



Airport Master Plan

Brown Field
Municipal Airport

**Working Paper 5—
Alternatives
Development,
Evaluation and
Selection**

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Prepared by:



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5.1 Introduction

An effective combination of airside (airfield) and landside planning is essential to the successful development of an airport. After the evaluation of existing conditions, determination and FAA approval of forecasts, and identifying facility requirements for an airport, the next step in the master plan process involves developing a series of alternative solutions to satisfy the existing and future demand as determined by the preceding steps. In this Working Paper, alternative plans for proposed development at Brown Municipal Airport are presented and evaluated, ultimately producing a preferred alternative for both the airside and landside components of the airport.

Objective of the Analysis

The overall objective of the alternatives analysis is to evaluate the best ways to implement the necessary facility requirements to safely and effectively meet FAA safety, capacity, and design standards and accommodate projected aviation demand over the planning period. In addition to fulfilling this primary objective, the following operational and economic objectives of the Airport were also considered in the development and evaluation of alternatives:

- Become financially self-sufficient
- Encourage airport business growth and opportunities
- Be customer focused both internally and externally
- Maximize the City's return on investment (ROI) for Airport property

Alternatives Approach

The runway and taxiway system and associated airspace and safety areas at the Airport encompasses the greatest land and imaginary surface areas required to meet FAA safety and design standards. Thus, to ensure that the FAA safety, capacity, and design standards would be met airside alternatives were developed separately. Development of landside alternatives occurred separately, but concurrently. Through thoughtful examination and consideration, five alternative scenarios were formed for the landside components of the Airport and three scenarios were formed for the airside components. These initial draft alternative scenarios were then presented to the PAC and public for input and comment. Collection and interpretation of input gathered from the PAC and public ultimately indicated that no single proposed alternative contained all of the preferred airside and landside components desired from the PAC and the public. As such, adjustments were made to each proposed alternative scenario. Next, evaluation criteria were created using guidance found in FAA's AC 150/5070-6B, *Airport Master Plans*, to rate each alternative, with the goal of identifying a recommended airside and landside alternative. Based on the outcome of the evaluation and ranking process, a preferred airside and landside alternative scenario emerged; the preferred airside and landside scenario were then combined into one recommended preferred development alternative for the Airport. This recommended combined alternative was presented to the PAC and the City for final review and consensus.

5.2 Airfield Facility Priorities

Airfield facilities are, by their very nature, the focal point of an airport complex. They are the facilities that directly support operating aircraft such as runways, taxiways, and navigational aids. Because of their role, and the fact that they occupy a great deal of the airport's property, airfield facility needs are often the most critical factor in the determination of viable airport development alternatives. The runway system requires the greatest commitment of land area and is often the greatest influence on the identification and development of other airport facilities.

The potential need for physical expansion of an airport to accommodate airfield development is the primary factor that determines long-term development. The runway and taxiway system directly affects the efficiency of aircraft movements both on the ground and in the surrounding airspace. It also may limit the ability of the Airport to handle certain aircraft.

Required Airfield Improvements

The airfield's existing configuration accommodates the existing and future aircraft fleet mix and traffic levels with the use of two parallel bi-directional runways and associated taxiways. Working Paper 3 identified the following areas for improvement on the airfield to mitigate safety issues and conform to FAA design criteria as set forth in FAA AC 150/5300-13A, *Airport Design*.

Taxiway A, Runway 26R Interface

Taxiway to runway interfaces which provide wide expanses of pavement are discouraged by the FAA. It is recommended to reconfigure the Taxiway A, Runway 26 interface to standardize lighting, signage, and pavement.

Taxiway C, Runway 26L Interface

An acute angle taxiway should never be used at a runway entrance or crossing points. Right angle intersections, both between taxiways and between taxiways and runways, provide the best visibility to the left and right for a pilot. Therefore, it is recommended that Taxiway C between Runway 26L and Taxiway A be reconfigured to a 90-degree runway to taxiway interface.

Proposed Airfield Improvements

Beyond the required improvements to the existing taxiway geometry described above, additional airfield modifications should be planned to fulfill the ultimate development goals of the airport. While these ultimate airfield development initiatives may not be justified for immediate implementation, planning for their eventual implementation serves to preserve the required land area for such improvements and guides the creation of development concepts for the other functional areas of the airport property.

Hold Bays

Proposed hold bays will allow aircraft to safely perform pre-flight procedures without causing taxiway congestion. Ideally, run-up areas should be associated with each runway end to allow aircraft to safely perform a run-up clear of taxiing aircraft. These run-up areas should have appropriate markings and depth to ensure the safe operation of aircraft entering and exiting the hold area.

Additional Runway 8L/26R to Taxiway A Connection

To enhance capacity and increase safety at SDM, an additional taxiway connection between Runway 8L/26R and Taxiway A is proposed. This will reduce the number of runway crossings at the Runway 8R threshold, as well as reduce runway occupancy time on Runway 8L/26R.

Proposed Instrument Approach Procedures

An evaluation of the runway system was conducted as it relates to instrument approach procedures (IAP). The analysis consisted of two separate evaluations, looking 1) at the feasibility of adding an IAP to Runway 26R and 2) reviewing the controlling obstacles for Runway 8L's published IAPs to determine the feasibility of reducing the existing approach minimums. A brief description of each evaluation is described below, with the full report analysis found in **Appendix B**.

Proposed Runway 26R Instrument Approach

An in-depth FAA Terminal Instrument Procedures (TERPS) evaluation determined that an area navigation (RNAV) GPS procedure with lateral navigation (LNAV) to Runway 26R appears viable, albeit with approach minimums that exceed visual flight rule conditions. Nonetheless, the availability of this instrument approach provides positive course guidance during marginal weather for aircraft arriving from areas east of the Airport and serves as a valuable enhancement to flight safety that should be pursued with the FAA Flight Procedures Office.

Runway 8L Controlling Obstacle Review

Based on the evaluation, the current approach minimums are very near the lowest that can be authorized for the existing type of non-precision instrument approach and is viewed to provide an adequate level of service to the Airport's users.

5.3 Airside Alternatives Development

The City of San Diego has a defined vision for the future of the Airport. Based on this vision, input from the public, and the considerations described, several airside development alternatives emerged. Three separate airfield alternative concepts were developed based on identified airfield improvements. Similarities exist between the three airfield alternatives, but differences can be seen regarding the hold bays and taxiway development. These alternatives are described in more detail in the following paragraphs.

Alternative 1 – No Action

This alternative involves maintaining the existing layout, size, and configuration of all associated airside facilities over the course of the planning period. **Figure 5.1** depicts the No Action alternative.

Alternative 2 – Airfield Design Deficiencies

This alternative reflects airport improvements required to mitigate existing airport design deficiencies. This is proposed to be completed through measures such as pavement removal, reconfiguration, and replacement. These improvements are intended to address design deficiencies with the least amount of financial and environmental impact to the City. This includes minimizing the use of undisturbed land or land already leased to tenants. The new taxiway pavement geometry is designed according to FAA AC 150/5300-13A, Change 1, *Airport Design*. Components of this alternative are depicted in **Figure 5.2** and include the following features:

- **Taxiway A Reconfiguration** – This taxiway reconfiguration proposes the elimination of the wide expanse of pavement present at Taxiway A and the 26R threshold. In this reconfiguration it also proposed to decouple the taxiway edge from the blast pad pavement for Runway 26L.
- **Taxiway C Reconfiguration** – Reconfiguration of Taxiway C proposed between the 28L threshold and Taxiway A. This 90-degree reconfiguration will remove the inadvisable acute angled taxiway which currently provides access to the Runway 26L threshold.
- **Additional Taxiway Connection** – Alternative 2 proposes an additional taxiway connection between Runway 8L/26R and Taxiway A approximately 1,300 feet from the Runway 8L threshold to reduce runway 8R/26L crossings, and reduce runway occupancy time for Runway 8L/26R.

Alternative 3 – Hold Bay Capacity

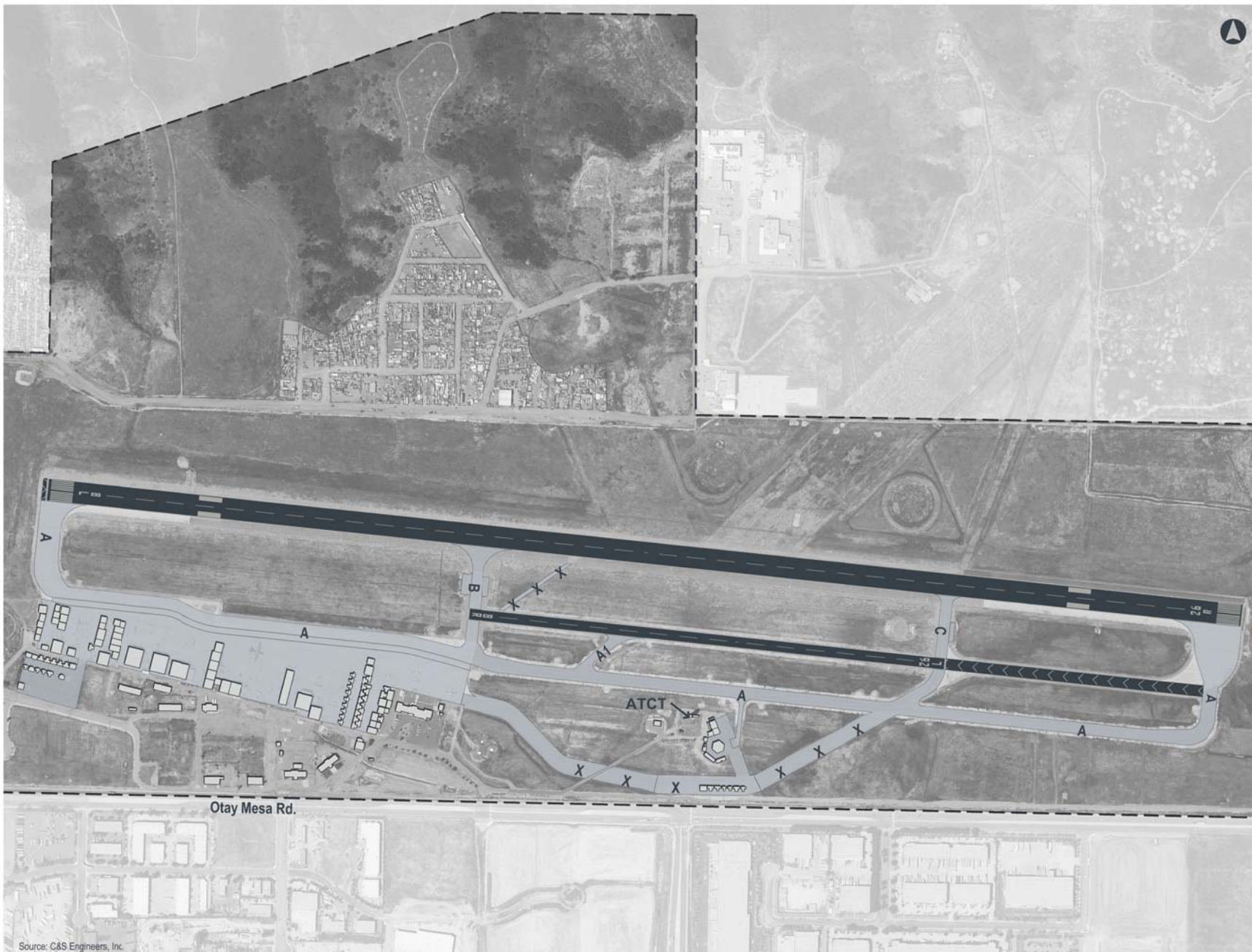
This alternative presents similar design deficiency options as presented in Alternative 2, as well as options for hold bay and run-up areas. These options will meet the required demand and provide additional run-up area and bypass capacity. Components of this alternative are depicted in **Figure 5.3** and include the following characteristics:

- **Runway 26R, Taxiway A Hold Bay** – Proposed addition of a 9,780-square yard run-up area capable of accommodating four Beechcraft Baron 58 aircraft, with a proposed depth capable of accommodating a C-130.
- **Runway 26L, Taxiway A Hold Bay** – Proposed addition of a 6,671-square yard run-up area, adjacent to the Runway 26L threshold, and south of Taxiway A, capable of accommodating three Beechcraft Baron 58 aircraft.
- **Runway 8L, Taxiway A Hold Bay** – Proposed addition of a 6,671-square yard run-up area capable of accommodating Beechcraft Baron 58 aircraft north of Taxiway A.
- **Reactivation of Abandoned Taxiway Pavement** – To allow for appropriate flow of traffic in and out of the EAA leasehold, a reactivation of taxiway pavement was proposed to the east.

Figure 5.1
Airside/Landside
Alternative 1
No Action

Legend

- Property Line
- Existing Buildings
- Existing Airfield Pavement

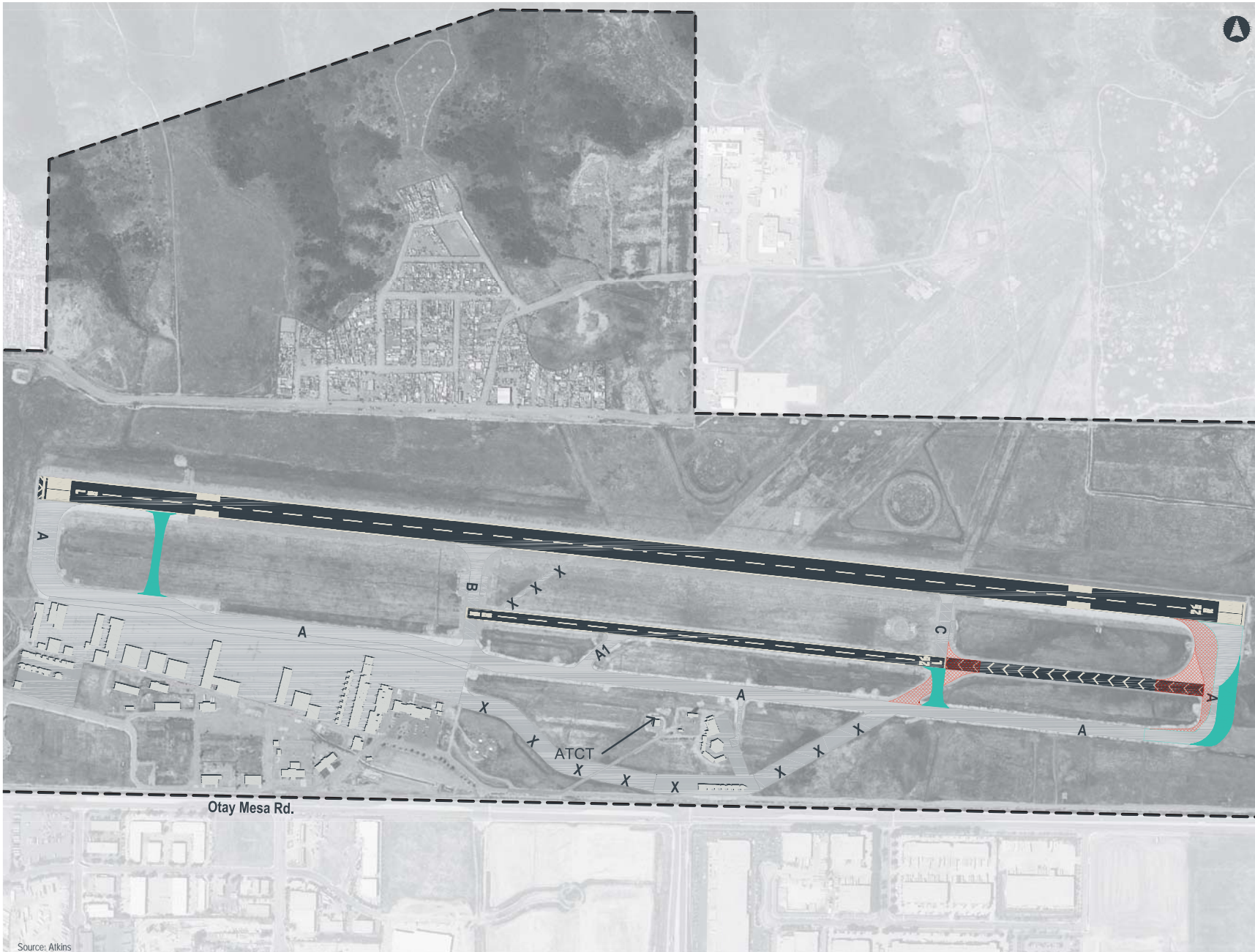


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Figure 5.2
Airside Alternative 2
Airfield Design
Deficiencies

