



Chapter

6

**DEVELOPMENT
ALTERNATIVES**

DEVELOPMENT ALTERNATIVES

*for the Airport Master Plan
at Grand Canyon West Airport*

6.0 INTRODUCTION

The preceding discussion of facility needs provides the basis for developing alternative expansion concepts. The Facility Requirements Chapter provided recommended development for the majority of needs for the existing or some future airport for the Grand Canyon West area. This Chapter will focus on the logical alternatives that the Airport Planning Committee and the Hualapai Tribe should consider for the existing and future aviation needs of the region. As discussed in Chapter V, "Facility Requirements", Runway 17/35's length is less than the recommended length for the design aircraft. Chapter V also pointed out that the existing runway is in need of paving. This master plan study has identified five general alternatives, including the "Do nothing" alternative, which to an extent, could provide aviation facilities at the existing site.

6.0.1 Alternatives Considered And Further Analyzed In This Chapter

The following alternatives for providing aviation service to the Grand Canyon West area have been analyzed in this chapter and compared on their advantages, disadvantages, and feasibility. Figures 6-1 and 6-2 depict the alternatives presented in Alternatives "3 and 4" respectively.

- 1) Maintain the airport as it presently exists. ("Do nothing" alternative)
- 2) Pave the existing runway and existing apron in Phase I. Relocate the terminal and apron to the western side of the runway in Phase II. Extend runway 1,500 feet to the south in Phase III. Extend runway to the north 3,300 feet in Phase III (if necessary).
- 3) Pave existing runway, construct new apron, relocate terminal to western side of runway, and construct subbase for full length parallel taxiway in Phase I. Pave parallel taxiway and extend runway 1,500 feet to the south

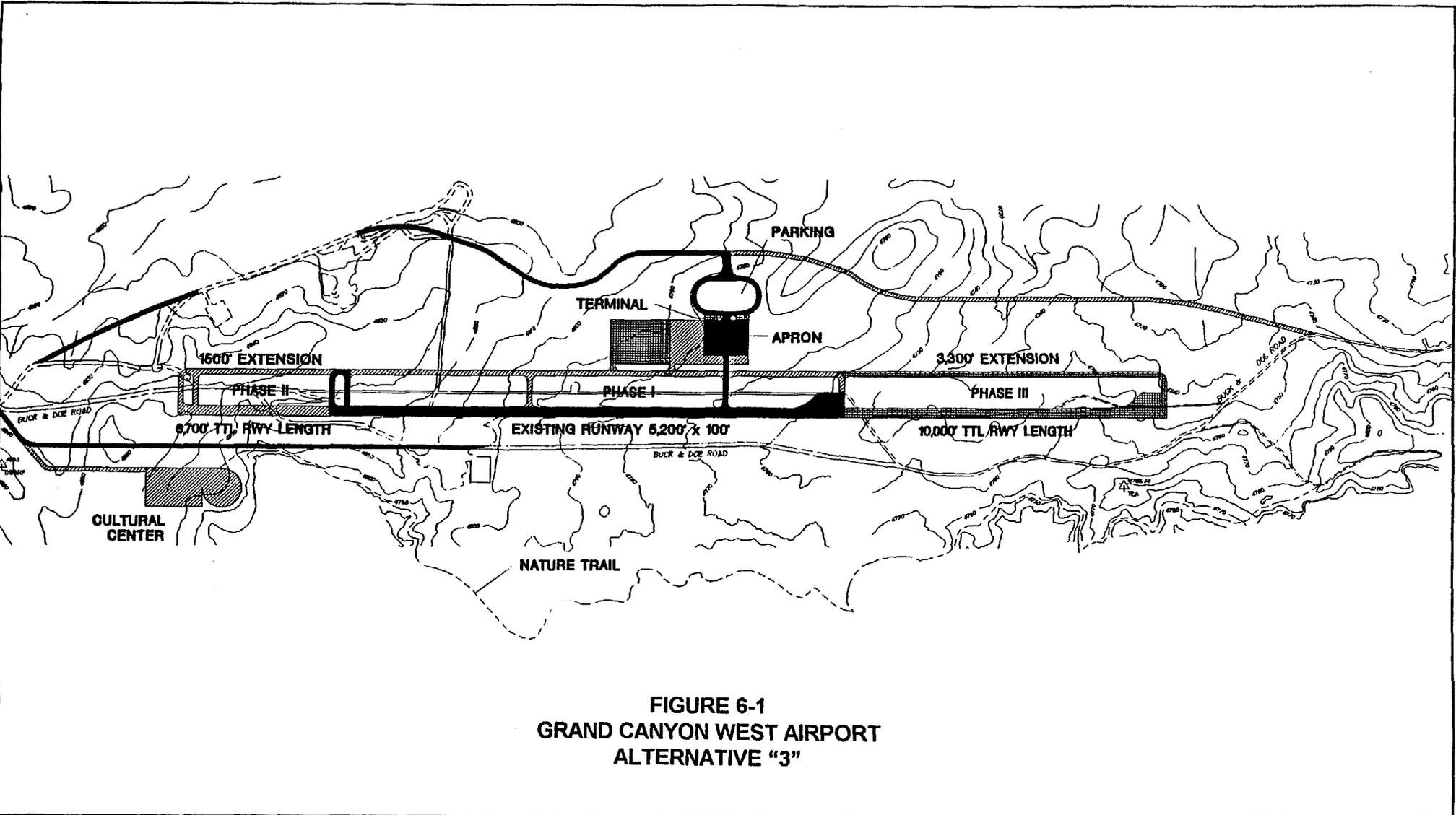
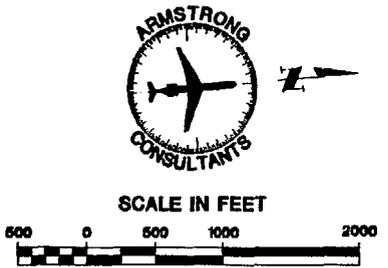


