passenger queuing aisles. It is important that the holdroom is large enough to accommodate all passengers during the time of peak use.

The existing holdroom portion of the terminal is 860 square feet and has 58 seats. The forecasted peak hour enplanement numbers are used to estimate the holdroom requirements. PUW is currently served by a 76 seat Q400 and two charter flights. Both the B737 and A319 charter aircraft carry roughly 150 passengers. According to the 2013 forecast, an additional Q400 route will be added after 2023 and a 90-seat RJ will be added after 2033.

ACRP *Report 25* provides recommendations for holdroom facilities. Its recommends sizing the holdroom based on the average seating capacity of the largest aircraft expected to use each gate. Typical design load factors for the aircraft are 80 percent to 90 percent. Based on the ACRP *Report 25 and a design load factor or 85 percent*, current facility needs are 2,139 square feet and the 2038 facility needs are 4,118 square feet. These numbers include holdroom floor area, gate podium area, wheelchair storage, play area, public circulation and restrooms.

Baggage Claim Device and Baggage Claim Area – 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. 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 existing baggage claim device has 22 linear feet of frontage space. Baggage claim *frontage* is the part of the baggage belt that is available for use by passengers who are claiming bags.

Advisory Circular 150/5360-9, *Planning and Design of Airport Terminal Building Facilities at Non-Hub Locations* is no longer accurate, since passengers generally have more baggage in today's market than they did when the Advisory Circular was written. The recommendations for baggage claim device lengths in this report are based on guidance from ACRP *Report 25*. The recommended overall length of claim device public frontage at PUW 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 the year 2038 overall baggage claim frontage is for approximately 162 190 lineal feet, while the current need for baggage belt length is approximately 84 lineal feet.

The existing baggage claim area in front of the claim device is 168 square feet. Currently, deplaning passengers will stand in front of the bag slide waiting for their baggage to appear. Since the frontage available is only 22 feet long, the front row of passengers waiting for bags block the remaining passengers from accessing the baggage slide. ACRP's *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 amount of baggage claim area needed to meet current requirements is 1,273 square feet, while 2,859 square feet will be needed to meet year 2038 requirements.

The baggage claim public area provides space for arriving passengers to retrieve their bags from the baggage claim device and also needs to provide sufficient space to accommodate a variety of ancillary and shared uses. For example, this portion of the building also provides space for information kiosks, hotel boards and other related conveniences for passengers. Currently, this area is also shared with the public seating area. Design of the baggage area should also accommodate meeters and greeters, who will often meet passengers in the baggage claim area. Passengers should also have access to seating and restrooms since they generally arrive in the bag claim area before their baggage is off-loaded from the aircraft.

Usable Area: Revenue Generating Space

FAA Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*, recommends that up to 55 percent of a passenger terminal facility's usable area be revenue generating, though the amount at non-hub airports is typically much less than this. Revenue generating spaces include areas that are leased by airlines for ticketing counters, offices and operations. The airline spaces often include areas for baggage make-up and passenger support in hold rooms. Other revenue generating space includes car rental agencies and concessions offering food, beverage and retail options to travelers. All other leased spaces within the passenger terminal facility are also considered to be revenue generating areas.

Airline Ticketing Counters and Ticketing Areas – The guidelines for the airline ticket counter length addresses the amount of space the airlines will use in the ticket lobby. The ticket counter length that is recommended by Advisory Circular 150/5360-13,
Planning and Design Guidelines for Airport Terminal Facilities, for a two-position ticketing counter is approximately 10 lineal feet. At non-hub airports, a two-position counter is standard for most commuter airlines, and a total of four ticketing positions are typically sufficient for most regional and major airlines. PUW currently has one commuter airline.

The existing ticket counter is about 14 feet in length. Advisory Circular 150/5360-9, *Planning and Design of Airport Terminal Building Facilities at Non-Hub Locations*, recommends 13 lineal feet of ticket counter length to meet current needs and 26 lineal feet to meet the year 2038 needs.

Airline Ticketing and Operations Offices – At most medium and small airport terminal buildings, airline operational efficiencies are realized when airline functions are centralized in the space located behind the ticketing counter. 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. Changes in airline business operations, as well as online and kiosk ticketing options for passengers, have resulted in both staff reductions and a reduced need for airline office space over time. PUW currently has one ticketing kiosk.

The amount of airline leased space behind the counter is largely dependent on the length of the ticket counter. The existing amount of area behind the ticket counters that is used by the airlines for office and operations space, exclusive of the baggage screening process, is about 357 square feet. The recommended amount of office/operations space to meet current needs and 2038 needs is roughly 254 and 534 square feet respectively. Additionally, it is recommended that space for ticketing kiosks be provided near the ticketing queue area. This location has the benefit of being accessible to both passengers and ticket agents, who are often called on to assist at the kiosk or to check baggage. The area leased by airlines will largely be impacted by the number of air carriers. Design layouts for this area should anticipate an increase in demand over time and be able to accommodate additional carriers.

Outbound Baggage – The outbound baggage or baggage make-up area is a back of house 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 existing baggage make-up functions occur in the ATO space. Since a consolidated baggage system was not recommended by the TSA for an airport of this size until recently, the FAA Advisory Circulars do not provide size recommendations for an enclosed, common-use, outbound baggage room. 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. The recommended size for an enclosed outbound baggage area to meet current facility requirements is 700 square feet. The recommended size for the same facility in 2038 is 1,400 square feet.

Baggage Screening and Handling System – 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. TSA baggage screening currently takes place behind the ticket counters and uses 536 square feet of space. Once the baggage has been screened, it is deposited onto dedicated airline baggage belts and carried to each airline’s baggage make-up area. At PUW, it is currently deposited at the door adjacent to the airline make-up area. The size for the TSA baggage screening room is based on the expected size of the bag screening and conveying equipment. At a minimum, the recommended size for a baggage screening room that would meet current facility requirements is 317 square feet. The recommended size for 2038 facility requirements is 668 square feet.

Inbound Baggage – The existing inbound baggage room is shared with outbound baggage. These are part of the “back of house” area for the sole air carrier. Back of the house refers to areas that are not accessible to the general public. 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. For example, due to current space limitations, tugs are currently required to back into the room. The recommended size for the current inbound baggage room is 500 square feet and the recommended size for the future needs of the 2038 facility is 1,100 square feet.

Concessionaire Services – Terminal concessionaire services are defined as all commercial functions that serve the public. These services provide food, beverage and retail options to travelers on both the sterile and non-sterile side of the checkpoint. Prior to the security measures instituted after the events of 9/11, food service amenities were traditionally located close to the main entry of the terminal. Now the security checkpoint effectively divides the airport into two distinct parts: the sterile and non-sterile areas. At PUW, there is no existing area for food service on either side of the checkpoint. There are only vending machines on the both sides of the checkpoint area totaling 115 square feet (65 non-sterile and 50 sterile).

Concession services on the sterile side of the checkpoint contribute to passenger convenience since passengers are often unable to leave the sterile portion of the terminal in order to find food and other necessities once they have passed through the security checkpoint. Additionally, airlines have reduced in-flight meal services. For these reasons, it is important for future airport terminal design to allow passengers to have food and beverage options available on the sterile side of the checkpoint. Vending areas supplement the staffed facilities, especially when flight times do not coincide with the operating hours of the concessions.

Recommendations for concession space are described in Figure 6-9 of Advisory Circular 150/5360-9, *Planning and Design of Airport Terminal Building Facilities at Non-Hub Locations.* Using these standards, the current concession space needs are approximately 1,145 square feet of overall concession area. In the future, 2,558 square feet will be needed to meet projected year 2038 passenger levels. These recommendations consider the changes in recent security procedures and reflect the increase in overall area to account for both sides of the checkpoint.

During the design process, concession areas should be strategically located in both the sterile and non-sterile portions of the terminal. They should be designed cooperatively with concessionaires to meet the size and space needs of the industry. Typically, the size of the concession area will vary from airport to airport, depending on individual concessionaire needs.

Car Rental – Car rental facilities at airport terminal buildings generally include an office area with a front counter and queuing space in front of counters. Car rental counters are typically located near the baggage claim area and located to provide easy access to the car rental parking area outside.

The existing car rental space, including the back office and front counter area measures a combined total of 324 square feet for three car rental companies. This does not include the queuing space in front of the counter, which is currently 137 square feet in total. The car rental companies do not have additional office space outside of the counter area. Advisory Circular 150/5360-9, *Planning and Design of Airport Terminal Building Facilities at Non-Hub Locations*, recommends 80 square feet plus queuing space for each car rental company. Experience at other airports indicates that car rental companies typically prefer to provide enough office and counter space for two people to work at the same time.

The recommended current and 2038 facility requirements are the same at 750 square feet for both car rental counter area and associated office spaces. In addition, 225 square feet of area will be required to meet space needs for current and future car rental queuing.