Legend

-  Property Line
-  Existing Buildings
-  Existing Airfield Pavement
-  Proposed Airfield Pavement
-  Proposed Demolition



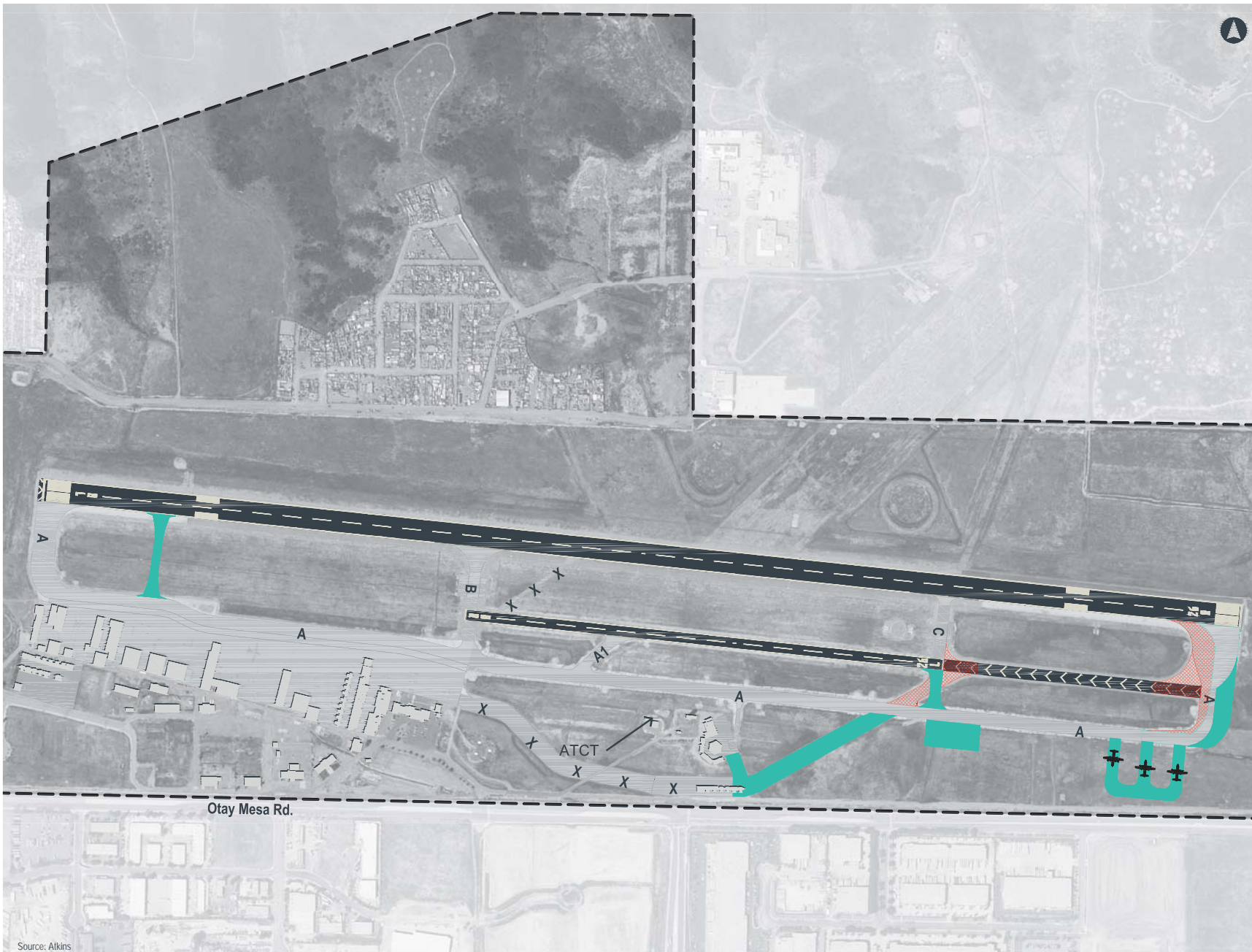
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Figure 5.3
Airside Alternative 3
Hold Bay Capacity

Legend

-  Property Line
-  Existing Buildings
-  Existing Airfield Pavement
-  Proposed Airfield Pavement
-  Proposed Demolition



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5.4 Landside Facility Priorities and Location Options

Landside and select support facilities are integral components of a well-functioning airport. Thus the careful and insightful planning of proposed future development in these areas is essential. The previous section recognized the areas of the airfield where enhancements are needed and presented various alternatives correcting non-standard design elements or improving the overall capacity and safety of the airfield configuration. Similarly, this section provides various alternatives for several key components associated with landside facilities. As a result of the *Facility Requirements* needs assessment and outreach with the PAC and public users of the Airport, the top priorities needed from a landside perspective were identified and include:

- 1) Additional hangar storage,
- 2) Additional U.S. Customs aircraft parking apron,
- 3) Updated and larger terminal building, and
- 4) A consolidated maintenance facility.

Hangars

Although the demand for additional aircraft storage hangars is not currently critical, the hangar space demand analysis, completed in the *Facility Requirements* Working Paper, shows a shortage of T-hangars and small single-aircraft box hangars in the 20-year planning period. It was determined that the Airport would be deficient by approximately 85,400 square feet, or roughly 61 T-hangars by 2037. It should be noted this is the minimum amount of these hangar types recommended based on the projected demand over the planning period; however, the option to construct additional hangars beyond the forecasted demand is justified if the interest and financial support exist. Therefore, when identifying areas of the airfield to potentially construct the additional hangars, consideration was made as to the amount of space that would ultimately be needed if additional hangars were desired within the planning period and beyond. Designating a larger area for hangar development ensures the space is preserved for similar future development, which adds to the overall cohesiveness of the airfield layout.

Proposed Hangar Locations

Based upon the existing configuration of the airfield, along with input from the City, PAC, and public, the identification of four areas on the airfield emerged as potential locations for the construction of additional T- and single-aircraft box hangars (see **Figure 5.4**). Designations assigned to the areas are:

- Hangar Site 1 – West of Main Apron
- Hangar Site 2 – Sikorsky Street
- Hangar Site 3 – Terminal Area
- Hangar Site 4 – East of Main Apron
- Hangar Site 5 – EAA Leasehold

The initial analysis examined a number of potential sites. These areas were ultimately narrowed down to the five potential locations described above. For example, all hangar development to the north of the runway was excluded due to the absence of infrastructure and aviation support facilities on this side of the airfield. The remaining five locations represent the most logical areas based on the existing airfield configuration. For comparative purposes, **Table 5.1** illustrates the considerations of each potential hangar site.

Table 5.1 – Hangar Site Considerations

Site Designation	Location Considerations
Site 1 – West of Main Apron	<ul style="list-style-type: none"> • Adequate space for the hangars needed for the 20-year planning period • Ample space to expand further to the west if demand increases • Far from the terminal • Displaces the small parking area currently located on the west end of the apron • Requires realignment of Fairchild St. • Does not conflict with MAP
Site 2 – Sikorsky Street	<ul style="list-style-type: none"> • Adequate space for the hangars needed for the 20-year planning period • Ample space to expand further to the east if demand increases • Requires an additional taxilane to cross Curran St., or requires the closing or partial closing of Curran St. • Requires putting a taxilane through one of the leaseholds • Not connected to the current apron south of Curran St. because it has not been developed all the way to the east border of the leasehold • Partially conflicts with MAP
Site 3 – Terminal Area	<ul style="list-style-type: none"> • Inadequate space for the hangars needed for the 20-year planning period • Close to the terminal and taxiways • Further expansion limited depending on terminal relocation and Continental St. • The old tower is considered historically significant and would need to be relocated • Partially conflicts with MAP
Site 4 – East of Main Apron	<ul style="list-style-type: none"> • Adequate space for the hangars needed for the 20-year planning period • Ample space to expand further to the east if demand increases, this expansion lends towards an eventual bridge of the two aprons • Close to the terminal and taxiways • Hangar development could affect the Tower’s line of site • Prevents re-opening of Taxiway C • Conflicts with MAP
Site 5 – EAA Leasehold	<ul style="list-style-type: none"> • Location not suitable to provide the full number of hangars needed for the 20-year planning period due to its distance from the terminal and the FBOs • Meets the stated need for additional hangar storage by EAA • Close to the taxiway • The eastern row of hangars would conflict with MAP

Source: C&S Engineers, Inc., 2018

U.S. Customs Aircraft Parking Apron

Based on analysis performed in the *Facility Requirements Working Paper*, the existing apron space for based and transient aircraft, not requiring the services of the U.S. Customs at the Airport, is adequate to accommodate the 20-year planning period. However, according to the Airport, the existing 1,800 square yards of aircraft parking apron designated for U.S. Customs services is not large enough to handle the current parking demand during peak activity. Often, aircraft waiting to be cleared by Customs must wait on nearby taxiways and/or other portions of the airfield far removed from the designated area. This creates issues with the airfield capacity and efficiency, as well as poses potential safety and security risks to the airfield. Therefore, it was recommended that the existing apron be reconfigured to include more parking space either by absorbing more of the adjacent transient apron or by constructing additional apron.

Proposed U.S. Customs Aircraft Parking Apron Locations

Much like the potential hangar sites discussion, several sites on the airfield were examined to identify the most optimal location for additional U.S. Customs designated aircraft parking. The optimal location for U.S. Customs aircraft parking apron is easily accessible from the primary taxiway and adjacent to, or very near, the terminal and/or FBO facilities. Today at SDM, the U.S. Customs designated apron is conveniently located in front of the terminal building and the adjacent U.S. Customs building, as well as one FBO onsite. The desire to preserve the convenience of the current location ultimately led to few options for consideration in expanding their apron area. **Figure 5.5** depicts the proposed U.S. Customs apron locations; these areas have been designated as follows:

- U.S. Customs Apron Site 1 – West Itinerant Apron
- U.S. Customs Apron Site 2 – East of Main Apron

In addition, the U.S. Customs apron needs to be directly accessible by the U.S. Customs offices. Again, for comparative purposes, **Table 5.2** demonstrates the considerations of each potential U.S. Customs apron site.

Table 5.2 – U.S. Customs Apron Comparison

Site Designation	Location Considerations
Site 1 – West Itinerant Apron	<ul style="list-style-type: none"> • Eliminates all City operated transient apron, this apron would be leased to U.S. Customs instead • Reduces transient apron space for aircraft not requiring the U.S. Customs • Provides limited additional space for U.S. Customs • Not enough space for a taxilane between rows of tie-downs • Does not conflict with MAP
Site 2 – East of Main Apron	<ul style="list-style-type: none"> • Requires construction of new apron area • Provides ample additional space for U.S. Customs • Enough space for a taxilane between rows of tie-downs • Interfered with reopening of Taxiway C • Conflicts with MAP

Source: C&S Engineers, Inc., 2018

The next section addresses the terminal building alternatives including the inclusion of a U.S. Customs office.

Terminal and Offices

The top priority of the Airport is to address the aging and confined space of the existing terminal building. Currently, the terminal building houses City of San Diego staff and terminal area, offices for the San Diego Jet Center, and the Landing Strip restaurant.

The existing City terminal building is approximately 12,600 square feet. Findings of the terminal space analysis completed within the *Facility Requirements* Working Paper indicates the existing size of the facility is adequate over the 20-year planning period. The onsite inventory, supported by Airport management input, proved a number of age, environmental, and space issues exist. Concerns included cracks in the foundation, hazardous material in the structure, pest infestation, and inadequate space for airport personnel operations. As a result, the terminal needs to be rehabilitated and expanded or a new terminal needs to be constructed.

As further explained in the *Ancillary Support Structures* section below, the Airport would benefit from a consolidated maintenance facility, which could be incorporated into the terminal and office structures. In addition, U.S. Customs currently occupies a small building adjacent to the terminal, but they have expressed the need for more space. To provide enough space for U.S. Customs, either their current building would need an expansion, or they would need to relocate. This relocation could also be incorporated into the terminal and office structures. Therefore, terminal area options need to consider all five elements: City of San Diego staff and terminal area, San Diego Jet Center, the Landing Strip, U.S. Customs, and consolidated maintenance.

Proposed Terminal and Offices Locations

Examination of a number of potential terminal sites occurred. For example, relocating the terminal towards the center and south of the main apron was discussed, but dismissed due to its distance from the City-owned transient apron. Discussions ultimately led to the narrowing down of potential locations to the three listed below; these areas have been designated as follows:

- Terminal and Offices Site 1 – Renovate and Expand
- Terminal and Offices Site 2 – New Building South
- Terminal and Offices Site 3 – New Building East

Table 5.3 describes the considerations taken into account when assessing potential locations for the terminal and offices.

Table 5.3 – Terminal and Offices Site Comparison

Site Designation	Location Considerations
Site 1 – Renovate and Expand	<ul style="list-style-type: none"> • Could incorporate all five elements • Close to the San Diego Jet Center FBO • Directly behind the U.S. Customs Apron and itinerant parking • Condition of existing building is poor and would require potentially expensive renovation and future maintenance • Entire site previously developed • Does not conflict with MAP
Site 2 – New Building South	<ul style="list-style-type: none"> • Could incorporate all five elements • Separated from U.S. Customs Apron and itinerant parking • Requires a new parking lot • Development would likely effect the drainage ditch • Opens up additional hangar and apron space close to the taxiway • Previously undeveloped • Conflicts with MAP
Site 3 – New Building East	<ul style="list-style-type: none"> • Could incorporate all five elements • Close to the San Diego Jet Center FBO • Directly behind the U.S. Customs Apron and itinerant parking • Could make use of existing parking area • Portions of site previously developed • Conflicts with MAP

Source: C&S Engineers, Inc., 2018

More than one building/site can be used to meet the Airport’s terminal and office needs. Furthermore, the Terminal and Offices sites do not dictate the scale of the expansion or building to allow for the inclusion of any combination of the five discussed elements. A number of considerations apply to determining what elements will be located at the site or sites. These considerations are discussed in **Table 5.4.**

Table 5.4 – Element Considerations

Site Designation	Location Considerations
City of San Diego Terminal and Offices	<ul style="list-style-type: none"> • Locate near any City itinerant aircraft parking • Locate close to the Airport main entrance • Public-facing terminal area needs to be accessible and welcoming to the public • Provide vehicle parking
San Diego Jet Center	<ul style="list-style-type: none"> • Locate near San Diego Jet Center itinerant apron • Provide vehicle parking • Public-facing
Landing Strip	<ul style="list-style-type: none"> • Public-facing • Provide ample vehicle parking • Does not need to be located adjacent to the apron or hangars • Could benefit from a view of the runway • Could benefit from co-location with other tenants
U.S. Customs	<ul style="list-style-type: none"> • Locate adjacent to the U.S. Customs apron • Provide vehicle parking
Consolidated Maintenance	<ul style="list-style-type: none"> • Not public-facing • Parking for maintenance vehicles • Locate centrally for operational efficiency

Source: C&S Engineers, Inc., 2018

Maintenance Facilities

Currently a number of small structures house equipment, supplies, and maintenance activity across the airfield. Airport Management indicated that although the current storage space is adequate, the multiple locations of this space is inefficient and inconvenient. Fewer and or more centrally located structures would improve operational efficiency. As a result, a combined, single-structure maintenance building was proposed as the most efficient solution. Various location options were assessed taking into consideration the non-public facing nature of this facility, the need for associated parking space for maintenance vehicles, and location efficiency. The combined total space of the current facilities equates to approximately 3,200 square feet, which was the square footage used to determine location options for the combined maintenance facilities.

