January 2018

McClellan-Palomar AIRPORT MASTER PLAN

Prepared for:

Prepared by: Kimley»Horn

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McCLELLAN-PALOMAR AIRPORT MASTER PLAN UPDATE

PUBLIC DRAFT

January 2018

Prepared for:
County of San Diego

Prepared by:
Kimley-Horn and Associates, Inc.

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EXECUTIVE SUMMARY

Overview

McClellan-Palomar Airport (Airport) is a general aviation airport owned and operated by the County of San Diego and located in the City of Carlsbad. The Airport provides valuable general aviation, corporate and commercial services acting as an economic engine for North San Diego County and the City of Carlsbad.

The Airport serves as a gateway to world-class resorts and tourist attractions and as a means of connectivity for local and visiting business people to and from the area. The Airport provides important linkage to a global economy, attracting corporations and bringing jobs. Economic activities related to the Airport generate hundreds and millions of dollars of income and revenue for the surrounding local communities.

The County of San Diego has prepared a comprehensive McClellan-Palomar Airport Master Plan Update (Airport Master Plan Update) to plan for the future while enhancing operations and safety at the Airport. Many options were developed and considered as the Airport Master Plan Update was prepared.

The Airport Master Plan Update creates a new blueprint for development of the Airport over the next 20-year planning cycle. The major projects identified for consideration over the next 20-years include:

Installation of an Engineered Materials Arresting Systems, or EMAS, at both ends of the runways. EMAS enhances safety by working like a runaway truck ramp to slow and safely stop an aircraft by absorbing its energy should it overrun the runway.

Shift the Runway to the north by 123-feet to increase the separation distance between the runway and the taxiway. This will improve safety for current and projected aircraft types at the Airport by providing additional wingtip clearance during simultaneous runway/taxiway operations.

Extend the runway, possibly in phases, increasing the length by 200 to 800 feet for a maximum of 5,700 feet. This would allow aircraft already using the Airport to extend the distance they can fly by being able to take-off with more fuel. The extension would have the added benefit of reducing noise west of the Airport because aircraft will gain height sooner.

These projects would not make the Airport more usable for larger aircraft, such as Boeing 737's, because there would still be space limitations preventing such aircraft from operating on the ground at safe distances. In addition to the small size of the airfield, there are a numbers of aviation businesses that have made substantial investment in buildings. These aviation businesses hold long-term leases with the County which the Airport Master Plan does not propose to redevelop. Even if every project in the Airport Master Plan Update is completed McClellan-Palomar Airport would not be able to handle the size or volume of aircraft, or number of passengers, as San Diego International or John Wayne Airport.

The Airport Master Plan Update divides the projects into 3 phases; Near-term (0-7 years), Intermediate-term (8-12 years), and Long-term (13-20 years).

The Airport Master Plan update also includes new forecasts for aircraft, commercial passengers and of takeoffs and landings. The new forecasts anticipate McClellan-Palomar Airport to regain a foothold on commercial airline service but remain a regional general aviation airfield serving primarily corporate and private jets. The new Airport Master Plan Update includes three different scenarios- a baseline and two alternatives - to provide a range depending on future aviation demands within the San Diego Region.

The Airport Master Plan Update has analyzed the current facilities, including aircraft and public parking; passenger gates; ticketing and baggage areas; airline offices; and TSA screening and auxiliary spaces. It was determined the current facilities could service approximately 305,000 departing passengers with only minor modification. The Airport Master Plan Update also includes analysis to determine if a higher number of passengers could be served, if needed, to meet demand. A second alternative scenario was included, as a contingency forecast, for up the 575,000 annual departing passengers. This scenario would require some modification to the terminal and facilities, such as additional passenger gates, larger restrooms and more area for TSA screening. The Airport Master Plan Update suggests Airport Management monitor use of the terminal to determine when these projects would be needed. The Airport Master Plan Update does not include any plans for more than 575,000 annual departing passengers.

The largest scenario in the Airport Master Plan Update predicts takeoffs and landings to reach a maximum combined total of 208,000 over the next 20-years. This is nearly 30% lower than McClellan-Palomar Airport's peak in 1999, when there were over 285,000 total takeoffs and landings. This is due to the shift from numerous smaller general aviation aircraft to fewer operations by larger, quieter corporate aircraft.

2036 Scenarios	Departing Commercial Passengers	Aircraft Takeoffs and Landings
BASELINE	171	192,860
Scenario 1	305,000	195,000
Scenario 2	575,000	208,000

McClellan-Palomar Airport Background

The airfield was opened in 1959 by the County after being relocated from Del Mar due to the construction of Interstate 5. When it was constructed, the area was mainly dominated by agricultural uses surrounding the Airport. Over the years, as the region grew, the Airport also grew in activity with a peak in annual aircraft operations (either a takeoff or landing) in 1999 of nearly 292,000. For many years, the Airport served as a favorite location for pilots to train and base their small general aviation aircraft. As north San Diego and the City of Carlsbad developed robust centers of business and industrial parks, the Airport began serving as a vital link to global markets for corporate clients, and also expanded commercial airline service. Commercial air service was growing with multiple airlines when the County began building a new commercial passenger terminal in 2007. Over the next several years, the airline industry as a whole experienced changing economic conditions which led to a decline in aviation activity. At the time the highly acclaimed new terminal opened in 2009, there was only one airline operating at the Airport. This airline stopped service in 2015 due to a business decision to move to a larger aircraft unable to operate from McClellan-Palomar, and remove the aircraft type that had been operating at the Airport from its fleet. Since that time, several airlines have expressed interest in starting new commercial service out of McClellan-Palomar Airport with Cal Jet by Elite Airways being the first to restart commercial service in September 2017.

McClellan-Palomar Airport 1997 Master Plan

The County completed an Airport Master Plan for McClellan-Palomar Airport in 1997, which anticipated continued growth of aircraft operations over the 20-year planning horizon of the document. The 1997 Master Plan also predicted the type of aircraft serving McClellan-Palomar Airport to increase in size to newer, larger regional jets. The 1997 Master Plan projected that annual operations would grow to over 289,000 by 2015. However, continued growth of operations was not experienced throughout the last 20-years as predicted and have been declining over the past 10 years instead. The 1997 Master Plan did correctly predict the shift in aircraft to newer, quieter and more efficient regional jets.

Airport master plans are periodically updated to support the maintenance, development, and modernization of airports, as well as to plan for construction needed to accommodate future demand for aviation services on a local, regional, and national basis.

Previous Board Actions

In 2011, based on community support, the Board directed staff to conduct a feasibility study to determine if there were potential improvements, including extending the runway, that could make the Airport better and safer that made sense from an economic perspective.

On September 25, 2013, the Board received the completed Feasibility Study for Potential Improvements to McClellan-Palomar Airport Runway prepared for the County by Kimley-Horn and Associates, Inc. It was determined the options and alternatives from the Feasibility Study would be considered as part of a new 20-year McClellan Palomar Airport Master Plan Update (Master Plan Update).

The Airport Master Plan Update was started in early 2014 and to date has included numerous public outreach efforts. As the master plan process moved forward it became clear that there were several leading options to be considered as the preferred alternative for the future classification of the Airport. Three options were presented for the Board's consideration on December 16, 2015. The Board directed staff to proceed with the Airport Master Plan focusing on the modified C/D–III classification as the preferred option, subject to the preparation of a Program-Level Environmental Impact Report. As coordination with the FAA continued it was determined that combining the C/D classification was not workable so separate options were developed for both a modified C–III classification and a modified D–III classification, which have no discernable differences as they pertain to airfield geometry.

Master Plan Purpose

The purpose of a Master Plan Update is to provide a developmental framework that meets existing and future aviation demand in a safe and cost-effective manner. A Master Plan Update further considers environmental, socioeconomic, and community development factors. The objective is to develop a planning road map for the future that is flexible, reasonable, and justifiable. Market trends, land use opportunities and constraints, phasing and financial feasibility are all considered as part of the master plan process. Public involvement and environmental review are also very important in developing a Master Plan Update that meets the needs of the community.

The new Master Plan Update considers the runway design elements in the context of other long-term facility improvements. It also considers future projects in terms of sequencing, prioritization, environmental processing requirements, business and real property issues, and financial planning. The Master Plan Updates also strives to layout the sequence and thresholds for when improvements may be needed, as funding becomes available.

The Master Plan Update identifies the future role of the Airport to include supporting local businesses, accommodating corporate users, providing regional commercial airline service, serving private recreational fliers and enhancing public safety. These roles are all considered in planning future airport development.

Public Involvement

The master plan process included five specific opportunities for the public to be involved. These opportunities included a dedicated website, an introductory public meeting and three well-attended public workshops. Interested members of the public could sign up to receive notices about the Airport Master Plan Update. There have also been multiple Palomar Airport Advisory Committee meetings that included Airport Master Plan items on the agenda. Many comment cards, surveys, and emails regarding the Airport Master Plan have been received, reviewed, and responded to. There have been meetings with stakeholder groups, comprised of tenant, industry, and local and federal agency representatives. There was coordination with Federal Aviation Administration and neighboring cities of Carlsbad, San Marcos, and Vista.

There were opportunities for the public to learn more about the Airport Master Plan and give input regarding impacts during the preparation of the Program Environmental Impact Report. This includes a public workshop at the beginning of preparation, and two more workshops to be held during the public comment period for the draft Program Environmental Impact Report and Airport Master Plan.

Aviation Activity Forecast

Forecast for aviation activity over the future planning period is an important part of a master plan. The Airport Master Plan Update contains serval types of forecast including number of passenger enplanements, based aircraft, and aircraft operations.

Aviation activity forecasting is both an analytical and subjective process. Actual activity that will be achieved in future years may differ from the forecasts developed in this planning document because of future changes in local conditions, dynamics of the airline and general aviation industries, and economic and political changes for the local area and nation as a whole. The FAA has a responsibility to review aviation forecasts that are submitted to the agency in conjunction with airport master plans and Airport Layout Plan (ALP) updates.

Aviation Activity Forecasts should:

- Be realistic
- Be based on latest available date
- Reflect current conditions at the airport
- Be supported by information in the study
- Provide adequate justification for the airport planning and development

The Airport Master Plan Update includes three potential scenarios. A Baseline forecast and two "planning-level" forecast scenarios that reflect the return of commercial service to the Airport. The forecasts are intended for facility planning to assist the Airport in determining appropriate facilities if demand exceeds forecasted levels of demand.

Baseline

The Baseline forecast was prepared in early 2017, using data from 2016 as the base year. However, unlike in past years, in 2016 there were almost no commercial operations at the Airport. The Baseline forecast uses the FAA's Terminal Area Forecast (TAF). This reflects the current conditions of the airline industry. However, the FAA TAF may not be the best indicator of future conditions at McClellan-Palomar Airport. This is because the TAF uses historic trends to predict future conditions and does not take specific airport circumstances into account.

The Baseline forecast, based on the TAF, goes from 2016 levels of passenger enplanements, based aircraft, and aircraft operations over the 20-year planning period. Passenger enplanements would increase from 131 in 2016, when there was almost no airline service, to 171 in 2036. This does not recognize the potential of the Airport to provide service. Based aircraft would increase from current 298 to 389 in 3036. Aircraft operations would increase from 149,029 in 2016 to 159,511 in 2036.

Baseline Forecast			
Year	Passenger Enplanements	Based Aircraft	Aircraft Operations
2016	131	298	149,029
2021	141	318	153,881
2026	151	339	155,723
2031	161	364	157,600
2036	171	389	159,511

Source: FAA Terminal Area Forecasts, issued January 2017

Planning Activity Level Forecasts

Since the commercial airline service trend for McClellan-Palomar had dropped to near zero in 2016 for various reasons, the TAF uses that depressed trend to predict only 171 annual passengers in year 2036. Therefore, two forecast scenarios (referred to as Planning Activity Level 1 or PAL 1, and Planning Activity Level 2 or PAL 2, in the Airport Master Plan Update) were also developed to reflect potential growth related to the return of commercial airline service, and consideration of local and regional planning documents.

Scenario 1

Scenario 1 (PAL 1 in the Airport Master Plan Update) is based on the number of passengers that the current terminal facility could handle with minor modifications. It reflects that one airline recently began service and could develop more flights to more destinations in the near future. This scenario would fully utilize the existing terminal with approximately 305,000 anticipated annual passengers by the end of the 20-year planning period. Aircraft operations are forecast to grow from 149,029 in 2016 to approximately 195,000, in 2036, which would still be significantly lower than the historical high of 292,000 in 1999. Based aircraft forecast is the same as the Baseline Forecast, 298 in 2016 to 389 in 2036.

Scenario 1: PAL 1 – Existing Facilities			
Year	Passenger Enplanements	Based Aircraft	Aircraft Operations
2016	131	298	149,029
2021	172,244	318	171,473
2026	233,929	339	181,122
2031	279,670	364	190,169
2036	304,673	389	195,050

Scenario 2

There is also another scenario, (PAL 2 in the Airport Master Plan Update) which reflects the number of passengers predicted in the Regional Aviation Strategic Plan (RASP) prepared by the San Diego County Regional Airport Authority (SDCRAA) in 2011. This indicates up to 575,000 annual passengers and would require some modifications to the Airport facilities, such as additional passenger gates, larger restrooms and more area for TSA screening. This scenario would result in the same number of based aircraft as the other scenarios and approximately 208,000 annual operations.

Scenario 2: PAL 2 – Contingency Scenario			
Year	**Passenger Enplanements**	**Based Aircraft**	**Aircraft Operations**
2016	131	298	149,029
2021	331,639	318	181,693
2026	452,673	339	192,802
2031	530,841	364	208,004
2036	575,000	389	208,004

Airport Classifications

Airport Classification is another important part of a master plan. Airports are classified by Airport Reference Code (ARC) based on the characteristics of the aircraft that operate at the Airport. The ARC dictates airport design criteria and signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. Runways are classified by; 1) RDC which includes the Aircraft Approach Code (AAC) and is given an alpha designation (A, B, C, D, & E) based on an aircraft's approach speed; 2) Airplane Design Group (ADG) indicated by numeric codes (I, II, III, IV, V, & VI) which are based on wingspan and tail height; and 3) the runway's visibility minimums expressed by Runway Visual Range (RVR) values in feet. The current ARC for McClellan-Palomar Airport is a B-II code which represents a mid-sized business jet. However, a substantial number of larger jets currently use the Airport and it's expected these aircraft will continue to use the Airport.

The Airport currently meets all B-II design criteria as designated in the previous 1997 Master Plan. However, the 1997 Master Plan did predict a future shift to larger C/D-III sized aircraft. FAA policy advises that during the Master Plan process airport dimensional standards, such as runway length and width, and separation between runways and taxiways, should be selected which are appropriate for the critical aircraft that will make substantial use of the airport during the planning period. This means that when a substantial number of operations of larger aircraft are taking place or expected to take place in the future, the Airport's Master Plan should address a transition to a classification that supports these aircraft. Recent studies have determined that there are currently more than 500 annual operations of C/D-III category aircraft at McClellan-Palomar Airport. Aircraft Approach Category C/D airports support approach speeds up to 166 knots. Airplane Design Group III airports support wing spans up to 117 feet. The current B-II classification supports approach speeds of up to 120 knots, and wingspans up to 78 feet.

Alternatives Development and Evaluation

In order to determine the best options for the future multiple development options were identified and evaluated based on the following criteria:

- Ability to accommodate projected demand
- Impact on existing facilities
- Ability of improvements to remain on Airport-owned property
- Environmental impacts
- Implementation cost
- Safety Considerations
- Impacts to surrounding environs including businesses, roadways and neighborhoods
- Airport development potential
- Eligibility for FAA funding
- Keep within the existing footprint of the Airport

It is also important to identify that recommended airfield improvements are solely based on accommodating existing and projected aircraft operations and are not contingent on scheduled commercial activity in any way.

Preferred Airfield Alternative - D-III Modified Standards Compliance

Five airfield design alternatives have been developed and included in the Airport Master Plan Update. Prior to identification of these final alternatives, an initial group of multiple design scenarios were developed. These scenarios were reviewed by the planning team and the Airport sponsor, discussed in general with an advisory group, presented at a public workshop, and refined into a final list of options to move forward for detailed evaluation.

On December 16, 2015, the Board reviewed leading options and directed staff to proceed with the McClellan Palomar Airport Master Plan Update focusing on the modified C/D–III classification as the preferred option, subject to the preparation of a Program-Level Environmental Impact Report. Following the Board meeting, the FAA indicated the County should select either C or D, rather than a hybrid. As such, the D-III Modified Standards Compliance was selected as the preferred alternative in the Airport Master Plan Update, subject to public review and a final determination by the County Board of Supervisors. This alternative includes the same features as the option identified by the Board but the name was changed to make it more consistent with FAA standards. This option conforms to most criteria for C/D–III aircraft, with two modification to standards that will need to be obtained from the FAA. It was developed to avoid the need to purchase additional land on the north side while meeting the runway/taxiway separations and minimizing impacts on the existing aircraft ramps. This option would allow a portion of the general aviation northern ramp to remain long enough to accommodate all aircraft that are currently using it as the airfield is transitioned to the full standards.

The D-III Modified Standards Compliance Alternative meets most of the D-III design criteria. This alternative would shift the centerline of Runway 06-24 123 feet to the north, and the centerline of Taxiway Alpha 19 feet north in order to establish 400 feet of separation between the runway and Taxiway A. This achieves the required distance of separation between a runway and a taxiway for a D-III runway. There are only two non-standard components of this alternative. The first is it does not meet design criteria for the Runway Object Free Area (ROFA) to the north of Runway 06-24. The ROFA is an area which must remain clear of all objects. The standard width of the ROFA for a D-III runway is 800 feet (400 feet either side of runway centerline). D-III Modified Standards Compliance Alternative provides a 762-foot-wide runway object free area, 362 feet to the north of the runway centerline and 400 feet south of the runway centerline on the east end of Runway 06-24. The second non-standard components is the proposed distance of 493 feet from runway centerline to aircraft parking instead of the 500 foot standard. These actions are reasonable as they do not impact safety based on aircraft types anticipated to operate at the Airport. These actions each require approval of modifications of standards from the FAA, which have been sought at the time this Airport Master Plan Update was prepared. This alternative also includes a recommended extension of the runway of up to 800 feet off the east end of Runway 24, as well as EMAS systems on both runway ends, which would enhance safety.

The D-III Modified Standards Compliance Alternative maintains the existing runway width of 150 feet. This runway width is adequate for large corporate aircraft as well as regional commercial aircraft. The proposed alternative does not introduce any new impacts to existing aviation businesses south of Runway 06-24, or the Airport's commercial aircraft ramp or terminal building.

This D-III Modified Standards Compliance alternative would address the needs of all aircraft currently using the Airport as well as newly designed corporate aircraft that would foreseeably use the Airport in the future. It would also address needs of smaller commercial aircraft, such as CRJ-700 and EMB 170/190. The C/D is the design alternative the majority of community participants, including airport businesses and operators, local agencies, and community members, supported with over 90 percent favoring this option.

Currently, there are over 500 annual operations of C aircraft at the Airport. The Airport Master Plan Update forecasts that in 15 years, there will be 500 annual operations conducted by D aircraft. FAA guidance recommends that airport sponsors should start planning improvements when operations reach this level. An alternative approach to changing to a D-III at this time could be to change to the C-III now and monitoring the number of operations throughout the 20-year planning period. If use by D aircraft does materialize, the County could consider beginning to plan towards a modified D-III at that time.

D-III Modified Standards Compliance Alternative	
Attributes	• Compliant with FAA D-III design criteria with modifications to standard for ROFA • Accommodates both the current corporate fleet and potential regional commuter aircraft • EMAS systems to both Runway End 06 and 24 enhances safety • Allows for up to an 800-foot extension to runway, which enhances safety and increases airfield capability • Consolidation and construction of connector taxiways between Taxiway A and Runway 06-24 to improve airfield safety and with proper placement can enhance operational capacity • Approach RPZ dimensions do not change • No impacts to aviation business, terminal ramp and southerly general aviation parking • Good Potential for some FAA funding • Most public support • Stays within the existing footprint for the Airport.
Constraints	• Significant costs and environmental impacts for extensions of Runway 06-24 and Taxiway A over existing landfill areas • Requires shifting the approach lighting system • Requires relocation of existing NAVAIDs • Elimination of North Aircraft Parking Apron and self-service fuel facility • Requires approval of a modification of standards from the FAA

Future Projects

The McClellan-Palomar Airport Master Plan Update consists of many individual projects. It is expected the projects will be completed over a 20-year planning period covered by the new Airport Master Plan. Staff will return to the Board of Supervisors at later dates for approval, to advertise and award construction contracts as projects are fully designed and funding becomes available. Major projects identified in the Airport Master Plan include the Runway Safety Areas, Runway Extension and new Aircraft Rescue and Fire Fighting Facility.

Runway Safety Areas - Engineered Materials Arresting Systems (EMAS)

A modified C-III or D-III classification would require larger Runway Safety Areas (RSAs) compared with the current B-II classification. Construction of an EMAS would enable the Airport to function without a standard sized RSA because the energy absorbing materials slow and stop an aircraft within a shorter distance. With a preferred C-III or D-III classification, an EMAS would be required on the west end of the runway because there is not enough area to meet the higher safety standards associated with this designation without reducing runway length with a displaced threshold. There is currently enough area for the required larger safety area on the east end. A runway extension is not required but is included in the McClellan-Palomar Airport Master Plan as it would enhance the usability of the Airport, as described below. Once the full extension is constructed EMAS would be needed on the east end as well to provide the required length of safety area.

Shift Runway

One of the projects identified in the Airport Master Plan Update is to shift the Runway to the north by 123-feet to increase the distance between the runway and the taxiway. The shift will improve safety for aircraft types currently and projected to operate at the Airport by providing additional wingtip clearance during simultaneous runway/taxiway operations.

Completion of this project would eliminate the north aircraft parking area because this would fall into the new Runway Object Free Area. This would require relocating 30+ aircraft currently parked in this location. It would also require removal of the self-service fuel facility on the north side of the airfield that is used by those aircraft.

Runway Extension

McClellan-Palomar Airport is home to a wide range of aircraft, including business jets. The existing runway length of 4,897 feet does not provide aircraft operators that currently use the Airport the same benefits they would have with a longer runway. This is because these aircraft need more runway length than currently exists to takeoff fully-fueled and loaded, which would then allow them to fly farther and be more competitive in national and global markets. A business case analysis was completed as part of the Feasibility Study to aid in the assessment of an extension versus no extension. The McClellan-Palomar Airport Master Plan Update includes a runway extension option of up to 800 feet. This length was selected because it is the longest that could be accommodated on existing Airport land without the need to purchase additional land. An extension could be built in phases depending on funding availability. The Airport Master Plan also explores an interim option of extending the runway 200’ in the current location.

Another benefit of a runway extension identified by the study is that it would reduce aircraft noise for residential communities west of the Airport. Shifting the beginning of the runway further east would mean aircraft would increase flight elevation sooner. Aircraft would be higher, and therefore quieter to those on the ground, as they fly west towards the coast. This would result in the footprint for noise sensitive areas moving east over industrial-use properties and even farther away from residential properties to the southwest. However, because the landing threshold would remain in the current location, noise to the east of the Airport from landing aircraft would not increase.

Larger corporate aircraft often stop and refuel at nearby airports with longer runways such as San Diego International Airport in order to reach their destination. This poses a significant inconvenience to operators, leads to lower fuel sales at CRQ, and increases the amount of fuel aircraft consume and emissions released into the environment.

Proposed runway extensions of varying lengths are identified in the Alternatives Analysis; for the purposes of this Airport Master Plan Update, in order to accommodate existing and projected operating aircraft at CRQ including the anticipated future design aircraft (Gulfstream G650), an extension of up to 800 feet is recommended to provide the Airport with approximately 5,700 feet of runway length. Longer options were considered but determined to be infeasible because, with the change to the preferred option of C-III Modified Standards Compliance alternative, any extension longer than 800 feet would require purchasing land around the Airport in order to comply with FAA safety requirements.

New Aircraft Rescue and Fire Fighting Facility

One of the specific components of this Airport Master Plan Update is to identify alternatives for the relocation of the existing ARFF facility. The existing facility is a canopy structure. A new proposed ARFF facility would be constructed to “Index B” standards identified in FAA guidance documents. The recommended site is located south of the existing Airport traffic control tower and west of an access road and encompasses approximately 7,000 square feet. This area is owned by the Airport and is currently occupied by a parking lot and adjacent lots could accommodate the parking spaces lost by relocation of the ARFF.

Potential Passenger Terminal Facility Improvements

The passenger terminal building at CRQ was completed in 2009 and has an interior area of approximately 12,590 square feet. The single-story facility includes awnings and outdoor space for the baggage claim that expand the building's footprint to approximately 18,000 square feet. It is expected the terminal can meet the levels of the Baseline Forecast and PAL 1 with little, if any modification. Terminal Improvements may be needed if passenger demand ever reaches the levels identified in Scenario 2, the contingency scenario. These potential projects include passenger boarding gates, hold room reconfiguration, employee parking, baggage screening, baggage makeup area, passenger screening, baggage claim and restroom facilities.

Potential Funding

The Airport Master Plan details potential grants and other funding sources. These sources include federal grants, passenger facility charges, state grants, County and Airport funds, bonds and private funds. However, funding of a runway extension or other projects detailed in the McClellan-Palomar Airport Master Plan Update is not guaranteed. Approval of the Airport Master Plan will not commit the County to construct any facilities, carry out any improvements or financially obligate the County. Staff would return to the Board at a later date(s) for approval to advertise and award construction contracts as projects are fully designed and funding is identified. It is expected the projects will be completed in phases over the 20-year planning period covered by the McClellan-Palomar Airport Master Plan Update.

Development Strategy and Time Frame

The McClellan-Palomar Airport Master Plan Update outlines recommended improvements to the Airport through 2036 based on Aviation Demand Forecasts. Implementation of the recommendations set forth in the plan will depend upon FAA programming and funding availability, completion of project specific environmental studies and documentation in accordance with CEQA and the National Environmental Policy Act (NEPA), as well as the attainment of the projected aviation traffic levels. The Airport Master Plan identifies specific projects and estimates completion according to short-term, mid-term and long-term timeframes, as shown on the following table:

Near-Term (±0-7 Years)		
Relocation of Segmented Circle	Pavement Removal/Installation	$150,000
Relocation of the Lighting Vault	Building Relocation 100 SF	$575,000
Relocation of the Glideslope Building and Antenna	Building Relocation ±360 SF	$350,000
Relocation of Windsock Equipment	Pavement Removal ±760 SY	$130,000
Construction of EMAS System serving RWY 24 (Includes Relocation of the Vehicle Service Road)	EMAS ±580 SY VSR ±9,100 SY	$25,000,000
Relocation of ARFF Facility	±4,700 SF Facility	$525,000
200' Extension of Existing Runway 06-24 and Taxiway A (Interim condition)	±11,600 SY	$14,320,500
	Phase Subtotal	**$26,730,000**
	Phase Subtotal*	**$41,050,500**
Intermediate-Term (±8-12 Years)		
Removal of North Apron and Taxiway N	Pavement Removal ±43,000 SY	$684,000
Enhancement of Near-Term Auto Parking	±800 SY of pavement	$232,000
Removal of Fuel Farm on North Apron	±25,000 GAL	$45,000
Preservation of area reserved for GA aircraft parking	±3 acres	TBD
Passenger/Admin/Parking Facility Improvements	±4 acres	TBD
	Phase Subtotal	$961,000
Long-Term (±13-20 Years)		
800' Relocation/Extension of RWY 06-24 (if completed in one phase)	±81,610 SY	$27,850,000
Remove/Reconstruct Connector Taxiways	±13,000 SY	$1,760,000
Remove/Reconstruct TWY A	±39,070 SY	$14,360,000
Construction of EMAS System serving RWY 06	±580 SY	$12,160,000
Relocation of EMAS System serving RWY 24	±580 SY	$11,240,000
Relocation of NAVAIDS (ILS, GS, MALSR, PAPI)		$2,800,000
200' Relocation/Extension of Runway 06-24 and Taxiway A (if completed in 2 phases)		$9,366,000
Additional 600' Relocation/Extension of Runway 06-24 and Taxiway A (if completed in 2 phases)		$30,960,000
	Phase Subtotal (200' Extension plus 600' Extension)	$82,646,000
	Phase Subtotal (800' Extension)	$70,170,000
Phased Development Total Costs		
	Total Estimated Program Cost (200' Extension plus 600' Extension)	$110,337,000
	Total Estimated Program Cost (800' Extension)	$97,861,000
	Total Estimated Program Cost (200' Extension plus 600' Extension)*	$124,657,500
	Total Estimated Program Cost (800' Extension)*	$112,181,500

Source: Kimley-Horn, 2017. * Includes interim 200' extension to existing Runway 06-24 and Taxiway A

Board Policy F-44 Development of McClellan-Palomar Airport

The Board adopted Board Policy F-44 Development of McClellan-Palomar Airport in 1987. The purpose of the policy was to guide future development at the Airport and to implement a voluntary noise abatement program. The County's commitment to continue to implement a noise abatement program and monitoring program is duplicated in the Airport Master Plan.

Landfill

Another specific consideration addressed throughout the Airport Master Plan Update pertains to portions of the Airport that were previously used as a landfill. The landfill material underneath the east side of the Airport is unsuitable under current conditions to use as a stabilized base for airfield improvements due to issues with settlement. The landfill area is equipped with a methane gas extraction system that consists of extraction wells, header piping, and condensate pumps. The constraints of the landfill have been considered in the preliminary design for the runway extension. Impacts from the landfill will be included in the Program EIR.

Noise

Aircraft noise is generally one of the most prominent and controversial environmental issues associated with Airport development. In 2006, a FAR Part 150 Study Update was completed by the County of San Diego for CRQ to identify land use compatibility and noise issues surrounding the Airport. The study determined that McClellan-Palomar Airport is not a noise impacted airport because the Community Noise Equivalency Level (CNEL) 65 dB contour does not extend into noise-sensitive areas surrounding the Airport. The County updated these noise contours in 2010 to address the potential increase in commercial operations with regional jet aircraft being considered at the Airport. The Airport Master Plan EIR will include an evaluation of existing and future contours. Both the 2010 and 2017 updated contours indicate that in most cases the noise levels have actually decreased around the Airport. This is most likely due to reduced number of aircraft operations and newer quieter aircraft using the Airport. Noise contours for the potential runway extension have also been developed. These contours demonstrate a runway extension would actually reduce noise for neighborhoods west of the Airport without increasing noise for other neighborhoods. The Airport Master Plan Update recognizes that noise is an issue.

A noise analysis completed as part of the accompanying Program Level Environmental Impact Report indicates that noise levels have actually decreased around the Airport over the past 20 years, due to reduced number of aircraft operations and newer, quieter aircraft using the Airport. The noise levels for the areas around the Airport are not expected to reach past levels for the next 20-year period included in the Airport Master Plan Update. Noise impacts related to the potential runway extension are also included in the analysis and show that noise would actually be reduced for neighborhoods west of the Airport, without any increase in noise to the neighborhoods east of the Airport.

