Section 5
Airfield System

The airfield system consists of runways, taxiways, aprons, and the air traffic control tower and air traffic control radar system.

Figure 5-1 presents the recommended ultimate configuration of the airfield system. Primary facilities include two parallel runways in the 4/22 direction, one cross taxiway pair connecting the two runways, multiple taxiways and taxilanes for aircraft circulation, and aprons to support passenger, general aviation, cargo, and aircraft maintenance facilities.

Runways

Existing land reservations at GSP allow for two parallel runways. Issues of runway capacity and configuration have been addressed to determine when a second runway will be needed, how long each runway should be, and what separation between runways should be used to optimize aircraft operations.

Runway Capacity

A runway demand/capacity analysis was performed to project when the existing runway may reach saturation. Airports are generally permitted to apply for FAA funding for a second runway when the existing runway reaches 60% of its capacity. Another critical issue was the determination of the ultimate GSP airfield capacity so that the airport system could be balanced to optimize capital investment.

Table 5-1 presents the projected runway system capacity and saturation dates for GSP. Peak hour capacities are based on projected fleet mix, distribution of arrivals and departures, and the existing visual flight rule/instrument flight rule (VFR/IFR) conditions. Given the demand projections presented in Section 4, Traffic Projections, for passenger, cargo, and general aviation aircraft movements at GSP, the existing runway is projected to reach 60% of saturation between 2010 and 2015. Ultimate airfield capacity with two runways may be reached between 2040 and 2045.

<table>
<thead>
<tr>
<th>Runway Configuration</th>
<th>Peak Hour Capacity</th>
<th>Annual Capacity</th>
<th>Saturation Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>One runway</td>
<td>45</td>
<td>156,000</td>
<td>2015 – 2025</td>
</tr>
<tr>
<td>Two runways</td>
<td>90</td>
<td>312,000</td>
<td>2040 – 2050</td>
</tr>
</tbody>
</table>

Separation Between Runways

Under current FAA regulations, a 4,300-foot runway separation allows independent simultaneous operations under all flight conditions. Given that current site boundaries can accommodate such a separation and additional land is not needed, a 4,300-foot separation is recommended. This separation is sufficient to accommodate all other airport facilities as described in the remainder of this report.

Primary Runway Length

At ultimate development, existing Runway 4/22 will become Runway 4L/22R and will be considered the primary airport runway. This runway's length is 11,001 feet.

Given the 11,001-foot runway, the operational impacts on aircraft arrivals and departures were determined by using the design flight schedule, and applying such factors as the climate at GSP and the performance of aircraft and their engines.

This analysis determined that the existing 11,001-foot runway length will be able to accommodate, without any restriction, more than 99% of all aircraft departures and more than 95% of all cargo departures. The number of cargo operations impacted is considered to be an overstatement considering that the majority of cargo aircraft reach volume capacity before weight capacity.

Commercial factors, in addition to operational adequacy considerations, argue for and support GSP’s 11,001-foot runway. Throughout the US, cargo carriers have invested heavily in airports with runways that are considerably shorter than 11,001 feet.

Secondary Runway Length

At ultimate development, planned Runway 4R/22L will be considered the secondary runway at GSP. With a 4,300-foot separation, the airport currently has land available to build this runway up to a maximum of 8,200 feet in length.

Construction of the secondary runway will be triggered either by capacity constraints of the existing runway or by the decision of the Airport Commission to provide carriers with the added flexibility of simultaneous takeoffs and landings. While a runway longer than 8,200 feet would provide additional operational flexibility, it would result in the following consequences:

- Higher costs and need for additional land acquisition
- Need to realign Highway SC101
- Significant increase in the off-airport noise profile
- Potential negative community reaction

These issues outweigh the benefit of added flexibility, and it is recommended than an 8,200-foot runway length be adopted for the following scenario:

- For landings, the 8,200-foot runway will be able to accommodate practically all aircraft, thus alleviating pressure on the primary runway.
- For takeoffs, heavier aircraft will be directed to the 11,001-foot runway, while small passenger, commuter, and general aviation aircraft will use both runways.