Proposed Maintenance Facilities Locations

A number of location options were assessed. For example, a consolidated maintenance facility adjacent to the City’s transient apron was considered but dismissed based on space constraints. **Figure 5.6** depicts the proposed maintenance facility locations; these areas have been designated as follows:

- Maintenance Facility Site 1 – West of Apron
- Maintenance Facility Site 2 – South and Central
- Maintenance Facility Site 3 – Expansion of Existing
- Maintenance Facility Site 4 – Co-locate with Terminal/Office Building

Table 5.5 – Maintenance Facilities Site Comparison

Site Designation	Location Considerations
Site 1 – West of Apron	<ul style="list-style-type: none"> • Close to First Flight FBO • Adequate space for building and maintenance vehicle parking • Inefficient location to serve entire airfield, but could provide for the west half • Site not previously developed • Does not conflict with MAP
Site 2 – South and Central	<ul style="list-style-type: none"> • Central to the apron and able to serve as a combined, single-structure maintenance building for the entire airfield • Adequate space for building and maintenance vehicle parking • Site previously developed • Conflicts with MAP
Site 3 – Expansion of Existing	<ul style="list-style-type: none"> • Adequate space for building and maintenance vehicle parking • Location adequate for a combined, single-structure maintenance building to serve the entire airfield • Distanced from the apron • Site previously developed • Condition of existing building is poor and would require potentially expensive renovation and future maintenance • Conflicts with MAP
Site 4 – Co-locate with Terminal/Office Building	<ul style="list-style-type: none"> • Close to transient apron • Adequate space for building and maintenance vehicle parking • Inefficient location to serve entire airfield, but could provide for the east half • Conflicts with MAP depending on terminal/office building location

Source: C&S Engineers, Inc., 2018

Ancillary Support Structures

The sections above identified the top four priorities of the Airport from a landside perspective based on the *Facility Requirements*; however, there are also other ancillary items that were identified by the Facilities Requirements analysis as important support facilities that should be considered within the 20-year planning period. These support facilities include aircraft wash racks and an additional airport entrance. The aircraft wash rack facilities were identified as a priority for the City; thus, several locations have been proposed around the airfield for consideration. Tenants have requested the additional airport entrance for some time, and a proposed location had already been identified. This additional entrance would be located on Otay Mesa Rd., south of the EAA leasehold, to serve this leasehold and ATCT. The proposed locations for these ancillary items will be shown on select alternative renderings (where applicable), allowing evaluators to weigh each option and make recommendations to the preferred location(s) of these support facilities.

5.5 Landside Alternatives Development

The City of San Diego has a defined vision for the future of the Airport. Based on this vision, input from the public, and the considerations described above for potential locations of the four key landside components, several landside development alternatives emerged. The alternatives were developed in a progression from minimum to high action concepts designed to meet the 20-year planning period demand. These alternatives are designated as follows:

Alternative 1 – No action

This alternative involves maintaining the existing layout, size, and configuration of all associated landside buildings and ancillary facilities over the course of the planning period. **Figure 5.1** depicts the No Action alternative.

Alternative 2 – Smooth Transition

This alternative allows for the minimum disruption to the current configuration of the apron with the alterations to the terminal building and the U.S. Customs apron using existing space. In addition, the maintenance facilities would be located at an existing building, which would be renovated and expanded to support consolidated activities. The additional hangars would be constructed at the EAA leasehold and to the west of the existing apron. Two wash racks are proposed: one in conjuncture with the proposed hangar development on the west end, and one east of the terminal.

- **Hangar Sites 1 and 5** – Hangar Site 1 allows for an extension of the main apron to the west which would continue the growth already established by San Diego Jet Center on the west end of the apron, south of Curran St. Development at this site, approximately 59 hangars, would be minimally constrained due to the lack of development there currently; however, it would require the realignment of a portion of Fairchild St. In addition, to meet EAA’s demand, hangar development would be included at Hangar Site 5, with approximately 29 hangars.
- **U.S. Customs Apron Site 1** – Use of existing apron for the expansion of the U.S. Customs box would avoid additional apron construction. This Site would take apron space away from the City, which currently uses the apron to serve transient aircraft.
- **Terminal and Offices Site 1** – Renovating and expanding the current terminal by 6,000 square feet to make room for administration and specified tenants would require the least apron realignment and minimize development of additional areas. An additional 45 parking spaces are proposed east of the terminal and its current parking to make up for the parking spaces lost due to the expansion.
- **Maintenance Facilities Site 3** – Renovating and expanding a current building for use as a 10,000-square-foot consolidated maintenance facility would minimize additional development.

Figure 5.7 depicts Landside Alternative 2.

Figure 5.7
Landside Alternative 2
Smooth Transition



Legend

- Property Line
- Existing Buildings
- Proposed Buildings
- Existing Airfield Pavement
- Proposed Airfield Pavement
- Proposed Demolition
- Proposed Taxiway/Taxilane Centerline
- Proposed Wash Rack
- Existing Customs Box
- Proposed Customs Box Expansion



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Alternative 3 – Centralizing

This alternative provides for the stated future demand while supporting a centralization of landside operations at the airport through the strategic alignment of proposed development. The alternative proposes a new terminal to the east of the original and maintains the current terminal for use by some tenants. The new terminal would include facilities for consolidated maintenance activities as well. Both buildings would be able to make use of the existing parking lot. U.S. Customs apron would ultimately be expanded east onto the newly constructed apron. Hangar development would extend from the border of the new terminal development and new U.S. Customs apron to the east. Additional hangar development would occur at the EAA leasehold. One wash rack is proposed off the west end of the apron and a second is proposed adjacent to the current terminal. Components of this alternative are depicted in **Figure 5.8** and include:

- **Hangar Sites 4 and 5** – Hangar Site 4 would begin development east of the new U.S. Customs Apron and New Terminal Building and would extend eastward along Taxiway A towards the tower. The Site’s 59 hangars would fill in some of the space between the main apron and the currently separated EAA apron. The centralized location of this site would support efficient access and operations. Additional hangar development would also occur at the EAA leasehold, 29 hangars, to meet their demand.
- **U.S. Customs Apron Sites 1 and 2** – U.S. Customs apron would ultimately be expanded to the east on newly constructed apron. This approach could be phased to allow for more immediate expansion to the proposed U.S. Customs Apron Site 1 temporarily. Site 1 could then be returned to the City once Site 2 was developed and available for the U.S. Customs Apron expansion. Ultimate expansion to Site 2 would provide for increased efficiency of operations for U.S. Customs due to the additional space available.
- **Terminal and Offices Site 3** – An additional 22,000-square-foot consolidated maintenance and terminal/offices building would provide the additional space necessary for these operations in a new and adjacent facility. Site 3 would also add approximately 45 vehicle parking spaces. Maintaining the current terminal building would allow for some tenants/operations to remain in this building and would also preserve the historic significance of the old tower. However, the poor conditions of the current terminal could result in limited use of the building and/or substantial maintenance costs.
- **Maintenance Facilities Site 4** – Co-locating a new terminal/offices facility with a consolidated maintenance facility would bring all of these operations to the center of the airfield, improving efficiency. However, developing this as a shared space could have negative impacts. For example, the maintenance operations, equipment, and vehicles could result in visual impacts to the public-facing operations of the terminal and tenant activities.

Figure 5.8
Landside Alternative 3
Centralizing



Legend

- — Property Line
- Existing Buildings
- Proposed Buildings
- Existing Airfield Pavement
- Proposed Airfield Pavement
- Proposed Demolition
- Proposed Taxiway/Taxilane Centerline
- Proposed Wash Rack
- Existing Customs Box
- Proposed Customs Box Expansion



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Alternative 4 – Fresh Perspective

This alternative proposes the redevelopment of areas of the airport and reconfigures some landside components as a means of meeting the stated future demand. A new terminal and offices building would be constructed to the south of Continental St. along with paved parking. The area with the current terminal building and parking would be redeveloped for hangars. A new U.S. Customs apron would be established east of the main apron extending from Taxiway A south to the new terminal area. Beginning at the U.S. Customs apron, additional hangar development would continue east along Taxiway A. EAA hangar space would also be included in this alternative. Lastly, a consolidated maintenance facility would be constructed south of Curran St. central to the main apron. One wash rack is proposed off of the west end of the apron while a second is proposed west of the new terminal. In addition, the new entrance is proposed south of the EAA leasehold, entering via Otay Mesa Rd. An access road would run west along the Airport border to connect to the proposed terminal and continue to the current Otay Mesa entrance. Approximately 40 vehicle parking spaces would be provided east of the new entrance. Components of this alternative are depicted in **Figure 5.9** and include:

- **Hangar Sites 3, 4 and 5** – Development of 30 hangars at Site 3, where the current terminal is located. This redevelopment would require the terminal’s demolition and the relocation of the old tower maximize centralized hangars close to the taxiway and promote efficiency. Site 4 would extend this hangar development east towards the tower and provide an additional 59 hangars. In addition, to meet EAA’s demand, 29 hangars would be constructed at Hangar Site 5.
- **U.S. Customs Apron Site 2** – The U.S. Customs apron would be relocated to Site 2 and altered to accommodate the entire space needs. This Site would extend south towards the new terminal and offices building to provide direct access to the U.S. Customs offices.
- **Terminal and Offices Site 2** – The new terminal and offices building would be approximately 14,000 square feet and would be combined with the relocated old tower. Associated vehicle parking would provide approximately 100 vehicle parking spaces. The sites location south of Curran St. would open up additional space for hangar development in line with the main apron and adjacent to the taxiway.
- **Maintenance Facilities Site 2** – This site is located south of Curran St. central to the main apron and Airport operations. This 10,000 SF facility would require demolition of currently abandoned buildings on the site.

Figure 5.9
Landside Alternative 4
Fresh Perspective



Legend

- — Property Line
- Existing Buildings
- Proposed Buildings
- Existing Airfield Pavement
- Proposed Airfield Pavement
- Proposed Demolition
- Proposed Taxiway/Taxilane Centerline
- Proposed Wash Rack
- Proposed New Customs Box



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Alternative 5 – MAP Development

The MAP alternative depicts the proposed MAP development combined with potential City-initiated development to accommodate projected demand. As proposed, MAP would provide extensive aeronautical and non-aeronautical landside facilities to support the Airport and would exceed facility requirement demands for aircraft storage, apron, and support facilities identified for the 20-year planning period. The alternative proposes the renovation and expansion of the terminal building, expansion of the U.S. Customs apron to incorporate City transient apron, and the construction of a consolidated maintenance building south and central to the main apron to meet demand and support the MAP development. Components of this alternative are depicted in **Figure 5.10** and include:

- **Reserved Aeronautical Development** – It is assumed that hangar demand will be met by the proposed MAP development. However, the remaining available land outside of the MAP development boundaries to the south and west of the main apron would be reserved for aeronautical development, which could include hangars.
- **U.S. Customs Apron Site 1** – Use of existing apron for the expansion of the U.S. Customs box would take apron space away from the City, which currently uses the apron to serve transient aircraft.
- **Terminal and Offices Site 1** – Renovating and expanding the current terminal by 6,000 square feet would make room for administration and specified tenants.
- **Maintenance Facilities Site 2** – This site is located south of Curran St. central to the main apron and Airport operations. This 10,000-square foot facility would require demolition of currently abandoned buildings on the site.

Figure 5.10
Landside Alternative 5
MAP Development



Legend

- — Property Line
- Existing Buildings
- Proposed Buildings
- Existing Airfield Pavement
- Proposed Airfield Pavement
- Proposed Demolition
- MAP Development Area
- Reserved for Aeronautical Development
- Existing Customs Box
- Proposed Customs Box Expansion



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5.6 Alternatives Evaluation Criteria

The evaluation of the alternatives followed the criteria as found in FAA's AC 150/5070-6B, *Airport Master Plans* and included the following:

- Financial Feasibility
- Operational Performance
- Environmental Implications
- Best Planning Tenets

Financial Feasibility

This analysis considers the impacts of a particular alternative in relation to the Airport's economic viability as well as that of the surrounding community. Furthermore, the analysis provides consideration of the estimated development costs associated with the various alternatives, along with prospective funding sources. The following were assessed as a part of this analysis:

- Development Costs – Anticipated costs of development and potential alternative funding sources. Alternative funding sources include those other than the City or the FAA, such as private business owners and/or developers.
- Job Creation – The potential to create employment and other economic development benefits for the Airport and immediate surrounding area.
- Financial Sustainability – Revenue generation through increased activity and new businesses, etc. to increase the Airport's ability to become more financially self-sufficient.

Operational Performance

An airport's ability to function as a system can be determined based on several factors:

- Capacity – Ability to accommodate future demand as determined in the *Facility Requirements*.
- Capability – Ability to meet airport design standards and ensure a safe operating environment.
- Operational Efficiency – How well the alternatives work as a system to avoid delays, inefficiencies, airspace conflicts, etc. This also considers the coexistence of existing and future users.

Environmental Implications

As discussed in the Environmental Overview, there are a number of environmental resources that may be impacted to some degree as a result of airport development. To review the NEPA environmental categories associated with SDM, please refer to Section 4.3, Environmental Impact Analysis in Working Paper 4, or see **Tables 5.6** and **5.7**. The following are the environmental criteria identified for SDM:

- Air Quality – Anticipated change in emissions.
- Biological Resources (Including Fish, Wildlife, and Plants) – Adverse impacts to special status species and substantial loss, degradation, disturbance, or fragmentation of native species habitats or populations.
- Hazardous Materials, Solid Waste, and Pollution Prevention – Involve a contaminated site, violate laws regarding hazardous materials, or produce a different quantity or type of hazardous waste.
- Land Use – Compatibility of the alternative with existing and planned land uses.
- Noise and Noise-Compatible Land Use – Noise impacts on noise sensitive areas within Section

4(f) properties.

- Climate – Contribution to climate change due to increased Greenhouse Gas emissions.
- Department of Transportation Act, Section 4(f) – Protection of significant resources including publicly owned parks, recreational areas, wildlife refuges, and historic sites.
- Historical, Architectural, Archeological, and Cultural Resources – Potential for project to disturb any cultural, architectural, historic or archaeological resources at the Airport.
- Visual Effects (Including Light Emissions) – Light emission effects and changes to visual resources or visual character.
- Water Resources (Including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers) – Water used for drinking and support functions such as recreation, transportation, agriculture, and aquatic ecosystems.
- Farmlands – Potential to convert important farmlands to nonagricultural resources.
- Socioeconomics, Environmental Justice and Children’s Environmental Health and Safety Risks – Impact on population, employment, housing, and public services.

Best Planning Tenets

Several best planning tenets were selected to determine the most responsible and implementable alternative within this Airport Master Plan. These include:

- Flexibility – Accommodate unforeseen change (e.g., increases or decreases in activity levels, changes to fleet mix, new users, etc.).
- Technically Feasible – Considers site constraints and other limitations.
- Conforms to the City’s Goals – Creates a more attractive experience/Airport for GA pilots.

5.7 Alternatives Evaluation Summary

PAC and Public Review

The Airport Master Plan Planning Advisory Committee (PAC) and public evaluated the aforementioned alternatives and provided input and recommendations for the planning team's consideration. While the comments and recommendations varied on each alternative, several recurring themes emerged from the PAC and public's review and input. The more significant concerns and suggestions provided by both entities included the following:

Landside

- There was significant support for the proposed hangar development at the EAA leasehold, Hangar Site 5.
- Terminal and Offices Site 2 was identified as too far removed from the airfield.

Airside

- An additional taxiway connector for Runway 8L/26R and Taxiway A, west of the Runway 8R threshold was received very favorably by ATC staff and PAC members. ATC staff noted this as desirable to reduce runway crossings at the Runway 8R threshold, and reduce runway occupancy time on Runway 8L/26R.
- Removal of blast pad pavement was understood as necessary but was considered undesirable by some members of the PAC.
- ATC staff and PAC members voiced concern over the lack of bypass and run-up area in the Taxiway A / Runway 26R threshold area presented in Alternative 2. Requested reviewing the proposed geometry to ensure capacity in this area is addressed.
- Hold bay enhancements presented in Alternative 3 were supported; however, there were concerns with these facilities encroaching on or overlapping MAP development areas.
- Reactivation of taxiway pavement to allow for appropriate traffic flow in EAA areas was favorably received by ATC and PAC members.

The above items summarize the majority of the most frequent or common input received from the PAC, public and FAA regarding the presented airside and landside alternatives; however, all PAC and public comments related to the proposed alternatives can be found in **Appendix A**.

