APPENDIX B – DETAILED ALTERNATIVES EVALUATION

This appendix presents rationale behind the alternatives secondary screening results summarized in Chapter 6 of this document.

B.1 Economic Viability

Economic viability criteria were formulated to examine both capital and operational costs. A relative comparison demonstrated that Alternative B1 would perform best among the alternatives primarily due to its lower operational costs.

The economic viability criteria and results are presented in **Table B-1.** Using order of magnitude cost data for each alternative, the airside, terminal, landside and support facilities cost was estimated to rank the alternatives. Notably, Alternative B1 ranked the best among the four alternatives from an economic perspective, with Alternative A2 being second best.

While Alternative B1 had lower operational costs, its capital costs were greater than those associated with Alternative A2. The lower operational costs associated with Alternative B1 result from the fact that the alternative does not require an APM or a sophisticated baggage conveyance system.

The economic viability criteria were subdivided into three categories: capital cost allowances, operational cost allowances and environmental mitigation costs.

Capital cost allowances. The capital costs used in this phase of the analysis do not represent the total cost of development, but are comparable across the alternatives to facilitate the evaluation. The actual cost to construct any one of the alternatives may be different than those shown in **Table B-1** primarily due to refinement of the alternative from a planning concept to a fully designed and engineered facility. To account for this uncertainty, a range of *cost allowances* rather than *cost estimates* were provided for each of the alternatives using approximate unit costs. Because the unit costs used for each of the alternatives were the same, the cost allowances provide an accurate manner in which to compare the alternatives to one another. The ranking from least costly to most costly from a capital cost perspective was: A3, A2, B1 and A8.

Operational cost allowances. Three functional elements that would involve operational costs were evaluated: automated people mover, baggage system, and duplication of passenger processing facilities.

The costs to operate and maintain the *Automated People Mover* (APM) were qualitatively determined based on (1) the length of the APM, (2) the type of APM – either secure or non-secure, and (3) the required number of stations. Therefore, the optimal alternative (of those requiring an APM) would be one involving a non-secure APM with the shortest track and the least number of stations. Because Alternative B1 would not require an APM system, it is the optimal alternative. Alternative A8 requires the shortest track length, followed by Alternative A3 and A2. Alternative A2 followed Alternative A3 as it would require a secure APM. The ranking from least costly to most costly was: B1, A8, A3, and A2.

The costs to operate and maintain the *baggage transport system* was determined based on the overall distance, including the length of conveyance system, necessary to move inbound and outbound baggage (inbound conveyed from check-in to the gate; outbound conveyed from the gate to baggage carousels).

Alternatives A2 and A3 would require a sophisticated baggage conveyance system to move luggage from the aircraft gates located south of the runway to baggage claim facilities located in the north complex.

The optimal alternative would be one that minimizes the distance required to move inbound and outbound baggage. Because Alternatives A8 and B1 do not require a sophisticated baggage conveyance system to move baggage from one side of the runway to the other, they perform best. Comparatively, the maximum distance from the baggage check-in to the end of the concourse required in Alternative A8 is slightly longer than that associated with B1. Alternatives A2 and A3 require an underground baggage conveyance system outside the terminal to transfer the bags from the aircraft gate to the baggage claim located on the opposite side of the runway. It was assumed the baggage conveyance system would be routed directly from the check-in areas at the processing center to the concourses via a tunnel for Alternatives A2 and A3. Alternative A2 would only require the single baggage claim in the north terminal, as opposed to A3 which would maintain the baggage claim in T2 West in addition to the claim in the north terminal. The ranking from best to worst was: B1, A8, A2, and A3.

Duplication of passenger processing functions. The operational and maintenance costs were based on the number of passenger processing functions required. Processing functions include areas near designated terminal curbfronts where passenger processing activities, including check-in, either via self-service

kiosks or the traditional ticket counter check-in positions, bag claim and security checkpoints, are located.

The optimal alternative has a single passenger processing area. Alternatives B1 and A2 require a single passenger processing area in the north terminal, whereas both A8 and A3 would require two areas. Alternative A8 requires complete passenger processing area in the southern terminal, and limited check-in within the north terminal for those arriving via mass transit. Likewise, Alternative A3 requires two passenger processing areas – one in the north terminal as well as the existing area in T2 West. The ranking from best to worst was: B1 / A2, A8 / A3.

While it is not possible to project environmental mitigation costs associated with the alternatives at this time, it is possible to examine the potential environmental impacts to enable a ranking of each alternative relative to the others. Alternatives A2 and A3 ranked best among the alternatives.