Even with lower expected noise levels than have been experienced in the past, noise will inherently continue to be an issue with the Airport. To address community concerns, Palomar Airport has an Airport Noise Officer who helps implement a Voluntary Noise Abatement Program (VNAP) to coordinate with pilots on quiet hours, minimum altitudes, and flight routes to try to avoid residential areas. Additionally, the Airport Noise Officer conducts public outreach presentations to educate the general public on airport operations, noise and aviation regulations.

A Program Environmental Impact Report (PEIR) is being prepared for the Airport Master Plan Update, with opportunities for public involvement that will analyze environmental effects for the project alternatives and describe mitigation measures. The PEIR will analyze if there are any impacts to resource areas such as biology, hazardous materials, noise and traffic.

Program Environmental Impact Report Prepared for the McClellan-Palomar Airport Master Plan

A Notice of Preparation for the Final Program Environmental Impact Report (PEIR) Prepared for the McClellan-Palomar Airport Master Plan was circulated for public and agency comment period from February 29, 2016 to March 29, 2016. The County will circulate the Draft PEIR for public review prior to completing the report. The Draft PEIR will describe project objectives, setting and characteristics, analyzes its environmental effects, addresses project alternatives, and describe mitigation measures and environmental design considerations. It will identify any significant impacts to subjects such as biology, hazardous materials, temporary construction noise and traffic.

Section 1 - INTRODUCTION

McClellan-Palomar Airport (CRQ) is situated in North San Diego County, approximately 30 miles from downtown San Diego. CRQ (Airport) is categorized by the Federal Aviation Administration (FAA) as a non-hub primary airport. Until April 2015, the Airport had scheduled commercial service provided by United Airlines/SkyWest and by Biz Charters from June to August 2015. Starting in September 2017, Cal Jet by Elite Airways began providing scheduled commercial service utilizing 64-seat Bombardier CRJ-700 (CRJ-700) aircraft. The Airport experiences significant general aviation and corporate aircraft activity. This Airport Master Plan Update analyzes the Airport's ability to accommodate existing levels of aviation demand and makes specific development recommendations to accommodate projected demand. The previous Airport Master Plan was completed in 1997.

An Airport Master Plan Update is a projection of an airport's conceptual long-term facility development. This plan is documented and approved by the County of San Diego Board of Supervisors, which owns and/or operates the airport. The Airport Master Plan Update is a narrative that presents the data and logic for the plan and displays the ultimate development concepts graphically in an Airport Layout Plan (ALP) set of drawings. Airport master plans are regularly updated to support the maintenance, development, and modernization of airports, as well as to plan for construction needed to accommodate demand for aviation services on a local, regional, and national basis.

1.1 PURPOSE

The purpose of an Airport Master Plan Update is to provide a development framework that meets existing and future aviation demand in a safe and cost-effective manner. The Airport Master Plan Update further considers environmental, socioeconomic, and community development factors. Per *FAA AC 150/5070-6B, Airport Master Plans*, each Airport Master Plan Update should meet the following objectives:

- Document the issues that the proposed development will address.
- Plan the proposed development through the technical, economic, and environmental investigation of concepts and alternatives.
- Provide an effective graphic presentation of the development of the airport and anticipated land uses near the airport.
- Establish a realistic schedule for the implementation of the development, particularly the near-term capital improvement program.
- Propose an achievable financial plan to support the implementation schedule.
- Provide sufficient project definition and detail for subsequent environmental evaluations that may be required before the project is approved.
- Present a plan that adequately addresses the issues and satisfies local, state, and federal regulations. This includes meeting land use compatibility compliance with FAA standards and CUP-172, which is detailed in subsequent portions of this Airport Master Plan Update.
- Document policies and future aeronautical demand to support municipal or local deliberations on spending, debt, land-use controls, and other policies necessary to preserve the integrity of the airport and its surroundings.
- Set the stage and establish the framework for a continuing planning process. Such a process should monitor key conditions and permit changes in plan recommendations as required.

Specific to this Airport Master Plan Update, the following additional goals and objectives have been established:

- Generate an Airport Master Plan Update that will be a useful tool for planning and project funding purposes for a 20-year horizon.

- Produce a document that adequately identifies existing facilities at the Airport, establishes projected levels of aviation demand, identifies facility requirements based on projected demand, and recommends realistic, feasible development alternatives to accommodate facility needs.
- Identify near-, intermediate-, and long-term improvements that enhance the Airport's safety, maximize efficiency, promote sustainability and economic stability, and are environmentally conscious while being attentive to the needs of the Airport and the community it serves.
- Examine previous Master Plans and other Airport-specific studies to validate or modify recommended actions as they pertain to projected levels of activity and proposed improvements.
- Incorporate recommended improvements into an updated ALP.

Baseline assumptions that have been established as a component of this Airport Master Plan Update include:

- McClellan-Palomar Airport will continue to operate as a publicly-owned facility that accommodates general aviation and corporate aircraft activity and re-established scheduled commercial service.
- Other commercial service airports in Southern California will continue service for the foreseeable future.
- The Airport will continue to secure scheduled commercial service and expand operations currently provided by Cal Jet by Elite Airways.
- The Airport will continue to foster growth in general aviation and corporate business aviation based tenants and transient operations.
- At a national level, the aviation industry will grow as forecasted by the FAA in its annual Aerospace Forecasts.
- Local and regional socioeconomic characteristics will mimic forecasts utilized from U.S. Census data and data provided by Woods and Poole, Inc., which is an independent firm that specializes in long-term county economic and demographic projections.[1] This assumption is important as forecasts presented in this Airport Master Plan Update do not incorporate any unforeseen changes in socioeconomic conditions of the Airport's surrounding community.
- Airport will not expand outside existing ownership boundaries. It is recommended that all Runway Protection Zones be acquired or have easements, though this action is not considered expansion based on a legal determination per the Carlsbad City Attorney.
- The County of San Diego will continue to experience economic and population growth during the 20-year planning horizon (SANDAG 2050 Regional Growth Forecast).

1.2 MASTER PLANNING PROCESS

This Airport Master Plan Update is an organized collection of information, analyses, and resulting decisions and policies guiding the future development of CRQ over a period of 20 years. This study addresses the following elements:

- Inventory of Existing Facilities – This element entails an evaluation of existing documents that directly or indirectly impact the functionality of CRQ. It also includes an extensive inventory of existing airside and landside facilities at the Airport as well as support facilities such as transportation infrastructure and auto parking. The inventory process also includes

[1] The Complete Economic and Demographic Data Source (CEDDS). http://www.woodsandpoole.com/, Woods & Poole. 2016.

documentation of air traffic activity, airspace, air traffic control, regional airports, local and regional socioeconomic data, and local and regional land use.

- Forecasts of Aviation Demand – Forecasts have been prepared for near-term (0-5 year), intermediate-term (6-10 year), and long-term (11-20 year) periods using 2016 as a base year. Forecasts for this Airport Master Plan Update have been compared with the FAA's Terminal Area Forecasts (TAF) and submitted to the FAA for review and approval. Specific elements of forecast analysis include passenger enplanements, aircraft operations (commercial/general aviation, local/itinerant), based aircraft, and aircraft fleet mix (based and itinerant).
- Demand/Capacity – This element entails determination of the existing airfield's capacity in comparison to existing and projected levels of aviation demand. A specific component of this Airport Master Plan Update is to also evaluate the adequacy of the existing transportation network that connects to the Airport, and identify potential impacts of future aviation activity. This evaluation is presented in Section 4.
- Facility Requirements – This component identifies airside and landside needs of existing facilities based on projected levels of aviation-related demand.
- Alternatives Analysis – Based on recommended facility requirements and projections of demand/capacity, this component identifies project development alternatives that are possible, reasonable, feasible, sustainable, and environmentally responsible. When applicable, this section of the Airport Master Plan Update also includes an environmental overview for projects that incorporate National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) guidelines as a precursor to future environmental documentation such as an Environmental Assessment (EA) or a Categorical Exclusion (CATEX). The primary objective of the Alternatives Analysis is to evaluate all development options for airside and landside facilities and recommend a preferred option and phasing strategy. This strategy, which categorizes the alternatives into near-term (0-7 years), intermediate-term (8-12 years), and long-term (13-20 years) timeframes, is also identified in the Scope of Services of this Airport Master Plan Update as the recommended Airport concept.
- Financial Management and Development Program – This element incorporates planning-level cost estimates for all recommended development alternatives, as well as for potential future planning efforts such as an Airport Master Plan Update.
- ALP – The recommended physical facility improvements identified in this Airport Master Plan Update are graphically represented on the ALP, which incorporates recommended development alternatives, as well as any changes that have occurred since the previous ALP was approved. This includes updates to Part 77 Surface drawings, FAA-approved approach and departure drawings, the Airport Property Map, and the On-Airport Land Use Plan.
- Public Involvement Program – The Public Involvement Program encourages information sharing and collaboration between the airport sponsor and the stakeholders. Opportunities to comment, before major decisions have been made, are essential to an effective Public Involvement Program. Throughout the development of this Airport Master Plan Update, input was gathered at regular coordination meetings with County staff, County officials, the FAA, and stakeholders. In addition, four public workshops were conducted at various benchmarks of the master plan process to provide status updates on the project and to gather feedback on the Airport Master Plan Update and other Airport-specific issues. The primary reason for receiving and incorporating public feedback is to ensure that proposed improvement at the Airport represent the surrounding community as well as specific Airport users.

Section 2 - INVENTORY OF EXISTING CONDITIONS

2.1 INTRODUCTION

CRQ is a Class I Part 139 FAA certified facility, which permits commercial service aboard scheduled small aircraft (10-30 seats), scheduled large aircraft (30+ seats), and unscheduled large aircraft. As noted, Cal Jet by Elite Airways began scheduled commercial service in September 2017 using 64-seat CRJ-700 aircraft. The Inventory of Existing Conditions provides an overview of existing airport facilities, which provides the requisite general facility data on which subsequent and more detailed analyses of airport capability/capacity will be conducted. This will be compared against projections of future aviation-related demand to determine whether current Airport facilities can meet projected passenger, aircraft operations, and based and itinerant aircraft demand and, if not, what future facilities may be needed at CRQ to do so.

This section provides an overview of the existing facilities and operational areas of the Airport. The following topics are discussed in this section:

- Airfield facilities
- Meteorological data
- Operations and airspace procedures
- Airport traffic control facilities
- Passenger terminal facilities
- Airport access and circulation
- Airport tenant and support facilities
- Airport utilities
- Land use and zoning policies
- Environmental considerations

2.2 AIRFIELD FACILITIES

Airfield facilities that accommodate aircraft operations are depicted in **Exhibit 2.1** and are briefly described in the following sub-sections.

2.2.1 AIRFIELD DESIGN CRITERIA

Prior to outlining the existing airfield facilities at CRQ, it is necessary to consider the dimensional criteria that the FAA utilizes in the planning of airport airfields and their relationship to aircraft size and performance. The FAA classifies airports and their runways according to the size and performance of aircraft that typically operate at an airport. Per FAA Advisory Circular (AC), 150/5300-13A, each runway is classified using a three-component identifier called the Runway Design Code (RDC). The RDC is comprised of the Aircraft Approach Category (AAC), the Airplane Design Group (ADG), and the operational visibility minimums specified for the runway. The AAC is based upon the approach speed of an aircraft or how fast the aircraft flies as it is landing; the ADG is based upon the wingspan and tail height of an aircraft; and the runway visibility minimums are expressed in terms of runway visual range (RVR), which is the minimum available horizontal visibility required of the pilot at the time of the landing. The RDC provides dimensional criteria for pavement surfaces, safety areas, runway width, and separation standards between active runways, runways and taxiways, runways to aircraft parking positions, and several other requirements to ensure the runway infrastructure can safely and efficiently accommodate the most demanding aircraft types, also referred to as the “design aircraft” that are expected to use the Airport on a regular basis. The components of the RDC are shown in **Table 2.1**.

Exhibit 2.1 Existing Airfield Facilities

Source: CRQ Airport Certification Manual, CRQ Airport Layout Plan, March 2013, FAA Master Record 5010, October 2013
Prepared by: Kimley-Horn and Associates, Inc. August 2017

Table 2.1– FAA Airport Design Criteria Classifications

Aircraft Approach Category	Approach Speed (knots)	Airplane Design Group	Wing Span (feet)	Tail Height (feet)	Runway Visual Range (feet)	Statute Mile Visibility
A	Less than 91	I	Less than 49	Less than 20	VIS	Visual
B	91 to 120	II	49 to 78	21 to 29	4,000	<1 Mile ≥ ¾ Mile
C	121 to 140	III	79 to 117	30 to 44	2,400	< ¾ Mile ≥ ½ Mile
D	141 to 165	IV	118 to 170	45 to 59	1,600	< ½ Mile ≥ ¼ Mile
E*	166 or Greater	V	171 to 213	60 to 65	1,200	< ¼ Mile
		VI	214 up to but less than 262	66 up to but less than 80		

Source: FAA Advisory Circular 150/5300-13A. Prepared by: Kimley-Horn, 2017. * AAC "E" only includes military aircraft.

Aircraft with approach speeds in Categories A and B are typically smaller, piston-engine aircraft, although Category B also includes small to mid-size business jets, including Cessna and Dassault Falcon models. Approach Category B also includes several regional commuter aircraft types including the Embraer EMB-120 that was operated by SkyWest Airlines at the Airport until April 2015. Approach Categories C, D, and E are normally larger turboprop- and turbine-powered aircraft.

Similarly, the wingspan and tail height of small, piston-engine aircraft normally correspond to Design Group I. Aircraft in Design Group II typically include commuter aircraft such as the Saab 340 or the Embraer EMB-120, along with several business turboprop and corporate jets that include the Beechcraft King Air, Cessna Citation Jet series, the Raytheon Learjet series, Embraer Legacy series, and smaller Dassault Falcon and Gulfstream business jets. Design group II also includes the CRJ-700 currently operated by Cal Jet by Elite Airways.

Design Group III includes larger corporate jets including the Gulfstream G500, G550, and G650; Bombardier Global Express; Dassault Falcon 5X and 7X; Embraer Lineage 1000; and a number of commercial regional/commuter turboprop aircraft such as the Bombardier Dash 8 100-400, ATR 42, and 72, and, while not seen at CRQ, larger air carrier aircraft types including the Boeing 717 and 737 series; Airbus A318, 319, 320 and 321; and McDonnell Douglas MD-80 series aircraft. Design Groups IV and V include large commercial transport aircraft not seen at CRQ such as the Airbus A330 and A340 and Boeing B757, B767, B777 and B747-400. Group VI would include the largest aircraft, such as the B747-800, Airbus A380, or C-5 military cargo aircraft. Group IV and V aircraft have not operated at CRQ due to operating conditions and insufficient space for ground movement and parking.

An example RDC would be a combination of the AAC, ADG, and visibility minimums, such as C-III-2400. As defined in FAA AC 150/5300-13A, the FAA classifies airport reference codes (ARC) based on the size of the largest aircraft that generally records at least 500 operations annually at an airport; this aircraft is known as the airport's "critical design aircraft." The critical aircraft may consist of the physical characteristics from several different aircraft types that are considered collectively. The overall ARC is the airport's highest RDC, minus the visibility component or third item noted in the above example. It is important to note that the ARC is used for planning and design and does not necessarily limit the types of aircraft that can safely operate at the Airport.

Based on the current ALP for CRQ (approved by the FAA in July 2010), the ARC is set at Approach Category B and Airplane Design Group II, or in its shortened form B-II, with the design aircraft designation of a Falcon 2000. The ultimate build-out ARC on the 2010 ALP is identified as C-II. Subsequent sections of the Airport Master Plan Update will review this designation under current conditions and determine whether any changes have taken place that trigger the need to adjust the ARC.

2.2.2 Runway System

The key portion of the airfield at every airport is the runway system. At CRQ, there is one active runway designated as Runway 06-24. It is 4,897 feet long and 150 feet wide and is oriented in a northeast/southwest direction. The approach end of runway 06 has a displaced threshold of 297 feet and a declared distance of 4,600 feet of landing distance. **Table 2.2** summarizes the physical characteristics of the runway.

Table 2.2 – Existing Runway Data

Item	Runway 06-24	
Length	4,897’	
Width	150’	
Effective Runway Gradient	.01%	
Runway Surface Type	Asphalt	
Runway Condition (1)	Good	
Runway Treatment	Grooved	
Load Bearing Capacity (1,000 lbs.)	60 – Single Wheel 80 – Dual Wheel 110 – Double Dual Tandem	
Aircraft Approach Category	B	
Airplane Design Group	II	
Runway Safety Area Length (beyond runway ends)	300’	
Runway Safety Area Width	150’	
Runway Object Free Area Length (beyond runway end)	300’	
Runway Object Free Area Width	500’	
Runway 06-24 to Taxiway A	296.5’	
Runway 06-24 to Taxiway N	300’	
Runway Visual Range	4,000	
Runway End	*6*	*24*
Runway End Elevations (2)	330.0’	326.3’
Runway Protection Zone		
Inner Width	500’	1,000’
Outer Width	700’	1,510’
Length (starting 200’ from runway end)	1,000’	1,700’

Notes:
Based on Form 5010, Effective 5/7/2015
Elevations in feet above MSL

Source: FAA Airport Master Record #5010, 2017; McClellan-Palomar Airport ALP, FAA Approved July 2010. Prepared by: Kimley-Horn, 2017.

2.2.3 Taxiway System

The existing taxiway system at the Airport consists of Taxiway A—a full-length parallel taxiway south of Runway 06-24 and Taxiway N—a one-quarter length parallel taxiway to the north. Taxiway A is an apron-edge taxiway along most of its length. Taxiway N provides access from Runway 06-24 to the north apron area. Existing characteristics of these taxiways are shown in **Table 2.3**.

Table 2.3 – Existing Taxiway Data

Item	Taxiway A	Taxiway N
Taxiway Width (ft.)	50	35
Taxiway Safety Area (ft.)	79	49
Pavement Composition	asphalt	asphalt

Source: Airport Records. Prepared by: Kimley-Horn, 2017.

In addition to the parallel taxiways, there are several connecting taxiways that provide access to and from the runway. Taxiway A has six connecting taxiways located between the runway ends. These connecting taxiways are designated from east to west as A1 through A6. Taxiway A3 is a high-speed exit taxiway for arrivals on Runway 06. Taxiways A4 and A5 are 45-degree high-speed exit taxiways for arrivals on Runway 24. Both ends of Taxiway A have large pre-flight run-up areas located just prior to the taxiway connection to the alignment of Runway 06-24. These areas have been sized to accommodate aircraft up to and including the majority of the ARC C-III and D-III business jets operating at CRQ without creating any impact to activity on Taxiway A. The run-up area immediately south of the Runway 06 landing threshold is also provided with a painted compass rose.

Taxiway N has a total of three connecting taxiways located between the runway ends. These connecting taxiways are designated as N1 through N3 from east to west. Taxiways N1 and N3 both intersect Runway 06-24 and Taxiway N at a 90-degree angle, while Taxiway N2 intersects Runway 06-24 at an approximate 30-degree angle oriented to favor west flow landing operations. Taxiway N has a designated pre-flight aircraft run-up area at its eastern end that is sized to accommodate several small general aviation (GA) aircraft that also provides enough space for aircraft taxiing on Taxiway N to pass by aircraft on the run-up area without interference.

2.2.4 Helipads

There are two helicopter parking areas at the Airport. The first is a designated helipad, which is located on the southeast side of the Airport immediately south of the Taxiway A run-up area near the approach end of Runway 24. This facility is 70’ by 60’ and marked with a painted “H” in a northwest/southeast orientation. The helipad is also equipped with lights at the outer boundary of the designated Final Approach and Takeoff Area (FATO) and its affiliated safety area.

A second helicopter parking area is marked to the west of the Magellan Aviation facilities on the eastern end of a set of tie-downs located along the south side of Taxiway A. This pad consists of a marked area on existing pavement 42’ in diameter with an elevated towable landing surface capable of accommodating a single helicopter. This parking area is not lighted.

2.2.5 Navigational Aids

Navigational aids (NAVAIDS) are any visual or electronic devices airborne or on the surface that provide point-to-point guidance information or position data to aircraft in flight. The Airport contains on-site NAVAIDS, as well as various NAVAIDS within the vicinity of the Airport, providing guidance to aircraft approaching or departing.

The Airport has a Category I (CAT I) Instrument Landing System (ILS) installation, consisting of a localizer antenna and a glideslope antenna. These NAVAIDS provide course and altitude guidance to aircraft approaching Runway 24 under Instrument Meteorological Conditions (IMC). A CAT I ILS provides an approach path for exact alignment and descent of an aircraft on final approach to a runway.

Another type of ground-based NAVAID is the Very High Frequency Omnidirectional Range (VOR) antenna. This type of facility allows not only for point-to-point navigation, but also provides position and distance information. There are several VORs within the region that provide navigational aid to aircraft departing from or arriving to CRQ. The Oceanside VOR is located approximately 11 miles northwest of the Airport and is used in conjunction with the ILS Runway 24 approach. It is also the primary NAVAID for executing the VOR-A approach to the Airport. The Mission Bay VORTAC (VOR with Tactical Air Navigation) is located approximately 24 miles southwest of the Airport and provides information used in conjunction with the ILS Runway 24 approach. The facility is used by pilots executing the ILS approach to determine when they arrive at specific points on the approach.

Other radio navigational aids within the vicinity include Julian VORTAC, Poggi VORTAC, Tijuana VOR/DME, Homeland VOR, and El Toro VOR/DME. VOR/DME refers to combined radio navigation station for aircraft, which consists of two radio beacons placed together, a VHF omnidirectional range (VOR), and distance measuring equipment (DME).

The National Airspace System (NAS) is being modernized by the Next Generation Air Transportation System (NextGen), including moving away from ground based radar to satellite signals. NAS programs and initiatives affect flight plans and can have noise impacts, as well as impacts to navigation aids, airspace, airfield capacity, and obstruction management. These initiatives and programs include 1) Automated Dependent Surveillance-Broadcast (ADS-B), which is the FAA's satellite-based successor to radar that uses GPS technology to determine and share precise aircraft location information, and streams additional flight information to the cockpits of properly equipped aircraft, and 2) NextGen Weather, which reduces weather impacts by producing and delivering tailored aviation weather products via System Wide Information Management (SWIM), helping controllers and operators develop reliable flight plans, make better decisions, and improve on-time performance. While some initiatives are already being implemented, more programs are in their initial stages of deployment such as weather, voice systems, information management, and data communications. Each of these programs is geared towards improving one facet of the safety and efficiency of the aviation transportation system.

Area Navigation (RNAV) is the overall terminology used for non-ground based instrument approaches that use the Global Positioning System (GPS) Wide Area Augmentation System (WAAS). These RNAV approaches are being implemented as part of the NextGen Performance Based Navigation (PBN) initiative. Several RNAV approaches are available at CRQ.

With ADS-B, pilots have access to the same radar information that Airport Traffic Control Tower (ATCT) can see as well as hazardous weather, terrain, and airspace restrictions. Additionally, while pilots are on the ground at an airport they can see where other aircraft and ground vehicles are located in an effort to raise situational awareness and reduce incursions.

2.2.6 Instrument Approaches

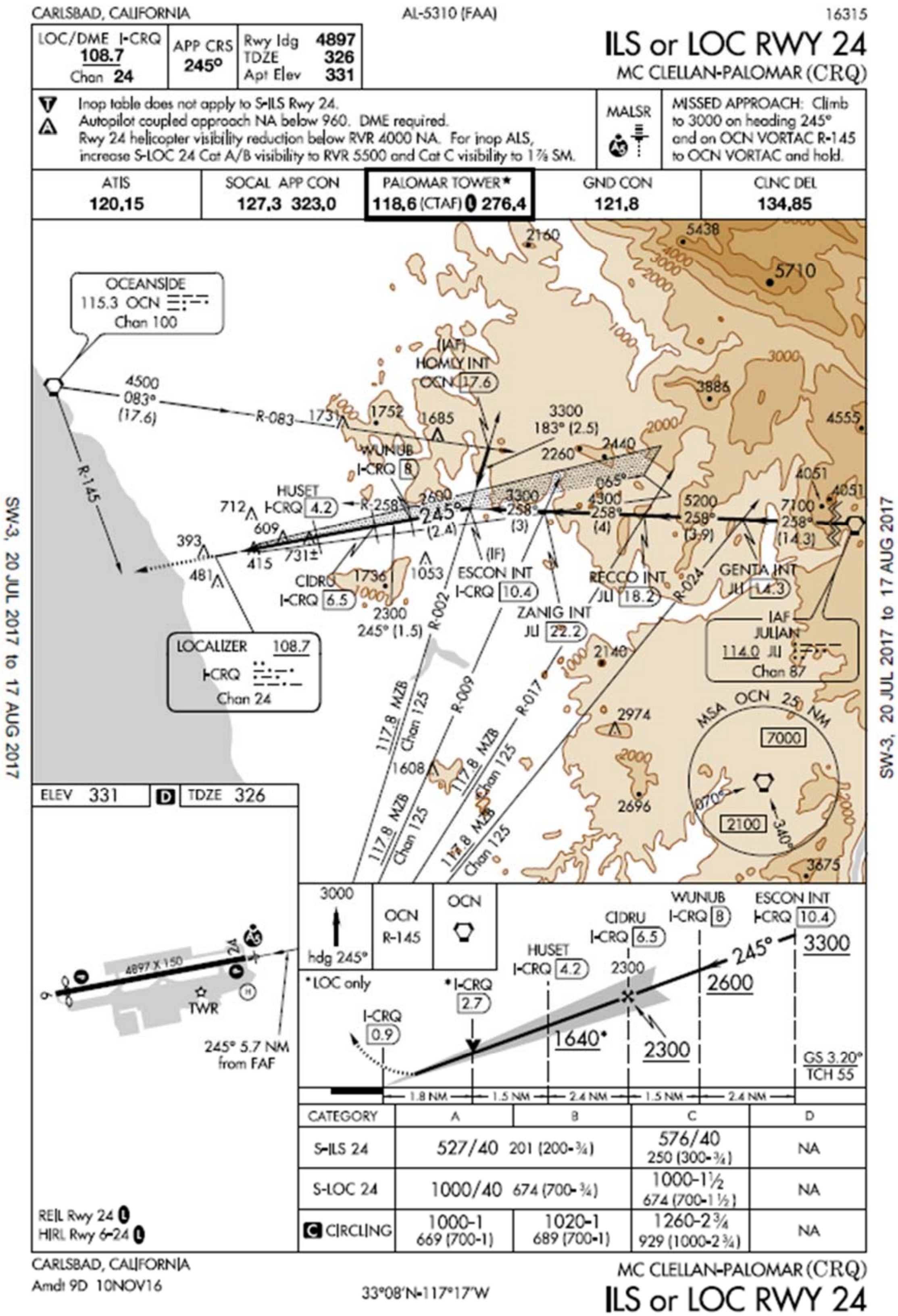
Instrument Approach Procedures (IAP), also known as Instrument Flight Rules (IFR), provide airports the capability to accommodate aircraft operations during periods of low visibility. This capability is tied to the type of procedure and the types of electronic navigational aids that are in place. Five published IAPs are available at CRQ.

There is an ILS approach, which is a precision IAP, that provides vertical and horizontal guidance for aircraft approaching Runway 24. This IAP uses ground-based radio navigational aids for aircraft guidance, including localizer antenna and a glideslope antenna. If an aircraft does not have the technology to complete the full ILS approach, it may use this approach as a Localizer (LOC) approach, which only provides horizontal guidance. The ILS version of this approach has a visibility minimum of ¾ statute mile (sm). The Localizer version has a visibility minimum of 1½ sm.