Airport Offices – There is no FAA guidance provided for the amount of area required for airport offices and the amount varies greatly from location to location. The existing airport administration offices have 167 square feet of terminal space. This size is undersized based on current staffing. Current facility needs are calculated based on 1.5 square feet per 1,000 annual enplaned passengers. Based on 49,300 planned annual enplanements for 2018, the terminal will need 74 square feet of airport offices. In 2038, 229 square feet will be needed to meet facility requirements.

Non-Usable Area and Building Support

Non-usable areas and building support areas are necessary for the building's functionality and maintenance. These areas include building structures, mechanical chases and building utilities, and space for functional building support such as maintenance and janitor rooms.

Building Support Spaces: Building System and Maintenance –Building systems, such as heating, cooling, electrical and plumbing systems are required to make the terminal function. In order to realize the unique functional needs of the facility, an effective airport terminal design process will combine building support requirements with input from airport staff. Maintenance expectations (janitorial/storage) should also be closely coordinated with the airport staff, since they have long-reaching impacts on the facility's future performance. The existing area for building utility systems is 280 square feet. The amount of building support space required to meet current demand is roughly 2,200 square feet and year 2038 facility requirements are 4,850 square feet of building support space.

Building Walls, Structure and Chases – Building structure and other non-usable space typically occupies 5-10 percent of the gross square footage of an airport terminal building. These building components include chases and wall thicknesses that are not accounted for in square footage take-offs. Note that these amounts refer to floor area only, and not to the space provided for utilities that occur above the ceiling or outside the building footprint. In the planning stage of a project, these areas are embedded in the recommendations for occupiable space. The design phase of a future project will locate chases, and determine the size of structures and the widths of walls.

4. Summary of Analysis

The analysis of existing terminal building performance and projected future performance shows that the terminal building is inadequately sized to meet current facility requirements. Several spaces are oversized for current needs, while others are greatly undersized. As passenger enplanement numbers continue to grow, there will be increased pressure on facility performance.

Eligible areas that are most deficient include the following:

- Holdroom
- Baggage claim
- Inbound/Outbound baggage areas
- Circulation
- Security checkpoint
- Public waiting

Table 2 compiles all of the recommendations for current needs up to year 2038 needs, and shows the sizes of existing areas, for comparison. Some areas have been omitted from the total terminal area. The recommendations for the amounts of areas listed in **Table 2** do not include the impact of charter passengers in the terminal, or the scenario of a charter flight and scheduled flight departing at the same time, as this may happen from time to time. Charter passengers can impact areas in the building, such as the security checkpoint and restrooms.

The overall terminal size recommendation in **Table 2** for year 2018 exceeds 18,900 square feet as mentioned in **Table 1**. The needs for individual internal spaces do not always increase proportional to the overall size of the terminal building. Instead some spaces grow in steps, such as restrooms, mechanical rooms and the security checkpoint will increase by adding modules of space, such as an entire checkpoint lane, an air handling unit or a restroom stall. The actual amount of space needed will be affect by the layout of the terminal, and the locations of the internal spaces, relative to each other.

Table 2: PUW Terminal Building Internal Space Inventory					
Area Description	**Existing Area (SF)**	**Current (2018) Demand Area (SF)**	**2023 Demand Area (SF)**	**2028 Demand Area (SF)**	**2038 Demand Area (SF)**
TSA Security Checkpoint	536	1,275	1,275	1,275	2,550
TSA Search & Operations	121	75	75	75	150
Checkpoint Exit Lane	0	150	150	150	300
Checkpoint Queuing	131	330	345	375	680
Public Circulation – Non-Sterile / Sterile	932	3,969	5,861	6,399	8,631
Public Restrooms	538	189	278	303	411
Public Waiting/Ancillary Space	1,147	488	510	555	1,027
Holdroom Area	860	2,139	3,000	3,400	4,118
Baggage Claim Area	168	1,273	2,442	2,672	2,859
Inbound Baggage	0	500	500	600	1,100
Outbound Baggage	0	700	700	800	1,400
Airline Ticket Office	357	254	265	289	534
Ticket Counter Area	212	125	131	142	264
Ticketing / Kiosk Queue	119	530	555	604	1,118
Rental Car Office	0	375	375	375	375
Rental Car Counter Area	324	375	375	375	375
Rental Car Queue	137	225	225	225	225
Sterile Concessions / Vending	50	358	538	587	813
Public Concessions / Vending	65	787	1,209	1,338	1,745
TSA Baggage Screening	536	317	332	361	668
TSA Administrative Offices	694	840	924	1016	1,229
Airport Administration Offices	167	74	132	144	229
Conference Rooms	200	242	266	360	460
Police	0	275	275	275	275
Employee Facilities	200	12	30	35	38
Receiving	0	150	307	380	500
Non-Public Circulation	0	35	50	60	66
Buildings Systems / Janitor / Storage	280	2,200	3,850	4,100	4,850
Walls / Chases / Structure	661	1,890	2,775	3,030	4,110
Total Area	**8,435**	**20,152**	**27,750**	**30,300**	**41,100**

*Area requirements are based on commercial enplanements only. They do not account for charter operations.

Section 6 – Terminal Demand / Capacity Analysis

1. Introduction

Aerial Photograph of Terminal Complex

The previous tasks determined the existing capacity of functional areas of the passenger terminal, as well as landside (vehicle access and parking), and airside areas (aircraft access and parking) associated with the terminal. Tasks also included an estimated future demand for these areas based on the forecasted numbers of passenger enplanements. Inside the terminal building, the arrangement of spaces is based on functional relationships. The primary functional components are the non-secure area, security screening, and the secure area. These components interact with a number of adjacent spaces, which often have interrelated functions. Alternatives are studied to determine the most successful arrangement of spaces for the Airport.

This section will create and analyze development alternates for the terminal building and complex to satisfy the facility requirements that were identified in Tasks 12.2-12.5. The alternates presented will take into consideration the long-term development of PUW while also considering near-term improvements, including the runway realignment. In addition, each alternate will be assessed for operational, economic, sustainability factors, and implementation feasibility. Constraints and opportunities as noted in public meetings and by the airport users will be noted. The section will conclude with a preferred alternate layout for the terminal building and complex.

2. Terminal Building: Evaluation of Alternatives

The existing layout of the terminal building must first be assessed for overall operational performance. The site alternatives and the building alternatives are evaluated for their ability to meet the functional objectives of efficiency, comfort, and to accommodate current and future demand.

Once this evaluation is completed, criteria is established to compare the alternative layouts. For airport terminal buildings, considerations for evaluating layouts will include safety, security, FAA, and TSA design standards, flexibility to adjust to unforeseen future changes, technical feasibility, cost, and satisfaction for user expectations. Additional criteria for evaluating the building's performance include Airport specific issues, such as business relationships, future vision of the airport sponsor, consideration of environmental features, existing condition of the facility, and operational impact of construction. Constructability and phasing will be applied to each alternative. This criteria will be used to determine which alternative offers the best overall arrangement for the Airport.

Evaluation criteria for establishing optimal terminal building site:

- Location of existing airfield: The terminal building location proximity to the airfield is the most critical relationship of the complex. It is beneficial for the terminal to be located in such a way as to provide easy transition for aircraft to move from the airfield to the building. The terminal proximity to the airfield will influence the length of time needed to taxi between the airfield and the terminal building and consequent overall travel time for passengers. The terminal proximity to the airfield will affect the amount of fuel consumed (operational cost) and fumes created while an aircraft moves between the airfield and the terminal building.
- Location of existing utility connections: Utility relocation can incur cost premiums for site work and installation of support infrastructure. Construction phasing must be planned in order to allow existing utilities to remain functional during construction.
- Location / proximity of existing public access roadways
- Overall project cost: The overall and incremental costs are to be appropriate to the amount gained and proportionate across the project. Renovations will be financed through sponsor and FAA funds.

3. Existing Airport Terminal Location

The existing terminal location was reviewed for adjacency relationships and site influences that impact the passengers, the Airport, and the airlines.

Opportunities
Opportunities for cost savings in the continued use of the existing facility were explored. The following opportunities for keeping the existing terminal building and the existing site were identified.

- Airfield Access: The existing airfield can be used for future use, but future demand requires the apron to be expanded, which is feasible at the current apron location.
- Airport Ground Access System: The airport access road system connects the airport roads to the public roadway system. This system includes the access roadways, sidewalk, and curb front loading / unloading lanes.
- Parking Lot Location: The existing parking lot location is directly adjacent to the terminal building. Future demand requires additional parking, which can be constructed at the existing site.
- Utility Connections: The existing utilities, including water, sewer, natural gas, and electric power can be reused for small additions to the building. However, large renovations and additions may require a significant increase in demand. In this case, it is more efficient to install new utility lines and connections in order to meet current and future needs.