Environmental mitigation costs. Each of the proposed alternatives has the potential to incur costs associated with environmental mitigation, notably abatement of hazardous materials, documentation and mitigation of historic properties, and relocation of endangered species. While it is not practical to calculate exact mitigation costs at this stage of the planning process, the following section ranks each alternative using the estimated level of mitigation effort required. The ranking from best to worst was: A2 / A3, A8 and B1.

Alternatives A2 and A3 would include development activity that would require hazardous materials mitigation within the former General Dynamics site and the former Teledyne-Ryan complex. Alternatives A2 / A3 would require documentation and mitigation of historic structures within the Teledyne-Ryan complex, as well as the Aircraft Service International Group (ASIG) and Allied Aerospace buildings. Alternatives A2 and A3 would also require relocation of a portion of the California Least Tern nesting site.

Alternative A8 would require the same as Alternatives A2 and A3, however, this alternative would require relocation of the *entire* California Least Tern nesting site.

Alternative B1 would include development activity that would require hazardous materials mitigation for the former General Dynamics site. In addition, Alternative B1 would require the expenditure necessary to acquire 27 acres of MCRD property which none of the A-series alternatives require.

Table B-1
ECONOMIC VIABILITY RANKING OF FINALIST ALTERNATIVES
San Diego International Airport

	A2		A3		A8		B1	
	Cost	Rank	Cost	Rank	Cost	Rank	Cost	Rank
Capital cost allowance								
Airside	$1.0–1.3	-	$0.7–1.0	-	$0.7–1.0	-	$0.7–1.0	-
Terminal	0.9–1.3	-	1.0–1.3	-	2.1–2.8	-	1.1–1.5	-
Landside	3.8–5.2	-	3.6–4.9	-	3.5–4.8	-	4.0–5.4	-
Support facilities	0.1	-	0.1	-	0.1	-	0.3–0.4	-
Total capital costs	$5.7–7.9	2	$5.4–7.3	1	$6.4–8.7	4	$6.1–8.3	3
Operational cost allowance								
APM operational cost	n/a	4	n/a	3	n/a	2	n/a	1
Baggage system operational cost	n/a	3	n/a	4	n/a	2	n/a	1
Duplication of passenger processing functions	n/a	1	n/a	3	n/a	3	n/a	1
Environmental mitigation cost	n/a	1	n/a	1	n/a	3	n/a	4
		11		12		14		10
Overall economic ranking		**2**		**3**		**4**		**1**

Note: capital costs shown in billions.
Source: Jacobs Consultancy Team, 2008.

Alternative B1 ranked best among the alternatives with respect to operational efficiency.

B.2 Operational Efficiency

The operational criteria and results are presented in **Table B-2.** As shown, Alternative B1 ranked the best in terms of operational efficiency, consistent with its performance with respect to the operational cost criteria. Again, Alternative A2 was a close second to Alternative B1, with A3 and A8 following, respectively. The criteria were subdivided into three categories: airport operations, passenger experience, and vehicle traffic.

Airport operations. *Runway crossings* by aircraft were estimated based on the location of the various facilities on the airfield. For example, in Alternative A2, RON aircraft could be accommodated on the same side of the runway as the passenger terminal which is not the case with any of the others. The optimal alternative would minimize runway crossings. The ranking from best to worst was: A2, A8, A3/B1.

With regard to the *baggage system*, the efficiency of the passenger concourses is partially based on the complexity of the baggage handling operation. This complexity is defined as the overall distance, including the length of conveyance system, necessary

to move inbound and outbound baggage (from check-in to the gate; from the gate to baggage carousels).

Accordingly, the optimal alternative is one that best minimizes the distance required to move inbound and outbound baggage. Alternatives A8 and B1 do not require a baggage conveyance system outside the terminal, and therefore perform best. Comparatively, the maximum distance from the check-in area to the end of the concourse required in Alternative A8 is slightly longer than that of B1. Alternatives A2 and A3 require an underground baggage conveyance system outside the terminal. It was assumed the baggage conveyance system would be routed directly from the check-in areas at the processing center to the concourses via a tunnel for Alternatives A2 and A3. The ranking from best to worst was: B1, A8, A3 and A2.

In terms of *construction phasing*, the ranking of each alternative is based on the duration of phased construction required. The duration is related to the impact to the existing terminal and landside area; the greater the impact to the existing terminal, the longer the duration of construction.