Evaluation Criteria Descriptions and Analysis

The evaluation criteria described above were applied to each airside and landside alternative based on the initial input from the PAC and public. **Tables 5.6** and **5.7** contain a detailed explanation of each alternative evaluation.

Table 5.6 – Airside Alternatives Evaluation

	Description	Alternative 1: No Action	Alternative 2: Design Deficiencies	Alternative 3: Hold Bay Capacity
Comparative Features				
Financial Feasibility				
Development Costs	Anticipated costs of development, considering potential alternative funding sources.	No Change.	Approximately \$XX in development costs associated with proposed airfield development. The City's share of the costs would include the amount after any FAA AIP and/or Caltrans funding is provided for eligible projects.	Approximately \$XX in development costs associated with proposed airfield development. The City's share of the costs would include the amount after any FAA AIP and/or Caltrans funding is provided for eligible projects.
Job Creation	Via employment, economic development, etc.	No Change.	Job creation and economic development will be temporary and tied to project design and construction.	Job creation and economic development will be temporary and tied to project design and construction.
Financial Sustainability	Revenue generation through increased activity and new businesses, etc. in order to increase the Airport's ability to become more financially self-sufficient.	No Change.	Projects will not create a direct impact to revenue generation.	Projects will not create a direct impact to revenue generation.
Operational Performance				
Capacity	Ability to accommodate future demand as determined in the facility requirements.	No Change.	Overall airfield capacity will increase due to the addition / reconfiguration of existing taxiway connections.	Similar airfield capacity increases to Alternative 2, plus run up / hold bay capacity increased.
Capability	Ability to meet airport design standards and ensure a safe operating environment.	Does not address the existing design deficiencies.	Addresses airport design deficiencies and ensures a safer operating environment.	Addresses airport design deficiencies and ensures a safer operating environment.
Operational Efficiency	How well the alternatives work as a system to avoid delays, inefficiencies, airspace conflicts, etc. Considers the coexistence of existing and future users.	No Change.	Reduction in operational efficiency at 26R departure end due to reduced run up and bypass areas.	Improves operational efficiency of Alternative 2 by increasing areas for bypass and aircraft runup.
Environmental Implications				
Air Quality	Anticipated change in emissions.	No Change	There will be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on air quality.	There will be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on air quality.
Biological Resources (Including Fish, Wildlife, and Plants)	Adverse impacts to special status species and substantial loss, degradation, disturbance, or fragmentation of native species habitats or populations.	No Change.	Development occurs in areas identified as having low levels of biological constraint. Additional environmental review and evaluation for all proposed development will still be needed prior to construction.	Proposed run up areas may impact areas identified as having moderate levels of biological constraint. Additional environmental review and evaluation for all proposed development will be needed prior to construction.

Table 5.6 – Airside Alternatives Evaluation

	Description	Alternative 1: No Action	Alternative 2: Design Deficiencies	Alternative 3: Hold Bay Capacity
Comparative Features				
Environmental Implications (Continued)				
Hazardous Materials, Solid Waste, and Pollution Prevention	Involve a contaminated site, violate laws regarding hazardous materials, or produce a different quantity or type of hazardous waste.	No Change.	No anticipated impact because proposed development is not located on any know contaminated sites.	No anticipated impact because proposed development is not located on any know contaminated sites.
Land Use	Compatibility of the alternative with existing and planned land uses.	No Change.	The proposed development does not significantly differ from, nor will it alter, the existing land uses in the vicinity of the Airport.	The proposed development does not significantly differ from, nor will it alter, the existing land uses in the vicinity of the Airport.
Noise and Noise-Compatible Land Use	Noise impacts on noise sensitive areas within Section 4(f) properties.	No Change.	Some temporary construction noise. Alternatives are intended to accommodate projected demand, though there could be additional noise generated from that activity, no significant impacts to sensitive land uses are anticipated.	Some temporary construction noise. Alternatives are intended to accommodate projected demand, though there could be additional noise generated from that activity, no significant impacts to sensitive land uses are anticipated.
Climate	Contribution to climate change due to increased Greenhouse Gas emissions.	No Change.	There would be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on Greenhouse Gas emissions.	There would be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on Greenhouse Gas emissions.
Department of Transportation Act, Section 4(f)	Protection of significant resources including publicly owned parks, recreational areas, wildlife refugees, and historic sites.	No Change.	Proposed development is not anticipated to have a significant effect on any Section 4(f) resources.	Proposed development is not anticipated to have a significant effect on any Section 4(f) resources.
Historical, Architectural, Archeological, and Cultural Resources	Potential for project to disturb any cultural, architectural, historic or archaeological resources at the Airport.	No Change.	Development occurs in areas with low levels of cultural constraints. However, proposed development in previously undisturbed areas has the potential to impact underground resources, thus further review and coordination would be needed prior to construction.	Run up areas may impact areas identified as having moderate levels of cultural constraints, and proposed development in previously undisturbed areas has the potential to impact underground resources, thus further review and coordination would be needed prior to construction.
Visual Effects (Including Light Emission)	Light emission effects and changes to visual resources or visual character.	No Change.	The proposed development is not anticipated to have a significant affect on visual effects or light emissions due to the Airport's location in an already highly developed landscape. However, the potential of additional light emissions to affect any biological resources may need further evaluation prior to construction.	The proposed development is not anticipated to have a significant affect on visual effects or light emissions due to the Airport's location in an already highly developed landscape. However, the potential of additional light emissions to affect any biological resources may need further evaluation prior to construction.

Table 5.6 – Airside Alternatives Evaluation

	Description	Alternative 1: No Action	Alternative 2: Design Deficiencies	Alternative 3: Hold Bay Capacity
Comparative Features				
Environmental Implications (Continued)				
Water Resources (Including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)	Water used for drinking and support functions such as recreation, transportation, agriculture, and aquatic ecosystems.	No Change.	The addition of impervious surfaces has the potential to increase runoff. The proposed development occurs in areas with existing surface waters and/or wetlands; additional environmental review and evaluation is needed prior to construction.	The addition of impervious surfaces has the potential to increase runoff. The proposed development occurs in areas with existing surface waters and/or wetlands; additional environmental review and evaluation is needed prior to construction. impact
Farmland	Potential to convert important farmlands to nonagricultural resources.	No Change.	According to the California Farmland Finder “Farmland of Local Importance” exists north of the runway and south of the airport boundary line and therefore would not be impacted by the proposed development.	According to the California Farmland Finder “Farmland of Local Importance” exists north of the runway and south of the airport boundary line and therefore would not be impacted by the proposed development.
Socioeconomics, Environmental Justice, and Children’s Environmental Health and Safety Risks	Impact on population, employment, housing, and public services.	No Change.	No displacement/land acquisition is involved in the proposed development. Increased construction and operation activities could cause potential environmental effects to environmental justice communities. Further assessment of whether there is a disproportionately high effect on minority populations is needed.	No displacement/land acquisition is involved in the proposed development. Increased construction and operation activities could cause potential environmental effects to environmental justice communities. Further assessment of whether there is a disproportionately high effect on minority populations is needed.
Best Planning Tenets				
Flexibility	Accommodates unforeseen change (e.g., increases or decreases in activity levels, changes to fleet mix, new users, etc.).	No Change.	Allows for unforeseen change.	Allows for unforeseen change.
Technically Feasible	Considers site constraints and other limitations.	No Change.	Technically Feasible.	Technically Feasible.
Conforms to the City’s Goals	Creates a more attractive experience/Airport for GA pilots	Does not conform to the City’s goals for the Airport.	No significant change.	More attractive for GA pilots and tenants due to additional run up areas available.

Table 5.7 – Landside Alternatives Evaluation

	Description	Alternative 1: No Action	Alternative 2: Smooth Transition	Alternative 3: Centralizing	Alternative 4: Fresh Perspective	Alternative 5: MAP Development
Comparative Features						
Financial Feasibility						
Development Costs	Anticipated costs of development, considering potential alternative funding sources.	None.	Approximately \$17 million in development costs, including hangars; hangars are usually funded by private developers, thus, the ultimate City cost share may be less. In addition, AIP eligible projects would receive 90% FAA funding and 4.5% Caltrans funding.	Approximately \$27 million in development costs, including hangars; hangars are usually funded by private developers, thus, the ultimate City cost share may be less. In addition, AIP eligible projects would receive 90% FAA funding and 4.5% Caltrans funding.	Approximately \$31 million in development costs, including hangars; hangars are usually funded by private developers, thus, the ultimate City cost share may be less. In addition, AIP eligible projects would receive 90% FAA funding and 4.5% Caltrans funding.	Approximately \$2 million in development costs. AIP eligible projects would receive 90% FAA funding and 4.5% Caltrans funding. This does not include the MAP proposed development, which would be funded by the developer.
Job Creation	Via employment, economic development, etc.	No Change.	Some temporary employment opportunities tied to project design and construction, but would be the least of alternatives 2-5.	Some temporary employment opportunities tied to project design and construction, greater than that of alternative 2.	Some temporary employment opportunities tied to project design and construction, greater than that of alternative 3.	Some temporary employment opportunities tied to project design and construction, highest of the alternatives. MAP development provides potential for permanent employment and economic development of the surrounding area, supported by the additional aeronautical and non-aeronautical development.
Financial Sustainability	Revenue generation through increased activity and new businesses, etc. in order to increase the Airport's ability to become more financially self-sufficient.	No Change.	Additional 5,000 SF of leased terminal space, U.S. Customs box apron, and hangars would increase incoming revenue, but it would be the least of alternatives 2-5.	Additional leased terminal space, U.S. Customs box apron, and hangars would increase incoming revenue, more so than alternative 2.	Additional leased terminal space, U.S. Customs box apron, and hangars would increase incoming revenue, similarly to alternative 2.	Additional 5,000 SF of leased terminal space, U.S. Customs box apron, and the lease of land for MAP would provide the greatest potential for incoming revenue.
Operational Performance						
Capacity	Ability to accommodate future demand as determined in the facility requirements.	Does not accommodate future demand.	Meets or exceeds future demand.	Meets or exceeds future demand.	Meets or exceeds future demand.	Meets or exceeds future demand.
Capability	Ability to meet airport design standards and ensure a safe operating environment.	No Change. (Some existing taxilanes do not meet current design standards.)	Meets airport design standards and supports a safe operating environment.	Meets airport design standards and supports a safe operating environment.	Meets airport design standards and supports a safe operating environment.	Meets airport design standards and supports a safe operating environment.
Operational Efficiency	How well the alternatives work as a system to avoid delays, inefficiencies, airspace conflicts, etc. Considers the coexistence of existing and future users.	No Change.	Improvement in efficiency due to the new consolidated maintenance building and renovated terminal building, offset by decreased efficiency due to the distance of proposed hangar development from the terminal, FBOs and proposed maintenance.	Increased efficiency due to the new consolidated maintenance building.	Increased efficiency due to the new consolidated maintenance building and new terminal building. The new airport access road would also improve efficiency.	Increased efficiency due to the new consolidated maintenance building and new terminal building.

Table 5.7 – Landside Alternatives Evaluation

	Description	Alternative 1: No Action	Alternative 2: Smooth Transition	Alternative 3: Centralizing	Alternative 4: Fresh Perspective	Alternative 5: MAP Development
Comparative Features						
Environmental Implications						
Air Quality	Anticipated change in emissions.	No Change.	There would be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on air quality. Hangar development off of the west end of the main apron will increase some taxiing distances.	There would be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on air quality.	There would be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on air quality.	There would be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on air quality.
Biological Resources (Including Fish, Wildlife, and Plants)	Adverse impacts to special status species and substantial loss, degradation, disturbance, or fragmentation of native species habitats or populations.	No Change.	The proposed development occurs in areas previously identified as having the presence of biological resources; additional environmental review and evaluation is needed prior to construction.	The proposed development occurs in areas previously identified as having the presence of biological resources; additional environmental review and evaluation is needed prior to construction.	The proposed development occurs in areas previously identified as having the presence of biological resources; additional environmental review and evaluation is needed prior to construction.	The proposed development occurs in areas previously identified as having the presence of biological resources; additional environmental review and evaluation is needed prior to construction.
Hazardous Materials, Solid Waste, and Pollution Prevention	Involve a contaminated site, violate laws regarding hazardous materials, or produce a different quantity or type of hazardous waste.	No Change.	Due to the nature of airport activities, the potential to encounter a range of containments during ground-disturbing activities associated with the proposed development exists; additional environmental review and evaluation is needed prior to construction. In addition, proposed development has the potential to disturb the CA Hazardous Waste Site off the west end of the apron.	Due to the nature of airport activities, the potential to encounter a range of containments during ground-disturbing activities associated with the proposed development exists; additional environmental review and evaluation is needed prior to construction.	Due to the nature of airport activities, the potential to encounter a range of containments during ground-disturbing activities associated with the proposed development exists; additional environmental review and evaluation is needed prior to construction. In addition, proposed development has the potential to disturb the two underground storage tanks south of Continental St.	Due to the nature of airport activities, the potential to encounter a range of containments during ground-disturbing activities associated with the proposed development exists; additional environmental review and evaluation is needed prior to construction.
Land Use	Compatibility of the alternative with existing and planned land uses.	No Change.	The proposed development does not significantly differ from, nor will it alter, the existing land uses in the vicinity of the Airport.	The proposed development does not significantly differ from, nor will it alter, the existing land uses in the vicinity of the Airport.	The proposed development does not significantly differ from, nor will it alter, the existing land uses in the vicinity of the Airport.	The proposed development does not significantly differ from, nor will it alter, the existing land uses in the vicinity of the Airport.
Noise and Noise-Compatible Land Use	Noise impacts on noise sensitive areas within Section 4(f) properties.	No Change.	Some temporary construction noise. Alternatives are intended to accommodate projected demand, though there could be additional noise generated from that activity, no significant impacts to sensitive land uses are anticipated.	Some temporary construction noise. Alternatives are intended to accommodate projected demand, though there could be additional noise generated from that activity, no significant impacts to sensitive land uses are anticipated.	Some temporary construction noise. Alternatives are intended to accommodate projected demand, though there could be additional noise generated from that activity, no significant impacts to sensitive land uses are anticipated.	Some temporary construction noise. Alternatives are intended to accommodate projected demand, though there could be additional noise generated from that activity, no significant impacts to sensitive land uses are anticipated.
Climate	Contribution to climate change due to increased Greenhouse Gas emissions.	No Change.	There would be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on Greenhouse Gas emissions. Hangar development off of the west end of the main apron will increase some taxiing distances.	There would be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on Greenhouse Gas emissions.	There would be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on Greenhouse Gas emissions.	There would be an increase in emissions associated with construction activity. Development is intended to accommodate projected demand and is not likely to have a significant impact on Greenhouse Gas emissions.