Constraints

The following constraints to development of the terminal building on the existing site were identified

- Continued Operation of the Airport: It is necessary that the Airport remains fully operational (including security measures) while alternations and additions are made to the terminal building.
- Public Vehicle Parking Lot and Access: As mentioned above, future demand requires additional parking. The parking expansion should be constructed simultaneously with the terminal expansion.
- Overall Building Arrangement: The interior spaces need rearrangement as the current spaces do not meet current demand and will not meet future demand.
- Building Systems / Interiors: The building systems and interiors are deteriorating and will need significant upgrades.
- Building Height Limitations / Building Restriction Line (BRL) / Part 77 Limits.

Facility Requirements Review

Prior to the development of alternatives for the terminal building and complex, the existing facilities were inventoried and assessed for overall performance and to determine if the existing facility could meet current and future demand. It was determined that all of the spaces in the existing terminal building and the complex were deficient to varying degrees. A proportionally large amount of space needs to be added to both the terminal area and the complex, in order to meet facility requirements. The following deficiencies at the terminal building and complex have been identified:

- Restrooms in non-secure and secure areas
- Passenger queuing area for ticketing, security checkpoint, and baggage claim
- The amount of space for the security checkpoint
- The amount of space in the holdroom
- The amount of baggage claim area
- The amount of vehicle and charter parking
- The amount of aircraft parking (including charter areas)
- Lack of a proper meeter / greeter area
- The amount of building support spaces

4. Terminal Area & Building Alternatives

The alternatives that will be analyzed for future implementation are:

- Alternate 1: Interim addition / renovation of the existing terminal
- Alternate 2: Expansion / renovation of the existing terminal
- Alternate 3: New terminal near the existing terminal
- Alternate 4: New terminal at a new location along the realigned runway

It should be noted that all of the alternatives assume the realigned runway has been constructed, as this phase will come after the runway construction. For each alternative, the proposed locations and attributes of the passenger terminal are described in relationship to other major components of the terminal complex; both landside and airside. Several stakeholder meetings and other airport meetings established initial key goals for the terminal building:

- Estimate the size of the terminal building and present to the users for feedback
- Explore site implications of adding the proposed amount of space to the existing building.
- Discuss the community's preference in preserving or not preserving all or part of the existing building.
- Identify key adjacencies between areas
  - Exit lane relationship to the security checkpoint
  - Exit lane relationship to baggage claim
  - Meeter / greeter location
  - Checkpoint relationship to the holdroom
  - Airline ticketing relationship to the checkpoint
  - General configuration for efficiency and constructability

Other key discussion elements that were considered are:

- Security checkpoint updated regulations
- Charter flights cause a significant increase in passengers and congestion

Alternative 1: Interim addition / renovation of the existing terminal:
The first alternative consists of a small addition to the secure area of the existing terminal building, increasing seating and adding restrooms to the holdroom area. This improvement is a near term expansion to address deficiencies in the holdroom. It does not remedy any of the other building deficiencies or address long-term requirements. 22 seats are added for a total of 68 seats. A small amount of space is added to the security checkpoint area as well. **Exhibit 1** shows the existing floor plan and proposed addition to the existing terminal. **Exhibit 2** shows the associated terminal area plan. Alternative 1 does not propose to add additional parking. The total estimated project cost is $1,630,000.

Advantages:

- Restrooms are added to the secure side of the terminal.
- Additional seating is added to the holdroom (15 seats).
- Some finishes are updated.
- The security checkpoint is enlarged to provide more recomposure area.

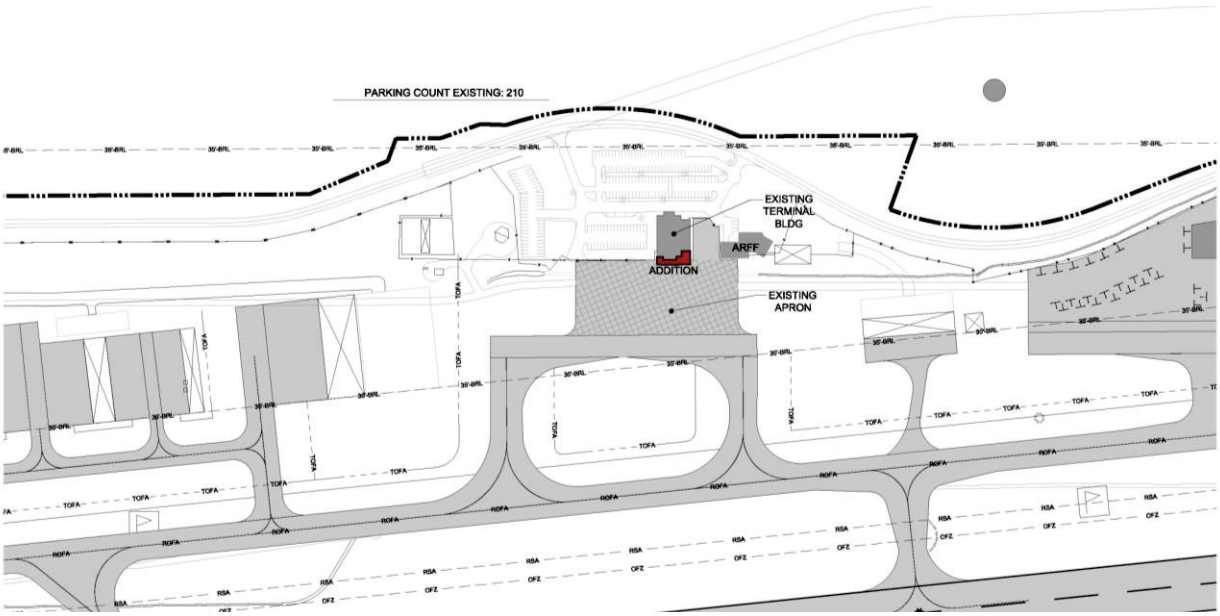
Disadvantages:

- This is only a short-term solution (no improvements are made to the non-secure area).
- Part of the funding will be used for this short-term goal, which could be used for long-term solutions.

Exhibit 3: Alternative 1, Existing Terminal and Addition / Renovation

Source: Mead & Hunt, Inc

Exhibit 4: Alternative 1, Terminal Area Plan



Source: Mead & Hunt, Inc

Alternative 2: Expansion and renovation of the existing terminal:

The building expansion provides new ticketing, security checkpoint, holdroom and public lobby areas and renovates the existing terminal to expand the baggage claim area. A second floor is added to house administrative areas and support areas. Minimal changes are made to the access roadways and the parking lot is expanded to add 508 parking spaces and a dedicated bus parking area. The unloading / loading area is relocated to west along the new terminal building. **Exhibit 3** shows the proposed terminal building. **Exhibit 4** shows the associated terminal area plan. The total estimated project cost is $36,345,000.

Advantages:

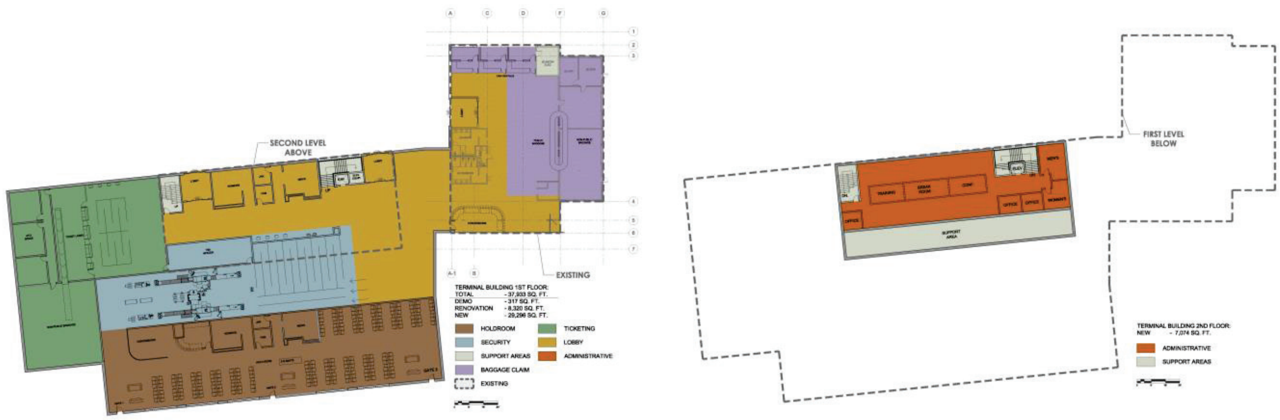
- This alternative is a long-term goal that will meet current and future demand.
- The existing building is reused.
- Allows for additional expansion to the west.
- Adjacencies mentioned previously are mostly met.
- The existing parking lot, roadways and apron are reused (parking lot and apron are expanded).

Disadvantages:

- Phasing and construability may be difficult in order to keep the existing building in operation.
- The exit lane location in relation to the baggage claim could be closet in proximity.
- Requires large amounts of ground cut.
- Requires a 30’-35’ retaining wall north of the parking area. The wall will require significant structural / water management considerations.
- Insufficient parking area for future needs.