Alternative B1 would be easiest to construct because it relocates the passenger terminal facilities to the land north of the runway largely undeveloped.

The optimal alternative would require the least amount of time to construct. Alternative B1 would require the least time to construct as it allows for the most seamless construction phasing as facilities in the north are constructed while facilities in the south remain in operation. Alternatives A2 and A3 require the demolition of T1 and the construction of the new concourses in its place. Alternative A3 being slightly better than A2 as T2 would remain in-place. Alternative A8 would impact the existing terminals the most, with all of the existing terminals demolished to construct the new terminal and concourse as well as the associated landside improvements (i.e. terminal curbfront). The ranking from best to worst was: B1, A3, A2, and A8.

Passenger experience. *Average walking distance* to the aircraft gate from the terminal curbfront was calculated for each of the alternative. The efficiency of the airfield and passenger concourses is based on the average walking distance from the terminal curbfront to the aircraft gates at each concourse. The average walking distance does not include the time passengers would travel on the APM. To determine the average walking distance, the walking distance from the point the passenger enters the processing area to the point he reaches the end of the

concourse piers was determined and averaged. For alternatives with multiple access points, the distances from each of those access points was determined and averaged. The optimal alternative provides the shortest average distance of travel The average walking distances for the alternatives, in order of shortest to longest, were Alternative A2 (~1,300 ft.), A3 (~1,554 ft.), B1 (~2,367 ft.), and A8 (3,760 ft.). Accordingly, the ranking from best to worst was: A2, A3, B1 and A8.

Alternative A8 ranked last among the alternatives as it would be most challenging to provide a seamless passenger experience given the location of the proposed terminal and concourse is in the place of current terminal facilities.

The ranking of each alternative relative to *passenger service* was based on maintaining or improving the current level of passenger service. The optimal alternative would allow for a seamless transition from use of the existing facilities to the newly constructed facilities. Alternative B1 provides for the most seamless transition as facilities in the north can be constructed and opened with minimal impact to passenger service. Alternative A3 would require no change to T2 as the other concourse and facilities are built, and there would be no reduction in the landside level of service. Alternative A2 requires the demolition of both T1 and T2. Finally, the construction of Alternative A8 would impact passenger service the most, with the entire terminal infrastructure to be demolished and reconstructed in-place. Accordingly, the ranking from best to worst was: B1, A3, A2 and A8.

Vehicle traffic. Order of magnitude *vehicle miles traveled* (VMT) were estimated for each of the four alternatives based on the location of the various facilities on the Airport. For purposes of comparing alternatives, those with lower airport-generated VMT would be rated higher than those with higher airport-generated VMT.

Alternatives A2 and B1 would provide the greatest reduction in vehicle miles traveled by passengers traveling to the Airport as all passengers would travel to the north complex for ticketing and check-in eliminating the need to drive to the south side of the Airport.

Alternative A2 would generate the lowest VMT, followed, in order of increasing VMT, by B1, A3, and A8. Alternatives A2 and B1 reduce VMT because they would provide a direct link between I-5 and the airport passenger terminal while A3 and A8 would require that some or all passengers using I-5 travel around the end of the runway to reach the passenger terminal.

The *competitive position between private automobile and mass transit* was also evaluated. These rankings reflect the relative ease with which transit riders can access the passenger terminal facilities. Alternatives providing a consistent passenger experience, regardless of access mode, were rated higher. Alternatives A2 and B1 were rated the highest, followed by A3 and A8. In

Alternatives A2 and B1, all passengers, regardless of airport access mode, share the same experience traveling to their aircraft gate. In addition, the transit ridership forecast projected higher transit use for Alternatives A2 and B1 than for A3 and A8. However, in Alternative A3 some passengers would be able to drive directly to the T2 West curbfront and avoid the APM ride that would be necessary for all transit patrons. Under Alternative A8, all transit riders would be required to ride the APM to get to the passenger terminal while passengers arriving via non-transit modes would be able to park near the terminal and walk to their gate.

To compare the *overall roadway level of service* (LOS) for each alternative, a high-level traffic analysis was conducted. This traffic analysis estimated future levels of activity on selected road segments that carry airport-related traffic and are considered primary access routes to the existing or proposed terminal locations. Specific roadways assessed include North Harbor Drive, Grape Street, Hawthorn Street, Pacific Highway, India Street, Laurel Street, and Rosecrans Street. The analysis incorporated growth in non-airport-related traffic (as projected in the SANDAG regional traffic model) and growth in airport-related traffic according to the aviation forecasts and locations of airport facilities under each alternative. Alternatives were ranked according to average LOS on all analyzed roadways with LOS A, B, and C considered acceptable and ranking best, followed by LOS D, E, and F.