FIGURE 6-1
 GRAND CANYON WEST AIRPORT
 ALTERNATIVE "3"



LEGEND	
	PHASE I DEVELOPMENT
	PHASE II DEVELOPMENT
	PHASE III DEVELOPMENT
	EXISTING ROAD (UNIMPROVED)
	PROPOSED ROAD
	PROPOSED TRAIL
	EXISTING CONTOURS
	CONTROL POINT



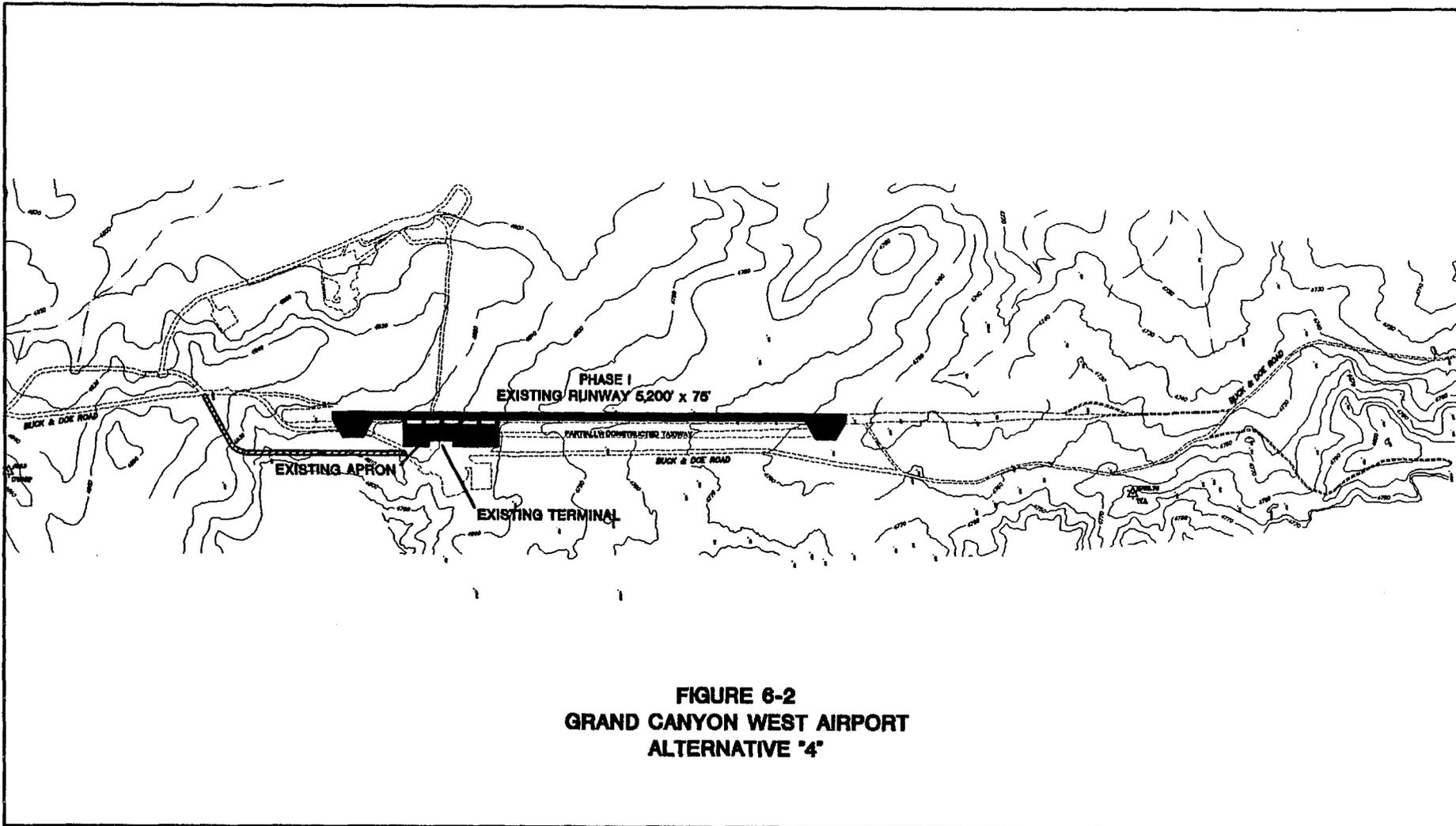
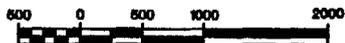


FIGURE 6-2
GRAND CANYON WEST AIRPORT
ALTERNATIVE "4"

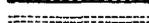
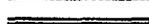


SCALE IN FEET



1" = 500'

PROPOSED PHASE I DEVELOPMENT

-  ASPHALT
-  GRAVEL
-  EXISTING ROAD (UNIMPROVED)
-  PROPOSED ROAD

in Phase II. Extend runway 3,300 feet to the north in Phase III (if necessary).

- 4) Pave the existing runway and existing apron in Phase I. Accomplish a Site Selection Study, Environmental Assessment, and develop a new airport site in Phase II. Relocate the airport in Phase III.
- 5) Accomplish a Site Selection Study, Environmental Assessment, and develop a new airport site in Phase I. Relocate airport in Phase II. (Operate existing airport in present condition in the interim.)

6.0.2 Alternatives Considered But Eliminated From Further Analysis

- 1) Develop airport on eastern side of runway.

The existing aircraft parking apron, terminal, and other facilities are located on the eastern side (Canyon Rim side) of the runway. Expanding these facilities at their existing location was reviewed. This area was found to be constrained and less desirable for the development of future airport facilities. The West Rim of the Grand Canyon is located at distances ranging from 400 feet to approximately 4,000 feet from the eastern edge of the runway. Terrain begins sloping down towards the rim at approximately 1,000 feet from the eastern runway edge. Set back distances prescribes in FAA Advisory Circular 150/5300-13 "Airport Design" combined with the terrain significantly limit the potential for development on the eastern side of the runway. Furthermore, the Canyon Rim offers several scenic overlooks and is an essential asset to the Hualapai Tour program. The area should be maintained in as pristine condition as possible. Future airport facility development on the western side of the runway is recommended.

- 2) Initial runway extension to the north versus the south.