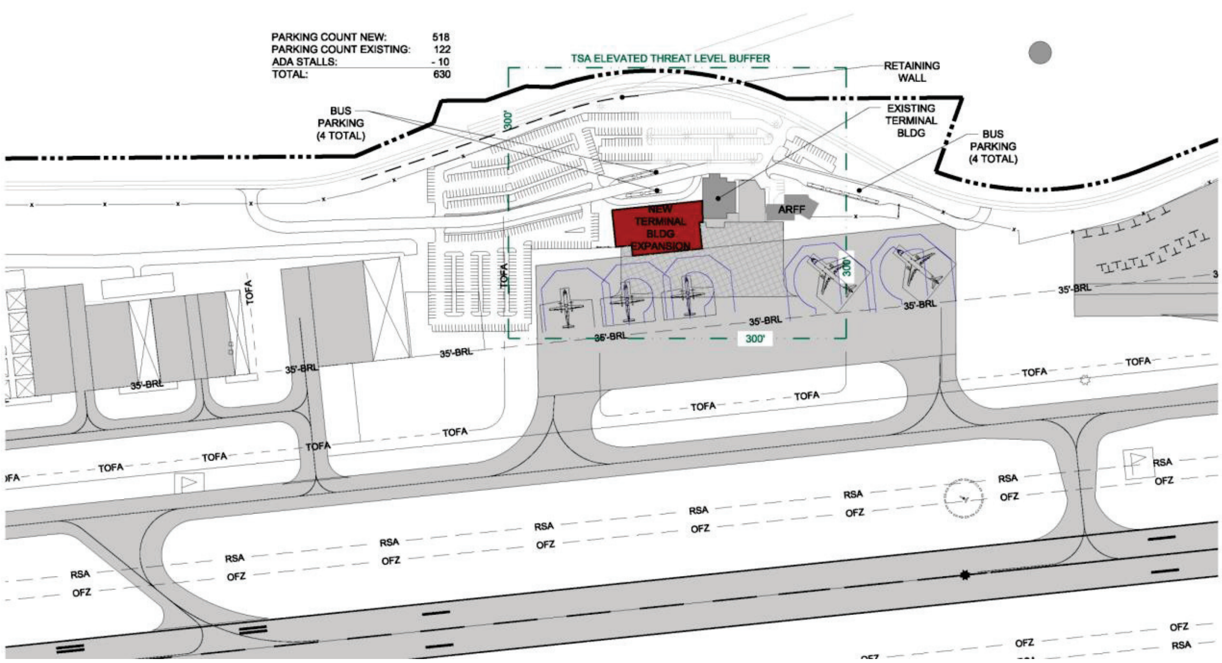
- The existing septic system will need to be relocated to accommodate additional parking and the extended sewer line.
- Oversized ramp area to accommodate the ARFF building.

Exhibit 3: Alternative 2, Terminal Building First and Second Floor Plans



Source: Mead & Hunt, Inc

Exhibit 4: Alternative 2, Terminal Area Plan



Source: Mead & Hunt, Inc

Alternative 3: Construction of a new terminal near the existing terminal:

Alternative 3 proposes a new terminal building in the vicinity of the existing terminal building. The new building will be closer to the proposed runway. Similar to Alternative 2, minimal changes are made to the access roadways and the existing parking lot is expanded. The new building and apron are located directly adjacent to the proposed runway. The layout of Alternative 3 is more efficient than Alternative 2. **Exhibit 5** shows the proposed terminal building. **Exhibit 6** shows the associated terminal area plan. The total estimated project cost is $39,590,000.

Advantages:

- This alternative is a long-term solution that will meet current and future demand.
- The existing parking lot is reused and expanded.
- Includes a dedicated bus / charter staging area.
- Construction can occur while keeping the existing terminal operational.
- Adjacencies mentioned previously are met.

Disadvantages:

- Requires a 15' retaining wall along the parking area.
- Requires significant ground cut and retaining wall / drainage consideration.
- The existing septic system will need to be relocated to accommodate additional parking and the extended sewer line.
- Future building and site expansions are limited by adjacent airport uses.

Alternative 4: Construction of a new terminal closer to the realigned runway:

Alternative 4 proposes a new terminal building located in an area currently occupied by the existing airfield. The layout of this terminal alternative offers the same opportunities as Alternative 3; however the opportunities for new building utilities, vehicle access and vehicle parking are improved. Alternative 4 also provides a separation between the public terminal and other airport and general aviation activities. **Exhibit 5** shows the proposed terminal building. **Exhibit 7** shows the associated terminal area plan. The total estimated project cost is $40,340,000.

Advantages:

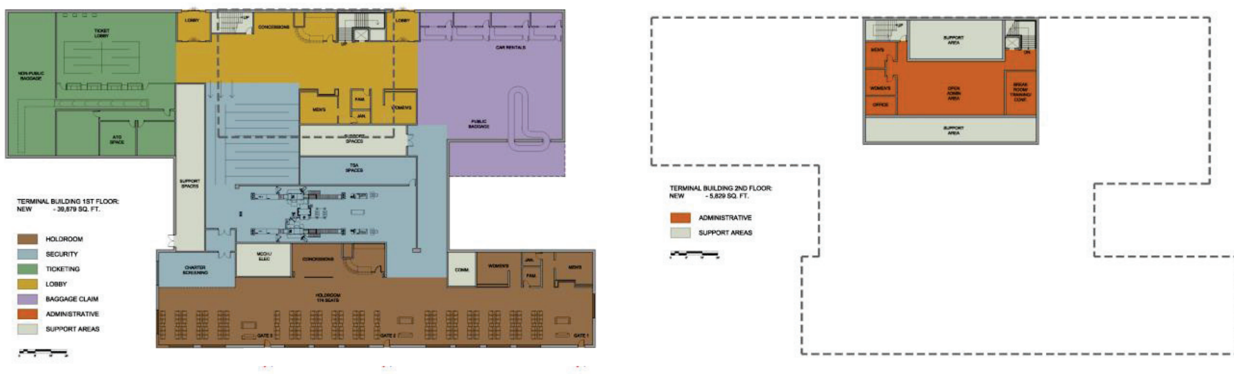
- This alternative is a long-term solution that will meet current and future demand.
- Construction can occur while keeping the existing terminal operational.
- Adjacencies mentioned previously are met.
- This option provides the greatest number of parking spaces.
- The retaining wall along the parking area is anticipated to be 12' or under.
- Comfortable slope for pedestrian movement and access road.
- Dedicated bus / charter staging area.
- Can accept fill material from runway excavation or site to site cut and fill.
- Ability to manage future phasing and growth with general aviation development.
- Existing ramp and terminal available for immediate revenue sources.
- Close proximity for connection to city sewer system.

- Leasable value of existing ramp and building estimated $475,000 / year.

Disadvantages:

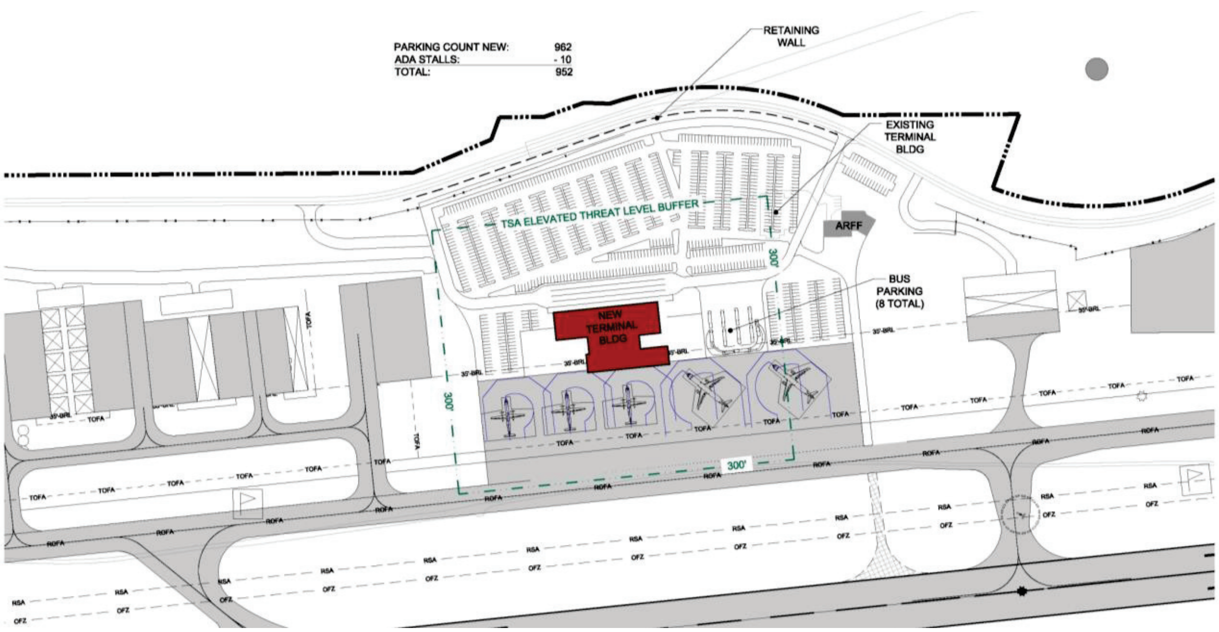
- This is the most expensive option.