In addition to the ILS approach, there are three GPS approaches to Runway 24, which use information from GPS satellites as opposed to ground-based radio navigational aids. The RNAV Z approach employs Required Navigation Performance (RNP), which requires greater navigation system performance monitoring and alerting than standard GPS approaches. An RNP approach can allow an appropriately-equipped aircraft and trained pilot to precisely fly curved approach paths and other complex arrival routes without the need for ground-based radio navigational aids. The visibility minimum for RNAV Z is 1 sm. The visibility minimums for RNAV X and RNAV Y approaches are ¾ sm. These approach procedures are shown in **Exhibits 2.2 through 2.5.**

There is also a VOR approach to the Airport, designated VOR-A. This approach utilizes the Oceanside VORTAC which is a ground-based radio navigational aid located off-airport. The procedure is a circling approach, meaning that the approach is not aligned with a specific runway end; rather, it requires the pilot to obtain sight of the airport environment and enter the airport traffic pattern to land while maintaining visual contact with the airport and runway. The visibility minimum for the VOR-A approach is 1 statute mile. This approach is shown in **Exhibit 2.6.**

Exhibit 2.2 FAA Published ILS or LOC/DME Runway 24 Approach



CATEGORY	A	B	C	D
S-ILS 24	527/40 201 (200-¾)		576/40 250 (300-¾)	NA
S-LOC 24	1000/40 674 (700-¾)		1000-1½ 674 (700-1½)	NA
CIRCLING	1000-1 669 (700-1)	1020-1 689 (700-1)	1260-2¾ 929 (1000-2¾)	NA

Exhibit 2.3 FAA Published RNAV (GPS) X Runway 24 Approach

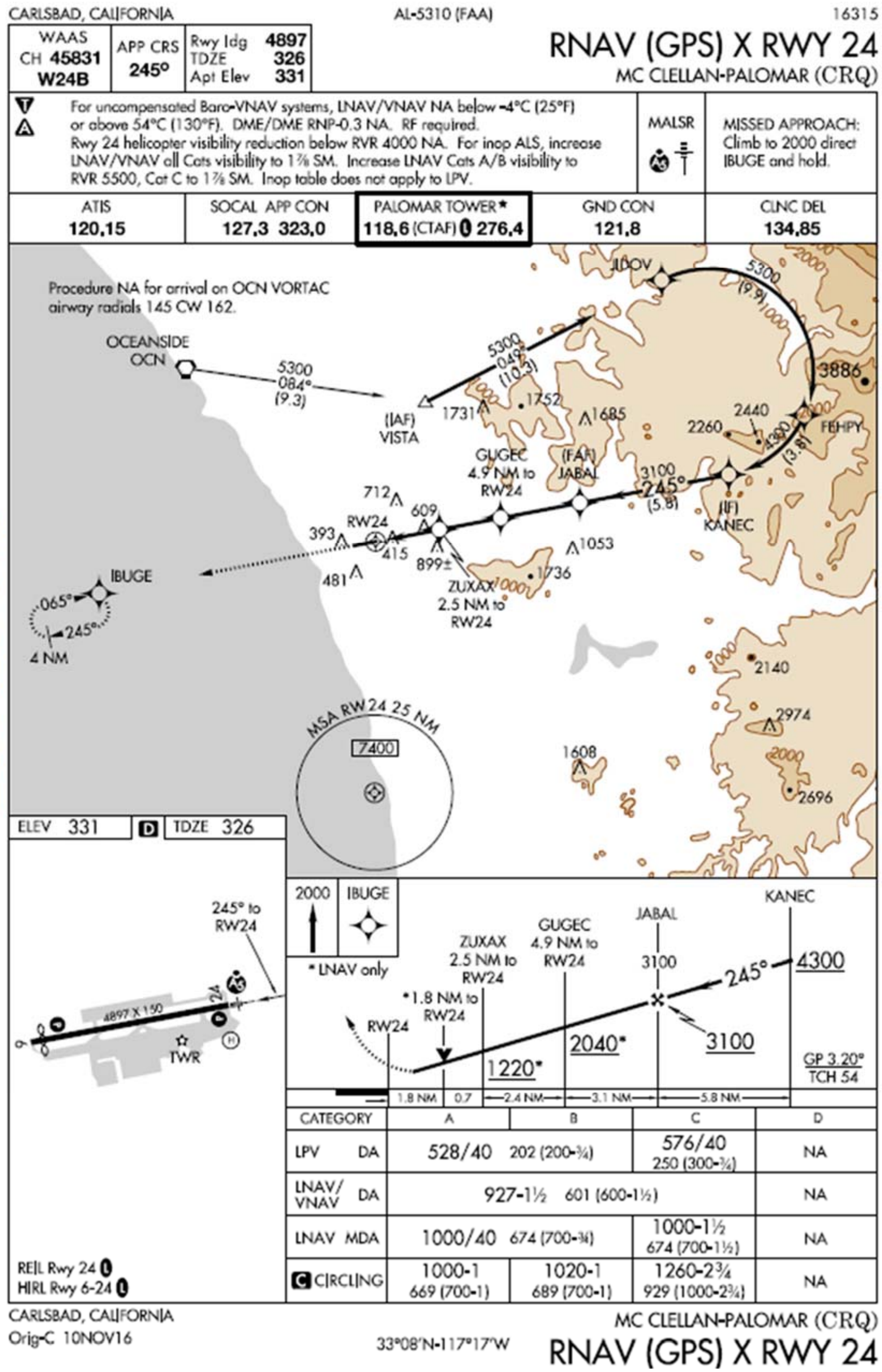


Exhibit 2.4 FAA Published RNAV (GPS) Y Runway 24 Approach

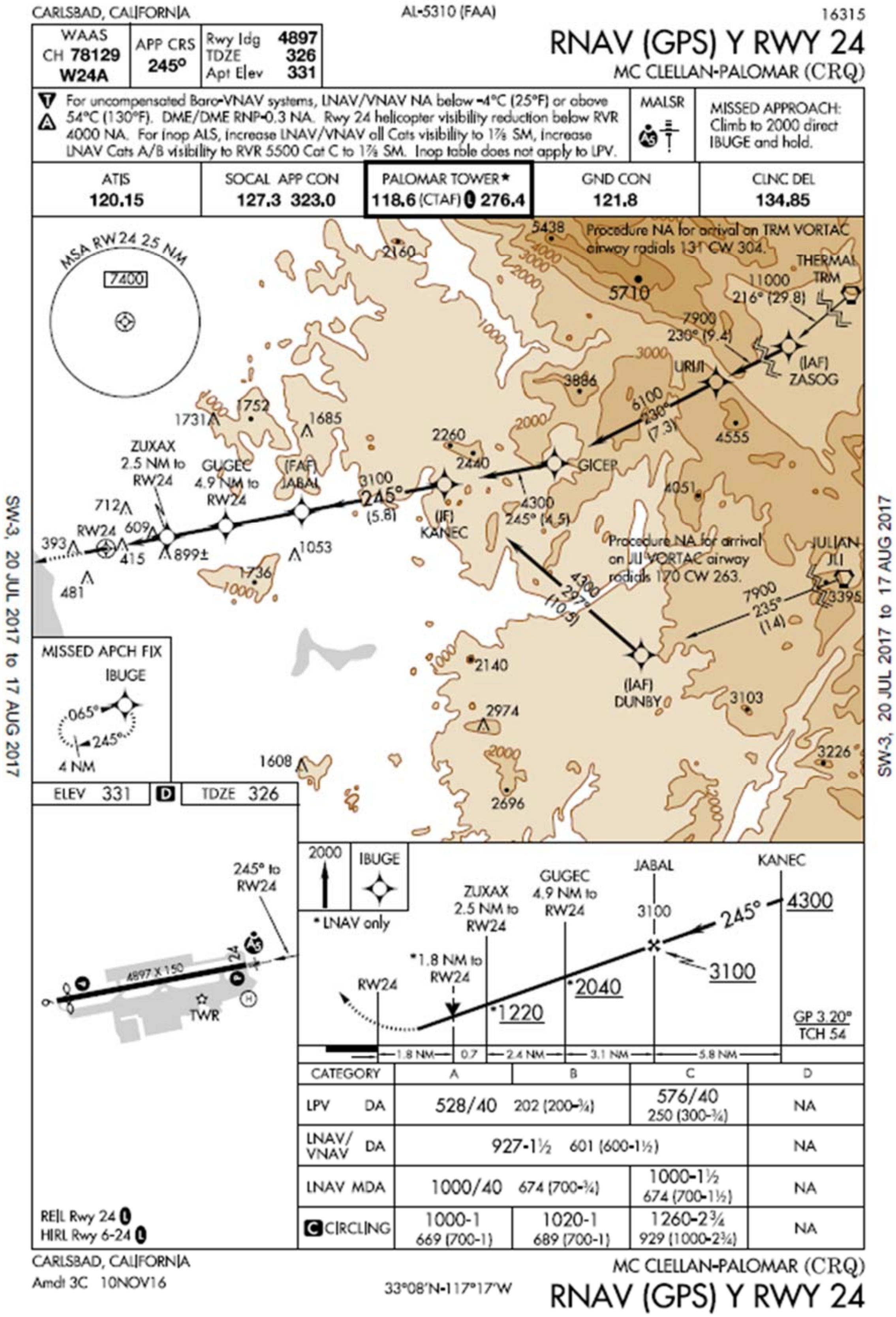


Exhibit 2.5 FAA Published RNAV (RNP) Z Runway 24 Approach

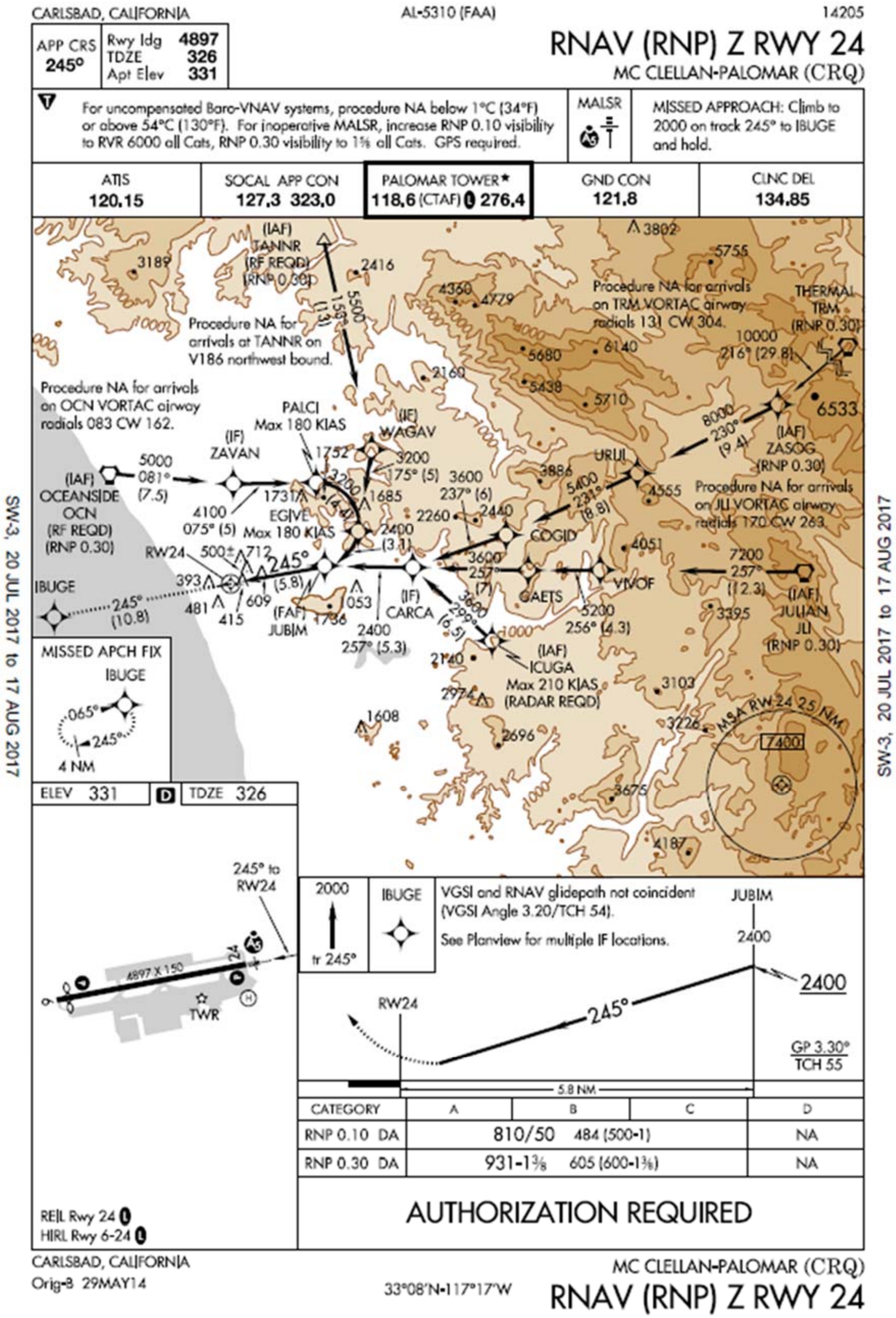
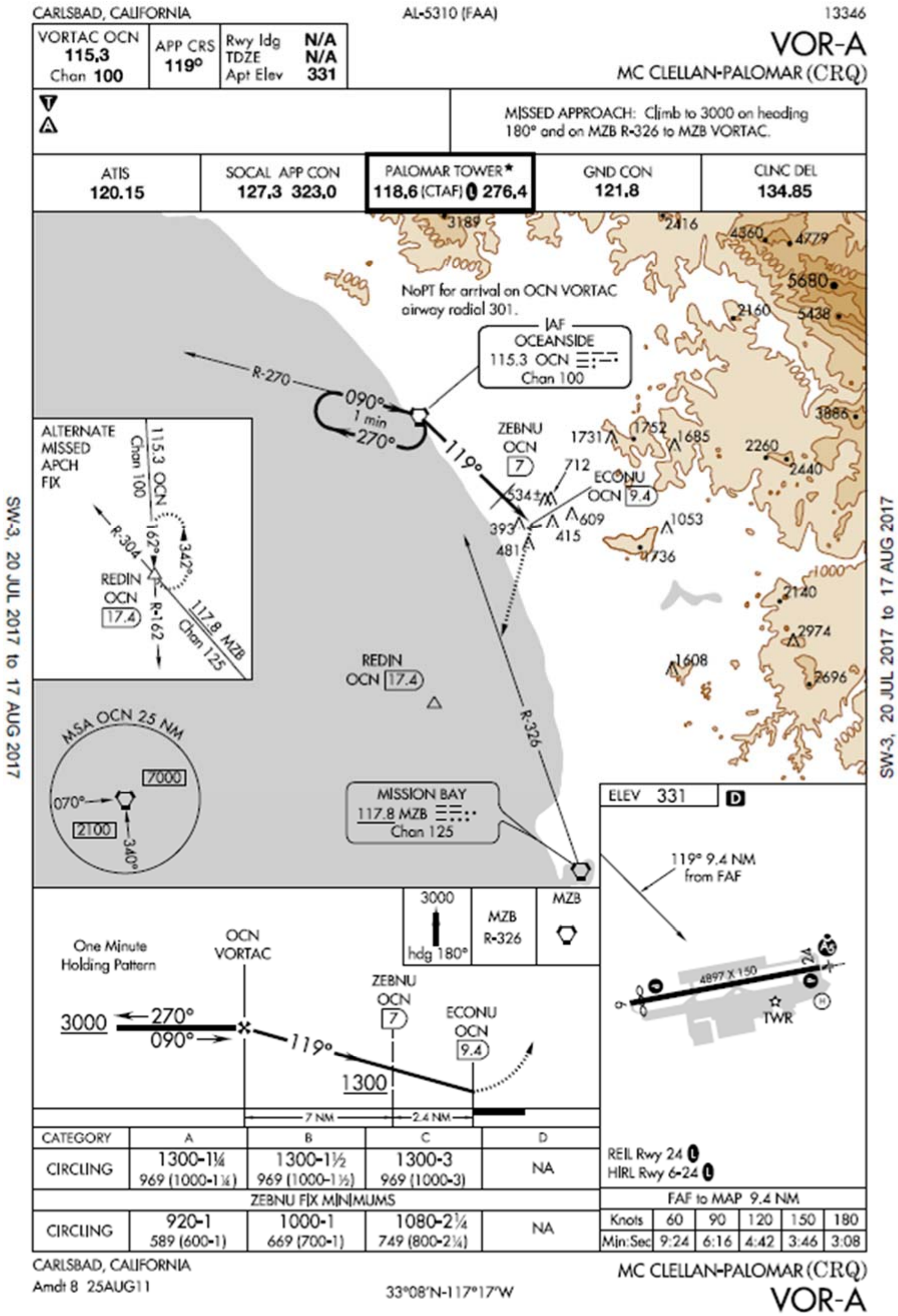


Exhibit 2.6 FAA Published VOR-A Approach



2.2.7 Airfield Lighting, Markings, and Signage

The Airport has various lighting, marking, and signage systems to aid pilots not only in ground wayfinding around the movement and non-movement areas, but also in the approach and departure phases of flight. The airport beacon is located on top of the ATCT and is a rotating light projecting an alternating green and white beam of light, 180 degrees apart, to demonstrate CRQ is a civilian land airport to pilots.

Runway 06-24 is equipped with a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) that serves the Runway 24 approach end. It is also equipped with Runway End Identifier Lights (REIL) on the Runway 24 end and Precision Approach Path Indicator lighting (PAPI), which provides visual aid to pilots in the proper glide path to the runway. PAPIs are provided for both ends of the runway. Runway 24 provides precision markings, while Runway 06 provides non-precision markings. The runway is also delineated with High Intensity Runway Lights (HIRL) that run along both sides of the runway for its entire length.

Table 2.4 summarizes the runway lighting and marking systems.

Table 2.4 – Runway Lighting and Marking Systems

Item	Runway 06-24
Runway Lighting	MALSR (Runway 24) HIRL
Runway Markings	Runway 06 - Non-Precision, Runway 24 - Precision
Visual Approach Aids	PAPI on both ends
Runway End Lighting	REIL (Runway 24)

Source: FAA Airport Master Record #5010. Prepared by: Kimley-Horn, 2017.

Taxiways at CRQ are equipped with Medium Intensity Taxiway Lights (MITL) that are located along the side of the taxiway except for where Taxiway A and Taxiway N abut aircraft parking aprons where the taxiway is delineated by painted markings. Taxiways are also delineated through signage and centerline and edge markings.

2.3 METEOROLOGICAL DATA

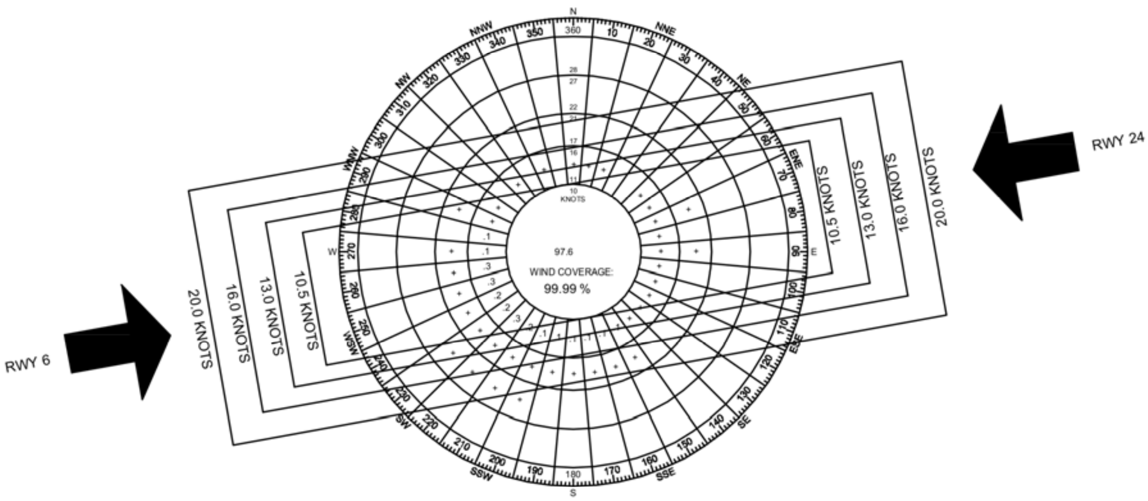
2.3.1 Temperature and Precipitation

The City of Carlsbad is located on the southern coast of the State of California and experiences a semi-arid Mediterranean climate and averages 263 sunny days per year. The city's yearly temperatures vary between a high of 66 and 74 degrees and a low between 47 and 65 degrees. Average annual precipitation for Carlsbad is around 11.84 inches, with a typical seasonal variation of 0.30 inches during summer to 6.66 inches during winter.

2.3.2 Wind Data

The prevailing winds for the Carlsbad area are predominantly westerly. Summaries of wind data at the Airport from 2009-2016 are shown in wind rose format in **Exhibit 2.7.**

Exhibit 2.7 CRQ Wind Rose



ALL WEATHER WIND ROSE				
RUNWAY	CROSSWIND COMPONENT (KNOTS)			
	10.5	13.0	16.0	20.0
6-24	99.25%	99.63%	99.94%	99.99%

Source: National Climate Data Center FAA AGIS Web Portal Station 722927. Period 2009-2016.

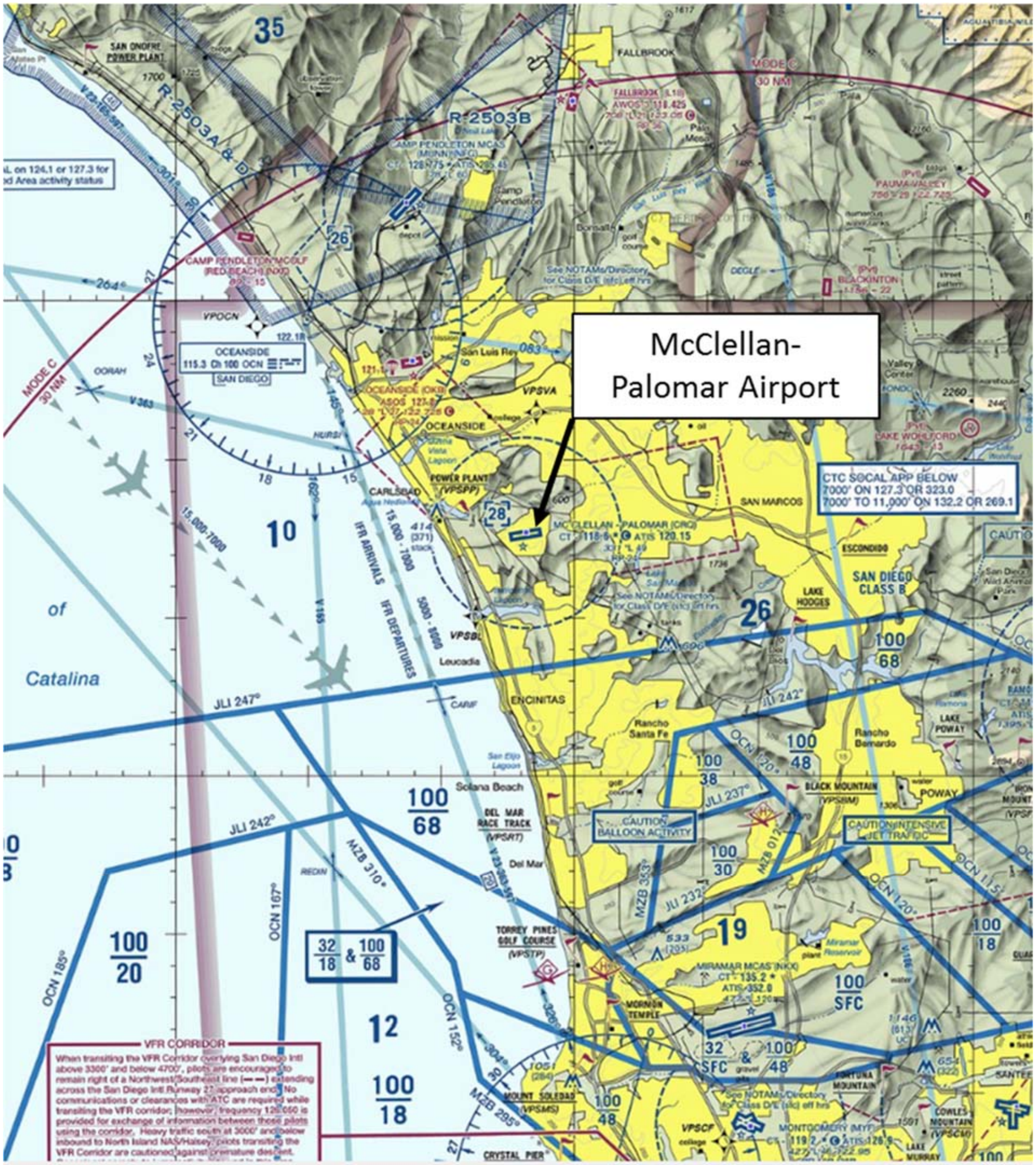
2.4 OPERATIONS AND AIRSPACE PROCEDURES

The airspace surrounding the Airport is classified as Class D from the surface of the ground to 2,800 feet above Mean Sea Level (MSL) during the hours of ATCT operation. In the hierarchy of airspace, Class D airspace generally describes the airspace that surrounds airports with an operational control tower, but with limited or no air carrier operations. The hours of control tower operation are 7:00 a.m. to 10:00 p.m. daily. During hours of tower operation, airport traffic controllers control runway usage by issuing landing and take-off clearances. ATCT also controls aircraft and vehicle ground movements on taxiways and runways. Aircraft operating under visual flight rules (VFR) must establish two-way radio communications with the tower prior to entering the Class D airspace. When the control tower closes, the airspace reverts to Class G airspace, which is uncontrolled airspace. Two sections of Class E airspace exist beyond Class D to provide additional control for the approaches to the runway. **Exhibit 2.8** illustrates the airspace surrounding the Airport.

As shown on **Exhibit 2.8**, the Airport's Class D airspace is located adjacent to the Class B airspace of San Diego International Airport and within the Mode C requirement. Class D airspace is much busier with a high level of air traffic, especially air carrier traffic, and employs higher restrictions on aircraft access. Directly to the west, Vector 23-363-597 provides a route for IFR arrivals and departures along the coast for SAN. Camp Pendleton military airport and three airspaces restricted for military activities are located 11 nautical miles (nm) to the north.

As depicted on the segmented circle, Runway 06 traffic pattern is left and Runway 24 is non-standard right. This traffic pattern helps aircraft avoid flying over the south of the Airport.

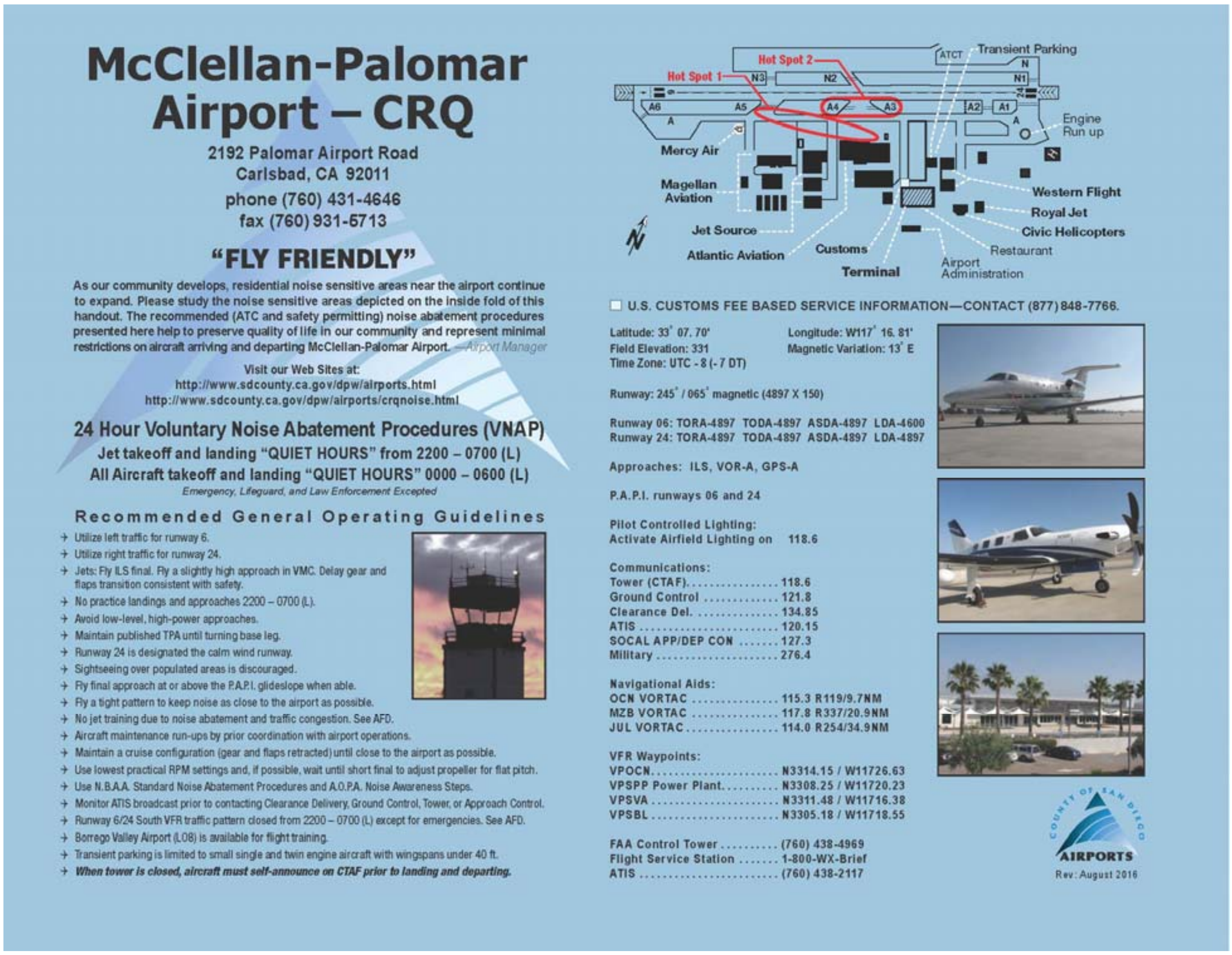
Exhibit 2.8 CRQ Airspace Map



Source: FAA San Diego Terminal Area Chart, Obtained June 2017. Prepared by: Kimley-Horn, 2017.

Several restrictions are in place due to operational capacity and voluntary noise abatement procedures (VNAP). During off hours, which is 10:00 p.m. to 7:00 a.m. (hours when Aircraft Rescue and Firefighting is closed), the Airport is closed to air carrier operations with more than nine passengers and military operations unless prior arrangements are made with the Airport Manager. Per the VNAP's Recommended General Operating Guidelines and FAA's Chart Supplements (previously known as the Airport Facility/Directory), no training is allowed by jet aircraft and multiple approaches from larger aircraft including helicopters is strongly discouraged. Jets are requested to fly the ILS approach. The traffic pattern altitude varies depending on the type of aircraft. The VFR traffic pattern is closed on the south side of the airport while the tower is closed, and any training activities are discouraged during this time. Per the VNAP, there is a voluntary curfew, or "quiet hours," for jets from 10:00 p.m. to 7:00 a.m. and propeller aircraft from 12:00 a.m. to 6:00 a.m. VNAP are shown in **Exhibit 2.9**.

Exhibit 2.9 CRQ Voluntary Noise Abatement Procedures (VNAP)



McClellan-Palomar Airport – CRQ

2192 Palomar Airport Road
Carlsbad, CA 92011
phone (760) 431-4646
fax (760) 931-5713

"FLY FRIENDLY"

As our community develops, residential noise sensitive areas near the airport continue to expand. Please study the noise sensitive areas depicted on the inside fold of this handout. The recommended (ATC and safety permitting) noise abatement procedures presented here help to preserve quality of life in our community and represent minimal restrictions on aircraft arriving and departing McClellan-Palomar Airport. *—Airport Manager*

Visit our Web Sites at:
http://www.sdcounty.ca.gov/dpw/airports.html
http://www.sdcounty.ca.gov/dpw/airports/crqnoise.html

24 Hour Voluntary Noise Abatement Procedures (VNAP)
Jet takeoff and landing "QUIET HOURS" from 2200 – 0700 (L)
All Aircraft takeoff and landing "QUIET HOURS" 0000 – 0600 (L)
Emergency, Lifeguard, and Law Enforcement Excepted

Recommended General Operating Guidelines

- Utilize left traffic for runway 6.
- Utilize right traffic for runway 24.
- Jets: Fly ILS final. Fly a slightly high approach in VMC. Delay gear and flaps transition consistent with safety.
- No practice landings and approaches 2200 – 0700 (L).
- Avoid low-level, high-power approaches.
- Maintain published TPA until turning base leg.
- Runway 24 is designated the calm wind runway.
- Sightseeing over populated areas is discouraged.
- Fly final approach at or above the P.A.P.I. glideslope when able.
- Fly a tight pattern to keep noise as close to the airport as possible.
- No jet training due to noise abatement and traffic congestion. See AFD.
- Aircraft maintenance run-ups by prior coordination with airport operations.
- Maintain a cruise configuration (gear and flaps retracted) until close to the airport as possible.
- Use lowest practical RPM settings and, if possible, wait until short final to adjust propeller for flat pitch.
- Use N.B.A.A. Standard Noise Abatement Procedures and A.O.P.A. Noise Awareness Steps.
- Monitor ATIS broadcast prior to contacting Clearance Delivery, Ground Control, Tower, or Approach Control.
- Runway 6/24 South VFR traffic pattern closed from 2200 – 0700 (L) except for emergencies. See AFD.
- Borrego Valley Airport (L08) is available for flight training.
- Transient parking is limited to small single and twin engine aircraft with wingspans under 40 ft.
- ***When tower is closed, aircraft must self-announce on CTAF prior to landing and departing.***

U.S. CUSTOMS FEE BASED SERVICE INFORMATION—CONTACT (877) 848-7766.