In order to achieve the future recommended runway length of 6,700 feet, and the ultimate recommended runway length of 10,000 feet, a combination of northern and southern extensions were reviewed. First, rising terrain to the north prohibited an extension exclusively to the north which would meet the recommended runway lengths without a displaced threshold. Second, an initial extension of 1,500 feet to the north, followed by a simultaneous runway extension of 1,500 feet to the south and 1,800 feet to the north would meet the ultimate recommended runway length; however, this scenario is not the most efficient. Runway ends would be impacted three times, each of which would require the relocation of visual aids and the remarking of the runway end. Whereas, in Alternatives "2 and 3", listed in Section 6.0.1, runway ends are only impacted twice to achieve the same ultimate runway length, with the relocation of visual aids and runway end remarking occurring only twice.

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- 3) Abandon existing airport and provide service from another airport in the region.

The Grand Canyon West Airport was constructed primarily to serve as a destination point for tourists visiting the West Rim of the Grand Canyon, and to serve as an origin for ground based Indian guided tours of the scenic overlooks along the Canyon Rim. The alternative of providing aviation services at another airport is considered impractical due to the lack of other airports close enough to the West Rim which possess adequate facilities to meet the combined aviation and tourism needs. The nearest airports, providing facilities to accommodate the aircraft activity that takes place at the Grand Canyon West Airport are located at the Hualapai Tribal Airstrip (an asphalt landing strip with no facilities, 45 surface miles away, over unimproved roads), and Kingman (a commercial service airport, 50 surface miles away, partially over unimproved roads).

Providing service from another airport would not be economical or feasible. Service from these locations would result in increased time, energy, and additional travel expense that would otherwise be unnecessary. This alternative ignores the existing problem of providing safe and efficient service to the Grand Canyon West area.

The following narrative concentrates on the development of facilities needed to meet the existing and future demand from general aviation and commuter aircraft. Since the airport is located on the Hualapai Reservation, land acquisition costs are not applicable; however, additional Hualapai Reservation land would be converted to airport use for any airport expansion or relocation. Estimated costs for the selected alternative are included in the Capital Improvement Plan (CIP) found in Chapter VIII.

6.1 ALTERNATIVE "1"

Maintain the airport as it presently exists.

The airport is unique for the area in that it serves as a destination point for tourists visiting the West Rim of the Grand Canyon. Aircraft operations occur on a regular and consistent basis and are projected to continue for the foreseeable future. The existing dirt/gravel runway is a hazard to aircraft operations and deters additional aircraft from using the airport, even though significant passenger demand exists. This alternative would not accomplish the Tribe's desire to attract and accommodate the design aircraft fleet in an effort to increase tourism and economic development of the Grand Canyon West area.

The major advantages to this alternative are:

- Reduces the amount of funding by the Hualapai Tribe for the airport, since no major capital improvement projects would occur.
- No additional land would be needed from the Hualapai Indian Reservation.
- Eliminates the potential environmental impacts associated with airport development.

The major disadvantages to this alternative are:

- Since surfaces may not be maintained appropriately, it may increase the liability to the Hualapai Tribe as a result of a stronger potential for mishaps occurring at the airport.
- Significantly reduces the ability of the Grand Canyon West Airport to meet the present and future aircraft demand.
- Significantly constrains the generation of additional Grand Canyon West tourism revenues.

6.2 ALTERNATIVE "2"

Pave the existing runway and existing apron in Phase I. Relocate the terminal and apron to the western side of the runway in Phase II. Extend runway 1,500 feet to the south in Phase III. Extend runway to the north 3,300 feet in Phase III (if necessary).

This alternative would involve the paving of the existing runway and existing aircraft parking apron located on the eastern side of the runway. Construction of the new apron and relocation on the terminal building and other facilities to the western side of the runway would be delayed until Phase II. A full length parallel taxiway would be constructed in Phase II. A runway extension of 1,500 feet to the south would be accomplished based on aircraft operations and demand late in Phase II or in Phase III. If commercial service jet operations are eventually justified and desired at the airport, a final runway extension of 3,300 feet to the north would be accomplished.

The major advantages to this alternative are:

- Spreads the capital funding requirements over a longer time period, thus reducing the short term capital expense to the Hualapai Tribe.
- Provides a paved runway and apron for aircraft operations.
- Provides an airport location within close proximity to the proposed Grand Canyon West Resort.

The major disadvantages to this alternative are:

- Existing apron would be constrained to meeting the FAA Safety and Design Standards for exclusively small, Category I aircraft. (Due to the proximity of the runway and apron to the existing terminal building.)
- Involves the duplication of apron paving costs with the paving of the existing apron on the eastern side of the runway, then the construction of a new apron on the western side of the runway.