Exhibit 5: Alternatives 3 and 4, Terminal Building First and Second Floor Plans



Source: Mead & Hunt, Inc

Exhibit 6: Alternative 3, Terminal Area Plan



Source: Mead & Hunt, Inc

Exhibit 7: Alternative 4, Terminal Area Plan

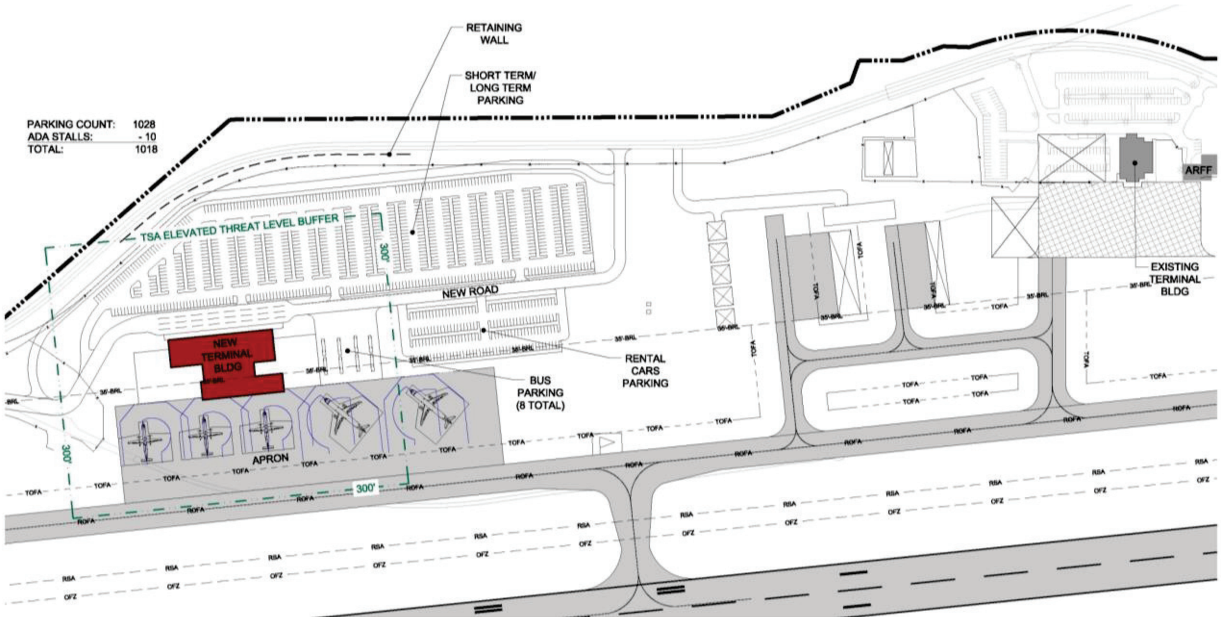


Table 1 compares terminal building area and parking capacity with forecasted enplanements for each of the four alternatives.

Table 1: Passenger Terminal and Terminal Airside Alternate Capacity Comparison

INTERIOR SPACE COMPARISONS					
	2038 GOAL – (WITHOUT CHARTER)*	Alternate 1 – ADDITION	Alternate 2 – EXPANSION	Alternate 3 – NEW CONSTRUCTION	Alternate 4 – NEW CONSTRUCTION
Annual Enplaned Passengers	**152,700**				
Peak Hour Enplanements	**137**				
Peak Hour Deplanements	**137**				
Security Checkpoint - Non-charter	5,607	2,401	5,751	8,088	8,088
Security Checkpoint - Charter	TBD	0	0	744	744
Holdroom	4,931	2,833	9,818	9,441	9,441
Number of Holdroom Seats	137	68	198	174	174
Entry - Circulation	12,152	2,098	10,840	5,220	5,220
Baggage Claim (includes car rental)	4,934	849	4,621	6,012	6,012
Ticketing	3,957	1,245	6,670	6,551	6,551
Administrative	1,116	390	4,010	2,706	2,706
Building Support Spaces	9,013	569	3,297	6,947	6,947
Total	**41,711**	**10,385**	**45,007**	**45,708**	**45,708**
Parking Total	**963**	**210**	**630**	**952**	**1,018**
Charter (Buses)	8	4	8	8	8
Aircraft Spaces	5	3	5	5	5

*2038 GOALS ARE DEFINED BY FAA AIP GUIDELINES, WHICH DO NOT INCLUDE PROVISIONS FOR CHARTER AIRCRAFT. ALTERNATE 2, 3, AND 4 INCLUDE ADDITIONAL AREA TO ACCOMMODATE CHARTER OPERATIONS.

5. Terminal Complex Operational Factors

The passenger terminal complex is the primary point of public interface between landside and airside activities at the Airport. As a result, any planning to meet the future facility needs of the terminal complex at PUW must also include a review of the airfield and the regional site. This will not only assist in determining site-driven constraints that will limit expansion possibilities, but will also reveal opportunities for cost savings in the continued use or replacement of existing facilities.

Landside Operational Factors

The landside operational area extends from public roadways and utilities to the front door of the terminal. Landside operational factors include vehicle access, way finding, availability of parking, pedestrian circulation and passenger pick-up / drop-off. All of these public interactions play a critical role in the perception and performance of the passenger terminal. **Exhibit 8** shows an aerial photograph of the existing PUW terminal area and local roadway system.

Exhibit 8: PUW Local Roadway System

Source: Bing Maps

Landside considerations for the terminal area at PUW:

- **5a Ground Access System:** vehicle access and circulation relating to public and airport roadways and opportunities for the future growth for vehicle access. An on-airport loop road will allow vehicles to circulate back to the terminal without re-entering the public road.

- **5b Parking Capacity and Circulation:** parking capacity, pedestrian circulation, opportunities for future growth of vehicle parking facilities and topographic concerns, such as storm water management and the installation of a retaining wall.

5c **Passenger Pick-Up / Drop-Off Area:** several lanes are required in front of the terminal to allow vehicles to circulate past loading / unloading activities. At PUW, it is important to keep charter bus activities separated from regular traffic.

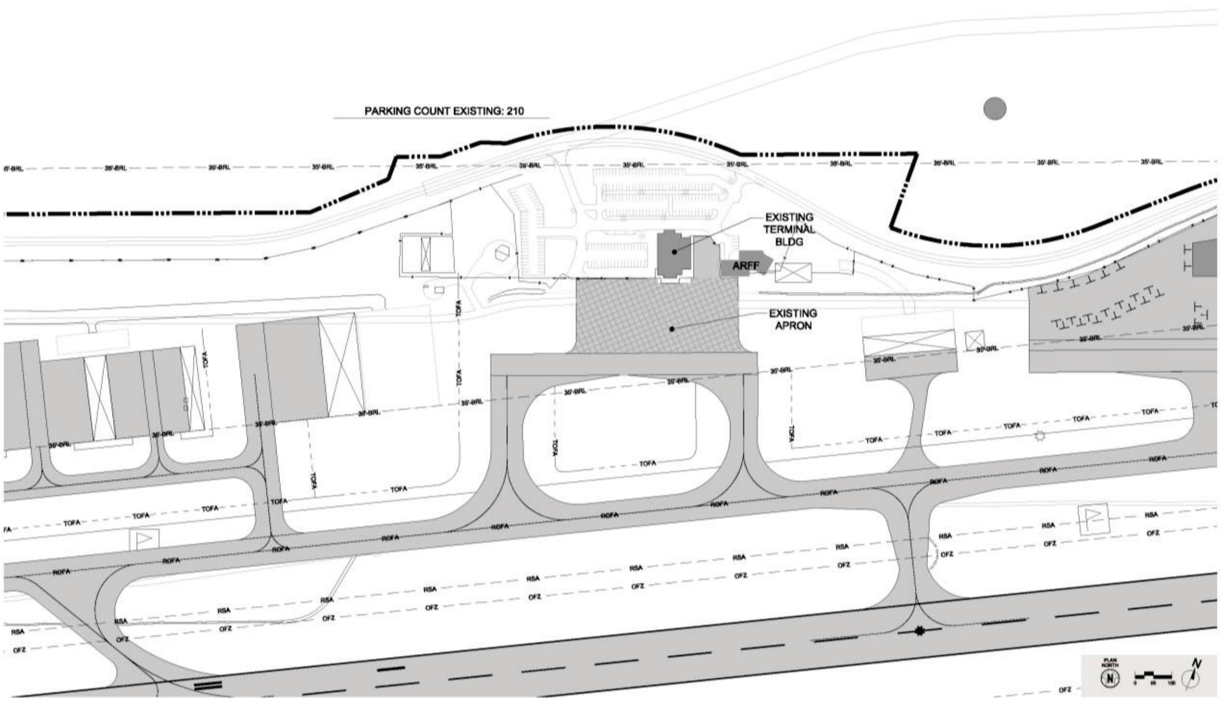
5d **Terminal Building Site Utilities**: existing sanitary waste is provided by a septic system and the Washington State University campus supplies existing water. Future growth will include municipal utility lines and connections for the terminal building.