Table 5.7 – Landside Alternatives Evaluation

	Description	Alternative 1: No Action	Alternative 2: Smooth Transition	Alternative 3: Centralizing	Alternative 4: Fresh Perspective	Alternative 5: MAP Development
Comparative Features						
Environmental Implications (Continued)						
Department of Transportation Act, Section 4(f)	Protection of significant resources including publicly owned parks, recreational areas, wildlife refuges, and historic sites.	No Change.	Proposed development is not anticipated to have a significant effect on any Section 4(f) resources. Renovation and expansion of the terminal will require preservation of the Naval airfield control tower.	Proposed development is not anticipated to have a significant effect on any Section 4(f) resources.	Proposed development would require the demolition or relocation of the Naval airfield control tower, negatively affecting the historic property.	Proposed development is not anticipated to have a significant effect on any Section 4(f) resources. Renovation and expansion of the terminal will require preservation of the Naval airfield control tower.
Historical, Architectural, Archeological, and Cultural Resources	Potential for project to disturb any cultural, architectural, historic or archaeological resources at the Airport.	No Change.	Any proposed development in previously undisturbed areas has the potential to impact underground resources, but coordination would be conducted during the environmental review and prior to construction. Renovation and expansion of the terminal will require preservation of the Naval airfield control tower.	Any proposed development in previously undisturbed areas has the potential to impact underground resources, but coordination would be conducted during the environmental review and prior to construction.	Any proposed development in previously undisturbed areas has the potential to impact underground resources, but coordination would be conducted during the environmental review and prior to construction. Proposed development would require the demolition or relocation of the Naval airfield control tower, negatively affecting the historical resource.	Any proposed development in previously undisturbed areas has the potential to impact underground resources, but coordination would be conducted during the environmental review and prior to construction. Renovation and expansion of the terminal will require preservation of the Naval airfield control tower.
Visual Effects (Including Light Emission)	Light emission effects and changes to visual resources or visual character.	No Change.	The proposed development is not anticipated to have a significant affect on visual effects or light emissions due to the Airport's location in an already highly developed landscape. However, the potential of additional light emissions to affect any biological resources may need further evaluation prior to construction.	The proposed development is not anticipated to have a significant affect on visual effects or light emissions due to the Airport's location in an already highly developed landscape. However, the potential of additional light emissions to affect any biological resources may need further evaluation prior to construction.	The proposed development is not anticipated to have a significant affect on visual effects or light emissions due to the Airport's location in an already highly developed landscape. However, the potential of additional light emissions to affect any biological resources may need further evaluation prior to construction.	The proposed development is not anticipated to have a significant affect on visual effects or light emissions due to the Airport's location in an already highly developed landscape. However, the potential of additional light emissions to affect any biological resources may need further evaluation prior to construction.
Water Resources (Including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)	Water used for drinking and support functions such as recreation, transportation, agriculture, and aquatic ecosystems.	No Change.	The addition of wash racks will improve water quality, however, the addition of impervious surfaces has the potential to increase runoff. In addition, the proposed development occurs in areas with existing surface waters and/or wetlands; additional environmental review and evaluation is needed prior to construction.	The addition of wash racks will improve water quality, however, the addition of impervious surfaces has the potential to increase runoff. In addition, the proposed development occurs in areas with existing jurisdictional drainage ditches, surface waters and/or wetlands; additional environmental review and evaluation is needed prior to construction.	The addition of wash racks will improve water quality, however, the addition of impervious surfaces has the potential to increase runoff. In addition, the proposed development occurs in areas with existing jurisdictional drainage ditches, surface waters and/or wetlands; additional environmental review and evaluation is needed prior to construction.	The addition of wash racks will improve water quality, however, the addition of impervious surfaces has the potential to increase runoff. In addition, the proposed development occurs in areas with existing jurisdictional drainage ditches, surface waters and/or wetlands; additional environmental review and evaluation is needed prior to construction.
Farmlands	Potential to convert important farmlands to nonagricultural resources.	No Change.	According to the California Farmland Finder "Farmland of Local Importance" exists north of the runway and south of the airport boundary line and therefore would not be impacted by the proposed development.	According to the California Farmland Finder "Farmland of Local Importance" exists north of the runway and south of the airport boundary line and therefore would not be impacted by the proposed development.	According to the California Farmland Finder "Farmland of Local Importance" exists north of the runway and south of the airport boundary line and therefore would not be impacted by the proposed development.	According to the California Farmland Finder "Farmland of Local Importance" exists north of the runway and south of the airport boundary line and therefore would not be impacted by the proposed development, not including MAP development.




Table 5.7 – Landside Alternatives Evaluation

	Description	Alternative 1: No Action	Alternative 2: Smooth Transition	Alternative 3: Centralizing	Alternative 4: Fresh Perspective	Alternative 5: MAP Development
Comparative Features						
Environmental Implications (Continued)						
Socioeconomics, Environmental Justice and Children’s Environmental Health and Safety Risks	Impact on population, employment, housing, and public services.	No Change.	No displacement/land acquisition is involved in the proposed development. Increased construction and operation activities could cause potential environmental effects to environmental justice communities. Further assessment of whether there is a disproportionately high effect on minority populations is needed.	No displacement/land acquisition is involved in the proposed development. Increased construction and operation activities could cause potential environmental effects to environmental justice communities. Further assessment of whether there is a disproportionately high effect on minority populations is needed.	No displacement/land acquisition is involved in the proposed development. Increased construction and operation activities could cause potential environmental effects to environmental justice communities. Further assessment of whether there is a disproportionately high effect on minority populations is needed.	No displacement/land acquisition is involved in the proposed development. Increased construction and operation activities could cause potential environmental effects to environmental justice communities. Further assessment of whether there is a disproportionately high effect on minority populations is needed.
Best Planning Tenets						
Flexibility	Accommodates unforeseen change (e.g., increases or decreases in activity levels, changes to fleet mix, new users, etc.).	No Change.	The alternative would allow for additional development should demand warrant it.	The alternative would allow for additional development should demand warrant it.	The alternative would allow for additional development should demand warrant it.	Additional development, should demand warrant it, is limited by the borders of the MAP development. However, MAP development is expected to accommodate additional demand.
Technically Feasible	Considers site constraints and other limitations.	No Change.	All future development occurs on land under direct control of the City, thus making it technically feasible, however the relocation of the airport road as a result of the proposed hangar development could act as a constraint.	All future development occurs on land under direct control of the City, thus making it a technically feasible alternative.	All future development occurs on land under direct control of the City, thus making it a technically feasible alternative.	All future development occurs on land under direct control of the City, thus making it a technically feasible alternative.
Conforms to the City’s Goals	Creates a more attractive experience/Airport for GA pilots	Does not conform to the City’s goals for the Airport.	Creates a more attractive experience for users by increasing aircraft storage and renovating the terminal.	Creates a more attractive experience for users than alternative 2, by increasing aircraft storage and providing a new, additional, terminal building.	Creates a more attractive experience for users than alternative 2, by increasing aircraft storage and providing a new terminal building..	Potential to create the most attractive experience for users by increasing aircraft storage and renovating the terminal, as well as the potential for additional aeronautical and non-aeronautical amenities through the MAP development.

Evaluation Scoring

Based on the qualitative and quantitative assessments presented, each evaluation criteria was assessed as having a positive, negative, or neutral impact. Similar to the Consumer Reports' system, the rating system uses a modified circle that visually communicates the qualitative assessment. These assessments were translated numerically as shown in **Table 5.8** below:

Table 5.8 – Alternative Evaluation Rating Values

Negative (-1)	Neutral (0)	Positive (+1)
		

Source: C&S Engineers, Inc., 2018

To balance the four categories of evaluation criteria, the environmental category (which has more criteria than the other categories) was weighted to equate to the others. The alternatives summary score reflects its overall impact based on the evaluation criteria. The alternatives' evaluation scorings are presented in **Tables 5.9** and **5.10**.

Table 5.9 – Airside Alternatives Evaluation Summary

Airside Alternatives

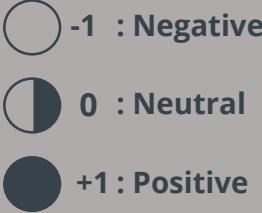
	Alternative 1: No Action	Alternative 2: Design Deficiencies	Alternative 3: Hold Bay Capacity
			
Comparative Features			
Financial Feasibility			
Development Costs			
Job Creation			
Financial Sustainability			
Operational Performance			
Capacity			
Capability			
Operational Efficiency			
Environmental Implications			
Air Quality			
Biological Resources (Including Fish, Wildlife, and Plants)			
Hazardous Materials, Solid Waste, and Pollution Prevention			
Land Use			
Noise and Noise-Compatible Land Use			
Climate			
Department of Transportation Act, Section 4(f)			
Historical, Architectural, Archeological, and Cultural Resources			
Visual Effects (Including Light Emission)			
Water Resources (Including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)			

Table 5.9 – Airside Alternatives Evaluation Summary

Airside Alternatives

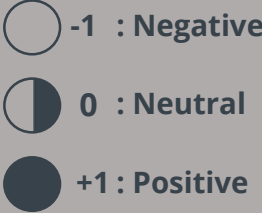















	Alternative 1: No Action	Alternative 2: Design Deficiencies	Alternative 3: Hold Bay Capacity
Comparative Features			
Environmental Implications (Continued)			
Farmlands			
Socioeconomics, Environmental Justice, and Children’s Environmental Health and Safety Risks			
Best Planning Tenets			
Flexibility			
Technically Feasible			
Conforms to the City’s Goals			
Summary Score			
Summary Score	-2	2.25	4.75
Ranking			
Ranking	3	2	1

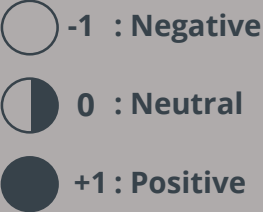
Table 5.10 – Landside Alternatives Evaluation Summary

Landside Alternatives

	Alternative 1: No Action	Alternative 2: Smooth Transition	Alternative 3: Centralizing	Alternative 4: Fresh Perspective	Alternative 5: MAP Development
<p>○ -1 : Negative</p> <p>◐ 0 : Neutral</p> <p>● +1 : Positive</p>					
Comparative Features					
Financial Feasibility					
Development Costs	◐	○	○	○	○
Job Creation	◐	●	●	●	●
Financial Sustainability	○	●	●	●	●
Operational Performance					
Capacity	○	●	●	●	●
Capability	◐	◐	◐	◐	◐
Operational Efficiency	○	○	●	●	●
Environmental Implications					
Air Quality	◐	○	○	○	○
Biological Resources (Including Fish, Wildlife, and Plants)	◐	○	○	○	○
Hazardous Materials, Solid Waste, and Pollution Prevention	◐	○	◐	○	◐
Land Use	◐	◐	◐	◐	◐
Noise and Noise- Compatible Land Use	◐	◐	◐	◐	◐
Climate	◐	○	○	○	○
Department of Transportation Act, Section 4(f)	◐	◐	◐	○	◐
Historical, Architectural, Archeological, and Cultural Resources	◐	◐	◐	○	◐
Visual Effects (Including Light Emission)	◐	◐	◐	◐	◐

Table 5.10 – Landside Alternatives Evaluation Summary

Landside Alternatives

	Alternative 1: No Action	Alternative 2: Smooth Transition	Alternative 3: Centralizing	Alternative 4: Fresh Perspective	Alternative 5: MAP Development
					
Comparative Features					
Environmental Implications (Continued)					
Water Resources (Including Wetlands, Floodplains, Surface waters, Groundwater, and Wild and Scenic Rivers)					
Farmlands					
Socioeconomics, Environmental Justice, and Children’s Environmental Health and Safety Risks					
Best Planning Tenets					
Flexibility					
Technically Feasible					
Conforms to the City’s Goals					
Summary Score					
Summary Score	-5	0.75	4	3.25	4
Ranking					
Ranking	5	4	1	3	1

Recommended Preferred Alternative

The initial input from the PAC and public allowed the planning team to evaluate each alternative for the airside and landside portions of the Airport using the criteria described. As a result, a combined preliminary recommended alternative was developed based on the highest ranking airside and landside alternatives. As shown in **Table 5.10**, Alternative 3 – Centralizing, and Alternative 5 – MAP Development received the same overall score. As a result, the detailed evaluation was relied upon to determine the recommended alternative. Based on the scale of benefits provided by these two alternatives, specifically the higher degree of benefit to the categories Development Costs, Job Creation, Financial Sustainability, and Conforms to the City’s Goals (refer to **Table 5.7**, for more details), Alternative 5 – MAP Development was chosen as the basis for the landside portion of the recommended alternative. As shown in **Table 5.9**, Alternative 3 was the highest ranked alternative and therefore was used as the basis for the airside portion of the recommended alternative. Therefore, landside Alternative 5 and airside Alternative 3 formed the initial combined recommended alternative. However, based on the detailed alternatives evaluation and input from the PAC, the public and the City, components were altered or brought in from other alternatives to develop the highest value and most cohesive recommended preferred alternative. These alterations are detailed as follows:

Landside

- To accommodate future demand without relying on the MAP development, hangar development was added at Hangar Site 1 (as allowed by the MAP boundaries) and hangar site 5. Hangar Site 5 was also expanded to include approximately 65 vehicle parking spaces to compensate for this proposed development replacing a current parking area off of the west end of the apron, and to accommodate the additional hangars proposed. In addition, a wash rack was added to Hangar Site 1 to accommodate all aircraft at the Airport.
- Based on City input, the U.S. Customs facility was proposed as a separate building from the Terminal, adjacent to the terminal and bordering the U.S. Customs Apron.
- Based on City input and the understanding of the current conditions of the terminal facility, instead of proposing a terminal facility expansion, the alternative was altered to propose the replacement of the terminal with a larger terminal facility in the same location. This replacement would result in the relocation of the old ATCT.

Airside

- To accommodate the MAP development boundaries, the proposed run-up areas were altered to recommend a single run-up area connected to the west end of Taxiway A.
- To allow for aircraft to run-up and bypass one another, a dual taxiway entry with appropriate islands is proposed for the reconfiguration area associated with Runway 26R and Taxiway A.
- In order to accommodate the MAP development boundaries, the proposed airfield pavement at old Taxiway C, providing additional access to Taxiway A by EAA, was removed. The proposed landside development at EAA provides a second point of access for EAA instead.

The resulting Recommended Preferred Alternative is shown on **Figure 5.11**. This recommended alternative was presented to the City and PAC for final review and approval.

Figure 5.11
Recommended
Preferred Alternative

Legend

-  Property Line
-  Existing Buildings
-  Proposed Buildings
-  Existing Airfield Pavement
-  Proposed Pavement
-  MAP Development Area
-  Proposed Demolition
-  Proposed Taxiway/Taxilane Centerline
-  Proposed Wash Rack
-  Existing Customs Box
-  Proposed Customs Box Expansion

DRAFT



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Recommended Supplemental Projects

Some improvement projects recommended for the Airport relate to routine maintenance and upkeep, safety and security enhancements, or other proposed studies that did not need to be associated with a development alternative. Regardless of the preferred development alternative selected, incorporating these items into the planning horizon is suggested. The subsequent Working Paper, *Financial Feasibility Analysis*, will contain a financial analysis and a phased capital improvement plan (CIP) of all proposed development and recommended supplemental projects.

Appendix A – Public Comments

Public Meeting #3 Comments

Airside Alternative 2

1. Cons: need to leave all landscape from runways intact. Don't remove any landscape just make it.

Airside Alternative 3

1. Pros: liked the expanded run-up areas for 26R.
2. Cons: need expanded run-up areas for 8L.

Landside Alternative 2

1. Pros: good hangar placement, both ends.
2. Cons: Need to leave "landmark" old terminal building, fix it up, need better "opening" with new terminal by old one, not customs.
3. Customs is not a good "welcome mat" for new opt?

BROWN FIELD MUNICIPAL AIRPORT MASTER PLAN - PUBLIC MEETING

Comment Card

Date: 2/21/18

Name: _____

Organization/Affiliation (if applicable): CALIFORNIA FLIGHT MUSEUM

Email Address: _____

Would you like to receive project updates? Yes No

Please note that comments and corresponding contact information received will become part of the Meeting Summary Report and may be publicly available.

Do you wish to withhold your name and contact information from public review?

No Yes

Please Print Clearly - Use the other side of this form if additional space is needed.

I AM INTERESTED BUT HAVE NOT SEEN ANY

BROWN FIELD MUNICIPAL AIRPORT MASTER PLAN - PUBLIC MEETING

Comment Card

Date: 2/21/18

Name: _____

Organization/Affiliation (if applicable): _____

Email Address: _____

Would you like to receive project updates? Yes No

Please note that comments and corresponding contact information received will become part of the Meeting Summary Report and may be publicly available.

Do you wish to withhold your name and contact information from public review?

[] No [] Yes

Please Print Clearly - Use the other side of this form if additional space is needed.

It's high time that the City develop Brown Field for the community and the airport it self. Any decent airport has a Museum to illustrate the history of the airport and provide access by the public to aviation. The City should fund this and not rely on private enterprise to do it's work. This is the City's RESPONSIBILITY. It is necessary and long overdue!

BROWN FIELD MUNICIPAL AIRPORT MASTER PLAN - PUBLIC MEETING

Comment Card

Date: 7/21/18

Name: _____

Organization/Affiliation (if applicable): CALIFORNIA FLIGHT MUSEUM

Email Address: _____

Would you like to receive project updates? Yes No

Please note that comments and corresponding contact information received will become part of the Meeting Summary Report and may be publicly available.