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- The airport would be closed during the paving of the existing runway.
 - Potential negative effect on overall tourist experience in the area due to aircraft noise.

6.3 ALTERNATIVE “3”

Pave existing runway, construct new apron, relocate terminal to western side of runway, and construct subbase for full length parallel taxiway in Phase I. Pave parallel taxiway and extend runway 1,500 feet to the south in Phase II. Extend runway 3,300 feet to the north in Phase III (if necessary).

This alternative would involve the paving of the existing runway and the construction of a new apron on the western side of the runway in Phase I. The subbase for the parallel taxiway would be constructed in Phase I prior to commencing the paving of the runway. This would allow for aircraft operations to occur on the compacted taxiway surface while the runway is not in service. The existing dirt/gravel apron on the eastern side of the runway would be abandoned. The terminal building and other airport facilities would be relocated to the western side of the runway in Phase I. A runway extension of 1,500 feet to the south would be accomplished based on aircraft operations and demand in Phase II. If commercial service jet operations are eventually justified and desired at the airport, an ultimate runway extension of 3,300 feet to the north would be accomplished.

The major advantages for this alternative are:

- Provides a paved runway and apron with no FAA Safety and Design Standard constraints.
- The airport could remain open during the construction process.
- Maximizes the improvements to the airport in Phase I.
- Provides an airport location within close proximity to the proposed Grand Canyon West Resort.

The major disadvantages to this alternative are:

- Requires more capital investment in Phase I than Alternative “2”.
- Requires additional Hualapai Indian Reservation land to be converted to airport use.
- Potential negative effect on overall tourist experience in the area due to aircraft noise.

6.4 ALTERNATIVE “4”

Pave the existing runway and existing apron in Phase I. Accomplish a Site Selection Study, Environmental Assessment, and develop a new airport site in Phase II. Relocate the airport in Phase III.

This alternative would involve accomplishing the minimum improvements necessary at the airport to provide an acceptable aircraft operating surface until a Site Selection Study is accomplished and the airport is relocated. Paving at the

existing site would be limited to the existing runway and aircraft parking apron at a strength of 12,500 pounds Single Wheel Gear. This pavement could be strengthened at a later time to support heavier aircraft.

Criteria involved in the selection and development of a new airport site, which would also be involved in this alternative, are discussed in Alternative "5" below.

The airfield pavements installed at the existing site in Phase I could be rotomilled and used as base course for the parallel taxiway at the new site. This would aid in reducing the loss of capital investment at the existing site.

The major advantages to this alternative are:

- Provides a paved runway and apron which allows for increased aircraft operations and tourism revenues while alternative airport sites are being studied.
- There may be several areas on the Reservation that would be suitable for an airport.
- A new site would minimize or eliminate noise exposure to tourists at the Grand Canyon West Rim once the airport is relocated.

The major disadvantages to this alternative are:

- The FAA is not likely to fund improvements to the existing airport site *and* fund the development of an airport at a new site (to include a Site Selection Study, Environmental Assessment, and Construction). Sponsor and/or private funding, or a reimbursement arrangement to the FAA, would be needed to improve the existing site.
- The loss of the capital investment (if any) at the existing airport.
- Requires approximately 300 acres of Hualapai Indian Reservation land to be converted to airport use for the new airport site.
- Possible prolonged negotiations for utility and access easements, land use conversion, and environmental studies.
- Utility infrastructure would be required at two separate locations (at the new airport site and at the proposed resort site near the Grand Canyon West Rim), whereas utility infrastructure developed at the existing site would serve both the airport in its current location and the proposed resort complex.

6.5 ALTERNATIVE "5"

Accomplish a Site Selection Study, Environmental Assessment, and develop a new airport site in Phase I. Relocate airport in Phase II. (Operate existing airport in present condition in the interim.)