Latitude: 33° 07. 70' Longitude: W117° 16. 81'
Field Elevation: 331 Magnetic Variation: 13° E
Time Zone: UTC - 8 (- 7 DT)

Runway: 245° / 065° magnetic (4897 X 150)

Runway 06: TORA-4897 TODA-4897 ASDA-4897 LDA-4600
Runway 24: TORA-4897 TODA-4897 ASDA-4897 LDA-4897

Approaches: ILS, VOR-A, GPS-A

P.A.P.I. runways 06 and 24

Pilot Controlled Lighting:
Activate Airfield Lighting on 118.6

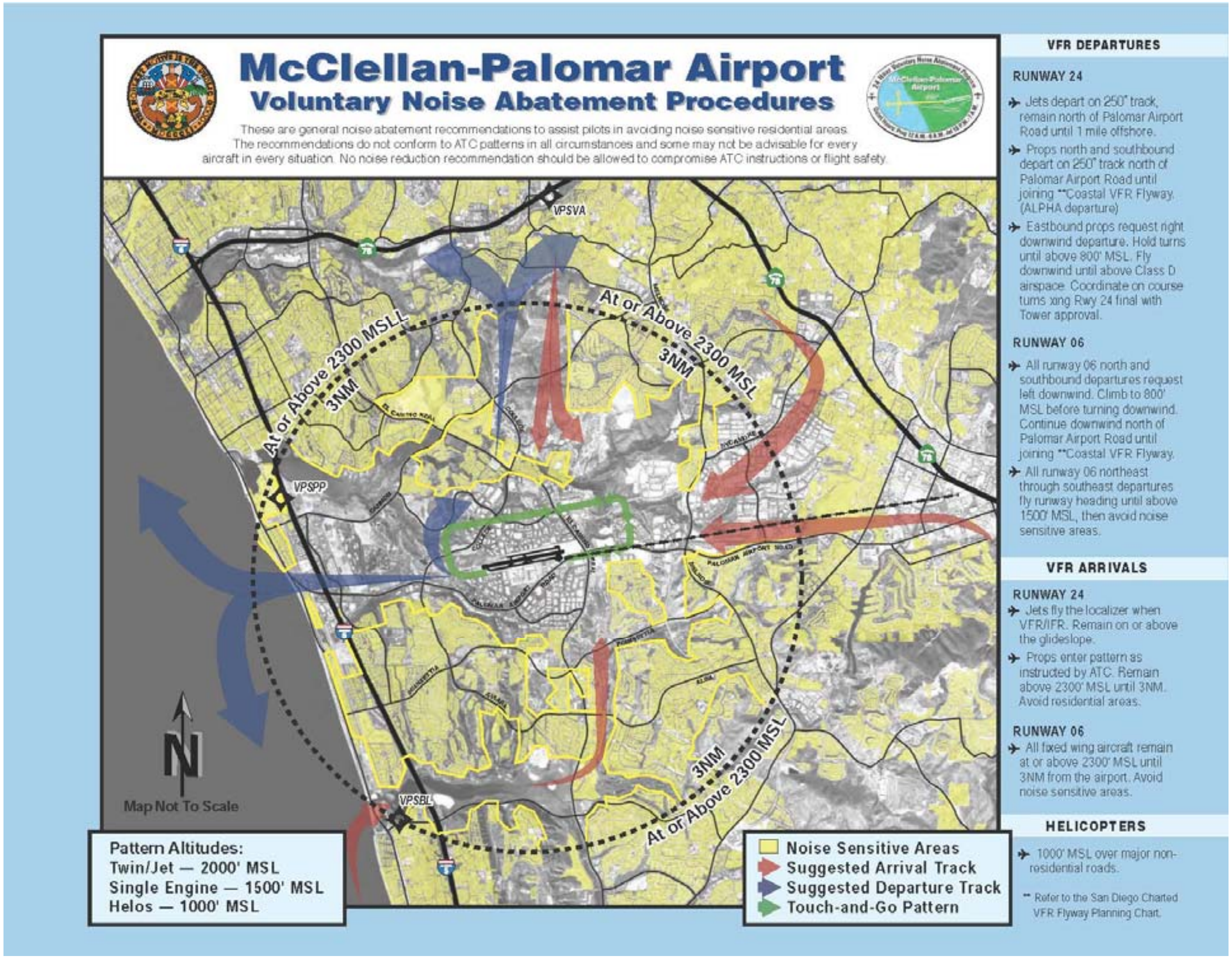
Communications:
Tower (CTAF) 118.6
Ground Control 121.8
Clearance Del. 134.85
ATIS 120.15
SOCAL APP/DEP CON 127.3
Military 276.4

Navigational Aids:
OCN VORTAC 115.3 R119/9.7NM
MZB VORTAC 117.8 R337/20.9NM
JUL VORTAC 114.0 R254/34.9NM

VFR Waypoints:
VPOCN .... N3314.15 / W11726.63
VPSPP Power Plant .... N3308.25 / W11720.23
VPSVA .... N3311.48 / W11716.38
VPSBL .... N3305.18 / W11718.55

FAA Control Tower .... (760) 438-4969
Flight Service Station 1-800-WX-Brief
ATIS .... (760) 438-2117

COUNTY OF SAN DIEGO AIRPORTS
Rev: August 2016



Source: County of San Diego. Obtained June 2016. Prepared by: Kimley-Horn, 2017.

2.5 AIRPORT TRAFFIC CONTROL FACILITIES

There are three facilities that provide air traffic control (ATC) services to aircraft arriving or departing the Airport or flying in the immediate vicinity. These facilities include the following:

- Los Angeles Air Route Traffic Control Center (ARTCC)
- Southern California Terminal Radar Approach Control (TRACON)
- McClellan-Palomar Airport Traffic Control Tower

The CRQ ATCT (identified on the radio as “Palomar Tower”) authorizes aircraft to land or take-off at the Airport or to transit the Airport’s Class D airspace while operating under VFR. VFR are a set of flight rules that govern aircraft flight during Visual Meteorological Conditions (VMC). The ATCT is operated by the FAA and is open daily from 7:00 a.m. to 10:00 p.m. The ATCT also provides clearances to aircraft on the ground planning to operate under IFR. These rules govern aircraft flight and separation during instrument meteorological conditions (i.e., when the visibility and sky conditions do not allow visual flight).

The Southern California TRACON provides radar services to aircraft approaching or departing the southern California region. Aircraft enroute to the Airport while operating under IFR will likely be in communication with the TRACON prior to arriving and will be separated from other aircraft. The Los Angeles ARTCC provides enroute radar services to aircraft for longer routes.

2.6 PASSENGER TERMINAL FACILITIES

2.6.1 TERMINAL BUILDING

In 1960, a one-story terminal building was built to serve the newly constructed Airport (opened in 1959) located north of Palomar Airport Road and south of the runway. The existing passenger terminal building at CRQ was constructed in 2009 and has an interior area of approximately 12,590 square feet. The total terminal complex includes awnings and outdoor space for the baggage claim, restaurant, Customs, rental car, and holdroom that when included with the passenger terminal building footprint, encompasses a total area of approximately 22,139 square feet.

The existing terminal complex consists of three primary sections: the airport terminal, the Landings Restaurant, which is in a separate structure, and the Customs facility also located in a separate structure from the terminal building. The passenger terminal facilities are shown in **Exhibit 2.10**. Major terminal area categories are listed in **Table 2.5**

Table 2.5 – Passenger Terminal Complex – Area Summary

Building Category	Total Area (Square Feet)
Airline	
Ticketing-Check-In	2,996
Holdroom	2,507
Baggage Claim (Covered Outdoor facility)	1,800
Airline Offices and Operations	1,918
Transportation Security Administration (TSA)	2,110
Concessions (includes separate restaurant)	3,729
U.S. Customs and Border Protection (CBP)	1,490
Rental Car	260
Circulation/Auxiliary Space - (Includes walls, hallways, elec. IT office, janitor facilities, communications	4,760
Restrooms	569
Total	22,139

Source: McClellan-Palomar Airport Terminal Floor Plans, Sheets A02.01.A-C, October 2011.
Prepared by: Kimley-Horn, 2017.

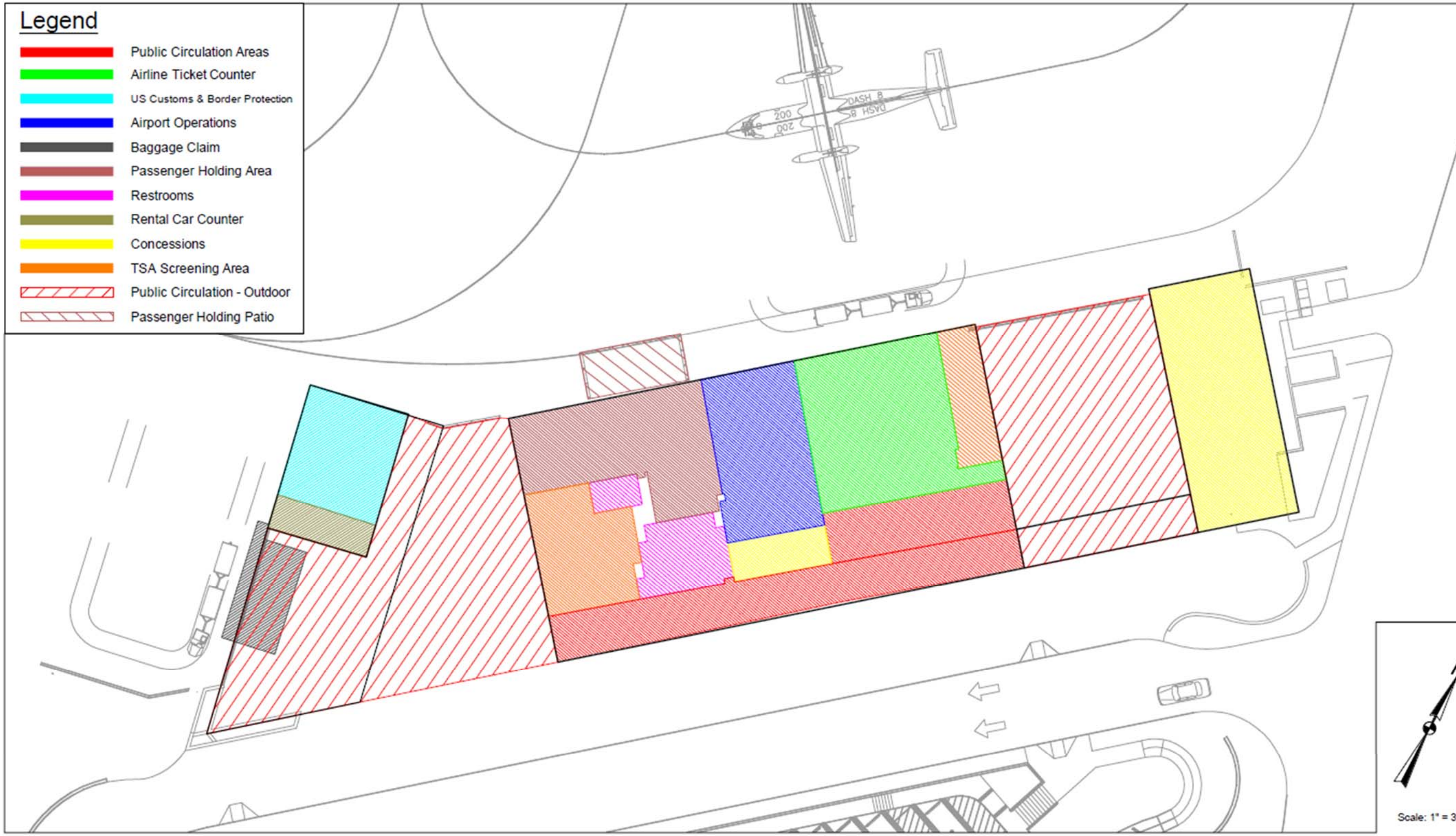
Note: Circulation/Auxiliary calculations do not include exterior spaces (outside holdroom, baggage claim). CBP, restaurant, and rental car facilities are in adjacent facilities and are not included as calculations for the 12,590-sf passenger terminal building footprint.

Major terminal area categories identified in **Table 2.5** are defined as follows:

Airline – These areas are leased to airlines for passenger processing and airline operations:

- Ticketing-Check-in: space dedicated to outbound passenger processing for obtaining boarding passes and checking baggage.
- Holdroom: space dedicated for passengers waiting to board aircraft. This area includes seating and standing areas and gate processing equipment.
- Baggage Claim: this area includes airside baggage drop including tug movement area, baggage claim devices, associated baggage area queuing, and waiting area.
- Airline Offices and Operations: areas dedicated to airline personnel for administrative and operational functions.

Exhibit 2.10 Existing Terminal Facilities



Source: McClellan-Palomar Airport Terminal Floor Plans, October 2011. Prepared by: Kimley-Horn, 2017.

TSA– Areas dedicated for security screening. Passengers are required to go through TSA checkpoints prior to entering and leaving the holdroom. This area also includes checked baggage screening areas.

Concessions – Area leased to vendors for retail, food and beverage sales, merchandise sales, vending areas, etc. A stand-alone airport restaurant is located to the east of the main passenger processing building and is separated from the actual terminal function by an open patio area with outdoor seating.

U.S. Customs and Border Protection (CBP) – CBP enforces the import and export laws and regulations of the U.S. federal government and conducts immigration policy and programs. The CBP facility provides areas used for conducting private and commercial air carrier inspections, specifically for aircraft entering from or leaving to a foreign country.

Rental Car – Area used for rental car companies, including counter space.

Circulation – Circulation areas are provided to allow for ample space to travel to different areas of the terminal and accommodate unforeseen changes in terminal use. These areas are not dedicated to any single tenant.

Restrooms – Areas used for men’s and women’s public bathroom facilities in the public portion of the terminal and in the sterile passenger areas.

2.6.2 Vehicle Parking

Vehicle parking at the Airport includes short-term and long-term public parking facilities. The short-term parking lot is located just south of the terminal curbfront, parallel to Palomar Airport Way and contains 19 spaces, seven of which are currently used by the rental car agencies for arriving passengers.

The long-term parking lot is located southwest of the terminal building between Palomar Airport Way, Owens Avenue, and Palomar Airport Road. The closest parking space in the long-term lot is approximately 700 feet from the nearest entrance to the primary terminal building. The lot itself is approximately 25 feet to 30 feet below the terminal and, to address this topographic condition, an elevator was constructed adjacent to the east end of the parking lot to ease the impact of the elevation change on pedestrians. From the furthest parking stall in the long-term lot to the elevator is a straight-line distance of just under 1,200 feet. The long-term lot accommodates 667 vehicles, 605 excluding rental car spaces. Approximately 75 spots are used for airport employees, rental car companies, and visitors. **Exhibit 2.11** depicts the location of the short- and long-term parking lots.

2.6.3 Terminal Curbfront

The vehicular curbfront adjacent to the terminal building consists of two lanes for its entire length (approximately 400 feet of loading zone area) between McClellan Way and Palomar Airport Way. The curbfront provides dwelling space for private vehicles, taxicabs, and on-demand commercial vehicles such as limousines. Two crosswalks divide the curbfront into three sections. Each crosswalk provides pedestrian access to the small short-term parking and rental car pick-up parking spaces in front of the terminal. Standing for vehicles picking up and dropping off passengers occurs in the inner lane closest to the terminal building, while the outer lane serves as the single through lane.

2.6.4 Rental Car Facilities

Two rental car companies—Hertz and Avis—currently operate at the CRQ passenger terminal. The rental car office for both agencies is located on the west end of the facility, adjacent to the CBP offices and the baggage claim area.

Exhibit 2.11 2017 Airport Tenants and Support Facilities

Source: CRQ Tenant Leases; McClellan-Palomar Airport Business Map, January 10, 2014; Airport Records
Prepared by: Kimley-Horn and Associates, Inc., August 2017

Arriving customers pick up their rental vehicles at the short-term parking lot. Departing customers are directed to drop off the vehicles in the long-term parking lot and walk to the terminal. As a result, no shuttles are required for rental car operations. As noted, approximately seven of the short-term parking lot spaces in front of the terminal building are presently allocated to the rental car operation[2]. The remaining rental car vehicles are stored in the long-term parking lot.

2.7 AIRPORT ACCESS AND CIRCULATION

2.7.1 ACCESS ROADWAYS

Primary vehicular access to the Airport is via Palomar Airport Road at the signalized intersection of Palomar Airport Way and Yarrow Drive. Palomar Airport Road is a six-lane divided roadway with access to Interstate 5 approximately 2 miles west of the Airport. To the east, Palomar Airport Road turns into W. San Marcos Boulevard when entering the City of San Marcos. To the east of the Airport, El Camino Real provides primary north/south access to the immediate area. El Camino Real is also a six-lane divided roadway that provides access to CA State Routes 78 and 76, approximately five and eight miles north of the Airport, respectively.

Table 2.6 provides a summary of the surrounding roadways and existing average daily traffic (ADT) volumes.

[2] Kimley-Horn, Site Visit Observations, November 2013.

Table 2.6– 2016 CRQ Area Traffic Count Data

Segment	Segment Location	Average Daily Traffic (ADT)
Palomar Airport Rd.	Paseo Del Norte to Armada Dr.	54,870
Palomar Airport Rd.	Yarrow Dr. to El Camino Real	38,882
Palomar Airport Rd.	El Camino Real to Loker Ave	55,192
Palomar Airport Rd.	Melrose Dr. to Paseo Valindo	37,152
El Camino Real	Plaza Dr. to Marron Rd.	31,098
El Camino Real	Tamarack Ave. to Kelly Dr.	28,072
El Camino Real	Jackspar Dr. to College Blvd.	35,892
El Camino Real	Faraday Ave. to Palomar Airport Rd.	35,509
El Camino Real	Arenal Rd. to Costa Del Mar Rd.	53,804
El Camino Real	Levante St. to Calle Barcelona	37,773
Melrose Dr.	Lionshead Ave. to Palomar Airport Rd.	31,512
Carlsbad Blvd.	State St. to Mountain View Dr.	14,148
Carlsbad Blvd.	Acacia Ave. to Cherry Ave.	19,755
Carlsbad Blvd.	Tamarack Ave. to Tierra Del Oro	23,834
Carlsbad Blvd.	Cannon Rd. to Cerezo Dr.	20,704
Carlsbad Blvd.	Breakwater Rd. to Poinsettia Ln.	18,033
Carlsbad Blvd.	Avenida Encinas to La Costa Ave.	19,635
La Costa Ave.	Piraeus St to Saxony Rd.	39,539
La Costa Ave.	Romeria St. to Cadencia St.	12,248
Rancho Santa Fe Rd.	La Costa Meadows Dr. to San Elijo Rd.	29,389
Poinsettia Ln.	Paseo Del Norte to Batiquitos Dr.	26,873
Tamarack Ave.	El Camino Real to La Portalada Dr.	8,892
Cannon Rd.	Paseo Del Norte to Car Country Dr.	26,504
Cannon Rd.	Hilltop St. to College Blvd.	28,578
College Blvd.	City Limits N to Tamarack Ave.	28,155
College Blvd.	Aston Ave. to Palomar Airport Rd.	14,237
Alga Rd.	Corinthia St. to El Fuerte St.	11,516

Source: City of Carlsbad 2016 Traffic Monitoring Program, Prepared by: Kimley-Horn, 2017

2.7.2 PUBLIC TRANSPORTATION

The North County Transit District (NCTD) provides public transportation to the Airport vicinity via two primary bus routes. Route 445 travels along Palomar Airport Road with a stop at Yarrow Drive on its route between Carlsbad Poinsettia and Palomar College. Route 309 travels along El Camino Real with stops near Palomar Airport Road on its route between Oceanside and Encinitas. Currently, no scheduled bus service stops at the terminal.

2.8 AIRPORT TENANT AND SUPPORT FACILITIES

The following sections describe the airport tenants who lease buildings or building space at CRQ for various purposes. These purposes include aviation businesses, such as Fixed Based Operators (FBOs) and aircraft maintenance facilities, as well as lessors of aircraft hangar space. Additionally, airport support facilities, such as airport maintenance, are described.

2.8.1 General Aviation Tenants

General aviation tenants at CRQ include entities such as FBOs, corporate flight department, T-hangar tenants, and other aviation-related businesses. The FBOs provide services such as fuel, hangar space and passenger amenities to transient and based aircraft. There are currently several FBOs that provide aircraft and passenger services, including Jet Source, Magellan Aviation, Western Flight Services, LLC, Royal Jet, and Atlantic Aviation. A brief description of these facilities is below, and they are depicted previously on **Exhibit 2.11**.

2.8.1.1 Magellan Aviation

Magellan Aviation is an FBO located south of Runway 06-24 on the western end of the developed general aviation facilities at CRQ. The FBO provides flight services to private aircraft, including jet fuel and Avgas from a fuel farm with in-ground tanks in the southeast corner of their leasehold, apron and hangar storage, aircraft maintenance, charter, sales, and passenger/pilot amenities. Magellan recently expanded into approximately 125,000 square feet of operational space[3]. The FBO operates four multi-aircraft hangars that are individually divided to provide a private unit for each tenant. These are all situated in the southern half of their leasehold. Three of these are sized for smaller aircraft (generally Group I) and consist of one single-loaded structure and two nested T-hangar units, while the fourth structure is sized for small to mid-sized business turboprop and business jet aircraft. To the west of the larger multi-tenant hangar is an individual hangar approximately 5,500 square feet in size.

Along the north side of the leasehold and fronting onto an open ramp that abuts the south side of Taxiway A is a new hangar/office facility with an approximate foot print of 69,800 square feet. To the immediate south of this structure is a new vehicle parking area and access drive that connects to Aircraft Road at its cul-de-sac terminus. Immediately south of this parking area is a combined hangar/office and shop facility that has an approximate footprint of an additional 38,800 square feet. Light aircraft parking is also provided on the south and west periphery of the site.

2.8.1.2 Atlantic Aviation

Atlantic Aviation is another FBO located at CRQ, offering many typical FBO services, including aircraft line services, flight planning, fueling, passenger concierge, and hangar/office leasing. It is located south of Runway 06-24, immediately adjacent to the passenger terminal and its associated ramp. Atlantic Aviation has a single large hangar complex with an associated airside ramp that fronts outward onto Taxiway A. This facility, which has a footprint of approximately 125,000 square feet, includes a general aviation lounge area providing services and amenities to both customers and corporate pilots located in the center of the hangar structure. A second small hangar and support space structure is located to the south of the large hangar and has a building footprint of approximately 23,600 square feet. A vehicle parking area for both buildings is provided to the south of the large hangar and west of the smaller hangar structure. Access to the site is provided by way of a drive that intersects the FBO access road approximately 500 feet west of the crosswalk from the main terminal parking lot to the terminal building. To both the east and west of the access drive, there is small aircraft parking and individual aircraft Port-a-Port hangars. There are approximately 31 Port-a-Port portable hangars located to the east of the entrance drive and 21 to the west.

[3] http://www.magellanaviation.aero/locations.html

2.8.1.3 Jet Source, Inc.

Jet Source is also located south of Runway 06-24, between Magellan Aviation and Atlantic Aviation, and offers all standard FBO services, as well as hangar and office leasing. Additionally, Jet Source offers aircraft charters.

The northernmost building is a combination hangar, shop area, FBO/GA terminal use, and parts storage building that fronts to an aircraft ramp abutting the south side of Taxiway A. This building has a footprint of approximately 51,800 square feet. One notable aspect of this structure is the investment that has been made into solar panels for building power.

Immediately south of the above noted building is an additional hangar approximately 17,700 square feet in size that opens to the east onto a north-south oriented taxilane that is shared with Atlantic Aviation to provide access to Taxiway A. The third building in the main part of the Jet Source leasehold is located directly south of the second structure and includes both finished office/support space and a hangar that opens onto the shared taxilane previously noted. This building also includes a significant solar panel system on its roof and has a footprint of approximately 45,400 square feet.

2.8.1.4 Western Flight Services, LLC

Western Flight Services, LLC is adjacent to the ATCT and directly east/northeast of the terminal building on the eastern half of the airport, south of Runway 06-24. Western Flight Services provides aircraft line services and passenger/flight crew amenities to general aviation users out of two separate hangars. Their first hangar located immediately east of the ATCT fronts on an open parking apron that abuts the south side of Taxiway A. This building has a footprint of approximately 14,500 square feet of hangar with an attached 3,550-square-foot structure for offices, lounge area, waiting room, and other support facilities for passengers and pilots.

The second Western Flight Services hangar building is located due south of the first structure and has a footprint of approximately 16,700 square feet. Vehicle parking for both uses is located along the western sides of the two noted hangars with direct access onto McClellan Drive.

2.8.1.5 Royal Jet

Royal Jet Inc. is a FBO that provides flight services to corporate and general aviation clients, including fueling and aircraft storage. The 9,800 square-foot hangar is located southeast of the ATCT along Palomar Airport Road with a 14,000 square-foot concrete ramp.

2.8.1.6 Civic Helicopters

Civic Helicopters is a Manufacturer Authorized Service Center for several types of aircraft and provides flight training with its fleet of nine rotorcraft. Civic also offers charter and air taxi operations, aerial photography, aerial surveys, and frost control. They operate from an approximately 14,000-square- foot facility located on the southern portion of the airfield immediately east of the Airport’s main entrance.

2.8.1.7 Other Tenants

In addition to these tenants, there are several tenants that provide aviation services such as air taxi and aircraft charter. These tenants include Schubach Aviation, JetMethods, Inc., Latitude 33 Aviation, Cutter Piper Sales, Loft, ATP Flight School, Pacific Coast Flyers, Pinnacle Aviation Academy, AirOptions Aviation LLC, Charter Flight Group, Plus One Flyers, and Clay Lacy Aviation. Many of these businesses sublease space from the aforementioned FBOs.

A listing of major tenants and buildings is provided in **Table 2.7**.

Table 2.7– Airport Buildings

Building #	Tenant	Facility Type
2002	Magellan Aviation	Hangar
2006	Magellan Aviation	FBO/main office/sublease offices
2008	Magellan Aviation	Hangar
2010	Magellan Aviation	Hangar
2012	Magellan Aviation	Hangar
2014	Magellan Aviation	Aircraft detailer
2016	Magellan Aviation	Hangar
2018	Magellan Aviation	Hangar
2026	Jet Source, Inc.	Schubach Aviation main office/hangar maintenance/Avionics
2036	Jet Source, Inc.	Latitude 33
2056	Jet Source, Inc.	Office/charter/aircraft sales/maintenance
2100	Atlantic Aviation	Main office/charter/aircraft sales/hangar
2150	Atlantic Aviation	Hangar/maintenance/aircraft detailer
2186	County Owned Hangar	Hangar/maintenance/flight school
2192	County of San Diego	Airport administration/maintenance building
2198	Passenger Terminal	Commercial service passenger terminal Customs and Border Protection Restaurant Transportation Security Administration Rental car agencies
2200	Federal Aviation Administration	Airport traffic control tower
2206	Civic Helicopters, Inc.	Office/flight training/charter/tours/ maintenance/aircraft sales
2208	Western Flight	Hangar
2210	Western Flight	Office/charter/aircraft sales/flight school/ flying club
2220	Royal Jet	Hangar

Source*:* McClellan-Palomar Airport Business Map, January 10, 2014. Prepared by: Kimley-Horn, 2017.

2.8.2 Retail Tenants

A retail site, called Palomar Commons, is located on Airport-owned property that is not accessible to the airfield along the south side of Palomar Airport Road. Specifically, this parcel is situated in the southwest quadrant of El Camino Real and Palomar Airport Road. The retail complex, which opened in late 2013, houses several large retailers, including Lowe's, and several associated outparcel businesses. This portion of Airport-owned property encompasses approximately 20.5 acres.

2.8.3 Aircraft Storage Facilities

The Airport contains many aircraft storage facilities, including community hangars and T-hangars. The Airport has 20 buildings and 50.6 acres of lease area, which includes hangar space. According to the most recent Airport Layout Plan, there are an estimated 110 T-hangar units. Other buildings include the airport maintenance facility and airport terminal building. A listing of airport buildings is provided above in **Table 2.7**.

2.8.4 Support Facilities

Airport support facilities ensure the airport continues operating in an efficient and safe manner. These facilities include Aircraft Rescue and Firefighting (ARFF), the ATCT, airport maintenance, and fueling facilities.

2.8.4.1 Aircraft Rescue and Firefighting

The Airport's onsite ARFF facility is located directly west of and adjacent to the passenger terminal and is a canopy structure that houses two ARFF vehicles—one primary and one backup. The facility allows direct apron access for ARFF operations. ARFF services are provided from 6:00 a.m. until 11:15 p.m. The primary unit is kept in response-ready status 15 minutes before the first scheduled flight in the morning and 15 minutes after the last scheduled flight each day of the week, according to the Airport Certification Manual (ACM).

2.8.4.2 Airport Operations and Maintenance

The Airport has one airfield operations and maintenance building located south of the terminal along the north side of Palomar Airport Road. This building is approximately 9,500 square feet and houses a wide variety of equipment for performing Airport operations and maintenance, including trucks, tool equipment, a wheel loader, backhoe, and various other machines. The Airport's maintenance staff handles most of the routine airfield maintenance needs, including maintaining airfield lighting, airfield pavement, and facilities.

2.8.4.3 Fueling Facilities

CRQ has several fueling facilities, with each fuel provider maintaining its own fuel storage, inventory, and distribution system. There are no fuel distribution lines at the Airport; all fuel is delivered to the storage tanks by truck.

There is no common use fuel storage facility or fuel distribution system maintained by the Airport. There are six entities on the field that dispense fuel: Jet Source, Inc., Magellan Aviation, Royal Jet, Western Flight Services, LLC, Atlantic Aviation, and the County of San Diego (which owns a self-service fuel facility on the north apron that has an agreement with a 3rd party to operate it). A summary of the fueling facilities and their fuel types and capacities is shown below in **Table 2.8.**

Table 2.8 – Airport Fuel Facilities

Provider	Jet A Capacity (Gallons)	AvGas Capacity (Gallons)
Atlantic Aviation	20,000	20,000
Magellan Aviation	20,000	15,000
Western Flight Services, LLC	40,000	12,500
Jet Source, Inc.	50,000	20,000
Royal Jet	12,000	--
County of San Diego (North Ramp)	--	12,000

Source: Airport Certification Manual, 2011; Interviews conducted 11/28/2013 onsite; Airport Records. Prepared by: Kimley-Horn, 2017.

2.8.4.4 Airport Traffic Control Tower

As noted in Section 2.5, the ATCT is operated by the FAA and is currently open daily from 7:00 a.m. to 10:00 p.m. The ATCT also provides clearances to aircraft on the ground planning to operate under IFR. These rules govern aircraft flight and separation during instrument meteorological conditions or when requested by the pilot under visual meteorological conditions.