The traffic analysis concluded that Alternatives A2 and B1 would result in the highest average LOS on the selected roadways, followed by A8 and A3. **Appendix A** of this document provides a detailed description of the traffic analysis.

Table B-2
OPERATIONAL EFFICIENCY RANKING OF FINALIST ALTERNATIVES
San Diego International Airport

	A2	A3	A8	B1
	Rank	Rank	Rank	Rank
Airport operations				
Runway crossings	1	3	2	3
Complexity of baggage system	4	3	2	1
Complexity of construction phasing	3	2	4	1
Passenger experience				
Average walking distance	1	2	4	3
Passenger service	3	2	4	1
Vehicle traffic				
Reduction in vehicle miles traveled	1	3	4	1
Competitive position auto vs. transit	1	3	4	1
Overall roads level of service	1	4	3	1
	15	22	27	12
Overall operational ranking	**2**	**3**	**4**	**1**

Source: Jacobs Consultancy Team, 2008.

Alternative A2 ranked best among the environmental criteria.

B.3 Environmental Considerations

The environmental criteria and results are presented in **Table B-3.** Notably Alternative A2 ranked the best among the four alternatives from an environmental perspective, followed by Alternatives A3, B1 and A8 in descending order.

The criteria were subdivided into the following subcategories: air quality, impervious area, hazardous materials, threatened and endangered species, and historic properties.

Air quality. Two measures of air quality were assessed for each of the alternatives: *total emissions* and *concentration of emissions near residential areas*.

For *total emissions*, the varying amount of emissions was assumed to be directly correlated to the amount of VMT. This was assumed because each of the alternatives serves the same amount of aircraft operations. Accordingly, the ranking from best to worst was: A2/B1, A3 and A8.

Alternative B1 is ranked below the other alternatives with respect to this criterion as it would concentrate emissions near residential areas.

With regard to the *concentration of emissions near residential areas*, the prevailing winds, location of residential areas, and location of future facilities was taken into account. Alternative B1 would relocate all of the aircraft terminal infrastructure and most of the parking to the north side, near Mission Hills; therefore, it would have the highest level of emissions near a residential area. Alternative A8 would continue to locate the passenger terminal and concourses south of the runway furthest from Mission Hills resulting in the best ranking. Alternatives A3 is slightly better than A2 because it splits activity associated with passengers traveling to the airport terminal between the north and the south, so A3 ranks better than A2. Accordingly, the ranking from best to worst was: A8, A3, A2, and B1.

Impervious area. Impervious area (i.e. paved surface area) was calculated for each of the alternatives by examining the amount of new pavement required. The optimal alternative would involve the least amount of new impervious area. The ranking from best to worst was: A2, A3, B1, and A8.

Because of their physical layout, Alternatives A2 and A3 would least impact potentially hazardous material sites.

Hazardous materials. There are several sites on airport property that are known to contain hazardous materials; the largest of these sites include the former Teledyne-Ryan complex, the former General Dynamics site, and the former Naval Training Center landfill which is undergoing site remediation. Each of the alternatives would affect a portion of some or all of these sites. Alternatives were ranked by the extent to which these sites would be impacted. The optimal alternative would avoid these sites altogether.

The T2 West expansion and ITC is common to all the alternatives, so the discriminating hazardous material sites include the former General Dynamics site and the Teledyne-Ryan complex. Alternatives A2 and A3 would construct approximately 8 aircraft gates and associated apron on the Teledyne-Ryan complex and would not affect the General Dynamics site. Alternative A8 would construct about 12 gates on the Teledyne-Ryan complex, and likewise would not affect the General Dynamics site. Alternative B1 would construct approximately 36 aircraft gates on the General Dynamics site, and it is possible support facilities would be relocated to the Teledyne-Ryan complex. The ranking from best to worst was: A2 / A3, A8, and B1.

Threatened and endangered species. Each of the alternatives were evaluated to determine their potential effect on the existing nesting sites of the California Least Tern, which are listed as endangered species under both the Federal and California Endangered Species Act. The nesting sites are located within airfield ovals formed between the runway and taxiway pavement on the southeast side of the airfield. The optimal alternative would not impact the nesting sites.

Alternative B1 would least impact the California Least Tern nesting sites located on the southeast portion of the Airport.