This alternative would allow the Hualapai Tribe to consider the possible relocation of the Grand Canyon West Airport to a new site. The existing Grand Canyon West Airport would be operated in its present condition until a new site is selected

and developed if this alternative were chosen. A new airport would require the construction of needed infrastructure such as utility lines and access roads to the selected site. At the minimum, approximately 190 acres would need to be acquired to construct a runway/taxiway system which would have an initial length of 6,700 feet with aircraft parking aprons and a Terminal facility. Approximately 110 additional acres would need to be acquired for an ultimate runway length of 10,000 feet. While the acreage discussed is the minimum needed to construct a new airport, it does include buffers to eliminate land use incompatibilities.

Normally the construction of a new runway is completed in a phased development, with the initial runway and parallel taxiway length being 6,700 feet and the final phase of development being the construction of an additional 3,300 feet.

The estimated costs for this alternative are based on a hypothetical site which meets grading criteria, crosswind coverage, environmental considerations, and FAR Part 77 criteria. A Site Selection Study of several potential sites would be required should this option be implemented.

The major advantages to this alternative are:

- There may be several areas on the Hualapai Reservation which could provide an airport site which would allow *unencumbered* development.
- A new site would eventually minimize or eliminate noise exposure to tourists at the Grand Canyon West Rim.
- The Site Selection Study, Environmental Assessment, and construction of the new airport may be eligible for FAA funding.

The major disadvantages to this alternative are:

- Constrains aircraft operations and tourism revenues at the unimproved existing site during the Site Selection Study, Environmental Assessment/Impact Statement, and construction of new airport.
- Approximately 300 acres of additional Hualapai Indian Reservation land would be converted to airport use.
- Possible prolonged negotiations for utility and access easements, land use conversion, and environmental studies.
- Utility infrastructure would be required at two separate locations (at the new site, and at the proposed resort site near the Canyon Rim), whereas utility infrastructure developed at the existing site would serve both the airport and the resort.

6.6 SELECTION OF THE PREFERRED ALTERNATIVE

The preferred alternative selected for development of the Grand Canyon West Airport is **Alternative "4"**.

The alternatives for development presented in this Chapter were discussed in an Airport Technical Advisory Committee (ATAC) and in a Tribal Interdisciplinary Team (ID Team) meeting. The alternative recommended by the consultant was

Alternative "3", which maximized the airport improvements to the existing site in Phase I. Information from these discussions were presented to the Tribal Council for selection. The Tribal Council selected Alternative "4" as the preferred development alternative.

Temporary paving (to meet the 5 year demand level) of the existing runway and apron surface is desired by the Tribe to provide a suitable runway surface for aircraft operations and increase tourism revenues; however, significant concern was raised within the Tribal Committees over the long term development goals of the airport and the proposed resort complex at the existing site. Rather than commit to long term airport development at the existing site, the Tribe elected to accomplish the minimal paving necessary at the existing location to support aircraft operations for a five year time frame, and to concurrently accomplish a Site Selection Study to evaluate alternative sites on the Reservation for long term airport development.

In light of the intention of the Hualapai Tribe to accomplish a Site Selection Study, the temporary paving of the existing site would not be eligible for FAA funding. The FAA will not fund development of the existing site *and* development of an alternative site in the future.

6.7 SUMMARY

The Grand Canyon West Airport is a general aviation facility serving as a destination point for tourists visiting the South Rim of the Grand Canyon and is an important revenue source for the Hualapai Tribe. The demands being placed on the airport are creating a need for safer and more efficient facilities for its users. The most pressing need for the airport is to pave the existing runway surface and eliminate the potential damage to aircraft operating at the airport. The second most pressing need is to develop a facility, either in the existing location or an alternate location, that meets FAA Safety and Design Standards and with sufficient runway length to accommodate the forecasted fleet mix of aircraft. A future runway length of 6,700 feet and an ultimate runway length of 10,000 feet at an appropriate airport site are recommended to meet this need. A runway/taxiway separation of 400 feet and adequate safety areas are required to meet FAA Safety and Design Standards

The following Chapters of this study, which include an Environmental Overview, Capital Improvement Program Cost Estimates, a Financial Plan, and the Airport Layout Plan Drawings, incorporate the development items necessary to accomplish Alternative "4" with respect to the existing site only. The proposed Site Selection Study and subsequent Environmental Assessment/Impact Statement would evaluate all of the proposed alternative sites and compare them with the existing site.