2.8.5 Apron Areas

Existing aircraft apron areas include aircraft tie-down storage facilities and circulation areas for general aircraft movement. The existing apron storage areas include space for based and itinerant aircraft parking. There are various categories of apron area, including FBO apron, public apron, and commercial service apron. FBO aprons are in front of Magellan, Jet Source, Atlantic Aviation, and Western Flight. A small public apron is in front of the ATCT, adjacent to the Western Flight apron. There is also a 38,530-square-yard apron (excluding the alignment of Taxiway N) located north of Runway 06-24, which includes 130 ADG I (wing-spans less than 49 feet) aircraft tie-downs for based aircraft.

There are several additional aircraft tie-down ramp locations situated along the south side of the alignment of Taxiway A. Proceeding from east to west, the first area with 27 tie-downs is located immediately west of the run-up area on the east end of Taxiway A and fronts directly out onto Taxiway A. This tie-down area is separated from a larger parking apron by an ADG I taxilane that runs along the south side of the tie-down apron. South of this tie-down area, there is an aircraft parking apron that extends from the fuel farm (west of the helipad) to the Western Flight hangar facilities.

The next designated tie-down area, for small aircraft, is located to the immediate north/northwest of the Airport Traffic Control Tower, along the northeast boundary of the air carrier ramp. This tie-down area is situated immediately adjacent to the taxilane that provides access to the terminal ramp area. East of the tie-downs is an open ramp that is approximately 110 square yards that abuts the north side of Western Flight.

An additional aircraft parking ramp that includes 30 small aircraft tie-downs is situated along the south side of Taxiway A between the Magellan Aviation leasehold and the run-up area/compass rose site toward Runway End 06.

A commercial airline service apron of approximately 14,700 square yards is located to the immediate north of the passenger terminal and is marked with five designated aircraft parking positions for commercial aircraft arriving at and departing the terminal. These positions are marked to accommodate the dimensional criteria for the previously operated fleet of EMB 120 aircraft as well as aircraft with wingspans in the lower half of the ADG III category. Within the overall terminal area ramp, a small section apron delineated with a blue boundary line is dedicated for use by the CBP. Unlike many airports, the configuration of the parking positions at CRQ does not allow aircraft to park nose in toward the terminal. This is due largely to the extent of facility development to the east and west of the terminal complex. The five parking positions are configured in a manner that places the aircraft in a line perpendicular to the terminal building, resulting in the first aircraft position being located approximately 63 feet from the backside of the terminal while position two is 172 feet, position three is 285 feet, position four is 400 feet, and position five is 516 feet from the terminal. The apron area locations are shown on **Exhibit 2.12.** It should be noted that the configuration of the CRJ-700, which began operation in September 2017 has a body width of 76.3 feet and length of 106.6 feet. While it is not anticipated that more than two of these aircraft will be staged on the commercial apron at a given time, re-striping of the apron spaces may be required to accommodate multiple aircraft.

Exhibit 2.12 Airport Apron Areas

Source: Airport Records
Prepared by: Kimley-Horn and Associates, Inc., August 2017

2.8.6 Airport Weather Information

The Airport has an on-site Automated Surface Observation System (ASOS), which provides a continuous broadcast of weather information at the surface of the Airport, including temperature, dew point, precipitation intensity and type, cloud cover, visibility, and various other measures. This facility is located adjacent to the segmented circle, north of Runway 06-24 and east of the northern apron. The weather information can be accessed by aviation radio, Automated Terminal Information System (ATIS), or by telephone.

2.8.7 Airport Security

The Airport's perimeter is enclosed by a combination of six- and eight-foot chain link fencing topped with three strands of barbed wire. The security gates are controlled and maintained by the County Airports Staff. Passage through the security gates is provided by contacting ATCT via radio communications. Access gates are kept closed and locked.

2.9 AIRPORT UTILITIES

Public and private sector utility companies serve the Airport and associated facilities. The major systems on Airport property are water, electric, natural gas, communications, sanitary sewer, and stormwater.

Water and sanitary sewer services are provided by the City of Carlsbad. The City of Carlsbad Environmental Service Department requires a stormwater management plan for all development within its city limits. City of Carlsbad Local Facilities Management Plan Zone 5, which includes the Airport, is divided into three separate drainage basins, two of which drain to the Agua Hedionda Lagoon. The third and most predominant basin drains down the Encinas Canyon and empties directly into the Pacific Ocean.

Currently, Pacific Bell (AT&T) is the only provider of landline telephone service and internet service at the Airport. Consultation with this provider revealed that only basic landline telephone service is currently available in the area.

San Diego Gas and Electric provides electrical service and natural gas service to the Airport and surrounding vicinity.

2.10 LAND USE & ZONING POLICIES

The County takes a proactive role working with local agencies, the San Diego County Regional Airport Authority (SDCRAA), and the FAA to protect the airspace around the airport from encroachment and to promote compatible off airport land development, and ensure the future safety and compatibility of the runway.

The following sections provide a description of the physical, political, and socio-economic aspects of the areas that surround the Airport. The specific sections include a discussion of area land uses surrounding the Airport and area land use plans, as well as an inventory of land use controls and future land use actions near the Airport. A map of existing land use delineated by the City of Carlsbad is shown on **Exhibit 2.13**.

Exhibit 2.13 Airport Area Existing Land Use

Source: City of Carlsbad GIS, 2016
Prepared by: Kimley-Horn and Associates, August 2017

Scale: 1" = ± 700'

2.10.1 ON-AIRPORT LAND USES

The Airport is on County of San Diego property within the municipal limits of the City of Carlsbad and is zoned Industrial (M) pursuant to the Carlsbad Municipal Code (CMC) Title 21 “Zoning Ordinance” (Section 21.34) and consists of government (airport) facility land uses. While the County has immunities from the City’s land use restrictions (See, for example, Government Code § 53090, et seq.), the County coordinates with the City in an effort to ensure City requirements are taken into consideration. The County has historically used the City’s use permit process as a vehicle to facilitate coordination and obtained Conditional Use Permit (CUP) 172 from the City on September 24, 1980. The County subsequently sought and obtained an amendment to CUP-172 related to the use of three parcels as parking lots. The amendment was approved on November 3, 2004 as CUP-172(B). Given the scope of uses allowed by right pursuant to CUP-172 as amended, the County has voluntarily remained in compliance with the use permit, but reserves the right to assert immunities should it become necessary to operate the Airport in a manner consistent with federal obligations or County objectives.

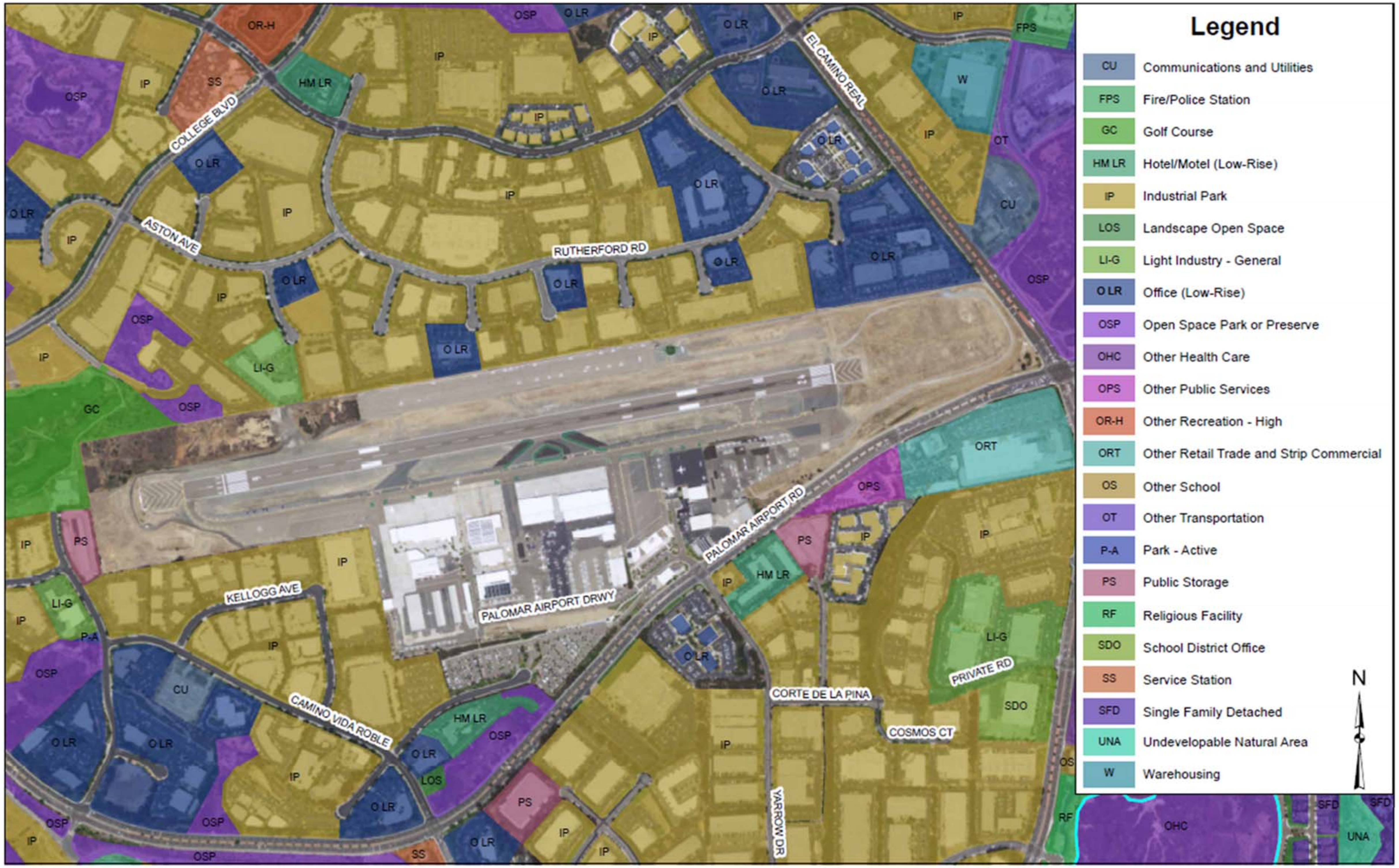
2.10.2 AREA LAND USE PLAN

Airport land use planning attempts to reconcile airport development and operations with surrounding land uses. Compatibility issues are generally defined as, “any airport impact that adversely affects the livability of a surrounding community, as well as any community characteristic that can adversely affect the viability of an airport.” California Department of Transportation’s (Caltrans) *California Airport Land Use Planning Handbook* (Handbook) provides regulatory guidance and best practices for State-compliant and effective airport land use planning (CALTRANS 2011). Most notably, the Handbook provides regulatory guidance pursuant to the 1967 California State Aeronautics Act (SAA, Public Utilities Code [PUC], Section 21001, et seq.), Article 3.5, *Airport Land Use Commissions* (ALUC or Commission). The SAA requires that every county in California with an airport operated for the benefit of the general public create an ALUC responsible for conducting airport land use compatibility planning and preventing the creation of new noise and safety problems in the vicinity of public-use airports.

For CRQ, the ALUC is the San Diego County Regional Airport Authority (SDCRAA). (Public Utilities Code § 170002, et seq.) One of the primary responsibilities of the ALUC is the preparation of an airport land use compatibility plan (ALUCP). Each ALUCP may include measures specifying land use, height restrictions, and building standards. The ALUCP is required to use and be based on the long-range master plan or airport layout plan for an airport. (Public Utilities Code § 21675.) Cities and Counties with land use jurisdiction for areas around airports are required to ensure their general and specific plans are consistent with the ALUCP. The authority of cities and counties to adopt land use plans that are inconsistent with an ALUCP is constrained by State law. (See, Government Code § 65302.3 & Public Utilities Code § 21675.)

CRQ is located in the City of Carlsbad, California, in the County of San Diego. The Airport is in an area of industrial and mixed uses that include commercial and utilities. The Airport is designated as public by the Carlsbad General Plan. Land use surrounding the Airport is regulated by the City of Carlsbad. The City of Carlsbad future land use map of the Airport and surrounding areas is shown in **Exhibit 2.14**.

Exhibit 2.14 Airport Area Future Land Use



Source: City of Carlsbad GIS, 2016
Prepared by: Kimley-Horn and Associates, August 2017

Scale: 1" = ± 700'

2.10.3 ZONING

General zoning for the City of Carlsbad is provided in the City's official zoning code. A City of Carlsbad zoning map of the Airport and surrounding uses is shown in **Exhibit 2.15** All development proposals—except where exempted by applicable law—are subject to the Carlsbad Municipal Code Title 21 (Zoning Ordinance). Pursuant to Government Code § 53090 et seq., the County's Airport is exempt from City zoning requirements. In an effort to coordinate City planning and County Airport operations, the County applied for and obtained a zone change and conditional use permit (CUP-172) from the City for the Airport in 1980. In 2004, the County voluntarily sought an amendment to CUP-172 to include adjacent industrial lots used for Airport parking.

In response to a proposal to expand the Airport to the north to add an additional runway, Carlsbad residents proposed an initiative in 1980 to require voter approval of any expansion of the Airport, which is defined as expanding beyond the current boundaries as outlined in CUP-172. The City adopted Ordinance No. 9558 in 1980 adding Section 21.53.015 to the City's Municipal Code. This Section provides as follows:

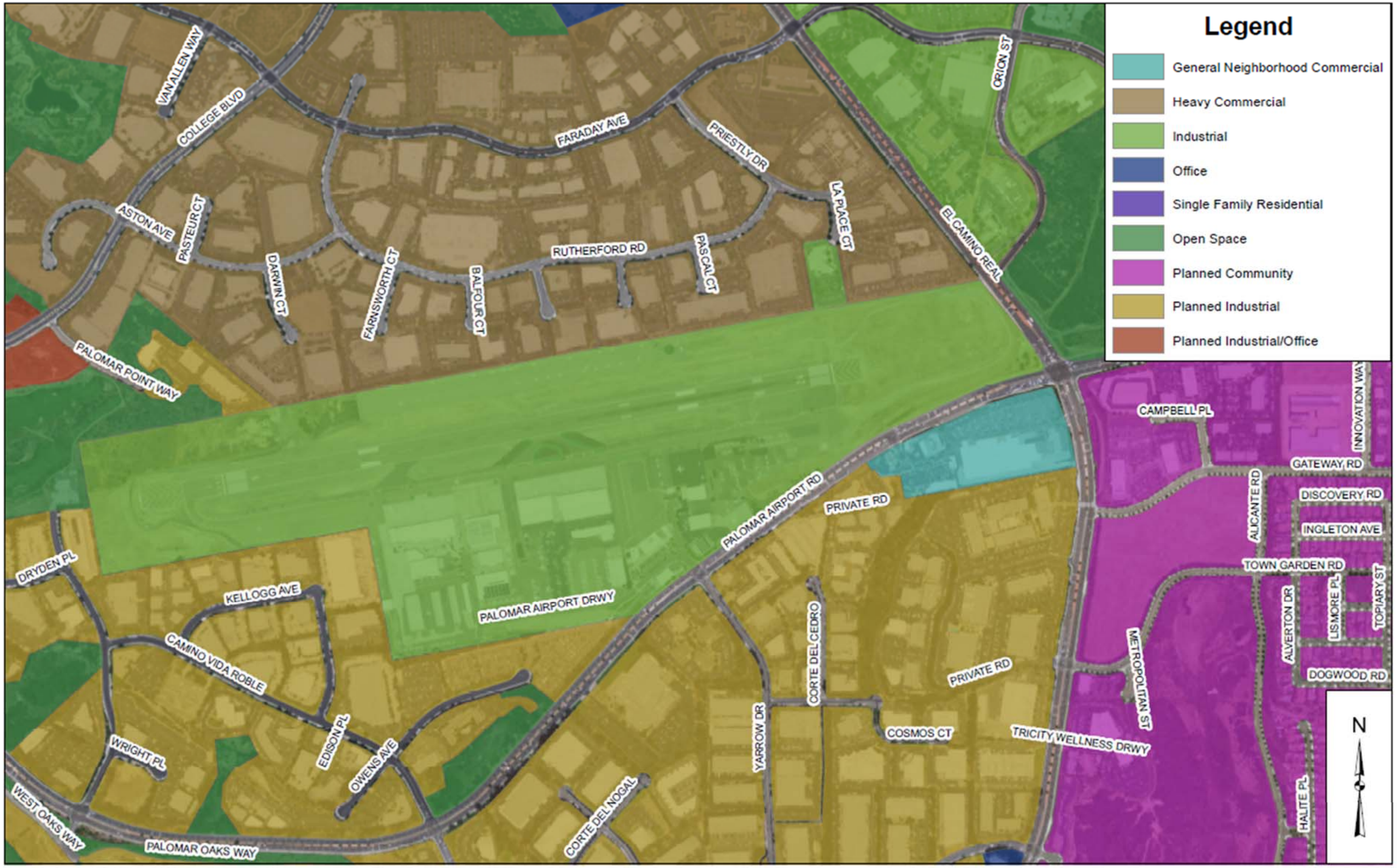
"21.53.015 Voter authorization required for airport expansion.

a) The city council shall not approve any zone change, general plan amendment or any other legislative enactment necessary to authorize expansion of any airport in the city nor shall the city commence any action or spend any funds preparatory to or in anticipation of such approvals without having been first authorized to do so by a majority vote of the qualified electors of the city voting at an election for such proposes.

b) This section was proposed by initiative petition and adopted by the vote of the city council without submission to the voters and it shall not be repealed or amended except by a vote of the people."

Municipal Code § 21.53.015 only applies if a legislative enactment is required from the City for an expansion. The County has not, as part of this Master Plan Update process, identified construction needed to expand airport facilities beyond the current boundaries of CUP-172 or for a legislative enactment from the City such as a zone change or general plan amendment to support any changes to facilities recommended by the Airport Master Plan Update. Because no construction is proposed to expand the airport boundaries to meet the safety objectives of the Master Plan, no voter authorization is needed to implement the Master Plan components.

Exhibit 2.15 Airport Area Zoning



Source: City of Carlsbad GIS, 2016
Prepared by: Kimley-Horn and Associates, August 2017

Scale: 1" = ± 700'

2.10.4 McClellan-Palomar Airport Land Use Compatibility Plan

The County recognizes the SDCRAA serves as the Airport Land Use Commission responsible for developing an Airport Land Use Compatibility Plan for the Airport. The basic function of the CRQ land use compatibility plans (compatibility plans) is to promote compatibility between airports and the land uses that surround them “to the extent that these areas are not already devoted to incompatible uses” (Pub. Util. Code §21674(a)). With limited exception, California law requires preparation of compatibility plans for each public-use and military airport in the State. Most counties have established an Airport Land Use Commission (ALUC), as provided for by law, to prepare compatibility plans for the airports in that county. In the County of San Diego, the ALUC function rests with the SDCRAA, in accordance with section 21670.3 of the California Public Utilities Code.

SDCRAA adopted the McClellan-Palomar Airport Land Use Compatibility Plan on January 25, 2010 and last amended the compatibility plan on December 1, 2011. This compatibility plan is the tool used by the SDCRAA, acting in its capacity as the County of San Diego ALUC, in fulfilling its purpose of promoting airport land use compatibility. Specifically, this compatibility plan (1) provides for the orderly growth of the Airport and the area surrounding the Airport and (2) safeguards the general welfare of the inhabitants within the vicinity of the Airport and the public in general. In accordance with State law, the compatibility plan was based on the ALP developed by the County for the Airport. (Pub. Util. Code § 21675(a)).

State law requires that compatibility plans be based on a long-term master plan or ALP. [Pub. Util. Code § 21675(a)]. Prior to modifying an airport master plan, the public agency owning the airport must submit the proposed modification to the ALUC for review [Pub. Util. Code §21676(c)]. The ALUC may thereafter amend the compatibility plan. If the compatibility plan is amended, local agencies may be required to amend their general plans, specific plans, zoning ordinances, and building codes to bring them into compliance with the compatibility plan [Pub. Util. Code § 21676(a) and (b)]. Furthermore, the ALUCP applies to special districts such as school districts and private parties when considering the siting and design or new facilities or expansion of existing ones. It is important to note that local agencies, such as the City of Carlsbad, do retain the authority to overrule the compatibility plan if certain findings can be made. (*Id*.) Per the City of Carlsbad General Plan, this requires a two-thirds vote by the City Council. This process helps to ensure that changes in Airport facilities approved as part of the Airport Master Plan Update process are reflected in local land use plans.

Proposed facility changes identified in the Airport Master Plan Update such as the relocation and extension of the runway, as well as forecasts of aviation activity would likely result in SDCRAA needing to amend the compatibility plan for the Airport. Changes to the compatibility plan could result in the City having to modify or amend its General Plan and other land use regulations. Additionally, any facility “expansions” as defined by State of California Public Utilities Code § 21664.5 (e.g., the extension or realignment of a runway) will require the Airport to amend the Airport’s State permit. It should be noted that this definition of expansion only applies as it pertains to the perspective of the State.

CRQ Current Land Use Compatibility Plan Maps are depicted on the following page and include:

- Noise: Noise contours reflect anticipated growth of the Airport through 2031 (**Exhibit 2.16**).
- Safety: Safety zones are established for evaluating safety and compatibility of land use actions in the Airport Influence Area (AIA). The risk contours and generic safety zones that apply to Runway 06-24 at the Airport are those for runway lengths of 4,000 feet to 5,999 feet (**Exhibit 2.17**).
- Airspace Protection: The airspace protection surfaces are established for evaluating the airspace compatibility of land use actions in the AIA of the Airport. The zones represent imaginary surfaces defined for the Airport in accordance with Part 77, Terminal Instrument

Procedures (TERPS), and the FAA's height notification area as defined in Part 77, Subpart B (**Exhibit 2.18**).

- Overflight: The overflight notification area established for the Airport, within which developers of new residential development projects shall record an overflight notification document as a condition of development approval (**Exhibit 2.19**).
- Airport Influence Area: The AIA is defined in the CRQ Land Use Compatibility Plan as "the area in which current or future airport-related noise, overflight, safety, or airspace protection factors may significantly affect land uses or necessitate restrictions on those uses." (**Exhibit 2.20**)