5e **Non-Aviation Development:** opportunities for airport-related development that is not directly related to aviation, such as a rental car quick turnaround facility (QTA) or an airport business park.

Airside Operational Factors

The location of the passenger terminal in relationship to airfield facilities will have a direct effect on the layout of the terminal area. Each of the proposed alternatives will be analyzed for this relationship. **Exhibit 9** shows a diagram of the existing PUW passenger terminal area in relationship to the realigned runway.

Exhibit 9: Existing Terminal Area with Realigned Runway



Source: Mead & Hunt, Inc.

Airside considerations for the terminal complex at PUW:

5f **Commercial Apron:** opportunities for future growth, aircraft parking capacity, and maneuvering capabilities on the commercial apron, including taxiway access.

5g **Terminal Support Facilities:** airport facilities related to passenger terminal, including the Aircraft Rescue and Firefighting Facility (ARFF), aircraft fueling facilities, and deicing pad.

5h **Aviation Development**: airport facilities not related to the passenger terminal, including general aviation, hangar and cargo facilities. It is important to separate the activities related to these facilities from the passenger terminal.

6. Terminal Building Operational Factors

The configuration of the terminal complex is based on the operational relationships between the different components, including the landside (vehicle access and parking), the terminal building, and the airside (aircraft access and parking). Likewise, the arrangement of terminal building is also based on relationships between different operational areas. The primary areas within the terminal building include the non-secure or public area, the security checkpoint, and the secure area which is accessible only to screened passengers and authorized personnel with security clearance. Within these primary areas, facilities interact with adjacent facilities that have related functions. Once the requirements for the types and sizes of terminal building facilities have been established, alternative layouts are generated and analyzed in order to understand the most beneficial arrangement for the Airport.

Each alternative has been evaluated for the operational efficiency of the terminal building and terminal complex. Once the terminal site is chosen, the terminal area and building layouts will be refined to fit the specific site.

Terminal layout considerations for the passenger terminal at PUW:

6a **Terminal Building / Ground Access Interface:** the efficiency of the terminal layout with respect to public access, including the curbside and charter parking, and opportunities for future growth of the area.

6b **Non-Secure Area:** The efficiency of the facilities' layout in the non-secure portion of the terminal building and the future growth opportunities of these facilities. This area includes public amenities, ticketing, baggage claim, and car rental counters.

6c **Checkpoint and Secure Area:** The efficiency of the facilities' layout in secure portion of the terminal building and the future growth opportunities of these facilities. This area includes the security checkpoint, passenger amenities, and the holdroom.

6d **Adaptability:** Passenger terminals need to be designed for growth and expandability to meet future enplanement needs as well as changing aviation and security standards.

7. Sustainability Factors

Many sustainability measures such as providing a high-quality building envelope or using efficient mechanical and lighting systems can be engaged at any building. Early design decisions will have a lasting impact on the extents to which these measures can be effective. For example, orienting the building to make the best use of daylight to light the interior of the building will not only reduce the amount of artificial lighting needed, it can also lower the HVAC costs by reducing the heat load associated with artificial lighting.

Energy modeling during early design phases will identify the best combination of building envelope properties and systems used in relation to life cycle costs.

Many opportunities for the efficient use of natural resources and the reduction of energy consumption exist at PUW. At the existing terminal building, the south wall configuration does not allow for control of the sunlight entering the building. As a result, the mechanical system serving this space struggles to maintain a comfortable temperature in sunny weather. In the future, the airport would benefit from modulating the sunlight that enters this space and by the improvements to the mechanical system. The installation of efficient heating and cooling systems such as a geothermal exchange system, which uses a heat pump to extract or return heat to the ground, will reduce ongoing utility costs. As part of the runway realignment, a well field for a geothermal exchange system can be located below a paved area, allowing aeronautical uses at the surface. The Palouse region is a rich agricultural area of rolling hills, and water is vital for preservation of this resource. Using water efficient plumbing fixtures can greatly reduce water consumption associated with buildings and treated reclaimed greywater can be used to irrigate landscaping or to flush toilets.

In the past, producing an energy-efficient project has typically been voluntary, but it is becoming increasingly common for federal, state, or local regulations to require a certain level of energy-efficiency in construction projects. An energy-efficient facility not only benefits the community and the environment, it will also have reduced utility expenses and operational costs over the life of the building. For this reason, each alternative will be evaluated for opportunities in energy efficiency and sustainability measures:

7a **Site Design Strategies:** Airport development patterns that facilitate connection to the existing communities and terminal support facilities, and provide in-fill growth along these connections, will make access to airport facilities more efficient. The building location in relationship to the local roadway system and, more importantly, the airfield will have a lasting impact on fuel consumption and the efficiency with which the airfield ultimately operates.

7b **Building Design Strategies:** It is important to orient the building in a way that allows efficient access to the airfield and roadway system, as well as makes the best use of local solar and geographic features. The shape of the building and the direction in which it is oriented can allow the building to make use of controlled solar access on the south side. Clustering buildings with associated uses will provide efficiency in operation.

7c **Reuse of Existing Facilities:** The renovation or reuse of existing facilities can be beneficial to the Airport. This can involve the adaptive reuse of existing facilities for new purposes.

8. Implementation Feasibility

Choosing the preferred alternative for the terminal complex and terminal building will depend not only on the opportunities that are made available in the project design, but also on the implementation strategies that make the project feasible. The proposed terminal alternatives have been evaluated for implementation feasibility in the context of the runway realignment project.

Implementation feasibility factors for the terminal area development at PUW:

8a Near Term Development: It is important that the passenger terminal maintains continuous operation and security measures while the runway is under construction. The study of the alternatives includes the consideration of temporary facilities and construction phasing necessary to maintain operation at the terminal:

Alternative 1 – the holdroom addition will require a temporary structure to accommodate holdroom activities during construction. Alternate 1 is not affected by the runway realignment.

Alternative 2 – a new commercial ramp area will need to be built prior to the construction of terminal expansion at the existing ramp. Temporary facilities may need to be provided for the baggage claim process while the existing terminal is being renovated. Alternative 2 is likely to not begin until the completion of the runway.

Alternative 3 – a new ramp will need to be constructed in conjunction with the new adjacent runway. Construction can be completed on the new terminal without affecting the operations of existing terminal. Alternative 3 could begin at the competition of the new runway. Phasing for the subsequent landside work for the parking lot expansion and the demolition of the existing terminal is expected to be complex.

Alternative 4 – the construction of the new terminal building and landside facilities can occur without affecting operations of the existing terminal. Construction of both the terminal and ramp can occur at completion of western half of the runway. Much of the grading work associated with the terminal area can be performed concurrent with the western runway work.

8b Long Term Development: Expansion associated with both the runway and the terminal at PUW is extensive, and will not occur simultaneously. Planning for long-term development for the terminal complex and terminal building will need to provide flexibility so that these facilities are not only functional today, but can be modified to meet future growth needs. It is important that the design and location of components such as the parking areas and commercial ramp area allow expandability for meeting future demand. Areas within the terminal must also be adaptable to accommodate changes in enplanement numbers and operational requirements. Long-term planning should consider the effect of facilities, such as roads, buildings and taxiways that will impact the terminal complex over the 20-year period and beyond. For example, future improvements planned for Airport Road, the public roadway leading to the terminal complex, will make additional parking space available in Alternatives 1 & 2.

9. Economic Factors

An airport plays an important role in the local business environment and airport improvements will directly and indirectly impact the economy of the surrounding community. Planning for a major airport development project typically begins several years in advance of the actual construction start date. Determining the financial impact of such a project will be a part of the planning effort. The financial planning will involve the Airport filing an Airport Capital Improvement Plan (ACIP) with the FAA, which will allocate funds in a way that will balance near-term operations and maintenance needs with the Airport's long-term goals. In addition, it will identify projects that are eligible for federal funding participation.

Economic factors for the terminal area development at PUW:

9a **Short-Term Project Costs:** Planning-level cost estimates have been prepared for the purpose of comparing the expected costs of the alternatives presented. These estimates will provide a general indication of development costs for buildings, roads, ramp area and utilities.

Many programs and resources exist to encourage the implementation of projects at airports. The Airport Improvement Program (AIP) is a major source of funding for such projects, providing grants for the planning and development of infrastructure improvements at public-use airports that are included in the National Plan of Integrated Airport Systems. These grants are funded nationally through the Airport and Airway Trust Fund, which is supported by revenues collected from domestic passenger ticket taxes, domestic flight segment taxes, international arrival and departure taxes, domestic waybill freight and mail taxes, and aviation fuel taxes.