Taxiways

Figure 5-1 illustrates the taxiing system as planned for ultimate development. Whenever possible, dual taxiways are used and loop systems created to minimize conflicts and provide alternative taxiing routes. Rapid exits, cross taxiways, and aircraft circulation are described below.
Rapid Exit Taxiways

To provide adequate capacity and improve runway operations, rapid exit taxiways should be provided for both runways. Runway 4L/22R already has two rapid exit taxiways in each landing direction (north and south) for a total of four rapid exits connecting to its single parallel taxiway. Runway 4R/22L will have at least one parallel taxiway, possibly two. With the first parallel taxiway built to the west, two rapid exit taxiways will be provided in each landing direction (north and south) for a total of four rapid exits. If a second parallel taxiway is built to the east of the runway, a similar configuration of four rapid exits will be provided.

Cross Taxiways

To provide access between the primary and secondary runways, two alternatives for cross taxiways were considered: a single pair of cross taxiways (see Figure 5-2) on the north side or dual pairs on each end.

Based on an analysis of impact on aircraft delay, a single pair of cross taxiways is recommended. Only a slight reduction in taxiing delay was achieved when a second pair of cross taxiways were used, as shown in Table 5-2. Such an improvement is not economically justified, especially given the additional capital cost and the need to significantly reconfigure the airport entrance road. At peak period, a 3-minute taxiing departure delay is considered acceptable by the aviation industry standards.

Taxing Patterns

Figure 5-3 depicts the suggested aircraft circulation routes to accommodate the runway operational scenario during the peak hour of the ultimate development.

During off-peak hours, the air traffic control tower will likely permit aircraft to use circulation patterns that minimize taxiing times and distances.

Figure 5-3 Aircraft Circulation during Peak Hour

Aprons

There are a number of aprons at GSP, most of which are located in the midfield area.

For passenger operations, a single apron surrounds the concourse building, providing 43 jet gates and six hardstands. On the west side of the concourse, a single Group IV apron edge taxiway provides circulation on the apron, while on the east side, Group III taxilanes provide access to gates. The total apron area is approximately 4.1 million square feet.

At ultimate development, two general aviation aprons will be provided. The existing apron adjacent to Runway 4L/22R will be maintained and expanded. A new apron will be built to the east of the existing G/A complex. Total G/A apron area will be approximately one million square feet.

Two cargo aprons will be located in the north area of the Midfield Zone, one adjacent to Runway 4L/22R and one adjacent to Runway 4R/22L. A single Group IV taxilane is provided for circulation on the aprons. Each apron is approximately 3 million square feet in area.

An aircraft maintenance apron, sized to accommodate B747's, is located west of the northern end of Runway 4L/22R in the north area of the West Zone. The total apron area, including the run-up pad, is 548,000 ft².

Air Traffic Control Tower

The existing air traffic control tower (ATCT) will be adequate for GSP with a one-runway operation. At the time a second runway is built, a new ATCT will be needed in order to satisfy line-of-sight requirements for controllers.

A location has been identified and land reserved for a new ATCT. A site central to the two runways is located east of the G/A complex and north of the long-term lot. The height and detailed layout of the tower will be the subject of a future study.

Air Traffic Control Radar

The FAA provides and operates air traffic surveillance radar at GSP. This radar is used to monitor and control traffic at GSP and also at other airports within approximately 50 miles of GSP.

The FAA proposes to replace GSP's existing ASR-8 radar with an upgraded ASR-11. Because the existing ASR-8 site will be displaced when GSP's second runway is constructed in the future, the new
radar will be installed on a different site that is compatible with the airport master plan.

The FAA has conducted a study of potential locations for the new ASR-11 and has concluded that two locations meet the official criteria of the National Airspace System plan. One of these potential locations is in the east portion of the airport, near Interstate 85 and Brockman-McClimon Road. A radar at this location, however, would adversely impact the optimum commercial or industrial development of this part of the airport east of the future second runway. The second potential location for the new radar is west of the existing runway, on the west side of the new SC80 (J. Verne Smith Parkway). Because this second potential location will not adversely affect any airport development, this location is designated as the site for the future ASR-11 radar.