Exhibit 2.16 Compatibility Policy Map: Noise

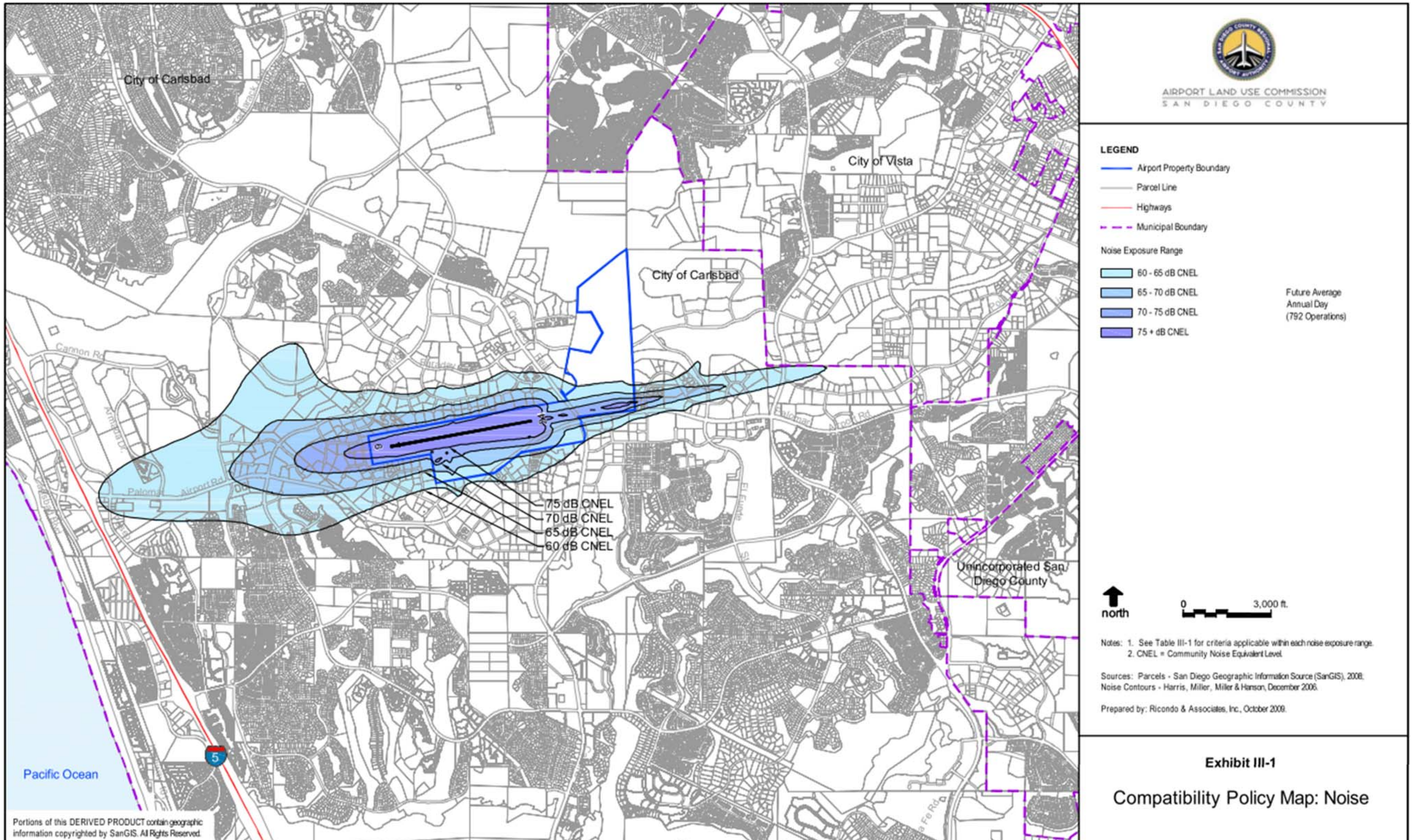


Exhibit 2.17 Compatibility Policy Map: Safety

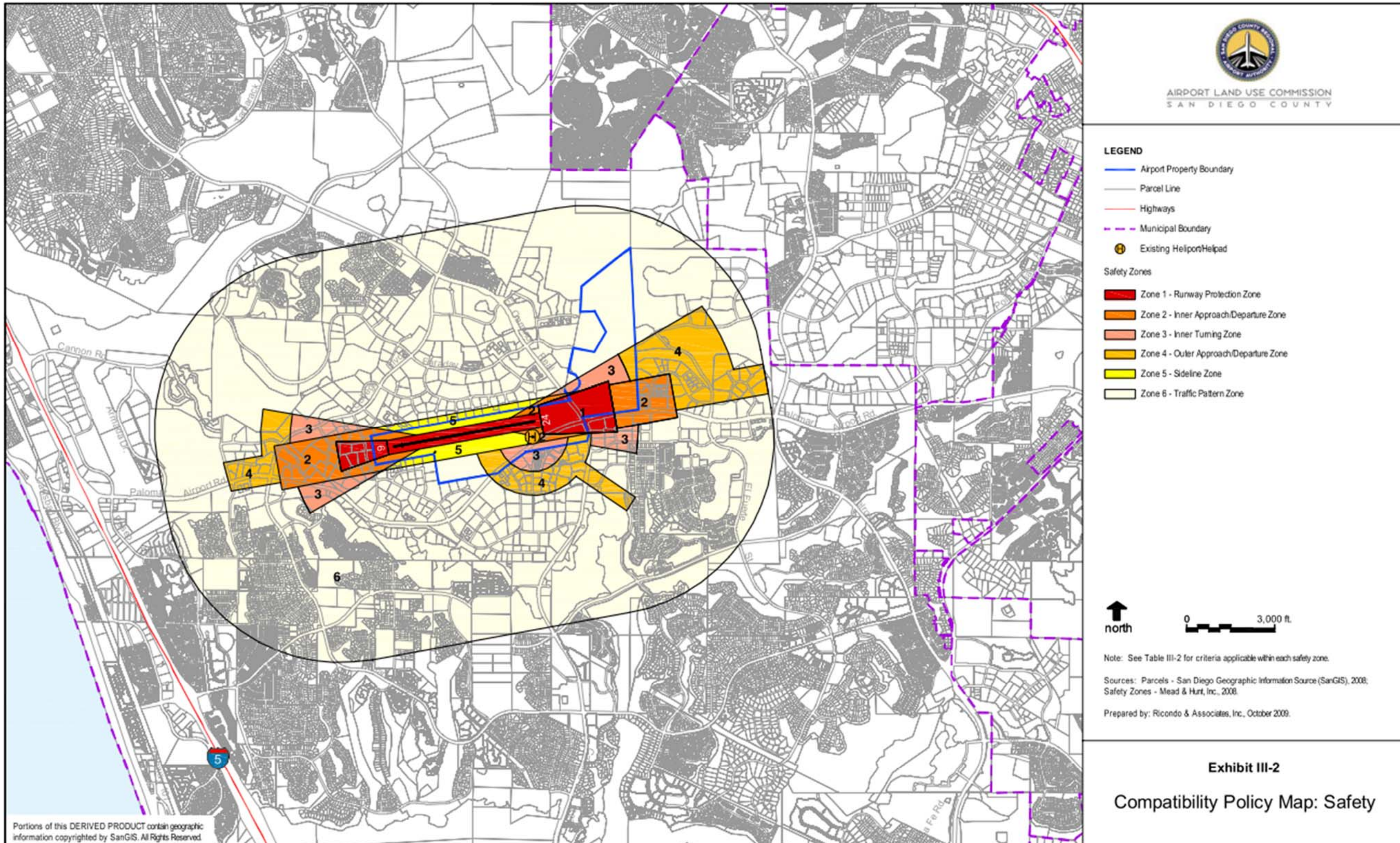


Exhibit 2.18 Compatibility Policy Map: Airspace Protection

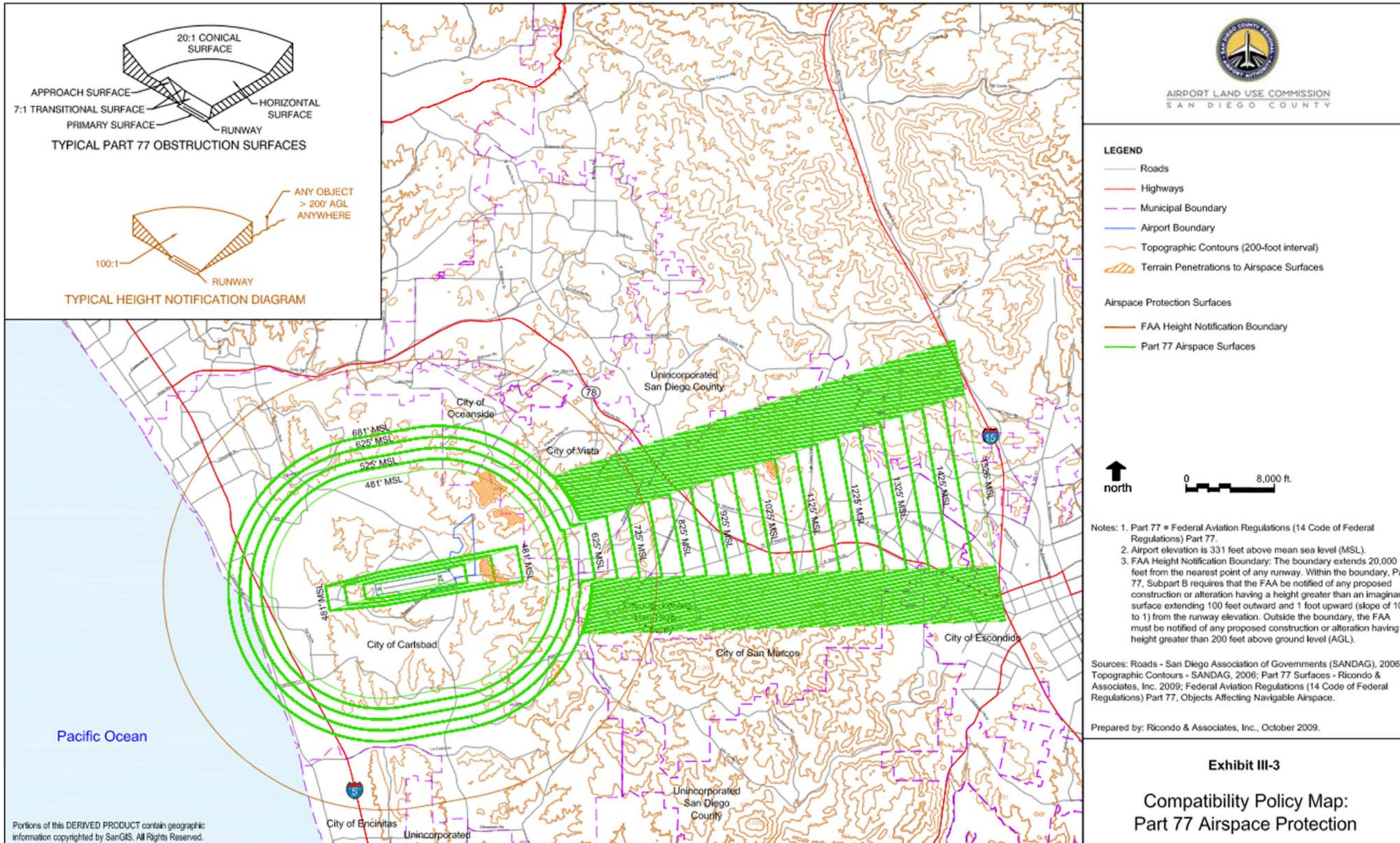


Exhibit 2.19 Compatibility Policy Map: Overflight

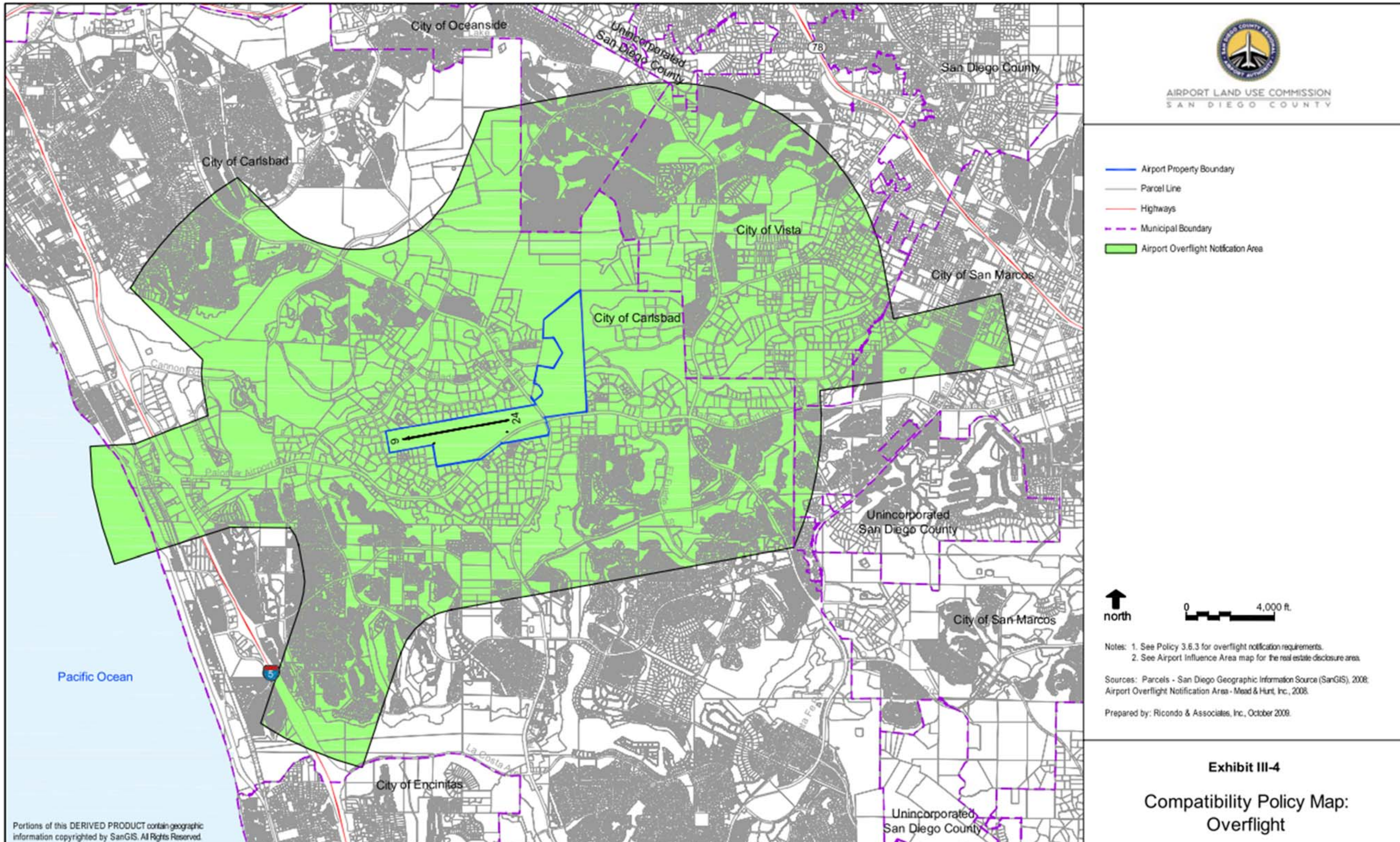
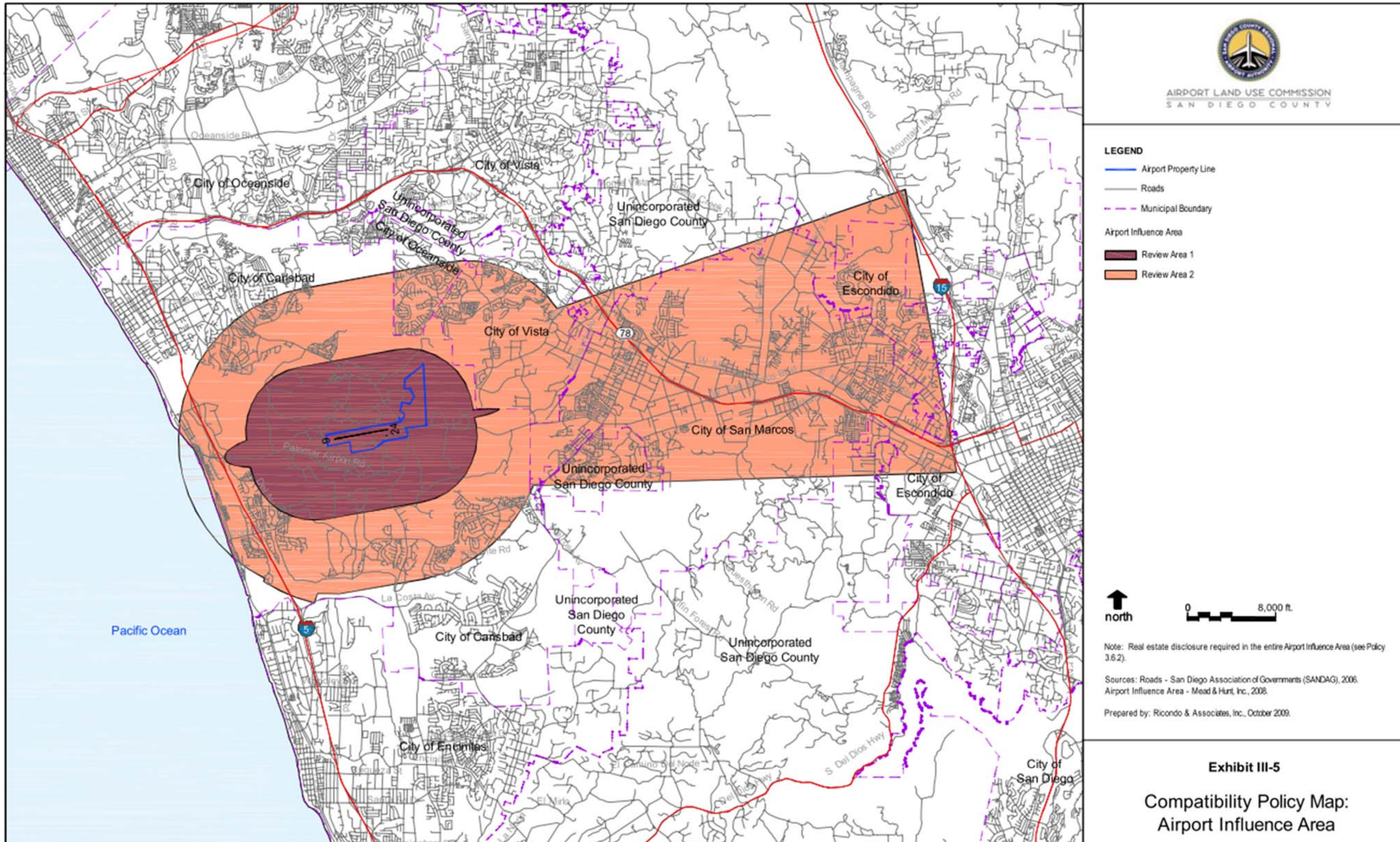


Exhibit 2.20 Compatibility Policy Map: Airport Influence Area



2.10.5 Policy F-44 "Development of McClellan-Palomar Airport"

County Policy F-44 "Development of CRQ" was adopted by the Board of Supervisors in 1987 to serve as a land use plan supplement to optimize airport use while minimizing noise impacts to the surrounding community. The policy currently provides general guidance as:

- The role of CRQ shall be to provide air transportation for the residents of North San Diego County and to facilitate general aviation support activities while minimizing noise impacts on surrounding areas and communities.
- Scheduled commuter airline operations are limited to aircraft meeting the approach speed and wing span categories for CRQ in accordance with FAA regulations. Commuter airline aircraft shall meet the FAA Stage III noise criteria. The policy also contains a limit to for airline operations to aircraft having 70 seats that is not consistent with current FAA requirements. However, any applications for airlines would need to go through review to determine is there will be any additional impacts. Operations for aircraft with greater than 70 seats will be carefully reviewed at that time.
- The County will take a proactive role working with local agencies, the SDCRAA, and the FAA to protect the airspace around the airport from encroachment, promote compatible off-airport land development, and to ensure the future safety and compatibility of the existing runway length and displacement threshold.
- The County will operate the airport in accordance with any adopted FAA Part 150 Noise Compatibility Plan recommendations and in full compliance with any State or Federal mandated noise standards relating to the operation of a public airport. The program will recognize the Noise Element of the City of Carlsbad's General Plan and implement mitigation measures consistent with State, Federal, and FAA Grant Assurance Agreements to minimize noise impacts.
- The County will monitor aircraft noise and verify the Community Noise Equivalent Level (CNEL) noise contours within the airport influence area as described in the Palomar Airport Comprehensive Land Use Plan, as well as monitor pilot compliance with any adopted FAA Part 150 Noise Abatement Program. The County will also continue to monitor air traffic around the airport with a noise monitoring and flight tracking system and implement procedures consistent with State, Federal, and FAA Grant Assurance Agreements.
- The Airport Manager will produce, distribute, and promote a detailed noise abatement program for the airport. The program will contain specific flight information and a chart identifying noise-sensitive areas. The noise abatement program will be updated annually and distributed to pilots. The Airport Manager will request pilot compliance with the program.
- This policy recognizes the SDCRAA as the Airport Land Use Commission responsible for developing an Airport Land Use Compatibility Plan for the Airport.

The purpose of this policy was to guide future development at the airport. The new McClellan-Palomar Airport Master Plan lays out a new comprehensive 20-year plan for development of the Airport, making Board Policy F-44 Development of McClellan-Palomar Airport duplicative. The Master Plan also details the County's relationship to other agencies relating to airport operation and development. The commitment to continue to implement a noise abatement program and monitoring program, as detailed in the Board Policy is also is also contained in Section 2.11.2 "Noise" of this Master Plan. For these reasons following adoption of the McClellan-Palomar Airport Master Plan the Board of Supervisors may determine Board Policy F-44 is no longer needed and repeal it.

2.11 ENVIRONMENTAL CONSIDERATIONS

An environmental overview is included in the Alternatives Section of this Airport Master Plan Update. Below is an initial inventory of environmental conditions at CRQ.

2.11.1 FLOODPLAIN

Flood Insurance Rate Maps (FIRMs), published by the Federal Emergency Management Agency (FEMA), are the basis for floodplain management, mitigation, and insurance activities for the National Flood Insurance Program. **Exhibit 2.21** and **Exhibit 2.22** show the FIRMs for the Airport's vicinity. As shown on **Exhibit 2.21**, there is a small area offsite located northwest of the Airport within a 100-year floodplain.

Exhibit 2.21 Floodplain Exhibit – West

Exhibit 2.22 Floodplain Exhibit – East

2.11.2 Noise

Aircraft noise is generally one of the most prominent and controversial environmental issues associated with airport development. In 2006, a FAR Part 150 Study Update was completed by the County of San Diego for CRQ to identify land use compatibility and noise issues surrounding the Airport. The study concluded that CRQ does not negatively impact noise sensitive areas and no mandatory noise restrictions were needed. This was illustrated on the Noise Exposure Maps (NEM) for the CNEL 65 dB contour for no-action (2004) conditions. In order to be a good neighbor, VNAPs have been established to preserve quality of life for the community and place minimal voluntary restrictions on aircraft arriving and departing CRQ. The VNAPs are presented in **Exhibit 2.9.**

The County updated these noise contours in 2010 in the ALUCP to address the potential increase in commercial operations that was being considered at CRQ. This update increased the number of operations under the 2004 no-action conditions to include the evaluation of noise environment with a possible 21 daily departures and arrivals (42 total daily operations) of Embraer-170 (EMB-170) aircraft. This update represented the anticipated commercial aircraft that would operate at CRQ as expressed in the activity forecasts and recommendations of this Airport Master Plan Update's 20-year planning horizon.

As noted, Cal Jet by Elite Airways began scheduled commercial service in September 2017 using CRJ-700 aircraft. Based on this recent change and anticipated increase of commercial operations, the County will continue to operate the Airport in accordance with any adopted FAA Part 150 Noise Compatibility Plan recommendations and full compliance with any State or Federal mandated noise Standards relating to the operation of a public airport. The programs will recognize the Noise Element of the City of Carlsbad's General Plan and implement measures consistent with State, Federal and FAA Grant Assurance Agreements to minimize noise impacts.

The County will continue to monitor aircraft noise and verify the CNEL noise contours within the airport influence area as described in the Palomar Airport Comprehensive Land Use Plan as well as monitor pilot compliance with any adopted FAA Part 150 Noise Abatement Program. The County will also continue to monitor air traffic around the airport with a noise monitoring and flight tracking system and continue to implement procedures consistent with State, Federal and FAA Grant Assurance Agreements.

The Airport Manager will continue to produce, distribute and promote a detailed noise abatement program for the Airport. The program will contain specific flight information and a chart indemnifying noise sensitive areas. The noise abatement program will be updated periodically and distributed to pilots by posting on the Airport website. The Airport Manager will request pilot compliance with the program.

2.11.3 Landfill

Another specific environmental consideration that will be addressed in greater detail throughout this Airport Master Plan Update pertains to portions of the airfield that were previously used as a landfill. The landfill material underneath the east side of the airfield is unsuitable under current conditions to use as a stabilized base for airfield improvements due to issues with settlement. The landfill area is equipped with a methane gas extraction system that consists of extraction wells, header piping, and condensate pumps.

The 2013 Feasibility Study for Potential Improvements to CRQ Runway (2013 Feasibility Study) included a thorough evaluation of environmental impacts related to the landfill. Conceptual settlement mitigation options for runway and taxiway extensions that were considered include:

- Structural options: bridging of the landfill or a structural slab supported by driven piles;
- Soil improvement options: fill supported on stone columns, fill supported on drilled displacement columns, accelerated settlement by surcharging, deep dynamic compaction, injection grouting, and excavation and backfilling of the landfill material; and

- Maintenance options: placing lightweight or standard fill to grade with periodic asphalt.[4]

[4] Feasibility Study for Potential Improvements to McClellan-Palomar Airport Runway, Final Report, August 1, 2013.

Section 3 - AVIATION ACTIVITY FORECAST

3.1 PREAMBLE

Forecasts of aviation demand for CRQ were originally developed in 2013 using year 2012 data as the base year for 5-, 10-, 15-, and 20-year projections. Due to significant changes in commercial service at the Airport since the completion of these forecasts (withdrawal of United Express/SkyWest Airlines service, trial service provided by Biz Charters) and a decline in overall activity at the Airport as reported in the FAA's TAF, forecasts have been updated using 2016 as the base year.

In addition to preferred methodologies for passenger enplanements, based aircraft, and aircraft operations that have been submitted to the FAA for review and approval, additional forecasts have been developed as "planning-level" scenarios in this Airport Master Plan Update. These forecasts are intended for facility planning to assist the Airport in determining appropriate facilities if demand exceeds forecasted levels of demand. The justification for development of alternative scenarios for planning purposes is supported by the return of commercial service at CRQ in September 2017 as well as other prospective airlines planning commercial service operations at the Airport. The Transportation Security Administration (TSA)-SAN formally committed to provide Federal Screening Resources and Other Requirements (FSROR) and start screening passenger services for the first airline upon operation. Forecasts of demand for planning-levels is further justified by the fact the cessation of commercial service provided by United Express/SkyWest was only due to the airline's removal of the Embraer 120 from its fleet (which operated at CRQ) despite high passenger demand and profitable passenger load factors.

3.2 INTRODUCTION

CRQ is a non-hub, primary airport owned and operated by the County of San Diego (the County). CRQ is one of 12 public-use airports located in the County of San Diego and is one of two airports in the County certified by the Federal Aviation Administration (FAA) for commercial airline service use. In addition to being certified for commercial operation, CRQ serves a high level of general aviation activity in the County.

An important factor in airport planning is the examination of the level of demand that may reasonably be expected to occur over a defined period. For purposes of this master planning effort, this involves projecting potential aviation activity through 2036. For a non-hub, primary airport such as CRQ, forecasts of enplaned passengers, based aircraft, operations (takeoffs and landings), and aircraft fleet mix are prepared to evaluate future demand. Forecasts of these factors help shape an understanding of future airport demand on existing airport facilities and aid in providing a picture of future facility requirements for the Airport.

Aviation activity forecasting is both an analytical and a subjective process. Actual activity that is achieved in future years may differ from the forecasts developed in this planning document because of future changes in local conditions, dynamics of the airline and general aviation industries, and economic and political changes for the local area and nation as a whole. These elements are examined and considered as part of the forecasting process but are subject to change over the course of the 20-year planning horizon.

The FAA has a responsibility to review aviation forecasts that are submitted to the agency in conjunction with airport master plans and ALP updates. The FAA reviews such forecasts with the objective of comparing these to the FAA's TAF to determine consistency with the TAF or, where defensible justification is established, include the forecasts in its Terminal Area Forecasts and the National Plan of Integrated Airport Systems (NPIAS). As stated in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, dated December 4, 2004, forecasts should:

- Be realistic
- Be based on latest available data
- Reflect current conditions at the airport
- Be supported by information in the study
- Provide adequate justification for the airport planning and development

The forecast process consists of a series of basic steps that can vary depending on the issues to be addressed and the level of effort required to develop the forecast. These steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results.

The forecast analysis for CRQ was produced using these basic guidelines:

- Recent CRQ forecasts, such as the RASP, the 2013 Feasibility Study, and the FAA TAF were examined and compared against current and historical levels of activity.[5]
- Historical CRQ and national aviation activity were examined along with other factors and trends that could affect demand.
- Other Airport and regional forecasts and studies were also reviewed for items that could influence the level and complexity of demand at CRQ.

The Airport Master Plan Update forecast was prepared in early 2017, using data from 2016 as the base year. The FAA's TAF is utilized to establish the existing and historical activity for the Airport. Furthermore, the FAA's TAF was selected as the preferred source for a baseline forecast with a "planning-level" forecast scenario, which includes the re-introduction of commercial service to the Airport based on re-introduction of commercial service at the Airport and the planning data supplied to the Airport by airlines as part of their negotiations to operate at CRQ.

Since the "planning-level" scenario is beyond the specific tolerance for future projections, submitted forecasts of aviation activity have not been approved by the FAA in their entirety. On October 10, 2017, The FAA Los Angeles Airports District Office issued a memo to the Airport Sponsor approving forecasts identified in the January 2017 FAA TAF for planning purposes. The memo also noted that while the FAA acknowledged that passenger service was reintroduced on October 26, 2017, with two daily departures to Las Vegas, there was a relatively high level of uncertainty about how passenger service will continue to evolve at CRQ in the coming years.

The memo went on to state that the FAA's understanding was that the County of San Diego was not proposing any near-term terminal or airfield capacity projects dependent upon the "planning-level" forecast for justification and because of this, the FAA had no objections if the County chose to base local land use planning decisions on the "planning-level" forecast, however, any related mitigation measure would not be eligible for Airport Improvement Program funding.

As such, while the FAA TAF issued January 2017 is the approved forecast for this Airport Master Plan Update, "planning-level" forecasts described in subsequent sections are also analyzed for long-term facility planning.

[5] Sources: Regional Aviation Strategic Plan, Final Report, Jacobs Consultancy, March 2011, 2013 Feasibility Study for Potential Improvements to McClellan-Palomar Airport Runway, FAA Terminal Area Forecast issued January 2017.

3.3 AIRPORT SERVICE AREA

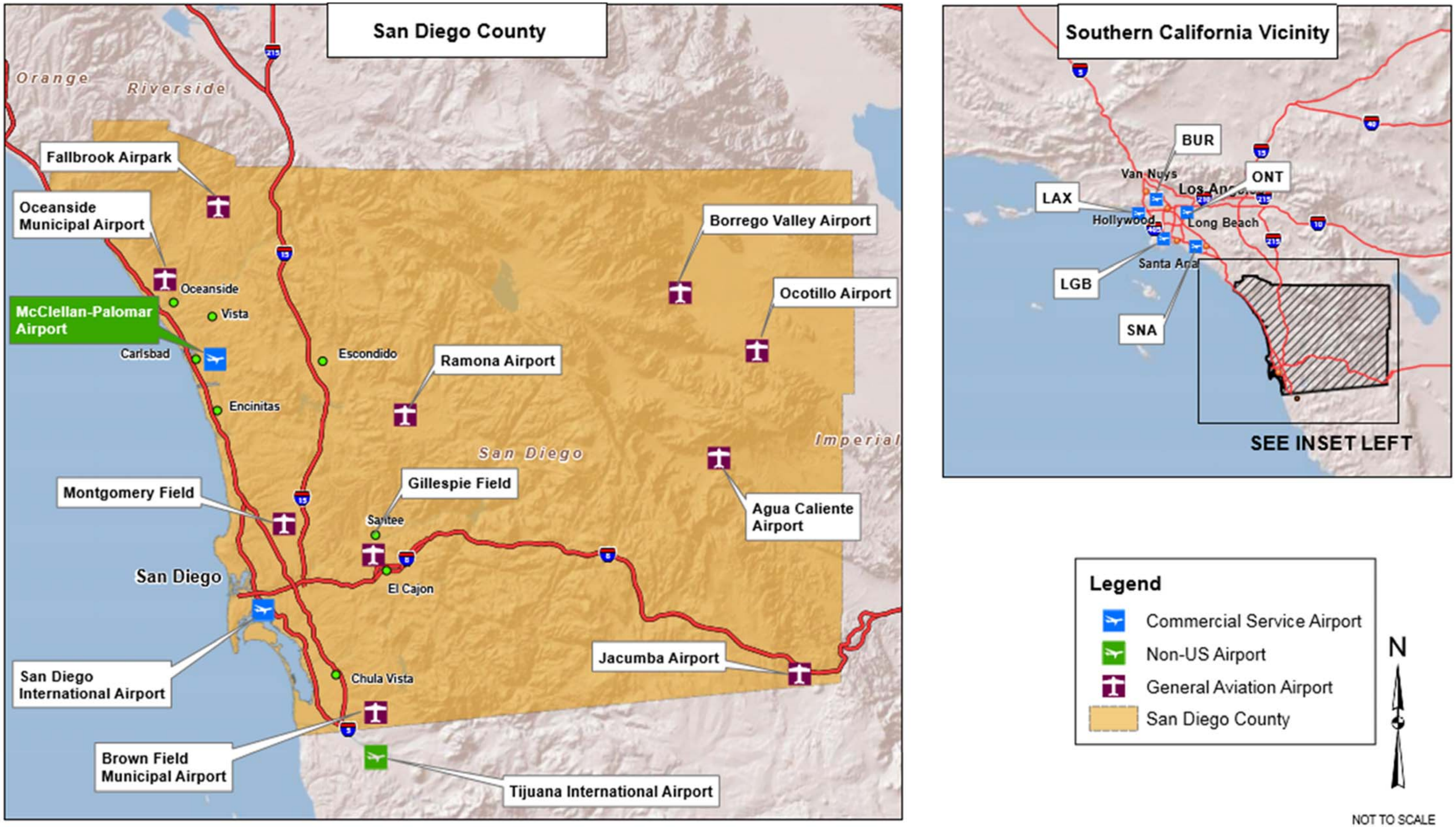
An airport's service area helps to define the market or area from which its aviation activity is being generated. The size of the airport service area is dependent upon the airport role, the airport's facilities and services, and the location of the airport relative to other facilities. Other factors that affect the airport service area include socioeconomic conditions and demographic characteristics. There are different airport service areas for commercial service and general aviation activities, and each must be examined to evaluate the future demand for CRQ.

3.3.1 COMMERCIAL AIRPORT SERVICE AREA

CRQ is one of 12 public-use airports in the County of San Diego as depicted on **Exhibit 3.1**. It is the only airport in the County, other than San Diego International (SAN), certified for commercial passenger service. The airport service area for commercial service at CRQ is influenced both by the market capture of SAN and by other commercial service airports to the north within the Los Angeles metropolitan area.

The Airport is in the northern County of San Diego, approximately four miles southeast of downtown Carlsbad, 30 miles north of downtown San Diego, and 50 miles southeast of the center of neighboring Orange County. This location also places CRQ near a significant base of population, business, employment, and potential passenger demand, including the communities of Oceanside, San Marcos, Vista, Encinitas, Rancho Santa Fe, and Carlsbad, while also being within the section of the County of San Diego with the highest median family income level. The Airport is situated approximately 2 miles to the east of Interstate 5, a major north-south connector between San Diego, Orange County, and the Los Angeles Metro area. The location of CRQ places the Airport between the two largest commercial passenger market areas in Southern California, San Diego and Los Angeles, and immediately adjacent to a primary corridor for a significant number of County of San Diego residents who routinely opt to drive to Los Angeles International Airport (LAX) and, to a lesser extent, John Wayne Airport (SNA) for commercial air service.

Exhibit 3.1 Airport Service Area



SNA, located 58 miles to the north in Orange County, is the closest commercial airport outside of the County of San Diego and enplaned over 4.9 million annual passengers in 2016[6]; the FAA classifies it as a medium-hub airport. SAN is located 28 miles to the south of CRQ and is classified by FAA as a large hub airport. In 2016, SAN accommodated approximately 10.3 million annual enplanements[7].

With FAA-classified large- and medium-hub passenger airports located within 60 miles in each direction, the Airport's commercial airport service area is primarily limited to the northwest portion of the County of San Diego and portions of southern Orange County. Due to their greater choice in the number of air carriers and in the number of non-stop markets served, both the medium and the larger hub airports capture a significant portion of air travelers from this airport service area.

In 2010, the Airport completed the *Passenger Retention Study and True Market Size Analysis* (Retention Study) to provide more definitive information regarding demand for commercial airline service in the region. The Retention Study examined airline trips taken by those living in the immediate CRQ service area for a 12-month period ending March 31, 2010. The immediate catchment or service area defined in this study was "the area where residents are closer to CRQ than any of the other Southern California airports"[8]. It is important to note that 2010 had the lowest operational activity compared to the prior 20 years (e.g., 138,361 in 2010 compared to 285,122 in 1999) and has since increased. This study occurred during a downturn in the national economy due to the recession. Also, LAX was the only destination from CRQ at the time the study was conducted.

The Retention Study determined that CRQ was capturing only 1.6 percent of commercial air service passengers from its defined airport service area. This low capture rate was based upon an estimate of 3.27 million annual passengers within the CRQ catchment area which, according to the Study, equated to approximately 1.64 million annual enplanements. It was found that 76 percent of these potential CRQ passengers were using SAN to the south, while 5.6 percent opted to take the 58-mile (116-mile round trip) drive to SNA. Much of this market leakage was likely attributable to the 20 non-stop markets served from SNA that include several west coast destinations. Of even greater interest was the determination that an estimated 15.8 percent of these passengers opted to drive the 95 miles (190-mile round trip) to LAX. More local travelers (1.8 percent) used Ontario International Airport (ONT) with its 14 non-stop markets despite a driving distance of 87 miles one way from CRQ. Again, the number of destinations served by non-stop flights to markets such as Oakland, San Jose, Sacramento, and Las Vegas contributed to this leakage from the CRQ catchment area.

The Retention Study identified the top five destinations of the commercial air passengers in CRQ's airport service area as the following:

1. San Francisco Bay Area (13.8 percent)
2. New York/Newark (6.8 percent)
3. Seattle/Tacoma (4.2 percent)
4. Las Vegas (4.1 percent)
5. Sacramento (3.8 percent)

In its conclusions, the Retention Study indicated that "the breadth of airline service provided by airlines at these other airports surrounding CRQ is the biggest impediment to potential local air service in Carlsbad." The study researchers pointed out that they could not accurately determine the percentage of local passengers that would use additional air service and that considerable time and effort marketing new services would be necessary to change travel habits. However, this has been mischaracterized as concluding that CRQ could expect to serve the entire 3.27 million passengers within the study area. This

[6] FAA TAF Issued January 2017

[7] FAA TAF Issued January 2017

[8] McClellan-Palomar Airport, Passenger Retention Study and True Passenger Market Size Analysis, Sixel Consulting Group, Inc., September 2010.

would require all potential passengers from North County to use CRQ as their only commercial airport. Even though the study did not estimate the number of passengers that might use CRQ, the Master Plan is analyzing two planning scenarios described in subsequent sections that utilize 304,673 and 575,000 annual enplanements by 2036.