Airport projects that are eligible for funding through revenue collected by the AIP are related to the enhancement of airport safety, capacity, security and environmental issues. Areas in airport terminal buildings that are eligible for AIP funding are those areas that are public spaces and are directly related to the movement of passengers and baggage. Projects that receive consideration for AIP grants have demonstrated a demand for them and have been shown to be eligible for the program according to FAA guidelines. The grants cover up to 90% of eligible costs at small non-hub primary airports, such as PUW. The Airport may decide to fund the remaining amount, the Airport match, by issuing general obligation bonds and paying the bonds back with PFC funds, airport revenue, general funds or tax revenues.

Table 2 shows estimates of 10-year and 20-year project costs and airport match for each of the alternatives.

Table 2: Passenger Terminal Project Costs
Note: Costs are based on 2013, non-inflated.

	Total 10 Year Terminal*	
	Project Costs	Airport Match
Alternate 1 - Addition	$1,640,000 - $1,910,000	$110,000 - $120,000
Alternate 2 - Expansion	$34,510,000 - $40,270,000	$5,730,000 - $6,680,000
Alternate 3 - New Construction	$36,540,000 - $42,630,000	$6,090,000 - $7,110,000
Alternate 4 - New Construction	$36,950,000 - $43,110,000	$6,140,000 - $7,160,000

*2 gates with reduced holdroom
*500 parking spaces for Alternate 2-3-4
*ramps for 3 aircraft

	Total 20 Year Terminal	
	Project Costs	Airport Match
Alternate 1 - Addition	$1,640,000 - $1,910,000	$110,000 - $120,000
Alternate 2 - Expansion	$38,410,000 - $44,810,000	$6,350,000 - $7,410,000
Alternate 3 - New Construction	$42,190,000 - $49,220,000	$7,730,000 - $9,020,000
Alternate 4 - New Construction	$42,940,000 - $50,090,000	$8,120,000 - $9,470,000

Source: Mead & Hunt, Inc

9b **Long-Term Value:** In order to better understand the economic factors associated with the proposed terminal complex and terminal building expansions, they need to be weighed against future opportunities for the Airport to generate revenue. These opportunities include Passenger Facility Charges (PFCs), parking fees, leasable areas, and concessions.

10. Preferred Alternative

Alternatives for the passenger terminal building and terminal complex were developed and assessed for the performance factors identified previously. The process of developing alternatives led to discussions regarding the operation of PUW that have involved the Airport, the public, stakeholders, and the planning team. In these discussions, Alternative 4 emerged as the preferred location for the passenger terminal facility in relation to the realigned runway. This location offers clear, efficient vehicle access to the terminal complex, provides effective access to the airfield, and allows future growth of facilities that support the terminal. This alternative will continue to be refined as the planning process ends and the design process begins. The ultimate goal for Alternative 4 will be to provide a terminal that meets the 20-year planning period. Additional development of this alternative shows that it can be constructed in two phases (**see Exhibit 10 and 11** for Phase 1 and Phase 2).

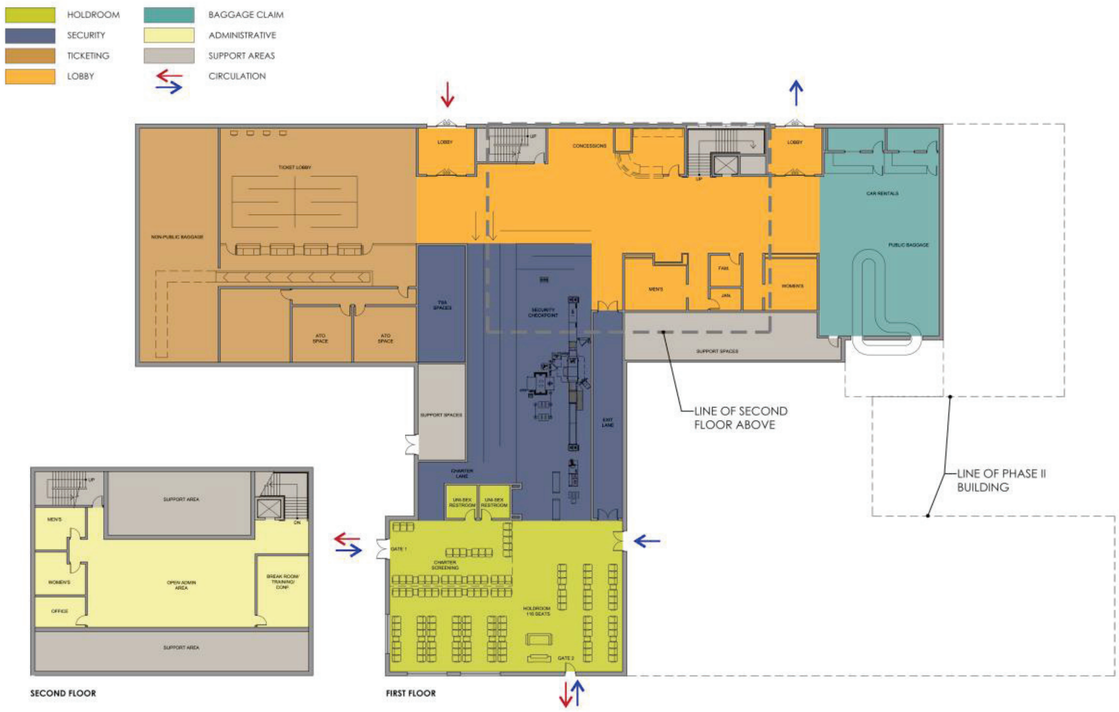
Table 3 compares the planning factors for each of the passenger terminal alternates.

Table 3: Passenger Terminal and Terminal Airside Alternate Planning Factor Comparison

ALTERNATE PLANNING FACTOR COMPARISSON																						
		Terminal Landside Operational Factors					Terminal Airside Operational Factors			Terminal Building Operational Factors				Sustainability Factors			Implementation Feasibility			Economic Factors		
		Ground Access System	Parking Capacity / Circulation	Pick-up / Drop-off Area	Site Utilities	Non-Aviation Development	Commercial Apron	Terminal Support Facilities	Aviation Development	Terminal / Ground Access Interface	Non-Secure Area	Checkpoint / Secure Area	Adaptability	Site Design Strategies	Building Design Strategies	Reuse of Existing Facilities	Staging with Airfield Work	Near Term Development	Long Term Development	Short Term Prjoect Costs	Long Term Value	
Alternate		5a	5b	5c	5d	5e	5f	5g	5h	6a	6b	6c	6d	7a	7b	7c	8a	8b	8c	9a	9b	Total
1	Interim Addition	1	1	1	2	1	2	4	3	1	1	1	1	3	2	5	5	3	1	5	1	44
2	Expansion and Renovation	3	2	3	3	1	3	3	3	2	3	4	3	3	3	5	4	3	4	3	3	61
3	New Terminal Near Existing	3	3	5	3	3	4	4	3	4	5	5	5	4	4	1	3	3	4	2	4	72
4	New Terminal Near Runway End	5	5	5	4	5	5	3	5	5	5	5	5	4	4	5	5	5	5	2	5	92

Source: Mead & Hunt, Inc.

Exhibit 10: Phase One – First and Second Floor



Source: Mead & Hunt, Inc

Exhibit 11: Phase Two

Source: Mead & Hunt, Inc

Section 7 – Cost Estimates for Preferred Alternative

1. Introduction

As noted previously, no funding for terminal improvements has been identified at this time. This chapter of the Terminal Area Master Plan explores eligibility for federal FAA funding for the preferred alternate terminal expansion, demonstrates PUW's ability to finance the project and discusses funding sources for the projects. The principal assumptions of this analysis are that the FAA continues their current capital funding programs and the Airport activity grows according to the aviation demand forecasts previously mentioned.

It should be noted that eligibility for FAA funding does not guarantee FAA participation in the funding of the project. Also, while tenant shells are eligible for FAA funding, the build-outs of the shells are not. In some cases the project provides the shell only for tenant spaces, leaving the build-out of that space for the tenant to design and construct as a separate project. In other cases, the airport may build out the space for the tenant. The amount of tenant build-out that is included in the scope of the project is ultimately determined through negotiations and discussions with tenants, and will affect both the project cost and the proportion of the cost that will be eligible for FAA funding.

Eligibility planning is an important step in the terminal planning process to determine the amount of potential FAA funding and the amount of funding that will needed to be provided by other sources. As the terminal area plan progresses into the design stages, spaces may vary from those outlined in this study. Revisions to the eligibility plan will be made during the design process, and the revised eligibility plan will be used to determine the amount of the project construction cost that will be eligible for FAA funding participation.