Do you wish to withhold your name and contact information from public review?

No Yes

Please Print Clearly - Use the other side of this form if additional space is needed.

1. I AM INTERESTED IN THE POSSIBILITY OF LAND BEING SET ASIDE FOR AN AIR MUSEUM. IT WOULD DRAW PEOPLE FROM THE EXPANDING SOUTHBAY REGION; GIVE A CONNECTION TO THE LOCAL COMMUNITY, AND ENCOURAGE PEOPLE TO SUPPORT GENERAL AVIATION.

2. I AM ENCOURAGED IN ALTERNATIVES 2, 3, 4 WHICH GREATLY EXPAND THE NUMBER OF HANGARS

3. A NEW TERMINAL BUILDING SHOULD BE FIRST CLASS WITH A FINE RESTAURANT AND SHOWER FACILITIES FOR PILOTS

4. IS THERE A NEED FOR AN EMERGENCY MEDICAL FACILITY FOR MEDICAL PATIENTS



City of San Diego Airports Master Plan Updates

PAC Comments

Alternative 2 & 3

Group 1

Pros	Cons	Comments
	Never Remove hard surfaces Suggesting Paint, C&A	
	Need additional Run up area adjacent to 8L (A)	



City of San Diego Airports Master Plan Updates

PAC Comments

Alternative _____

Group 2

alt 2

Pros	Cons	Comments
Cleaning up A 26C connection	Removal Pavement 26C	
	Evaluate Location of New Tmy access near 8L	
	Helipad Maps 2 LOS for tower Needs considering	



Airports

City of San Diego Airports Master Plan Updates

PAC Comments

Alternative 2 - LANDSIDE - Group 1

Pros	Cons	Comments
CONTIGUOUS CUSTOMS AREA	NEW MAINT - BLDG TO FAR FROM TERMINAL	CUSTOMS BLDG SHOULD BE LARGER
	WASH RACKS TOO SMALL? NEED TO ACCOMMODATE MORE THAN 1 AIRCRAFT	



SD Airports

City of San Diego Airports Master Plan Updates

PAC Comments

Alternative 2 - LANDSCAPE - Group 2

Pros	Cons	Comments
	LOCATION OF 59 HANGARS TO FAR FROM CENTER OF AIRFIELD	CONVERT EXISTING TERMINAL INTO A MUSEUM



Airports

City of San Diego Airports Master Plan Updates

PAC Comments

Alternative 3 - Landside - Group 1

Pros	Cons	Comments
	Terminal too far from Air Side	New Terminal Bldg could be constructed in existing parking lot
		Remove existing customs facility and (adjacent) info cue building
		↳ make existing (parking structure) the full customs facility



Airports

City of San Diego Airports Master Plan Updates

PAC Comments

Alternative 3 - LANDSIDE - Group 2

Pros	Cons	Comments
PROPOSED NEW TERMINAL BUILDING		ROADS TO PROVIDE ACCESS TO EAA (NEED IMPROVEMENT)
PROPOSED HANGAR LOCATIONS		ADD VIEWING AREA NEAR MIDFIELD (ALL ALTERNATIVES)
		SPLIT HANGARS BETWEEN MIDFIELD AND WESTERN END + TIE DOWNS
		SPLIT TERM AND MAINT BLDG



Airports

City of San Diego Airports Master Plan Updates

PAC Comments

Alternative 4

Pros	Cons	Comments
Good Rd. parallel to stay. Main Rd. & add to Alt. 3		
Small hangars		Adding small hangars / Thungers (tie downs) on the far West for the naive flyers
		Combine Customs & Terminal and add to Alt. 3
		Turn Terminal (Current) to a historical building - w/ bar, restaurant

Round 2



Airports

City of San Diego Airports Master Plan Updates

PAC Comments

Alternative 4

Pros	Cons	Comments
	Terminal needs airfield visib. ↳ Maybe even most frontage	Potentially just south/pkg lot
	Wash rack bigger - all	
	Avoid leasehold w/ maint. bldg	



Airports

City of San Diego Airports Master Plan Updates

PAC Comments

Alternative 5

Pros	Cons	Comments
Terminal expansion and new maintenance building does not conflict w/ MAP		

Round 2



City of San Diego Airports Master Plan Updates

PAC Comments 5

Alternative _____

Pros	Cons	Comments
		Access needed to airfield from north? Concern re: crossing

Figure
Alternative 2

Legend

-  Property Line
-  Existing Buildings
-  Existing Airfield Pavement
-  Proposed Airfield Pavement
-  Proposed Demolition

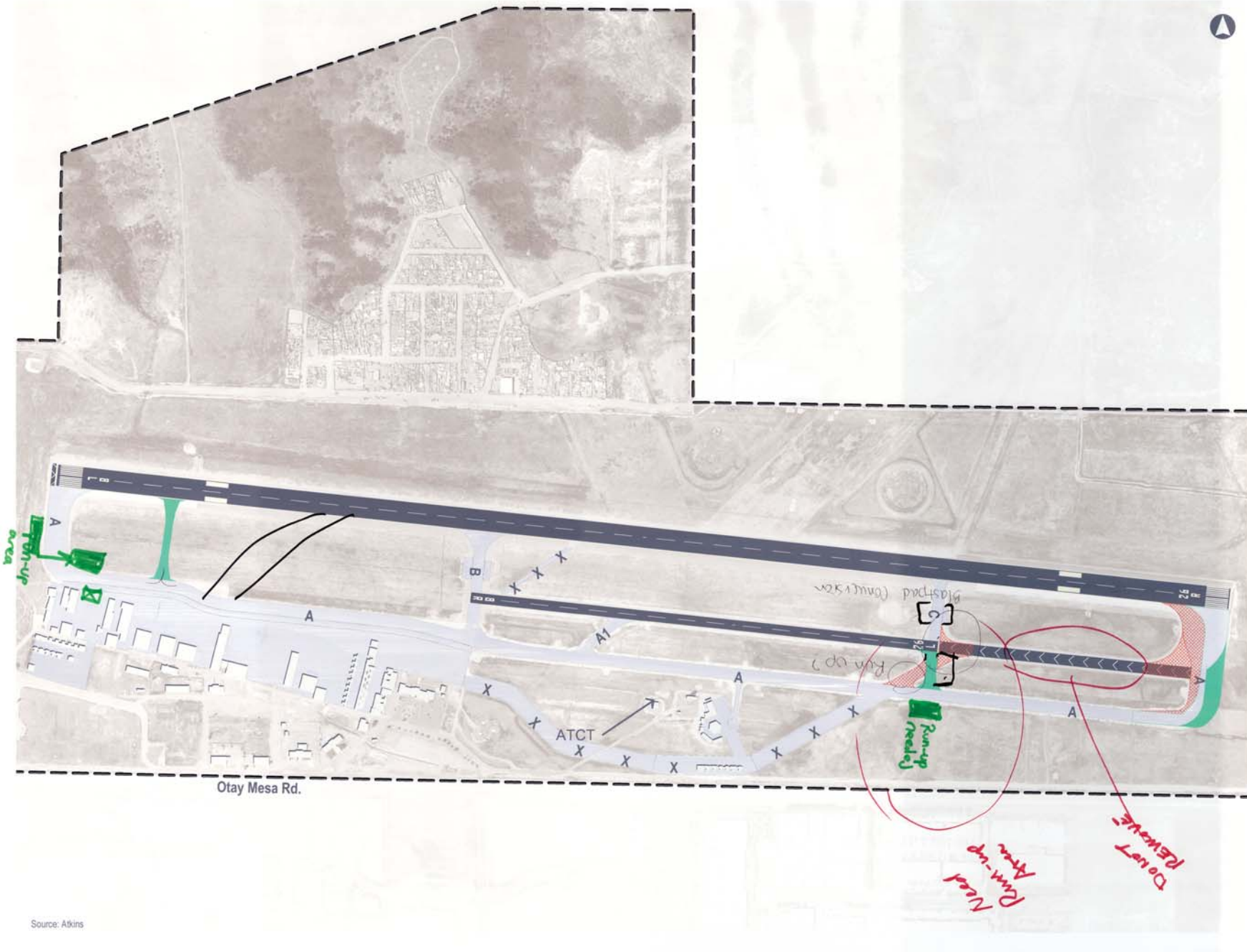


Figure
Alternative 3

Legend

-  Property Line
-  Existing Buildings
-  Existing Airfield Pavement
-  Proposed Airfield Pavement
-  Proposed Demolition



REMOVE!!
Necessary for engine problems, collisions, emergency situations, otherwise a problem will shut down all available access to runways

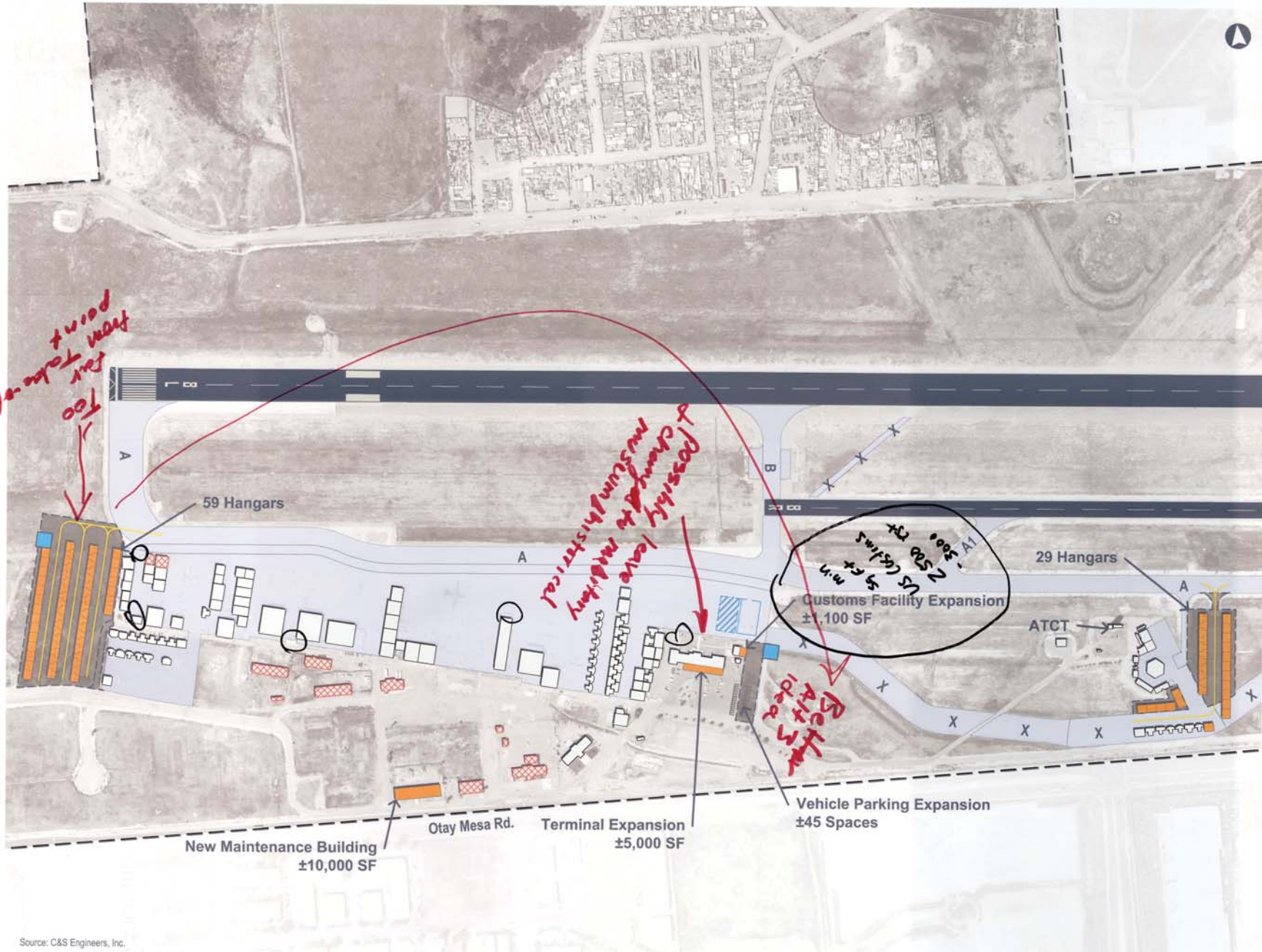


Figure 5.X
Alternative 2 -
Smooth Transition

Legend

-  Property Line
-  Existing Buildings
-  Proposed Buildings
-  Existing Airfield Pavement
-  Proposed Airfield Pavement
-  Proposed Demolition
-  Proposed Taxiway/Taxilane Centerline
-  Proposed Wash Rack
-  Existing Customs Box
-  Proposed Customs Box Expansion

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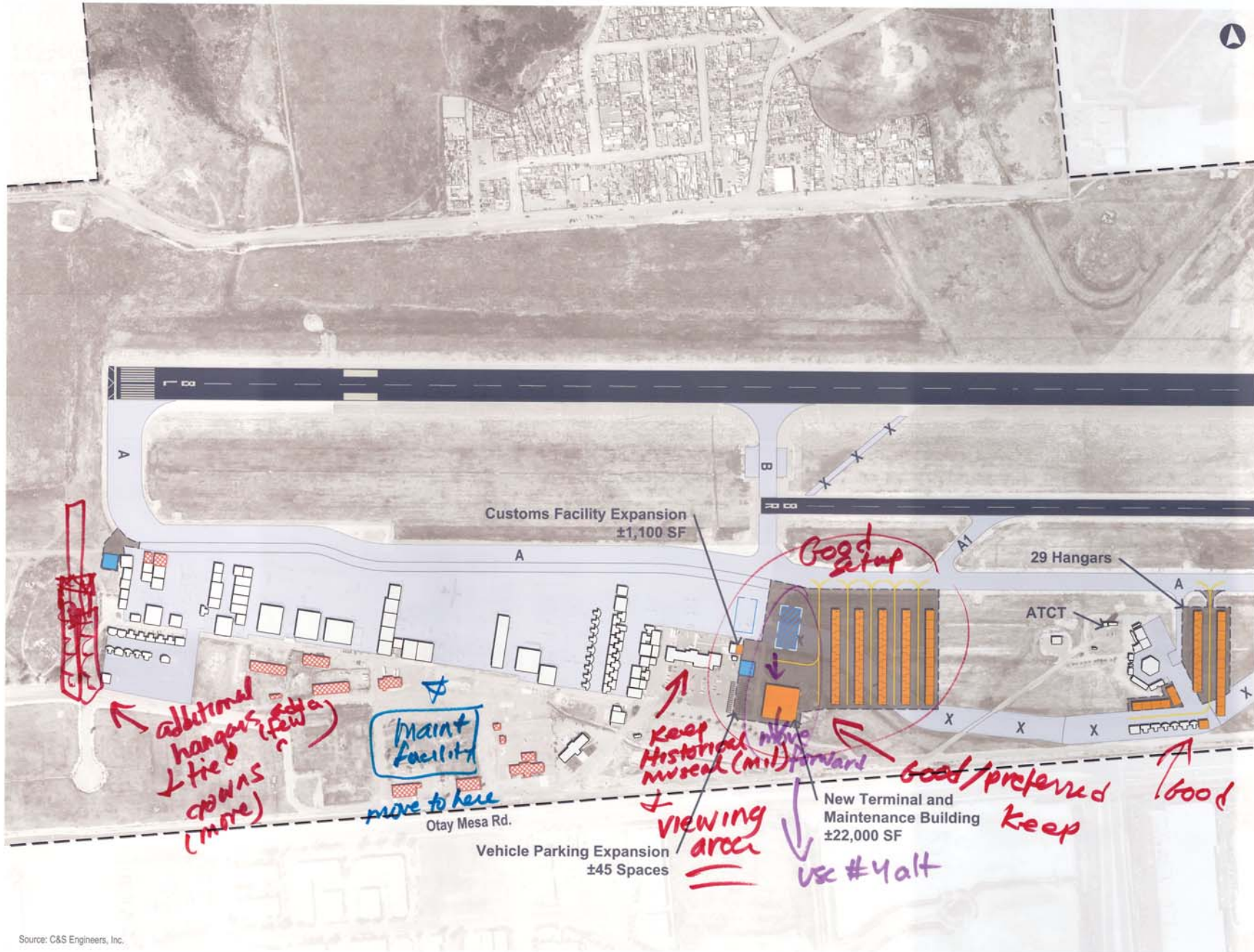


Source: C&S Engineers, Inc.