Finally, the Retention Study concluded, “It appears that the biggest challenge to passenger retention at CRQ is the fact that it offers the fewest non-stop destinations of all airports in Southern California. The key to reduced leakage will be increases in non-stop destinations, daily flights, and available seats.”

3.3.2 General Aviation Airport Service Area

All 12 public-use airports in the County serve general aviation as shown in **Exhibit 3.1**. The four closest public use airports to CRQ include two that are classified by the FAA as general aviation airports and two that are classified as general aviation reliever airports. As a result, these four airports share CRQ’s general aviation service area.

Fallbrook Community Airpark (L18) and Oceanside Municipal Airport (OKB) are the two closest airports from a nautical mile or flying perspective to CRQ, located 16 nautical miles north and 6.5 nautical miles northwest, respectively. Both airports have runways less than 2,200 feet in length, effectively limiting both airports to serving smaller piston-powered aircraft. While both are equipped with instrument approaches, neither has an airport traffic control tower. L18 reported 101 based aircraft, while OKB reported 79 based aircraft[9]. Both facilities are primarily single-engine, piston general aviation airports.

Ramona Airport (RNM), located 19 nautical miles to the southeast, and Montgomery-Gibbs Executive Airport (MYF), located 20 nautical miles to the south, are both classified by the FAA as reliever airports and are served by an ATCT and equipped with instrument approaches. RNM has a 5,000-foot-long runway with a 95,000-pound dual wheel pavement strength, making the airport capable of accommodating general aviation aircraft like that at CRQ. RNM reported 132 based aircraft, only one of which was identified as a jet aircraft.

MYF is somewhat limited by its 4,577-foot-long runway and 12,000-pound single wheel pavement strength, but was noted to have nine based jets out of a reported total of 456 based aircraft. As the closest FAA reliever airport to SAN and the San Diego central business district, MYF has more annual operations than CRQ with a 2015 operational level of 213,848 operations[10].

As with commercial service, the general aviation service area for CRQ is primarily the northwest portion of the County of San Diego. Smaller general aviation aircraft have additional options in L18 and OKB, but RNM is the closest airport with similar capabilities to serve business-class general aviation aircraft.

3.4 SOCIOECONOMIC AND DEMOGRAPHIC TRENDS OF THE SERVICE AREA

Local and regional forecasts developed for key socioeconomic variables provide an indication of the potential for supporting growth in aviation activity. Three variables that are typically useful in evaluating the service area and its potential for air traffic growth are population, employment, and income.

Population and other socioeconomic forecasts are regularly prepared by a number of sources. At the regional level, the San Diego Association of Governments (SANDAG) prepared population, employment, and income forecasts for the San Diego Metropolitan Statistical Area (MSA) and subareas in support of its *2050 Regional Transportation Plan* (RTP). These forecasts were prepared with a 2012 base year and were adopted by SANDAG in October 2013. The SANDAG forecasts were developed for the RTP in 10-year increments to the planning horizon of 2050. The forecasts shown are for the San Diego MSA, which

[9] Airport Master Record 5010, accessed November 1, 2016.
[10] Airport Master Record 5010, accessed November 1, 2016.

is estimated to reflect socioeconomic trends that impact the CRQ airport service. San Diego's MSA and subareas are depicted in **Exhibit 3.2**. It should be noted that the area identified as North City is more commonly referred to as North County. Socioeconomic data specific to the identified subareas were not available in the RTP.

The SANDAG forecasts for the primary socioeconomic variables for the MSA through 2050 are presented in **Table 3.1**. The SANDAG forecasts did not include per capita personal income. For this indicator, Woods and Poole Economics' *Complete Economic and Demographic Data Source (CEDDS)* was utilized and included in **Table 3.1**. Because the RTP utilized 2015 as a base year for socioeconomic forecasts, this is used as the base year for CEDDS data as well.

Between 2015 and 2050, the average annual growth rate (AAGR) of population in the MSA is projected to increase by 1.19 percent. The average annual growth rate for employment in the MSA between 2015 and 2050 is projected at 1.63 percent, while the MSA is expected to have an AAGR of 0.62 percent in median household income during that timeframe. Per capita personal income, adjusted for inflation, is projected to grow at an AAGR of 1.13 percent annually in the MSA through 2050. It should be noted that economic estimates were adjusted to constant dollars (2015), which adjusts for inflation over time.

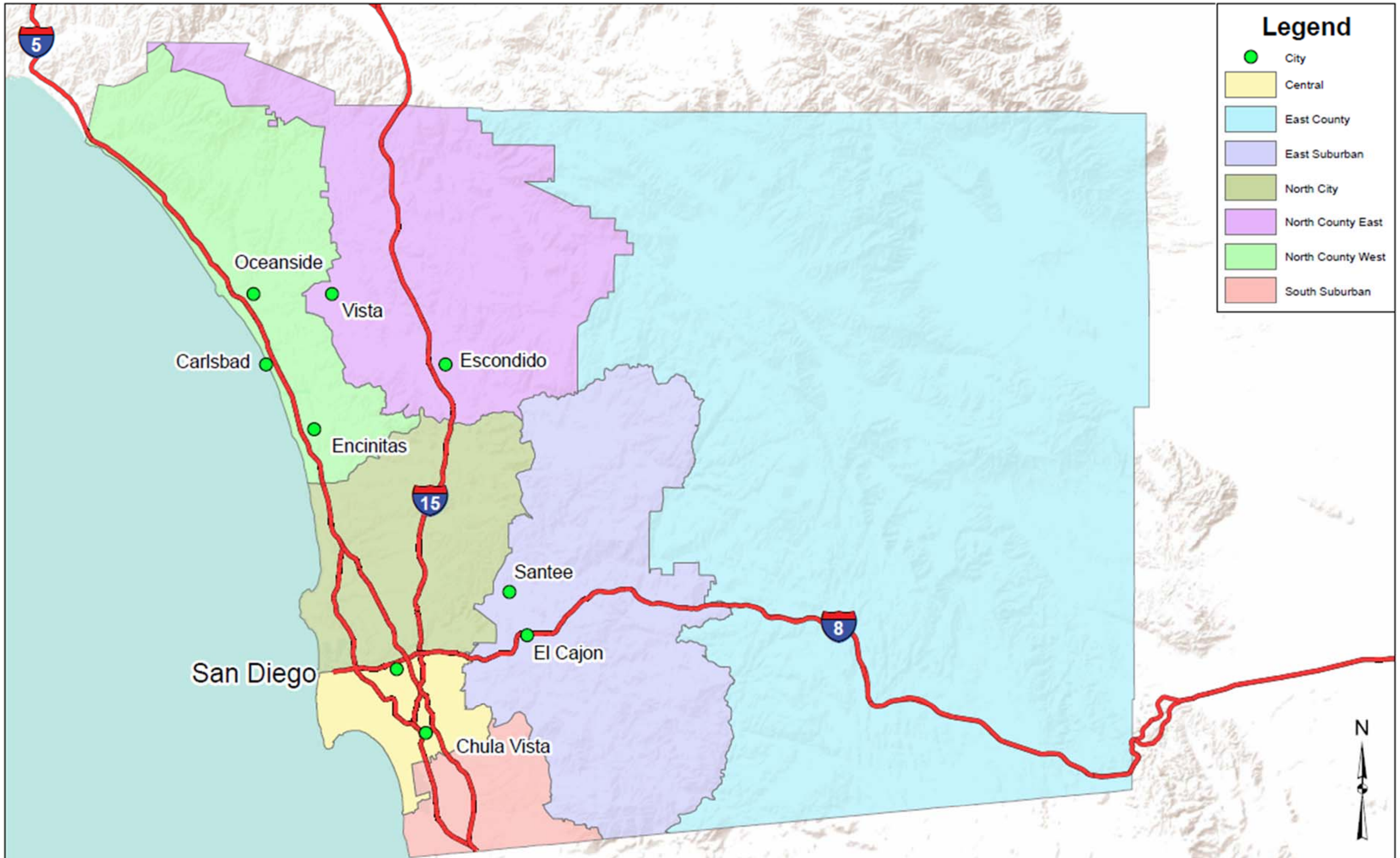
Income levels are often cited as a key variable in defining propensity for air travel and aircraft ownership. As shown in **Table 3.1**, the MSA of San Diego is anticipated to experience consistent growth through 2050.

Table 3.1 – County of San Diego Socioeconomic Forecasts

Category	Actual	Forecast			AAGR
	2015	2020	2035	2050	2015-2050
Population Forecasts					
San Diego MSA	3,297,980	3,489,220	4,093,700	4,667,620	1.19%
Employment Forecasts					
San Diego MSA	2,012,630	2,180,340	2,669,985	3,159,630	1.63%
Median Household Income (2015$)					
San Diego MSA	$74,184	$77,390	$84,512	$92,091	0.62%
Per Capita Personal Income (2015$)					
San Diego MSA	$ 52,937	$ 56,821	$ 64,494	$ 78,515	1.13%
AAGR: Average Annual Growth Rate					

Sources: Final Series 13 – 2050 Regional Growth Forecast, SANDAG, Adopted October 2013; PCPI: The Complete Economic and Demographic Data Source (CEDDS). http://www.woodsandpoole.com/, Woods & Poole. 2016, 2016 Extrapolated to 2015 dollars.
Prepared by: Kimley-Horn, 2017.

Exhibit 3.2 San Diego Metropolitan Statistical Area



Source: SanGIS/SANDAG Warehouse, Downloaded 2017
Prepared by: Kimley-Horn and Associates

NOT TO SCALE

3.5 HISTORICAL AVIATION ACTIVITY

This section presents a brief review of historical aviation activity at the Airport. The historical activity indicators examined include airline service, enplaned passengers, based aircraft, and aircraft operations data.

3.5.1 AIRLINE SERVICE

The Airport received Part 139 certification as a Class I facility from the FAA in 1996. A Part 139 Certification serves to ensure safety in air transportation. Airports serving all types of scheduled operations of air carrier aircraft for at least 31 passenger seats and any other type of air carrier operations are Class I airports[11]. CRQ has historically been served by regional (also referred to as commuter) carriers. According to Airport records, American Eagle Airlines operated at the Airport from 1991 through 1997. From 1996 through April 2015, United Express operated by SkyWest Airlines flew from CRQ to Los Angeles International (LAX). America West Airlines operated by Mesa Airlines (acquired by US Airways Group in 2005) operated at the Airport from 1999 to February 13, 2008, offering flights to Phoenix. Historical and recent air service had been provided on 30-seat turboprops.

The events of September 11, 2001, combined with an economic recession, significantly impacted CRQ's passenger enplanements. While both United Express (operated by SkyWest Airlines) and America West Express (operated by Mesa Airlines) maintained commercial airline service to CRQ, the number of daily flights was reduced by almost half. From 2002 to 2007, both airlines continued to serve the Airport, but annual enplanements dropped significantly. With the onset of the "Great Recession" of 2008-2010, passenger traffic at CRQ and airports throughout the U.S. dropped. America West Express/Mesa Airlines discontinued their service to CRQ in February 2008 due to consolidation of its routes. As of the first quarter of 2012, United Express/SkyWest Airlines averaged seven daily flights from CRQ to LAX. United/SkyWest service stopped in April of 2015. United Express/SkyWest was experiencing high passenger demand and profitable passenger load factors at CRQ, but a company-wide decision was made to remove the Embraer 120 from its fleet. The deletion of this aircraft, which operated the route between CRQ and LAX, from its fleet led to the cessation of service at the airport. A start-up airline began operating flights to and from LAX and later to and from LAS in summer of 2015 but ceased service due to company funding issues. At the time this Forecast Section was completed in Fall 2017, scheduled commercial service had resumed on CRJ-700 aircraft operated by Cal Jet by Elite Airways under FAA Part 121 Regularly Scheduled Airline Service.

3.5.2 ENPLANED PASSENGERS

Historical passenger enplanements at CRQ are shown in **Table 3.2** and **Exhibit 3.3**. Enplanements include fare-paying passengers aboard scheduled flights that originate at an airport. For the purposes of this Airport Master Plan Update, non-revenue enplanements and charter passengers are not included or analyzed. Commercial passenger activity at CRQ increased from 2,000 annual enplanements in 1990 to a peak of 78,519 enplanements in 2000. The events of September 11, 2001, combined with the economic recession that began in 2001, saw enplanement levels drop and stabilize around 50,000 by 2006. From 2007 to 2010, enplanements continued to decline even further to approximately 24,000 by 2010 due largely to the economic recession that began in 2007 and changes in airline business models. These models reduced seat capacity and resulted in changes in contracts between regional airlines and their air carrier partners, which contributed to the departure of Mesa Airlines in early 2008. Passenger activity increased dramatically between 2010 and 2014 before scheduled commercial service was discontinued in 2015.

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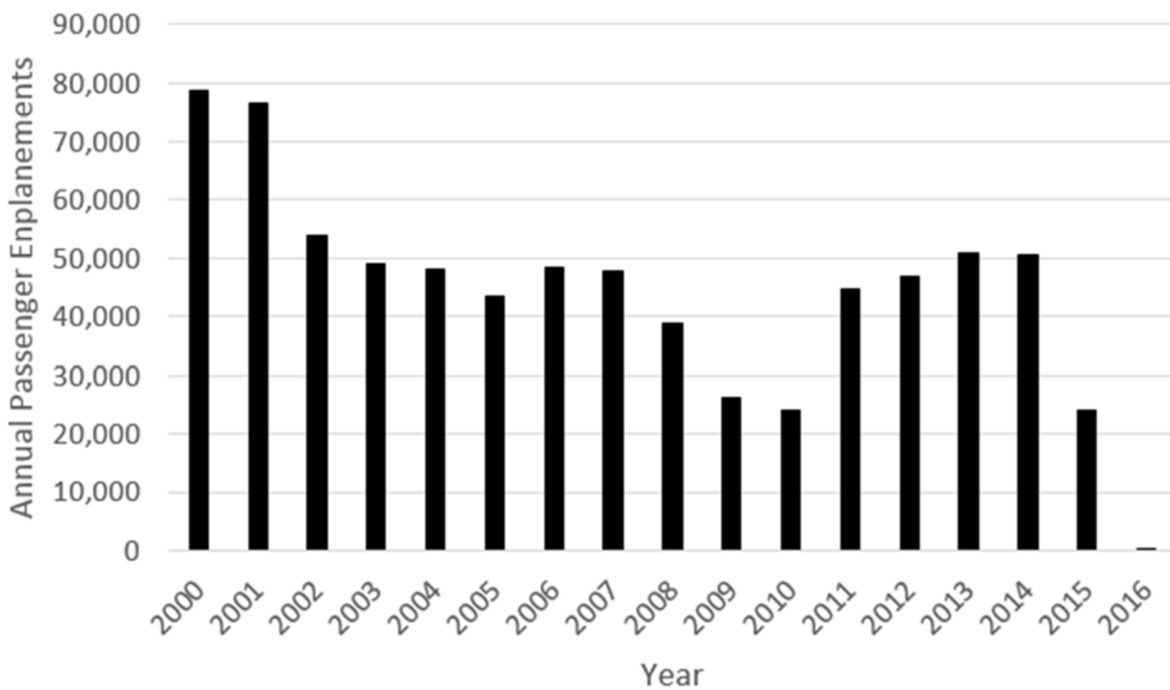
[11] Part 139 Airport Certification, Federal Aviation Administration, http://www.faa.gov/airports/airport_safety/part139_cert/?p1=classes, accessed December 5, 2013.

Table 3.2 – Historical Annual Passenger Enplanements

Year	CRQ Enplanements	Annual % Change
2000	78,519	
2005	43,553	-8.9%
2006	48,489	11.3%
2007	47,941	-1.1%
2008	38,994	-18.7%
2009	26,297	-32.6%
2010	23,996	-8.8%
2011	44,775	86.6%
2012	46,903	4.8%
2013	50,970	8.7%
2014	50,668	-0.6%
2015	23,988	-52.7%
2016	131	-99.5%

Sources: FAA TAF issued January 2017. Prepared by: Kimley-Horn, 2017.

Exhibit 3.3 Historical Annual Enplaned Passengers at CRQ (2000-2016)



Sources: FAA TAF Issued January 2017, Prepared by Kimley-Horn, 2017.

3.5.3 Based Aircraft

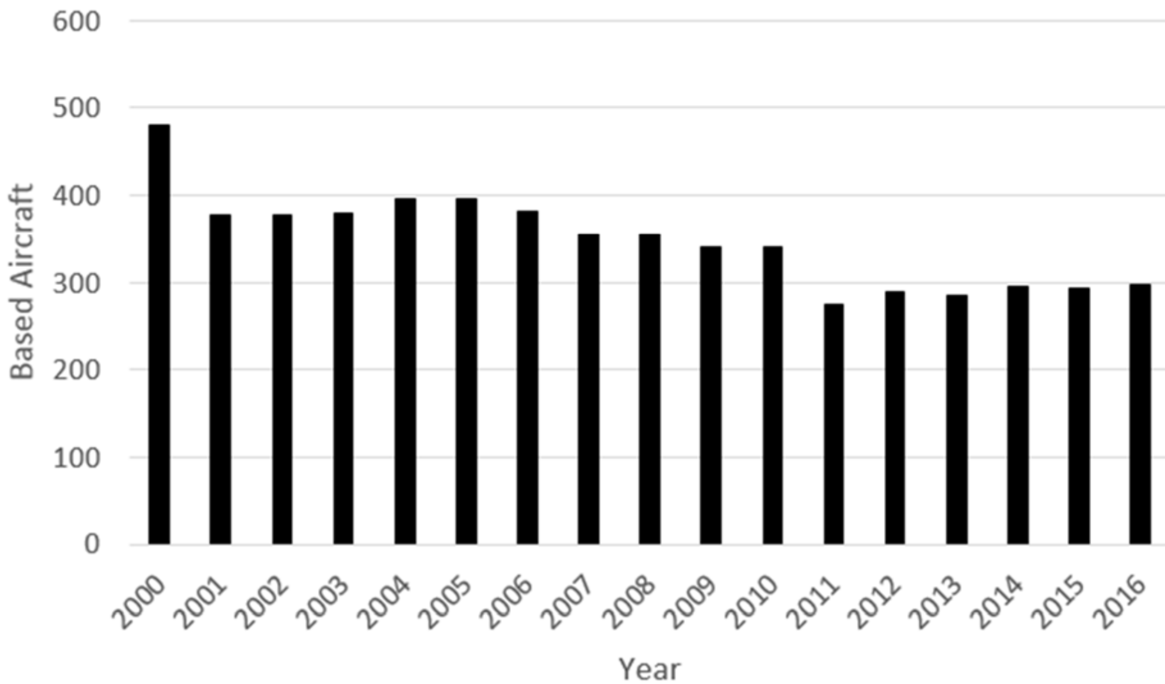
Historical based aircraft data was obtained from the FAA TAF issued January 2017. CRQ's historical based aircraft numbers are shown in **Table 3.3** and **Exhibit 3.4**. Total based aircraft have fluctuated over the past 20 years, from a high of 480 in 2000 and 1998 to a low of 274 in 2011. While there have been fluctuations since 2000, based aircraft have continued to decline, although there has been a slight increase since 2011. This overall decline is similar to that experienced by general aviation as a whole throughout the U.S. Additionally, in 2010, the FAA required all airports to provide the specific aircraft N-numbers, the unique alphanumeric characters starting with the letter "N" that are used to register and identify aircraft, for aircraft based at airports. This effort found the same aircraft based at multiple airports and led to decreases in based aircraft at many of the nation's airports. As of 2016, there were 298 based aircraft reported at CRQ. Of these aircraft, 63 percent were single-engine piston, 5 percent were multi-engine piston, 5 percent were turboprops, 22 percent were jet aircraft, and the remaining 5 percent were helicopters.

Table 3.3– Historical Total Based Aircraft

Year	Based Aircraft	% Change
2000	480	
2005	395	-17.7%
2006	382	-3.3%
2007	354	-7.3%
2008	354	0.0%
2009	341	-3.7%
2010	341	0.0%
2011	274	-19.6%
2012	290	5.8%
2013	285	-1.7%
2014	296	3.9%
2015	294	-0.7%
2016	298	1.4%

Source: FAA TAF Issued January 2017. Prepared by Kimley-Horn, 2017.

Exhibit 3.4 Historical Total Based Aircraft at CRQ (2000-2016)



Source: FAA TAF Issued January 2017. Prepared by Kimley-Horn, 2017.

3.5.4 AIRCRAFT OPERATIONS

While CRQ is equipped with an ATCT that operates from 7:00 a.m. to 10:00 p.m. local time, seven days a week, historical and base year operations estimates used in the forecasts for this Airport Master Plan Update are derived from the FAA's TAF. Operations are recorded by type and include air carrier, air taxi/commuter, general aviation, and military. Each aircraft's takeoffs and landings are summed to comprise total annual operations at the Airport. An operation is defined as a single landing or a single takeoff. Air Carrier operations are conducted under 14 Code of Federal Regulations (CFR) Part 121 and include scheduled, commercial flights. Air taxi operations are conducted under 14 CFR Part 135 as an on-demand or limited schedule basis with aircraft than have no more than 60 passenger seats. General aviation operations are typically conducted under 14 CFR Part 91 with single- and multi-engine aircraft for non-revenue service or non-passenger revenue services such as flight training, recreational, or emergency response.

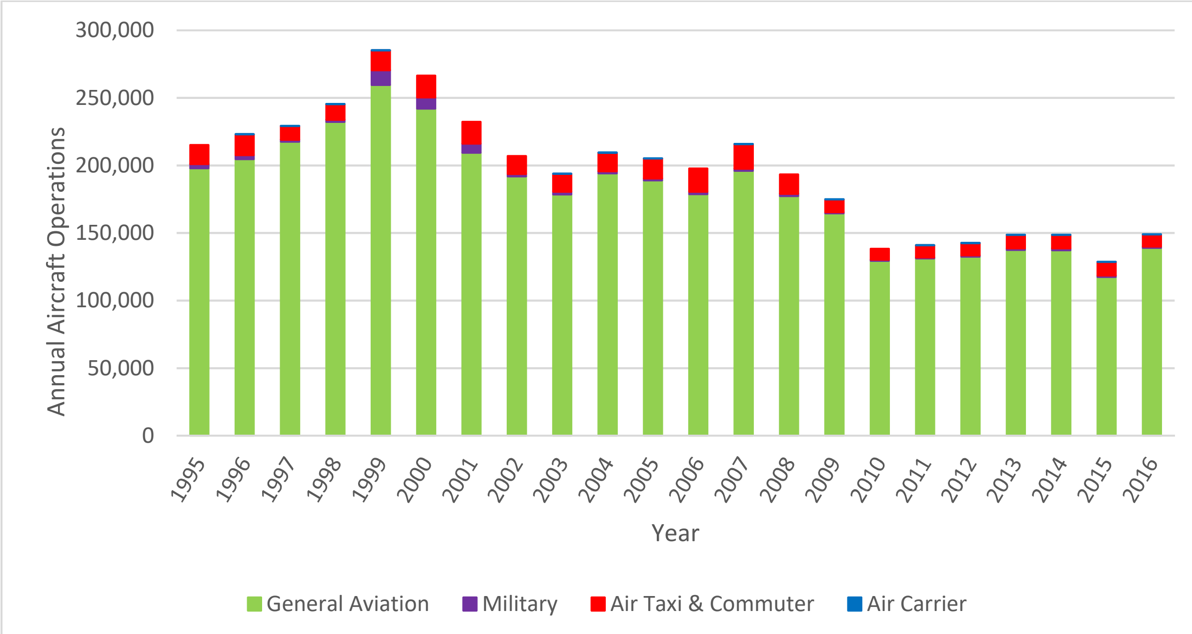
CRQ's historical annual aircraft operations are presented in **Table 3.4** and **Exhibit 3.5**. Total annual aircraft operations have decreased significantly over time. The reduction in aircraft operations is not just a trend specific to CRQ, but one that has been occurring nationally since 2000 as the costs (fuel, insurance, aircraft, etc.) associated with general aviation aircraft ownership have risen. Declines in the national economy that occurred from 2008 to 2010 have also negatively impacted the aviation sector.

Table 3.4– Historical Annual Aircraft Operations

Year	Air Carrier	Air Taxi	General Aviation	Military	Total Operations
1995	0	14,083	198,017	3,012	215,112
1996	15	15,298	204,693	3,021	223,027
1997	54	10,128	217,572	1,444	229,198
1998	8	11,537	232,285	1,545	245,375
1999	12	14,597	259,535	10,978	285,122
2000	0	16,110	242,087	8,245	266,442
2001	0	16,081	209,415	6,756	232,252
2002	0	13,209	191,918	1,824	206,951
2003	3	13,267	178,566	1,994	193,830
2004	2	13,733	194,121	1,634	209,490
2005	5	14,736	188,933	1,485	205,159
2006	0	17,207	178,781	1,750	197,738
2007	37	18,245	196,100	1,477	215,859
2008	0	14,288	177,403	1,616	193,307
2009	9	9,460	164,608	825	174,902
2010	0	8,042	129,466	853	138,361
2011	32	8,967	131,213	723	140,935
2012	3	9,085	132,542	924	142,554
2013	4	9,934	137,476	1,259	148,673
2014	1	9,961	137,297	1,350	148,609
2015	6	10,053	117,479	1,089	128,627
2016	1	8,982	139,091	955	149,029
Average Annual Growth Rates					
1995-2016	N/A	-1.72%	-1.42%	-3.25%	-1.46%

Source: FAA Terminal Area Forecast, Issued January 2017. Prepared by Kimley-Horn, 2017.

Exhibit 3.5 Historical Annual Aircraft Operations at CRQ (1995-2016)



Source: FAA Terminal Area Forecasts issued January 2017. Prepared by: Kimley-Horn and Associates, 2017.

In addition to the total number of annual aircraft operations, another important element to identify is operations by aircraft type, specifically as it pertains to the existing and recommended Airport Reference Code (ARC). An analysis of the FAA's Traffic Flow Management System Counts (TFMSC) database for base year 2016 is shown in **Table 3.5**. It should be noted that these do not include non-jet aircraft operations. Jet activity typically requires longer takeoff and landing lengths compared to piston and turbo-prop aircraft.

Table 3.5– Jet Operations by ADG

Aircraft Design Group	2016 Operations
B-II	5,834
C-I	1,128
C-II	2,632
C-III	317
D-I	76
D-III	405

Source: FAA TFMSC, obtained April 2017.

The primary purpose of evaluating operations described in **Table 3.5** is to identify that there are a significant number of operations at CRQ conducted by aircraft that exceed the Airport's existing B-II ARC. In 2016, there were 4,558 jet aircraft operations that exceeded the Airport's B-II ARC. Based on local and national trends of general aviation and corporate activity, it is anticipated that the proportion of jet operations at CRQ compared to total aircraft operations will increase throughout the 20-year planning horizon. Furthermore, as older jets are retired out of the active fleet, they are being replaced by larger, more fuel-efficient jet aircraft. It should also be noted that the 2013 Feasibility Study identified significant aircraft operations conducted by aircraft with ARCs that exceeded a C-III designation.

It should be noted that in subsequent Section 3.10.3, by 2031 it is anticipated that aircraft with a D-III ARCs will conduct more than 500 annual operations, which is the FAA's threshold for critical design aircraft determination. This means that in the future, Airport facilities should be designed and constructed to accommodate ARC D-III aircraft. As such, facility requirements and development alternatives described in subsequent Sections have been developed under the assessment that CRQ's airfield should be able to safely accommodate D-III ARC aircraft and that the existing B-II ARC is not adequate based on existing and projected levels of demand.

3.6 PREVIOUS PASSENGER ENPLANEMENT FORECASTS

Passenger enplanement forecasts for CRQ were prepared previously in three separate efforts including the following:

1. Regional Aviation Strategic Plan (RASP), March 2011
2. FAA Terminal Area Forecasts (TAF), Fiscal Years 2017-2040
3. Feasibility Study for Potential Improvements to McClellan-Palomar Airport Runway, 2013

These forecasts were developed for different reasons and with different underlying factors and assumptions. The 2013 Feasibility Study's forecast was developed for conditions specifically existing at CRQ at the time the projections were prepared, while the RASP was developed for a broader geography and examined passenger enplanement activity at numerous airports in the San Diego region. The TAF is developed by the FAA and updated on an annual basis for all active airports in the National Plan of Integrated Airport Systems (NPIAS). In the case of the TAF, the greatest attention and level of detail are provided to the development of forecasts for larger airports.

Brief descriptions of each of these studies' passenger enplanement forecasts are presented below.

3.6.1 2011 Regional Aviation Strategic Plan (RASP)

The RASP was developed for the SDCRAA to assess long-range capabilities of all public-use airports in the County of San Diego. The primary focus of the RASP was to determine how to handle the increasing passenger demand for air carrier service at SAN when that facility reaches its estimated capacity at 28 million annual passengers (14.2 million enplanements). SAN had 10.3 million enplanements in 2016.

The RASP assumes that SAN will reach its capacity somewhere between 2020 and 2025 and, as a strategy of alleviating congestion, the RASP indicated that some air carrier activity will be distributed to CRQ due to its proximity and because it is the only other Part 139 commercial service airport in the County of San Diego. The RASP enplanement forecast for CRQ reflects this shift in a projection of significantly increased enplanements during that timeframe.

The RASP uses 2009 as a base year and projects enplanements to the year 2030 for its study area. The RASP study area included the County of San Diego and the larger region, including five airports in the greater Los Angeles metropolitan area: LAX, SNA, LGB, ONT, and BUR. The baseline RASP findings projected annual enplanements to increase region-wide from 48 to 80 million between 2009 and 2030, representing an average annual growth rate of 2.4 percent per year. The RASP baseline model (described as a no-action alternative) indicated that SAN will begin to experience capacity constraints between 2020 and 2025, resulting in residents and visitors using other airports (including CRQ and airports outside the County of San Diego) beginning around 2020. This no-action alternative projected that SAN's share of the County of San Diego resident and visitor enplanements would drop from 85 percent in 2009 to 78 percent in 2030. CRQ's projected enplanements in the RASP baseline scenario were anticipated to increase from 62,400 in 2009 to 511,700 in 2030, representing an average annual growth rate of 10.5 percent per year.

The RASP considered 15 alternative scenarios to optimize the County of San Diego Airport System. One of those scenarios (Scenario 1C) assumes optimizing regional commercial activity by providing facilities for multi-carrier passenger service at CRQ. In this scenario, CRQ enplanements were forecast to increase from 62,400 to 641,400 between 2009 and 2030, representing an average annual growth rate of 11.7 percent per year. SDCRAA worked closely with SANDAG as it concurrently developed its Airport Multimodal Accessibility Plan (AMAP), and will ultimately incorporate the RASP recommendations into the AMAP and the region's 2050 Regional Transportation Plan.