This chapter is organized into the following sections:

- Terminal Building Eligibility
- Funding Sources
- Cost Estimates
- Potential Funding Plan

2. Terminal Building Eligibility for FAA Funding

At the conclusion of **Section 6** (Alternatives Development), a concept-level building plan and space summary table were established for the terminal building. The preferred alternate is a new terminal building at a new location along the realigned Runway 5/23. Next steps are to determine the project's eligibility for receiving FAA funding. The proposed terminal building will be assessed to define which portions are considered FAA eligible or ineligible for FAA funding. This determination is based on FAA AC 150/5360-9, Order 5100.38C, Mead & Hunt's experience at similar airports, and guidance from the Pullman Regional Federal Aviation Administration Office. Note: a draft of AIP Handbook Order 5100.38D is pending approval. The descriptions below are based on 5100.38D.

Funding Eligibility Categories for Terminal Buildings

The following describes the two FAA funding categories that apply to PUW. See **Exhibit 1**, Eligibility Plan.

- **Eligible Space, Building Components, and Equipment**

Eligible space is the terminal building space that is considered to be 100% eligible for FAA funding. Public space that is directly related to moving passengers or baggage is eligible. The majority of the space in the PUW terminal building is eligible for FAA funding. This is typical with small non-hub airports. Building components that are considered to be 100% eligible for FAA funding include the walls, floors, roof, chases, etc. that are required to construct the spaces that are eligible. Equipment that is considered to be 100% eligible is the equipment that is directly related to moving passengers or baggage.

Eligible spaces include:

- Public circulation
- Baggage claim area
- Public waiting / seating areas
- Restrooms
- Security checkpoint, (note that screening equipment is provided by TSA)
- Sterile holdroom
- Mechanical / electrical rooms with utilities that serve the public areas only
- Car rental counters and queuing
- Ticketing lobby, including counters
- Public portion of concession areas
- Outbound baggage area
- Support spaces

Examples of eligible building components and equipment:

- Walls, roof, floor, the complete exterior building envelope, and structure.
- Vertical chases: Plumbing chases that serve the public restrooms.
- Emergency Generator: An emergency generator that provides backup power to essential services in the event that primary power fails.
- Baggage Handling Conveyors: The sole purpose of the baggage conveyors and baggage claim devices is to transfer baggage, making this equipment eligible.
- Passenger Boarding Bridge: The sole purpose of the passenger boarding bridge is to allow passengers to board and disembark from an aircraft, making this equipment eligible.

Eligible space is shown in red on the eligibility floor plan as shown in **Exhibit 1**.

- **Ineligible Space**

Ineligible space is area inside the terminal building that is not eligible for AIP funding. Many ineligible spaces are essential to the terminal and / or overall airport operation. However, these spaces are not eligible because they are not directly related to moving passengers, baggage.

Ineligible spaces include:

- Airline ticket offices and spaces behind the ticket counter
- Non-public areas of concessions
- Vertical circulation (stairs, elevators)
- Janitor room
- Airport administration offices
- Rental car offices and spaces behind the ticket counter

Ineligible space is shown in orange on the eligibility floor plan in **Exhibit 1**.

Exhibit 1: Eligibility Floor Plan

Source: Mead & Hunt, Inc.

Summary of Determination of Eligibility for FAA Funding

The amount of eligibility for the design portion of the project is determined to be 78%. **Table 1** shows the overall project construction cost and eligibility percentages. The amount of FAA funding will be reduced and the local share increased, as the maximum percentage that the FAA can contribute to a project is 90% of the eligible costs. Therefore, 90% of the 78% eligible space may be funded by FAA.

Table 1: Eligible Construction Cost				
Category	% Eligible	Eligible	Ineligible	Total

Total Terminal Building Construction Cost	78%	$12,726,090	$3,589,410	$16,315,500
Phase One Cost	72%	$7,593,120	$2,952,880	$10,546,000
Phase Two Cost	94%	$5,423,330	$346,170	$5,769,500
Note: 90% of the 78% eligible space = $1,145,481 Note: Costs do not include contingencies or OH&P Note: Site costs not included.				

The ultimate goal of the eligibility process is to determine the percent of the project cost, not necessarily the amount of terminal building area that is eligible for FAA funding. Once the project nears the end of the design stage, cost estimates can be applied to the design plans in order to determine a refined eligibility percentage for project construction. This revised eligibility amount is anticipated to be higher than 78%.

3. Funding Sources

The funding for a terminal area plan can be sought from several sources. It should be noted that sources have not been specifically identified during this stage. This section will describe possible sources that can be investigated as the project progresses.

- FAA Airport Improvement Funding (AIP) funds
- Passenger Facility Charge (PFC)
- Vehicle Parking Revenue
- Local Funding Sources

FAA Airport Improvement Program (AIP) Funding

The FAA supports infrastructure improvements for all airports that are part of the National Plan of Integrated Airport Systems (NPIAS) through grants from its Airport Improvement Plan (AIP). The federal government allocates money to the AIP from the National Airport and Airway Trust Fund. The Trust Fund receives the excise tax revenues generated from domestic passenger ticket taxes, domestic flight segment taxes, international arrival and departure taxes, domestic waybill freight and mail taxes and aviation fuel taxes. Projects that are eligible for AIP funding include improvements related to enhancing airport safety, capacity, and environmental concerns.

AIP funding includes entitlement funding and discretionary funding. Entitlement funding is the annual funding that the airport receives from the FAA based on the annual number of passengers that the airport enplanes each year. Discretionary funding is FAA funding that is a pool of funds the FAA distributes based on project need, priority ranking system and any legislative action.

Passenger Facility Charge (PFC) Funding

The Passenger Facility Charge (PFC) is a funding source administered by the FAA and collected by the airlines whereby commercial service airports may charge and collect a specific dollar amount on each ticket for each enplaned passenger. That amount is limited to a maximum of $4.50 per passenger that departs the airport with a revenue ticket (frequent flyer tickets and other non-revenue ticketed passengers are exempt from this charge). The money collected by the airlines is transferred to the airport minus an administrative charge. This PFC funding can then be used to fund PFC eligible projects, which are identified in the PFC Application once the airport has filed and received FAA approval. Every PFC is tied to specific capital improvement projects that have been approved by the FAA. The fee expires when all of the money needed for the approved projects has been raised. However, new projects may be approved under a separate application.

Local Funding

Many local governments have programs that make funds available for airport projects. A local government can fund an airport by issuing bonds and paying back the bonds with either PFC funds, airport revenue or general funds.

Airport

The airport generates revenue from landing fees, tie-down fees, fuel flowage fees, FBO Building Rental fees, corporate hangar fees, and rental car concession fees.

Vehicle Parking Revenue

When paid parking is implemented for both short-term and long-term parking, revenue generated can be applied to pay for the parking lot expansion and revenue collection equipment installation.

Private Investments

Private sector investment is another source of funding for some types of airport improvements. The most common sources of funding for private sector development are commercial lending institutions and insurance companies.

4. Cost Estimates

The following cost estimates include the parking lot, terminal building, and terminal apron as described in exhibit 10, phase 1.

PUW TERMINAL BUILDING					
		Terminal Addition		New Western Terminal	
	Cost/Area	Area, SF	Total	Area, SF	Total
Demolition	LS	334	$10,000		
Renovation	$225	2,096	$314,400		
New	$350	2,034	$457,650	32,036	$11,212,600
Building			$782,050		$11,212,600
Site and Access			$225,000		$4,621,075
Total Building and Site			$1,007,050		$15,833,675
Contingency (20%)			$201,410.00		$3,166,735.00
Total			$1,208,460		$19,000,410
Soft Costs (35%)			$422,961.00		$6,650,143.50
Total Project Cost			$1,631,421		$25,650,554

Note: Building and Site costs include
- Construction Costs
- Site development costs
- FF&E

Note: Soft Costs include:
- Architectural/Engineering Fees
- Plan Approval Fees
- Testing and Commissioning
- Bidding Costs
- Sponsor Costs (Soft Costs)
- Sales Tax

Prices reflect ROM based on 2013 figures. No escalation is included.

8 – FAA Forecast Approval Letter

U.S. Department
of Transportation

**Federal Aviation
Administration**

Seattle Airports District Office
1601 Lind Avenue, S. W., Ste 250
Renton, Washington 98055-4056

October 18, 2013

Tony Bean
Airport Manager
3200 Airport Complex N
Pullman, WA 99163

Approval of Activity Forecast: Pullman-Moscow Regional Airport

Dear Mr. Bean:

I have reviewed the Forecast update submitted by Mead and Hunt for Pullman-Moscow Regional Airport.

The technical memorandum dated February 4, 2013 appears to be well-done and I believe that you and your Consultant have demonstrated adequate justification exists for the figures cited in the Aviation Activity Forecast Update. This forecast is hereby approved.

If you have any questions, please feel free to contact me at: 425-227-1654 or by e-mail at: deepeka.parashar@faa.gov.

Sincerely,

Deepa Parashar
Airport Planner, Washington

cc:
Kevin Mulcaster, Mead & Hunt
Mitch Hooper, Mead & Hunt

8 – FAA Forecast Approval Letter

U.S. Department
of Transportation

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Deepa Parashar
Airport Planner, Washington

cc:
Kevin Mulcaster, Mead & Hunt
Mitch Hooper, Mead & Hunt