Figure 5.X
Alternative 3 -
Centralizing

Legend

- Property Line
- Existing Buildings
- Proposed Buildings
- Existing Airfield Pavement
- Proposed Airfield Pavement
- Proposed Demolition
- Proposed Taxiway/Taxilane Centerline
- Proposed Wash Rack
- Existing Customs Box
- Proposed Customs Box Expansion



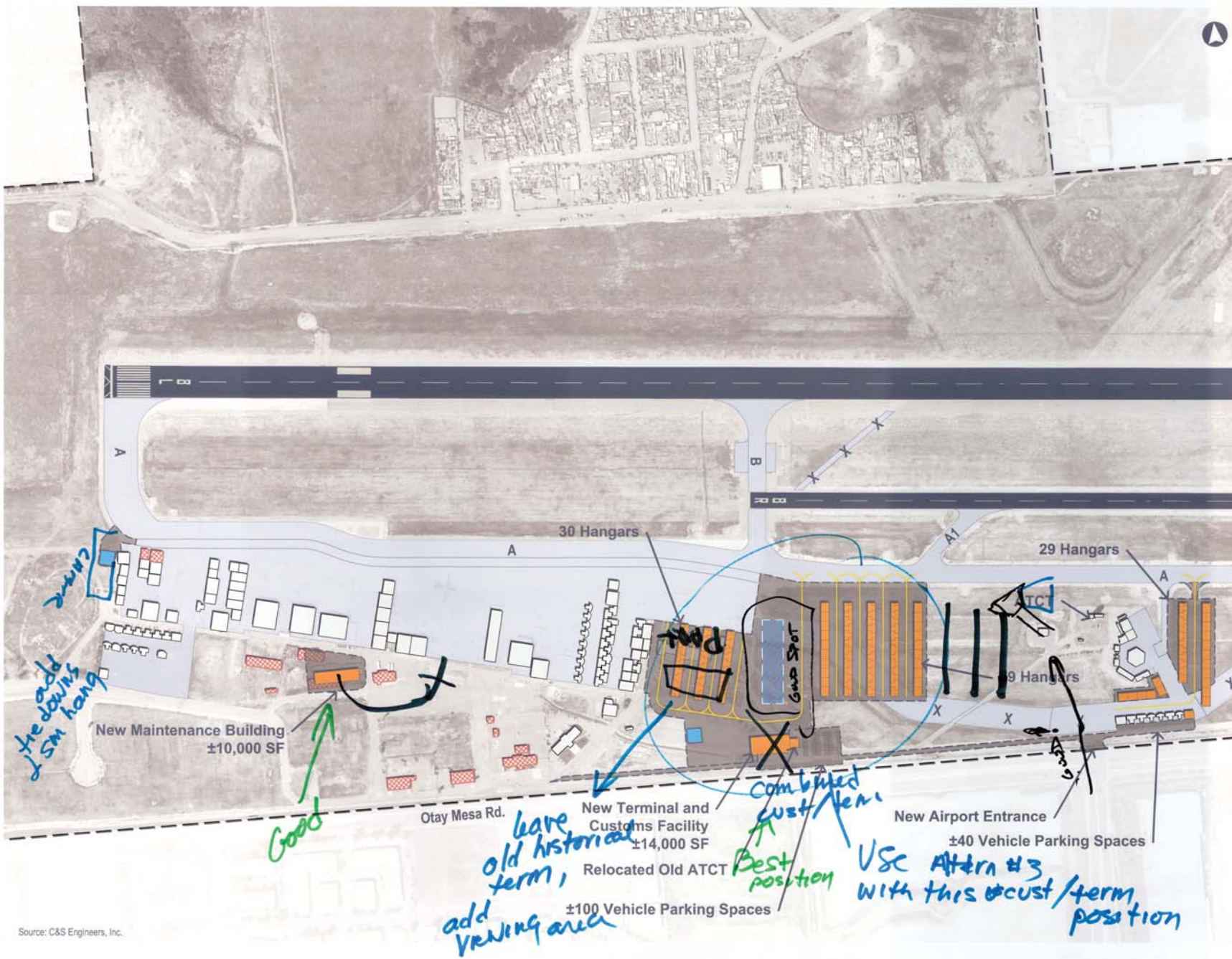
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Figure 5.X
Alternative 4 -
Fresh Perspective

Legend

- Property Line
- Existing Buildings
- Proposed Buildings
- Existing Airfield Pavement
- Proposed Airfield Pavement
- Proposed Demolition
- Proposed Taxiway/Taxilane Centerline
- Proposed Wash Rack
- Proposed New Customs Box



DRAFT



Figure 5.X
Alternative 5 -
MAP Development



Legend

-  Property Line
-  Existing Buildings
-  Proposed Buildings
-  Existing Airfield Pavement
-  Proposed Airfield Pavement
-  Proposed Demolition
-  Proposed Taxiway/Taxilane Centerline
-  MAP Development Area
-  Reserved for Aeronautical Development
-  Existing Customs Box
-  Proposed Customs Box Expansion

DRAFT



Appendix B – Airspace Analysis

Table of Contents

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Existing Instrument Approach Procedures	1
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Figures

Figure 1 – Existing and Potential Future Controlling Obstacles RNAV (GPS) LNAV 8L

Tables

Table 1 – RNAV (GPS) 8L Controlling Obstacles

Table 2 – VOR OR GPS - Controlling Obstacles

Executive Summary

A Terminal Instrument Procedures Analysis (TERPS) was conducted for Brown Field Municipal Airport (SDM or Airport) by QED Airport and Aviation Consultants to evaluate the runway system as it relates to instrument approach procedures. This evaluation focused on the end of the primary Runway 26R that is not presently served by instrument approach procedures. Airport owners and operators should continually strive to maximize the utility of the airport for its users, consistent with community goals and objectives. The runway facilities are a key component of the airport and have a direct correlation with respect to demand and capacity considerations. In addition to ensuring adequate length, width and pavement strength for aircraft operations, runways should also offer operational capability during marginal weather conditions to the extent practical and achievable. The current instrument approach procedures to Runway 8L were also reviewed with an aim to determine if mitigation of the controlling obstacle, i.e., the obstacle that establishes the approach minimums could result in a reduction of the approach minimums. These are summarized in the sections that follow as Appendix A and provides further detail of the analyses.

Existing Instrument Approach Procedures

The Federal Aviation Administration (FAA) has published a straight-in instrument approach procedure to Runway 8L and a circling approach based on the POGGI VORTAC (PGY) that provides a visual procedure to Brown Field Municipal Airport (SDM or Airport). The area navigation (RNAV [GPS]) procedure to Runway 8L offers three lines of approach minimums that may be flown depending on the avionics equipment of the aircraft. These are the localizer performance with vertical guidance (LPV), lateral and vertical navigation (LNAV/VNAV) minimums and a circling minimum. The current instrument approach procedure diagrams are presented at the end of this report.

Controlling Obstacles - RNAV (GPS) 8L

The controlling obstacles identified by the FAA, i.e., those that establish the altitudes for each segment of the RNAV (GPS) approach to Runway 8L, are shown in **Table 1**.

Table 1 – RNAV (GPS) 8L Controlling Obstacles

Approach Segment	Type	Coordinates	Elevation (feet above mean sea level [AMSL])	Accuracy Code
Initial	Tower (06-000538)	32°40'13.00"N 117°14'26.00"W	544	3C
Intermediate	Assumed Adverse Object	32°34'00.00"N 117°06'15.00"W	233	4E
Final - LPV	None	Not Applicable (NA)	NA	NA
Final - LNAV/VNAV	None	NA	NA	NA
Final - LNAV	Tree	32°34'18.89"N 117°01'06.13"W	589	2C
Circling by Aircraft				
Category A	Tree	32°34'18.94" N 116°56'31.71"W	669	2C
Category B	Tree	32°35'45.00"N 116°58'53.40"W	699	2C
Category C	Tree	32°35'24.79"N 116°54'58.52"W	869	2C
Category D	Assumed Adverse Object	32°36'00.73"N 116°54'22.07"W	1950	2C

Source: Federal Aviation Administration Flight Procedures Office

Absent specific surveyed obstacle data, the FAA will typically incorporate an assumed adverse object in an approach segment, particularly when it overlies terrain that may or may not be covered with vegetative growth such as trees. The use of the 200 feet above ground level (AGL) election is commonly applied in these instances.

An accuracy code of 2C (50 feet + horizontal and 20 feet + vertical) is acceptable for use in procedure design in the final approach segment. Higher (less accurate codes such as 4E) will require an upward adjustment to the reported elevation and the location of the obstacle. However, higher than 2C accuracy codes for the controlling obstacles in the initial and intermediate approach segments are acceptable for use without adjustment.

The approach minimums for the RNAV (GPS) LPV and LNAV/VNAV approaches to Runway 8L are the lowest that can be authorized for these procedures without an approach lighting system (726 feet AMSL or 200 feet above touchdown zone elevation and $\frac{3}{4}$ - statute mile (s.m.) visibility without an approach lighting system for the LPV approach). Additionally, for 776 feet AMSL or 250 feet above touchdown zone elevation and $\frac{3}{4}$ -s.m. visibility. The installation of a medium intensity approach lighting system with runway alignment indicator lights (MALSR) could lower the existing $\frac{3}{4}$ -s.m. visibility minimum to $\frac{1}{2}$ -s.m. for these approaches. It would be prudent to conduct a present value, life-cycle benefit/cost analysis to determine if the installation of a MALSR is cost

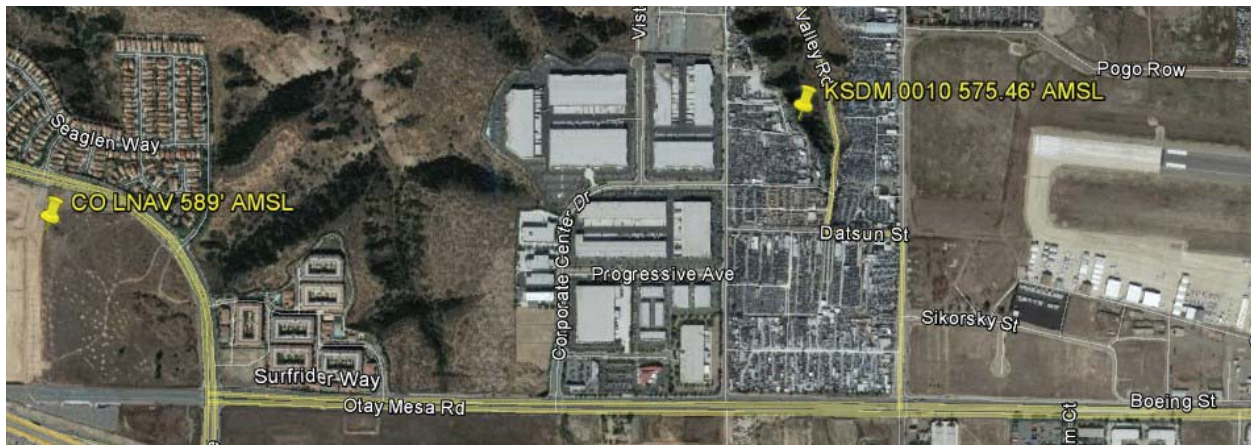
effective, as well as confirmation that the 34:1 visual area obstacle identification surface is clear. Visibility minimums are restricted to $\frac{3}{4}$ -s.m. when this surface is penetrated.

Installation of a MALSR on Runway 8L would not result in a reduction to the current 1-s.m. (approach category A and B aircraft) and 7/8-s.m. (approach category C and D aircraft) authorized for the LNAV procedure due to its associated ceiling minimum (840 feet AMSL or 314 feet height above touchdown elevation.) The lowest approach minimums for the LNAV procedure that can be published are 800' AMSL, or 250 feet height above touchdown zone elevation and 1-s.m. visibility without an approach lighting system.

Mitigation of the tree controlling the LNAV ceiling elevation of 840 feet AMSL may be possible if the tree is removed (see **Figure 1**.) This tree, at an elevation of 589 feet AMSL, appears to be one of several scattered trees of likely the same elevation in an area south of Ocean View Hills Parkway and its intersection with Sea Fire Point and may no longer exist. However, more recent surveys of the approach to Runway 8L identified a tree (KSDM0010) at 575.46 feet AMSL, which is likely the tallest tree in a grove just west of Olay Valley Road and nearly on the extended runway centerline. The difference in elevation between these two trees is slight and removal of the current controlling tree would not lower the 840 feet AMSL (314 feet height above touchdown elevation) ceiling minimum as TERPS design criteria require that these published values be rounded up to the next highest 20-foot increment, thereby maintaining the 840 feet AMSL ceiling. Therefore, removal of the taller tree and those surrounding it would not result in a reduction to the current LNAV approach minimums.

Figure 1 – Existing and Potential Future Controlling Obstacles

RNAV (GPS) LNAV 8L



Source: Google Earth Mappingm, FAA Obstacle Data and Woolpert Obstruction Survey

Controlling Obstacles - VOR or GPS-A

The controlling obstacles identified by the FAA, i.e., those that establish the altitudes for each segment of the VOR or GPS-A approach to Runway 8L is shown in **Table 2**. This approach is not specific to a runway end, but rather provides positive course guidance toward the center of the Airport and aircraft can then circle to land on either runway end depending on aircraft activity and wind velocities.

Table 2 – VOR OR GPS: A Controlling Obstacles

Approach Segment	Type	Coordinates	Elevation (feet AMSL)	Accuracy Code
Feeder	Treed Terrain	32°48'45.00"N	1691	6A
		117°01'50.00"W		
Intermediate	Treed Terrain	32°46'01.00"N	1473	6A
		116°58'57.00"W		
Final	Tree	32°40'56.00"N	969	2C
		116°58'11.00"W		
Circling by Aircraft				
Category A	Tree	32°34'19.00" N	719	2C
		116°56'30.00"W		
Category B	Tree	32°54'45.00"N	769	2C
		116°58'51.00"W		
Category C	Tree	32°54'45.00"N	769	2C
		116°58'51.00"W		
Category D	Tree	32°54'45.00"N	769	2C
		116°58'51.00"W		

Source: Federal Aviation Administration Flight Procedures Office

The controlling obstacles in each segment are natural features whose elevations are not capable of mitigation. The controlling obstacle in the final approach segment is located approximately 6.6 nautical miles (n.m.) north of the Airport and is assigned a satisfactory accuracy code for its use in determining the approach minimums.

Potential Instrument Approach Procedures to Runway 26R

Runway 26R is not served with an instrument approach procedure. The potential to establish RNAV (GPS) LNAV and LPV approaches is presented below. There are several challenges to implementing an instrument approach procedure to Runway 26R:

1. The border with Mexico is a limiting factor and requires that the controlled airspace for the procedure be positioned entirely in US airspace as the Southern California Terminal Radar Approach Control Facilities (TRACON) excludes airspace within Mexico.
2. The borderline between the two countries is generally aligned on a true heading of about 83.3 degrees (°) near the Airport and the runway extended centerline has a true heading of about 95.6°. The two headings intersect about 7.2 n.m. out from the extended runway centerline.
3. High terrain east of the Airport rises gradually from the Runway 26R elevation of 507 feet AMSL to about 700 feet AMSL approximately 2.7 n.m. and then begins to rise more steeply reaching altitudes of nearly 3,600 feet AMSL about 7.0 miles from the Runway 26R end before decreasing in elevation. The terrain also rises in a north-to-south direction. Transmission towers are located on the highest terrain to the east-northeast of the Airport at estimated elevations of 3,700 feet AMSL.
4. Transitions from the en route system to an initial approach fix and then to an intermediate approach fix are reasonably achieved from the west through the east quadrants.
5. The optimum length of the intermediate approach segment is 10.0 n.m. for both the LNAV and LPV procedures and its total width at that distance is 6.0 n.m.
6. The dimensions, slopes and obstacle clearance requirements of the obstacle evaluation area surfaces for LNAV and LPV procedures differ in the final approach segment and are equivalent in the intermediate approach segment.
7. Both the LNAV and LPV approach procedures must comply with allowable descent gradients in each segment of the approach. The final approach segment has an optimal descent gradient of 318 feet/n.m. and 150 feet/n.m. in the intermediate segment.