Alternative B1 would not require concourse development near the nesting sites and therefore ranks best. Alternative A2 ranked second best because the majority of the nesting site could remain undisturbed as RON aircraft parking could be accommodated in the space currently allocated to T2 West. Alternatives A3 and A8 would both require the majority of the nesting site. Alternative A3 would likely require an aircraft apron for RON aircraft so that it would be located on the same side of the runway as the passenger terminal to minimize runway crossings. The long linear concourse of Alternative A8 would require the nesting area's removal in its entirety. The ranking from best to worst was: B1, A2, and A3/A8.

Alternative B1 would least impact the potentially historic properties located on the Airport.

Historic properties. Several structures on airport property are eligible for listing on the National Register of Historic Places including the seventeen structures within the Teledyne-Ryan Aeronautical complex, the Allied Airspace building, and the ASIG building which functioned as the original United Airlines terminal. The ASIG building has previously been moved from its original location, reducing its historical value. Each of the alternatives affects a portion of some or all of these structures. The optimal alternative would avoid impact to each of the potentially historic properties.

Alternative B1 would have the least impact as only the Allied Airspace building would be affected assuming the support facilities could be relocated west of the Teledyne-Ryan complex and ASIG building. Because each of the A-series alternatives would likely affect the entire Teledyne-Ryan complex and the ASIG building, they are ranked together at a ranking of 2. Therefore, the ranking from best to worst was: B1, A2/A3/A8.

Table B-3
ENVIRONMENTAL RANKING OF FINALIST ALTERNATIVES
San Diego International Airport

	A2 Rank	A3 Rank	A8 Rank	B1 Rank
Air quality				
Total emissions	1	3	4	1
Concentration of emissions near residential areas	3	2	1	4
Impervious area	1	2	4	3
Hazardous materials	1	1	3	4
Effect on T&E species	2	3	3	1
Historic properties	2	2	2	1
	10	13	17	14
Overall environmental ranking	**1**	**2**	**4**	**3**

Source: Jacobs Consultancy Team, 2008.

B.4 Social Responsibility

Alternative A2 performed best among the social responsibility criteria.

The social responsibility criteria and results are presented in **Table B-4.** Notably Alternative A2 ranked the best among the four alternatives from the social perspective, followed by Alternatives A8, and A3/B1 in descending order.

The criteria were subdivided into the two subcategories: land acquisition and opportunities for off-airport land redevelopment.

All alternatives would require land acquisition to construct the ITC; Alternative B1 would also require 27 acres of MCRD land.

Land acquisition. Each of the alternatives required the same amount of residential and commercial land acquisition to accommodate the construction of the ITC and north terminal. The optimal alternative would minimize the amount of land acquisition required to construct.

Alternative B1, unlike the A-series alternatives, required acquisition of approximately 27 acres of MCRD land to facilitate the construction of an extension of Taxiway C. Therefore, each of the A-series alternatives was ranked 1, and Alternative B1 was ranked 4.

Off-airport land redevelopment. The potential for off-airport land redevelopment was qualitatively assessed. The optimal alternative would provide the maximum amount of land for nearby off-airport development. Alternatives A2 and B1 were

anticipated to provide the best potential, followed by Alternative A8 and A3, respectively.

Alternatives A2 and B1 would likely provide the best opportunities for off-airport land redevelopment.

Alternatives A2 and B1 would remove the existing terminal access road network to the south of the airport creating land that could be redeveloped for public use such as an expansion of the Spanish Landing Park, other passive recreational uses, or greenspace. Removing airport traffic from North Harbor Drive would also allow the character of the road to be modified if so desired. Neither Alternative A8 nor A3 would provide an excess of land highly suitable for redevelopment to public use. In the case of Alternative A8, the Airport's passenger terminal facilities would continue to occupy much of the space between the terminal concourse and North Harbor Drive; whereas A3 would continue to require the land associated with the curbfront and parking facilities serving T2 West. The ranking from best to worst was A2/B1, A8 and A3.

Table B-4

SOCIAL RESPONSIBILITY RANKING OF FINALIST ALTERNATIVES

San Diego International Airport

	A2	A3	A8	B1
	Rank	Rank	Rank	Rank
Land acquisition				
Residential	1	1	1	1
Commercial	1	1	1	1
Institutional	1	1	1	4
Opportunities for off-airport land redevelopment	1	4	3	1
	4	7	6	7
Overall social responsibility ranking	**1**	**3**	**2**	**3**

Source: Jacobs Consultancy Team, 2008.