The design criteria for instrument approach procedures is contained in several FAA Orders, principal among which are:

- FAA Order 8260.3C, United States Standard for Terminal Instrument Procedures (TERPS)
- FAA Order 8260.58A, United States Standard for Performance Based Navigation (PBN) Instrument Procedure Design

These procedure design documents offer flexibility in the configuration of the final, intermediate and initial approach segments in terms of their alignment with the extended runway centerline, length, width when joining the succeeding segment, intersection point of an offset alignment with the extended runway centerline, and descent gradients. Additionally, a stepdown fix may be incorporated into the design of the procedure in the final and intermediate segments for LNAV approach procedures in order to achieve lower minimum descent altitudes. This allows the design to accommodate obstacles that cannot otherwise be mitigated by their removal or reduction in elevation. Stepdown fixes are considered as a nonstandard application of TERPS design criteria.

RNAV (GPS) LNAV 26R

Multiple iterations of positioning the final, intermediate and initial approach segments were conducted to identify those alignments having the best opportunity to meet TERPS procedure design guidelines in order to achieve a viable RNAV (GPS) LNAV procedure to Runway 26R. Of those considered, the most effective solution is outlined below.

1. Offset the final approach segment 30° to the north of the extended runway centerline on a true heading of 65.6° at a point beginning 4,500 feet outbound from the Runway 26R end. At the 4,500 feet intercept point, the elevation of the obstacle clearance surface is estimated at 777 feet AMSL. This alignment attempts to avoid the relatively higher terrain that slopes generally upward toward the southeastern quadrant of the final approach segment, and is the largest offset angle permitted in accordance with TERPS guidance documents.
2. Select an initial approach fix and intermediate approach fix in the area northeast of the Airport that allows for a course alignments and descent gradients to meet allowable limits. The topography in this area is conducive to these outcomes. The challenge in defining an approach to Runway 26R focuses on terrain and manmade obstacles in the final approach segment. The intermediate approach segment is aligned with the final approach segment, which is, offset at the same true heading of 65.6° .
3. Set a final approach fix at a distance of 7.0 n.m. from the 4,500 feet intercept point. Initial evaluations of multiple iterations of the final and intermediate approach segments demonstrated that positioning the final approach fix at the optimal distance of 5.0 n.m. would not yield acceptable descent gradients between fixes. This includes a possible stepdown fix, and the Runway 26R end. The 4,500-foot intercept point will be the designated missed approach point for the RNAV (GPS) LNAV procedure.
4. With a length of 10.0 n.m., the highest obstacle in the intermediate approach segment governs the final approach fix altitude. Terrain ranging in elevations between 3,360 feet AMSL and 3,570 feet AMSL along with a series of towers, found near the aptly named Alta Road and Olay Mountain Truck Trail, are located within the final approach segment obstacle evaluation area (primary or secondary areas). The elevations of some of these towers are referenced in the November 5, 2018 edition of the Digital Obstacle File, but are evident on the Google Earth mapping dated November 8, 2016, and some are noted without elevation information on the current FAA Sectional Aeronautical Chart. The obstacle that controls the minimum descent altitude (MDA) is terrain located at $32^\circ 35' 53.22''\text{N}$ and $116^\circ 50' 42.16''\text{W}$ at an elevation of 3,484 feet AMSL. An allowance of 200 feet for an assumed adverse obstacle height was included as is typically applied by the FAA in the absence of a known manmade obstacle and the 250 feet required obstacle clearance is also incorporated into the analysis. This yields an MDA of 3,940 feet AMSL that is adjusted upward to account for the excessive length of the final approach segment. The resulting MDA is 4,000 feet AMSL.
5. The intermediate approach segment adjoins the final approach segment, can be aligned with the offset final approach course, and establishes the altitude of the final approach fix. Because the terrain and obstacles in the intermediate approach segment are at elevations less than the MDA of 4,000 feet AMSL, the final approach fix altitude is determined by adding 318 feet for each nautical mile that the controlling obstacle is inbound from the final approach fix, which in this case is 1.18 n.m. This maintains the optimal descent gradient within the final approach segment (318 feet /n.m., which is equivalent to a glide path angle of 3.00°) and sets the final approach fix altitude at 4,400 feet AMSL. Then, the intermediate approach fix is set an altitude of 5,900 feet AMSL and 10.0 n.m. from the final approach fix based on the optimum descent gradient of 150 feet/n.m. in this segment of the approach procedure.

6. As the aircraft descends from the final approach fix, there should be no obstacle penetrations including allowance for the required 250-foot obstacle clearance to the profile of the 318 feet/n.m. descent gradient, which is equivalent to a 3.00° glide path angle. Examination of the full obstacle evaluation area (primary and secondary) in the final approach segment to the missed approach point revealed that this criterion could be met and the MDA remains at 4,000' AMSL.
7. An evaluation of a number of possible stepdown fixes between the final approach fix and missed approach point was conducted to determine if the MDA could be lowered. Only one stepdown fix is allowed per TERPS design criteria when the final approach segment is between 5.0 n.m. and 10.0 n.m. in length. The analysis determined that given the distances available between the final approach fix and possible stepdown fixes, and the location and elevation of each of the intervening terrain/obstacles, the descent gradients between the fixes would exceed allowable limits. Consequently, it is necessary to maintain the MDA at an altitude of 4,000 feet AMSL.
8. The missed approach point is positioned to provide a clear missed approach obstacle clearance surface and is collocated with the 4,500-foot intercept point. A climbing turn to the right toward the Mission Bay VORTAC can be initiated and the VORTAC serves as the missed approach fix or as directed by air traffic control.

It is noted that the altitudes for the intermediate and final approach fixes were not adjusted upward for flight above precipitous terrain, which would have resulted in higher altitudes and the need to lengthen the final approach segment to enable an acceptable descent gradient between the final approach fix and the missed approach point. Thus, the altitudes shown are lower than those that would likely be determined by the FAA if this upward adjustment were applied.

The visibility component associated with an MDA of 4,000 feet AMSL is three s.m. and, therefore, the aircraft will essentially be operating in visual flight rule conditions. Approach minimums of 4,000 feet AMSL and 3.0 s.m. visibility can also be described for Runway 26R as a ceiling of 3,486 feet above touchdown zone elevation and 3.0 s.m. visibility (3,486-3) and applies to approach category A through D aircraft. There are several airports in the country where approach minimums are equivalent or higher than visual flight rule (VFR) conditions and, thus, there is precedent in proceeding to achieve this outcome for Runway 26R.

Aircraft may descend below the MDA when it is continuously in a position allowing for normal rate of descent. This includes using normal maneuvers to a landing on the intended runway; the flight visibility is not less than the visibility prescribed in that published for the instrument approach being used; and a visual reference for the intended runway is distinctly visible and identifiable to the pilot. Each of these conditions are met for the procedure described for Runway 26R as 318 feet/n.m. is the optimal descent rate in the final approach segment and its plane is not penetrated by obstacles including their associated required obstacle clearance. The visibility minimum of 3.0 s.m. is equivalent to that for visual flight rule operations and the runway end environment should be identifiable in order for the approach to continue. Additionally, visual identification is assisted with the PAPI-4 serving the Runway 26R end, which is set at a 4.00° glide path angle and a 73.4-foot threshold crossing height. Although the PAPI-4 is reported by the FAA as unusable beyond 3.0 n.m. due to the rapidly rising terrain to the east, the aircraft will be positioned within this operational limit at that point during the visual portion of the final approach.

It is noted that the resultant approach minimums are higher than the circling minimums published for the existing instrument approach procedures to Runway 8L, which may diminish its utility at the discretion of the pilot.

RNAV (GPS) LPV 26R

The potential to design an RNAV (GPS) LPV procedure to Runway 26R is more constrained than that for an RNAV (GPS) LNAV procedure because the final approach course cannot be offset from the extended runway centerline by more than 3.00° in accordance with TERPS design criteria. As a result, assuming even a 4.0 n.m. final approach segment, the shortest reasonable length, the final approach obstacle evaluation area lies within U.S. airspace. However, after allowing for an offset alignment of not more than 30° from the final approach course to the north and its associated turning radii, portions of the intermediate approach segment obstacle evaluation area will lie within Mexico's airspace.

Further, although the final approach segment obstacle evaluation area is narrower and incorporates three upward sloping surfaces, the terrain and towers east of the Airport do not allow for acceptable descent gradients between fixes and the Runway 26R end. Additionally, stepdown fixes are not authorized for RNAV (GPS) LPV procedures. Consequently, the potential to establish an RNAV (GPS) LPV procedure is considered unachievable.

Recommendations

The existing RNAV (GPS) LPV and LNAV/VNAV approach minimums to Runway 8L are the lowest that can be authorized absent the installation of a medium intensity approach lighting system with runway MALSR. The installation of a MALSR would lower the visibility minimum for these approach procedures and the basis and rationale for its establishment can be evaluated through the conduct of a net present value, life-cycle benefit/cost analysis. The analysis should also ensure that the 34:1 visual area obstacle identification surface is not penetrated. To assure that the Airport is providing the highest level of operational capability to its users, it is recommended that these analyses be undertaken. Should the results demonstrate that this is cost effective and all surfaces are clear of obstacles, the Airport should coordinate with the FAA for its future installation, operation and maintenance.

There does not appear to be justification to mitigating the trees controlling the approach minimums published for the RNAV (GPS) LNAV procedure to Runway 8L. The singular trees noted are in clusters and their removal would likely affect multiple trees. The current approach minimums are very near the lowest that can be authorized for this type of non-precision instrument approach and is viewed to provide an adequate level of service to the Airport's users.

Based on the analyses conducted, an RNAV (GPS) LNAV instrument approach procedure to Runway 26R appears viable, albeit with approach minimums that exceed visual flight rule conditions. Nonetheless, the availability of this instrument approach provides positive course guidance during marginal weather for aircraft arriving from areas east of the Airport and serves as a valuable enhancement to flight safety that should be pursued with the FAA Flight Procedures Office.

Disclaimer

The evaluation and findings presented above are based on obstacle data that is readily available and is limited to the FAA design guidelines relevant to RNAV (GPS) LNAV and LPV instrument approach procedures. The FAA may have other data that can alter these findings and, therefore, this analysis should be used to support a request to the FAA for its further detailed assessment of the potential to establish the suggested RNAV (GPS) LNAV procedure to Runway 26R and its flight check prior to publication.

SAN DIEGO, CALIFORNIA

AL-5814 (FAA)

16147

WAAS CH 56534 W08A	APP CRS 082°	Rwy Idg TDZE Apt Elev	7972 526 526
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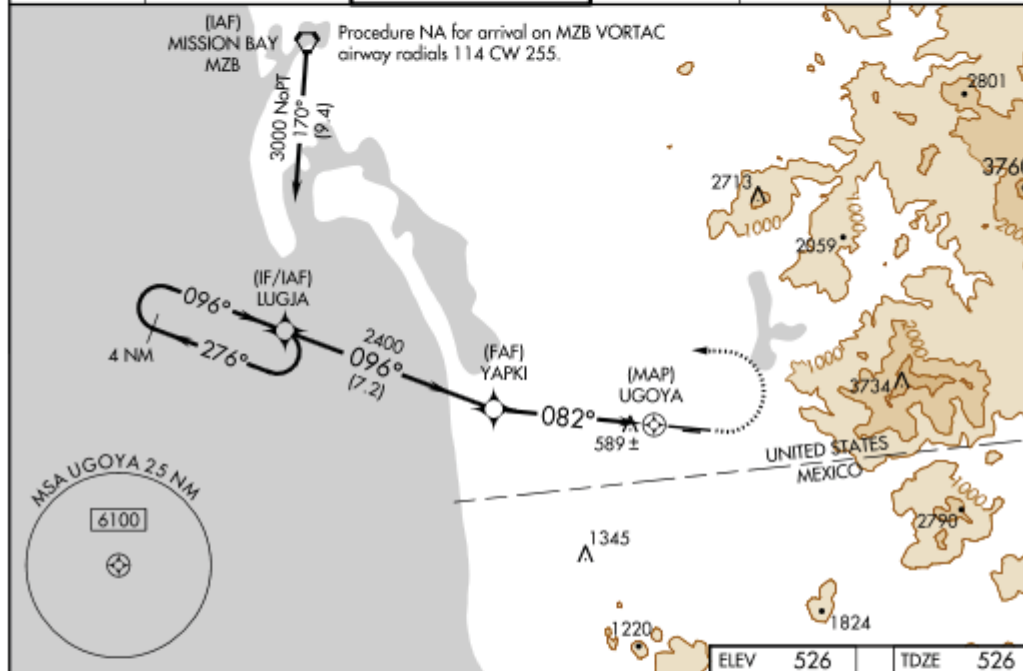
RNAV (GPS) RWY 8L

BROWN FIELD MUNI (SDM)

⚠ DME/DME RNP-0.3 NA. Circling NA south of Rwy BR-26L. For uncompensated Baro-VNAV systems, LNAV/VNAV NA below 2°C (36°F) or above 54°C (130°F). Baro-VNAV NA when using San Diego Intl altimeter setting. When local altimeter setting not received, use San Diego Intl altimeter setting and increase all DA 105 feet and all MDA 120 feet, increase LPV all Cats visibility 1/4 mile, LNAV/VNAV all Cats, and LNAV Cats C and D visibility 3/8 mile, and Circling Cat C visibility 1/2 mile.

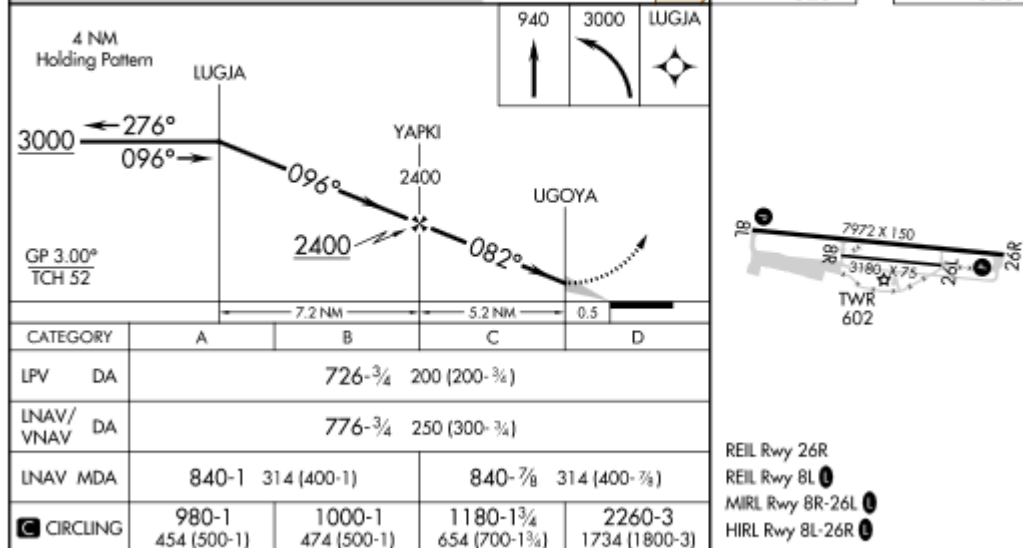
MISSED APPROACH: (Do not exceed 210 KIAS until LUGJA) Climb to 940 then climbing left turn to 3000 direct LUGJA and hold.

ATIS 132.35	SOCAL APP CON 124.35 279.625	BROWN TOWER * 128.25 (CTAF) 0 225.4	GND CON 124.4	CLNC DEL 124.4	UNICOM 122.95
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SW-3, 09 NOV 2017 to 07 DEC 2017

SW-3, 09 NOV 2017 to 07 DEC 2017



SAN DIEGO, CALIFORNIA

Amdt 1B 28APR16

32°34'N-116°59'W

BROWN FIELD MUNI (SDM)

RNAV (GPS) RWY 8L