3.6.2 Terminal Area Forecast (TAF)

The FAA TAF is the official forecast of aviation activity at airports eligible for FAA funding and is prepared for planning purposes related to the system budget and facility needs. The TAF is prepared annually for active airports in the NPIAS, including FAA-towered airports, Federal contract tower airports, non-federal towered airports, and non-towered airports. The 2016 TAF includes historical data through 2015 for based aircraft, passenger enplanements, and aircraft operations delineated by air carrier, air taxi & commuter, general aviation, and military. The TAF uses year over year trend methodology to project future conditions and does not take into account specific characteristics of the airport or region. Aircraft operations by type are also identified as itinerant or local. The TAF also includes estimates of projected activity for years 2016 through 2040. The most recent TAF, issued in January 2017 reflects the gap in commercial service in its estimates of base year 2016 data. The TAF shows 131 passenger enplanements in 2016, increasing to 171 in 2036, representing an average annual growth of 1.53% per year.

3.6.3 2013 Feasibility Study Forecast

The aviation activity forecast developed for the 2013 Feasibility Study was used in the analysis of the potential extension of the runway at CRQ, but anticipated that the airport would remain a B-II ARC. The study used 2011 as a base year and projected activity through 2021. The 2013 Feasibility Study forecast projected enplanements at CRQ to increase from 47,983 in 2011 to 62,000 in 2021, representing an average annual growth rate of 2.6 percent per year.

The 2013 Feasibility Study did not consider increased commercial service activity as outlined in the RASP or as identified under alternative demand scenarios later in this section of the Airport Master Plan Update. The 2013 Feasibility Study's focus was on general aviation uses only; it assumed commercial service would grow at a rate similar to recent historical passenger activity and the TAF.

3.6.4 Summary of Previous Passenger Enplanement Forecasts

Table 3.6 and **Exhibit 3.6** summarize the passenger enplanement levels for CRQ for each of the previous forecasts outlined above.

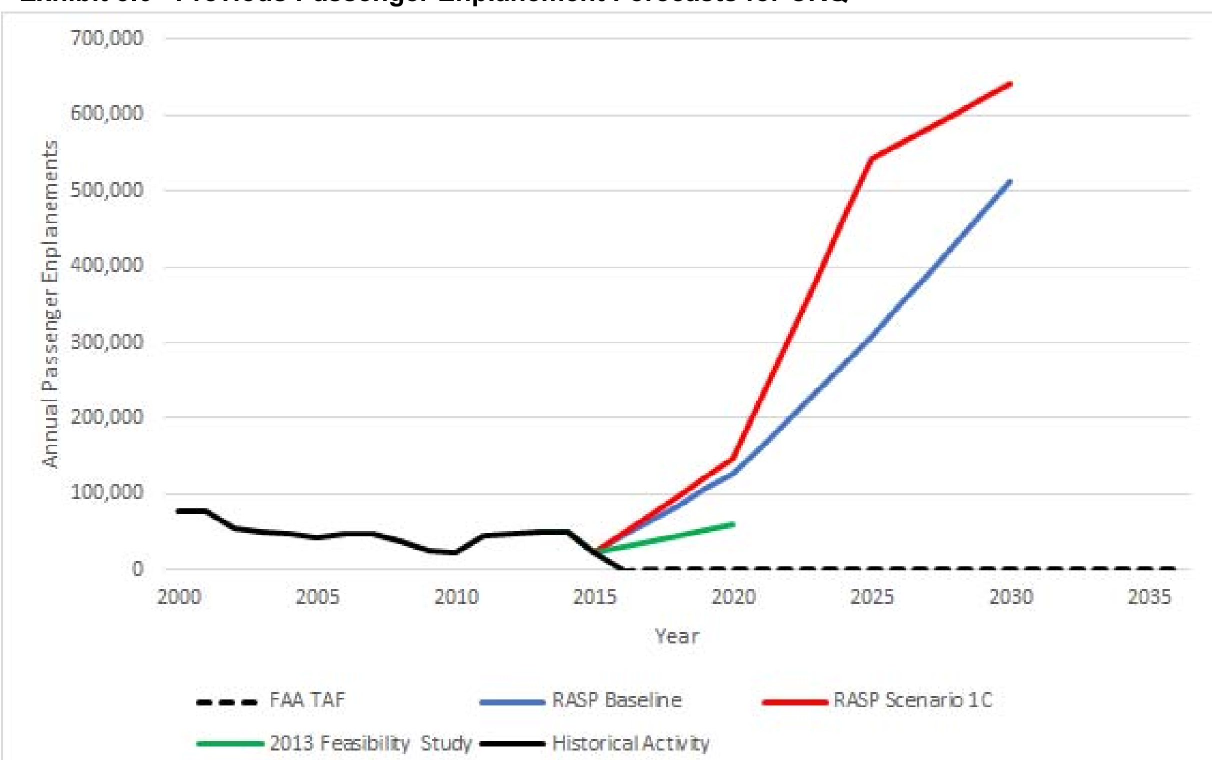
Table 3.6 – Previous Passenger Enplanement Forecasts for CRQ

Activity/Forecast	2016	2020	2025	2030	2035
Actual Activity	131	--	--	--	--
Previous Forecast					
San Diego RASP Forecast Scenarios					
Baseline – No Action Scenario	--	126,332	307,213	511,676	--
Scenario 1C – Enhanced Commercial Service at CRQ	--	147,427	542,922	641,355	--
FAA Terminal Area Forecast	--	139	149	159	169
2013 Feasibility Study (1)	--	60,400	--	--	--

Notes:
2013 Feasibility Study projections for 2015 and 2020 were interpolated from the 2011 actual enplanement count and forecast values listed for 2016 and 2021 in the study's Final Report.

Sources: RASP Forecasts, Final Report, Jacobs Consultancy, March 2011, Appendix B; FAA TAF – FAA Terminal Area Forecast issued January 2017; Feasibility Study for Potential Improvements to McClellan-Palomar Airport Runway, Final Report, August 1, 2013 – Table 3E. Prepared by: Kimley-Horn, 2017.

Exhibit 3.6 Previous Passenger Enplanement Forecasts for CRQ



Sources: RASP Forecasts, Final Report, Jacobs Consultancy, March 2011, Appendix B; FAA TAF issued January 2017; 2013 Feasibility Study. Prepared by: Kimley-Horn, 2017.

3.6.5 Evaluation of Previous Passenger Enplanement Forecasts

The commercial service passenger enplanement forecasts from the RASP, TAF, and the 2013 Feasibility Study were evaluated to determine if any of these would be suitable for use as the basis of the Airport Master Plan Update's passenger enplanement forecast. The underlying assumptions for each forecast are numerous and differ significantly. Key points of comparison between the RASP, TAF, and 2013 Feasibility Study forecasts are:

- The RASP forecasts were developed with a focus on activity projections for the San Diego region, not for activity at CRQ specifically. The RASP considers potential effects of increasingly constrained activity at SAN and how that might shift demand to CRQ, resulting in a higher activity forecast. The RASP assumes that CRQ can accommodate increased passenger activity up to 500,000 annual enplanements at the existing terminal facility and up to 750,000 annual enplanements with an increased terminal facility and vehicular parking capacity. RASP scenarios also assume implementation of a 1,000-foot runway extension. It should be noted that the capacity constraints that were identified for SAN were subsequently pushed 10 years further into the future from the 2035 timeframe (Regional Aviation Strategic Plan, Final Report, Jacobs Consultancy, March 2011).
- While the FAA applies a nationwide annual growth rate in the TAF, it does not consider the regional aviation conditions at SAN or does it look at the ability of CRQ to enhance its facilities to accommodate additional commercial passenger service, it does provide insight as to what existing and projected levels of demand would be based on market conditions and historical activity. However, the TAF forecasts do not assume that scheduled commercial service will return to CRQ in the 20-year planning period, despite the fact that at the time this Forecast Section was developed, two airlines had submitted applications to start operating at CRQ.
- The 2013 Feasibility Study forecast was developed specifically for current conditions and does not consider potential effects of constrained activity, thereby producing a lower activity forecast. The 2013 Feasibility Study did not consider increased commercial service activity as outlined in the RASP. It was focused on general aviation activity growth and use at the Airport and assumed commercial service would grow at a rate similar to recent historical passenger activity.

Through coordination with County staff, it was determined that the RASP and 2013 Feasibility Study forecasts represented factors that generated relevant demand scenarios that should be considered and used as a basis for comparative enplanement forecasts. This determination was triggered by the recognition that, despite extensive study, the region had not found an acceptable alternative to mitigate the well-documented constraints at SAN and the resulting shift in demand to CRQ as the only other airport with passenger service in the County. Furthermore, it is important to consider the limitations at SNA, the cap on commercial flights at Long Beach Airport (LGB), and capacity issues at LAX (assuming no changes in these limiting factors). SNA currently has two potentially constraining factors: the cap on enplaned passengers per year and their runway length. Long Beach Airport (LGB) is constrained to a total number of commercial operations. Los Angeles International Airport (LAX) is in the process of adding capacity but is limited in gates.

Additionally, the TAF reflects the cessation of scheduled commercial service at CRQ in 2015 and projects minimal passenger enplanements in the future with air taxi operations. As such, previous studies and the TAF do not accurately reflect anticipated levels of passenger forecast associated with the introduction of new scheduled commercial service that is anticipated to begin in 2017. The following sections describe methodologies and passenger enplanement forecasts that have been submitted to the FAA for review and approval.

3.7 PASSENGER ENPLANEMENT FORECASTS

This section presents forecasts of enplaned passengers at CRQ, which were developed with consideration of several factors and methodologies, including the following:

- Local socioeconomic and demographic factors
- The Airport's historical market share of regional enplaned passengers
- Previous forecasts developed for the Airport
- Known industry trends
- Strong interest from potential airlines, including two existing applications with two signed agreements to operate

As noted, facility requirements identified in subsequent sections of this Airport Master Plan Update are being driven by the proportionately high level of corporate and business aircraft that operate at CRQ and not by an anticipated increase in scheduled commercial operations and passenger enplanements. This is an important distinction, as there are no FAA Airport Improvement Program-eligible facility needs associated with the forecasts of airline operations or passenger enplanements.

3.7.1 FORECAST METHODOLOGY AND ASSUMPTIONS

As noted, in September 2017, Cal Jet by Elite Airways began scheduled commercial service at CRQ. Other airlines have also expressed legitimate interest in providing additional service at the Airport. It is assumed that the proposed improvements recommended in this Airport Master Plan Update will provide an environment more conducive to supporting scheduled air service while satisfying and remedying other issues more closely aligned with the existing based aircraft fleet mix and corporate general aviation activities at the Airport.

Enplanement forecasts are typically prepared using methodologies such as trend line, regression, and market share. Historical enplanement trends and their relationships to other indicators are considered to project future activity. For CRQ, historical enplanements have varied significantly based on the commercial airline providing the service, as well as other factors including aircraft type, economic conditions, and service destinations. Based on the lack of consistent historical trends, partially due to a nationwide downturn and a major shift in airline operations after September 11th, 2001 as well as the economic downturn that occurred from 2008 to 2010, many of the typical analytical forecasting techniques are not applicable for CRQ. In addition, due to CRQ's airport service area and the extensive amount of leakage of area passengers to other airports, the Airport's future enplanement levels will depend more upon its ability to retain and re-attract passengers and less on standard growth-based methodologies.

Numerous passenger enplanement forecast methodologies were initially developed for the purposes of this Airport Master Plan Update, including ones that examined CRQ's market share of enplanements compared to the San Diego Region and the State of California and others that incorporated historical trends and projected socioeconomic trends of the Airport's service area. Upon examination of these and other results, it was determined that the methodologies employed for the FAA's TAF were outside the tolerance of the TAF as discussed below. Per the FAA:

"*Airport District Offices (ADO) or Regional Airports Divisions (RO) are responsible for forecast approvals. When reviewing a sponsor's forecast, FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. Additional discussion on assumptions, data, and methodologies can be found in the APO report 'Forecasting Aviation Activity by Airport.' After a thorough review of the forecast, FAA then determines if the forecast is consistent with the TAF.*

For all classes of airports, forecasts for total enplanements, based aircraft, and total operations are considered consistent with the TAF if they meet the following criterion:

• Forecasts differ by less than 10 percent in the 5-year forecast period, and 15 percent in the 10-year forecast period

If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be used in FAA decision-making. This may involve revisions to the airport sponsor's submitted forecasts, adjustments to the TAF, or both."

As described below, the recommended forecast of passenger enplanements and total aircraft operations described in this Airport Master Plan Update exceed these review and approval thresholds for the local ADO. As such, the forecast has been submitted to FAA headquarters along with appropriate justification for review and approval.

Based on discussions with representatives of the County of San Diego and the FAA's Los Angeles Airports District Office in late Fall 2016 and early 2017, it was determined that, if a reasonable forecast could not be generated using typical projection methodologies, utilization of the TAF as a recommended forecast for this Airport Master Plan Update would be an acceptable approach in conjunction with a planning activity level (PAL) forecast that includes potential new airlines.

As several methodologies were developed and compared with the most recent version of the TAF issued in January 2017, none produced results that were within the previously identified tolerance for FAA forecast approval. Even with the reintroduction of commercial service, and the historical enplanement counts from the past 20 years, actuals exceeded allowable TAF variances. If only one of the two applicant airlines are successful, as was United Express/SkyWest for many years, the current TAF forecast projecting only 171 enplaned passengers by 2036 would be vastly inadequate. As such, this Airport Master Plan Update uses a dual approach. The TAF is the recommended baseline forecast for passenger enplanements and aircraft operations as it pertains to this Airport Master Plan Update, with the Planning Activity Level enplanement forecast and resulting operational forecast also being used for planning purposes over the 20-year horizon.

The baseline forecast, which follows the TAF, is referred to as the "Baseline Forecast" or the "Baseline Scenario" throughout the remainder of this document. The Planning Activity Forecast, which plans for the event that the new entrant airlines are successful and continue to succeed within their management plans is referred to as "PAL 1" throughout the remainder of this document. A summary of the Baseline Forecast is presented in **Table 3.7.**

As it pertains to the PAL 1 Forecast, each of the applicant airlines have confirmed that their operation plans can and will operate utilizing the existing airfield system and that their operations are not dependent on any airfield improvements.

The PAL 1 forecast assumes that the entrant airlines will operate as their business and operational plans predict and thus return commercial service to the Airport. This scenario matches the County's objective to continue to operate and market the airport as a commercial airport and, as such, this forecast will be used for planning purposes over the 20-year horizon.

Table 3.7– Baseline Passenger Enplanement Forecast – FAA TAF

Year	CRQ Enplanements
Historical	
2007	47,941
2008	38,994
2009	26,297
2010	23,996
2011	44,775
2012	46,903
2013	50,970
2014	50,668
2015	23,988
2016	131
Projected	
2021	141
2026	151
2031	161
2036	171
Average Annual Growth Rate 2016-2036	**1.53%**

Source: FAA TAF issued January 2017. Prepared by: Kimley-Horn, 2017.

3.7.2 Planning Activity Level Forecast

After the cessation of operations by United Express/SkyWest Airlines, various airlines expressed interest in operating from CRQ. Biz Charters provided commercial service at CRQ but discontinued service due to internal funding issues. At the time this forecast was prepared, Cal Jet by Elite Airways was in operation and two new airlines, with established main line carrier connections and different business plans have requested resumption of operations from the Airport. One airline has a current agreement necessary to start operations and San Diego-Transportation Security Administration (SAN-TSA) has formally committed to providing FSROR within the next month. This fact—along with other airline projections—have been used as a restarting point for the forecasting activity for this Plan. Each of these two airlines represents a different capture rate of passenger enplanements in the North County service area. If passenger enplanement growth in the North County service area occurs at a similar rate as the rest of the RASP study area (2.4 percent per year), it is anticipated that the estimated 1.64 million enplanements in the CRQ catchment area identified in the Retention Study would increase to approximately 2.73 million potential annual enplanements by 2030.

The PAL 1 forecast for passenger enplanements is derived from full utilization of the existing passenger terminal building and reasonable projections of airline applications in hand.

CRQ could focus on short-haul markets such as LAX, PHX, LAS, OAK, SJC, and SMF, relieving pressure on SAN so that it could focus on longer-haul demand. The increase in enplanements and operations envisioned in this scenario would reflect an alleviation of congestion at SAN through the entry of new airline service at CRQ. It is anticipated that, if the initial airlines are successful, that these conditions would allow a potential third airline to operate from CRQ in the long-term (10+ years) horizon.

The airlines planning on resuming commercial service at CRQ have identified their anticipated operating equipment, passenger load factors, route destinations, and flight schedules. This information has been evaluated and restructured to conform to historical trends and anticipated activity levels. **Table 3.8** identifies passenger enplanement forecasts by airline along with the assumptions that have been constructed based on the airlines' applications and factors described in the Retention Study.

As shown, modest boarding load factors (BLF) have been applied throughout the projection period, especially in the introductory years of anticipated service by the two initial airlines in 2017 and the third airline in 2027. The PAL 1 Forecast assumes that passenger load factors aboard the two entrant airlines will start at 50 percent in 2017 and increase gradually to 72 percent by 2036. The additional airline that is anticipated to start operation in 2027 is projected to operate with a passenger load factor of 50 percent in its initial year, increasing to 65 percent by 2036.

It should be noted that United/SkyWest experienced load factors[12] in the 62-68 percent range while in operation and the FAA Aerospace Forecast 2017-2037 identified that domestic load factors for U.S. commercial air carriers in 2016 was 79.9 percent for regional carrier load factors. Conservative Boarding Load Factors (BLF), well below previously achieved levels, were applied to the two airlines planning to offer scheduled passenger service at CRQ in mid-2017, identified in **Table 3.8.** As shown on this table, these projections, augmented by a third airline projected to begin service in the long-term timeframe, as described above, provide a realistic justification of the recommended forecast for passenger enplanements in this Airport Master Plan Update.

A key consideration with the re-commencement of commercial service is how the operations and enplanements are accounted for the first year of service by the three airlines. The forecast presented in this Airport Master Plan Update does not assume that airlines commence services at the first of the year or immediately operate at full planned operations. Lower boarding load factors and a later anticipated start date for operations are assumed. Airline #2 is anticipated to start operations with a smaller, 19-seat aircraft, and once the service is operating and recovering passengers, the airline plans to shift to a larger 30-seat aircraft. For this forecast the shift in equipment is assumed to occur after 90 days of operations. Airline #1 has stated their desire to commence service to multiple destinations right away upon start of service. This forecast does not include the full operational capacity the new airline anticipates with a total of 14 departures per day until 2024 to allow gradual growth as the start-up operations attract passengers. This phased development of operations fits the plans of each potential airline while maintaining some constraints on projections. This same philosophy is maintained with the potential third operating airline that joins in 2027. The enplanements for this airline are not assumed to be a full year of activity the first year, and the boarding load factor is also maintained at a start-up level. This approach is demonstrated within **Table 3.8** below.

[12] FAA Aerospace Forecast Fiscal Years 2017-2037.

Table 3.8 – Passenger Enplanement Forecast: PAL 1 Forecast

	Airline #1				Airline #2				Airline #3				
Year	Equipment (Seats)	Daily Departures*	BLF	Annual Enplanements	Equipment (Seats)	Daily Departures**	BLF	Annual Enplanements	Equipment (Seats)	Daily Departures	BLF	Annual Enplanements	Total Enplanements
2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	131
2017	64	12	50%	34,560	19/30	3	50%	4,410					38,970
2018	64	12	50%	140,160	30	3	50%	16,425					156,585
2019	64	12	52%	145,766	30	3	52%	17,082					162,848
2020	64	12	53%	148,570	30	3	53%	17,411					165,980
2021	64	12	55%	154,176	30	3	55%	18,068					172,244
2022	64	12	57%	159,782	30	3	57%	18,725					178,507
2023	64	12	59%	165,389	30	3	59%	19,382					184,770
2024	64	14	61%	199,494	30	3	61%	20,039					219,533
2025	64	14	63%	206,035	30	3	63%	20,696					226,731
2026	64	14	65%	212,576	30	3	65%	21,353					233,929
2027	64	14	65%	212,576	30	3	65%	21,353	64	3	50%	17,280	251,209
2028	64	14	65%	212,576	30	3	65%	21,353	64	3	50%	35,040	268,969
2029	64	14	65%	212,576	30	3	65%	21,353	64	3	52%	36,442	270,370
2030	64	14	66%	215,846	30	3	66%	21,681	64	3	53%	37,142	274,670
2031	64	14	67%	219,117	30	3	67%	22,010	64	3	55%	38,544	279,670
2032	64	14	68%	222,387	30	3	68%	22,338	64	3	57%	39,946	284,671
2033	64	14	69%	225,658	30	3	69%	22,667	64	3	59%	41,347	289,671
2034	64	14	70%	228,928	30	3	70%	22,995	64	3	61%	42,749	294,672
2035	64	14	71%	232,198	30	3	71%	23,324	64	3	63%	44,150	299,672
2036	64	14	72%	235,469	30	3	72%	23,652	64	3	65%	45,552	304,673

Source: County of San Diego; Prepared by: Kimley-Horn, 2017.

Notes: * Assumes 90 days in operation in 2017; **Assumes 60 days operating 19-seat aircraft in 2017, replaced permanently by 30-seat aircraft for remainder of 2017 (for 60 days) and then through2036; *** Airline #3 commences the latter half of 2027 for 180 days.

3.8 BASED AIRCRAFT FORECAST

Based aircraft are those aircraft that are stored long-term and operate out of a specific airport. As noted in the Inventory Section, the number of based aircraft at CRQ has fluctuated in recent history. Overall, the number of based aircraft at airports nationwide has declined over the past decade, primarily due to economic instability, changes in pilot licensing requirements, increasing fuel prices, and other costs associated with owning and operating an aircraft. In its Aerospace Forecast 2017-2037, the FAA projects continuing declines in single-engine piston and multi-engine piston aircraft in the U.S. fleet. However, the forecast also projects significant increases in turboprop and jet aircraft.

Projections of based aircraft over the Airport Master Plan Update study horizon impact future airport facility and infrastructure requirements such as hangar storage space and apron tie-down areas. Facility needs associated with based aircraft are not typically eligible for FAA Airport Improvement Program (AIP) funding. Because of this and the historical fluctuation in the number of based aircraft at CRQ, the FAA TAF is the recommended forecast for based aircraft in this Airport Master Plan Update (see **Table 3.9**).

Table 3.9 – Based Aircraft Forecast

Year	CRQ Based Aircraft
Historical	
2007	354
2008	354
2009	341
2010	341
2011	274
2012	290
2013	285
2014	296
2015	294
2016	298
Projected	
2021	318
2026	339
2031	364
2036	389
Average Annual Growth Rate 2016-2036	**1.53%**

Source: FAA TAF issued January 2017, Prepared by: Kimley-Horn, 2017.

3.8.1 BASED AIRCRAFT FLEET MIX

With the total number of based aircraft at the Airport projected to increase, the type of aircraft, or fleet mix, also needs to be determined. Based on the TAF, issued January 2017, a significant proportion of based aircraft in 2016 consisted of single-engine piston aircraft (62.8 percent). Jet aircraft accounted for 22.4 percent of based aircraft in 2015. The remainder of based aircraft at the Airport consisted of multi-engine piston aircraft (5 percent), turboprops (5 percent), and helicopters (4.7 percent).

Based on projected U.S. general aviation trends found in the FAA Aerospace Forecast (FY 2017-2037), single- and multi-engine piston aircraft are anticipated to lose their current market share of the active general aviation aircraft fleet in the country. Jet aircraft, turboprop aircraft, and helicopters are expected to continue to represent a growing percentage of the market share.

The projected trends in the national general aviation fleet were used as a guide to develop fleet mix projections at CRQ. The based aircraft fleet mix projection is presented in **Table 3.10**. The major growth in based aircraft at CRQ is anticipated to mirror the national trends and occur in the business jet fleet, turboprops, and helicopters. The fleet mix projection results in an estimated based aircraft fleet consisting of 195 single-engine pistons (50.0 percent), 19 multi-engine pistons (5.0 percent), 31 turboprops (8.0 percent), 117 jets (30.0 percent), and 27 helicopters (7.0 percent).

Table 3.10– Based Aircraft Fleet Mix Forecast

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jet	Helicopter	Total
Historical						
2014	167	18	25	70	14	294
2015	179	17	23	68	17	304
2016	187	15	15	67	14	298
Forecast						
2021	188	16	19	78	17	318
2026	190	17	22	90	20	339
2031	191	18	27	104	24	364
2036	195	19	31	117	27	389
Average Annual Growth Rates						
2016-2036	0.21%	1.33%	5.33%	3.73%	4.64%	1.53%

Source: 5010 Airport Master Record 2014-2016; Prepared by: Kimley-Horn, 2017.

3.9 AIRCRAFT OPERATIONS FORECAST

An aircraft operation can be defined as an aircraft takeoff or landing, with each of these activities resulting in one individual operation. The volume of aircraft operations in each timeframe, such as annual, monthly, daily, or hourly, is considered in relationship to the airfield's capacity in that timeframe. If the volume of aircraft operations begins to approach or exceed the established capacity of an airfield component—such as the runway—capacity improvements must be planned for and implemented.

At towered airports such as CRQ, operations are recorded and tracked by the ATCT during its operational hours. As noted previously, historical data from the TAF are utilized as a baseline for the development of forecasts identified in this Airport Master Plan Update. Aircraft operations are divided into local operations and itinerant operations. Local operations include aircraft operating in the traffic pattern or within sight of the ATCT, or aircraft known to be departing or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the airport. Local operations include subcategories for military and civil aviation aircraft[13].

Itinerant operations include takeoffs and landings of aircraft going from one airport to another. Itinerant operations are further subdivided into military, general aviation operations, air carrier, and air taxi/commuter operations. Air carrier operations represent takeoffs and landings by commercial aircraft with a seating capacity greater than 60, which includes the CRJ-700 currently being operated by Cal Jet by Elite Airways. Air taxi/commuter operations include takeoffs and landings by aircraft with 60 or fewer seats, conducting scheduled commercial flights. Air taxi/commuter operations also include takeoffs and landings by aircraft with 60 or fewer seats conducted on non-scheduled or for-hire flights.

Annual operations forecasts were prepared for each of the relevant categories for CRQ.

[13] Forecasting Aviation Activity by Airport, Federal Aviation Administration, July 2001.

3.9.1 Air Carrier Operations Forecast

While CRQ does have scheduled commercial service provided by Cal Jet by Elite Airways, the FAA TAF issued January 2017 does not project future air carrier operations at the Airport. The FAA updates the TAF on an annual basis but at the time that forecasts were completed for this Airport Master Plan Update, historical air carrier activity was non-existent, which was reflected in the TAF issued January 2017. While future updates to the TAF will likely reflect air carrier operations that are now occurring at the Airport, no such activity is identified in the current TAF. As such, utilizing typical forecast methodologies for air carrier operations does not provide a fair representation of a forecast now that commercial service has resumed.

Air carrier operations have been developed based on application submittals from two separate airlines that intend to operate at CRQ in the near term. Similar to passenger enplanement forecasts, these applications have been examined based on historical levels of activity at CRQ, industry trends, and anticipated activity generated from leakage at SAN and demand in North San Diego County. It should be noted that only one of the two airlines that have applied to operate at CRQ intends to operate air carrier category aircraft. The second airline has indicated it will operate air taxi category aircraft. It should also be noted that, based on the assumption air service at CRQ remains sustainable, it is estimated a third airline will enter the market in the long-term (10+ years) timeframe operating air carrier category aircraft (see **Table 3.11**).

Table 3.11 – Air Carrier Operations Forecast

	Airline #1			Airline #3			
Year	Daily Departures*	Daily Operations*	Annual Operations	Daily Departures	Daily Operations	Annual Operations	Total Operations
2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2017	12	24	2,160				2,160
2018	12	24	8,760				8,760
2019	12	24	8,760				8,760
2020	12	24	8,760				8,760
2021	12	24	8,760				8,760
2022	12	24	8,760				8,760
2023	12	24	8,760				8,760
2024	14	28	10,220				10,220
2025	14	28	10,220				10,220
2026	14	28	10,220				10,220
2027	14	28	10,220	3	6	1,080	11,300
2028	14	28	10,220	3	6	2,190	12,410
2029	14	28	10,220	3	6	2,190	12,410
2030	14	28	10,220	3	6	2,190	12,410
2031	14	28	10,220	3	6	2,190	12,410
2032	14	28	10,220	3	6	2,190	12,410
2033	14	28	10,220	3	6	2,190	12,410
2034	14	28	10,220	3	6	2,190	12,410
2035	14	28	10,220	3	6	2,190	12,410
2036	14	28	10,220	3	6	2,190	12,410

Source: County of San Diego. Kimley-Horn, 2017

Note: Only 2 airlines are projected to operate air carrier aircraft. Airlines #1 and #3 are referenced for consistency from Table 3.8;
* Assumes 180 days of operation in 2027

The forecast for air carrier operations assumes that in 2017, one of the two airlines that have applied to operate at CRQ will utilize 64-seat aircraft. This airline is anticipated to commence operations by conducting 12 daily departures (24 operations), seven days per week for 90 days in 2017, 12 daily departures (24 operations), seven days per week for 365 days from 2018 to 2023, then 14 daily departures (28 operations), seven days per week for 365 days per year from 2024-2036.

The forecast also assumes that an additional airline (not associated with the two with applications to operate in the near-term) is anticipated to provide scheduled commercial service also utilizing 64-seat aircraft starting approximately in 2027. This airline is anticipated to conduct three daily departures (six operations) for 180 days in 2027 and three daily departures (six operations) for 365 days per year from 2028-2036. Total air carrier operations are calculated by adding annual operations for these two airlines in the appropriate years. As shown in **Table 3.11**, it is anticipated that CRQ will experience 12,410 air carrier operations by 2036. Air carrier operations are associated with the PAL 1 forecast, which is the recommended forecast for this Airport Master Plan Update.

3.9.2 AIR TAXI/COMMUTER OPERATIONS FORECAST

The FAA defines an air taxi operation as that which is conducted by an aircraft designed to have a maximum seating capacity of 60 seats or less, or a maximum payload capacity of 18,000 pounds or less, carrying passengers or cargo for hire or compensation. This includes both scheduled commercial service operations as well as corporate business/charter operations.

Air taxi forecasts have been developed for a Baseline and a PAL 1 scenario. The Baseline Forecast assumes that air taxi/commuter operations will follow the TAF, while the PAL 1 Forecast assumes that, in addition to projected TAF air taxi/commuter operations, one of the two initial applicant airlines will operate air taxi/commuter category aircraft throughout the 20-year planning horizon (Airline #2).

The PAL 1 Forecast assumes that the applicant airline that has signed agreements to operate at CRQ anticipates starting operations with 19-seat aircraft for initial operations, then transitioning to 30-seat aircraft as BLF increases. It is anticipated that this airline will conduct three daily flights (six operations) for 120 days in 2017, then three daily flights (six operations) for 365 days per year from 2018 through 2036. These estimates are added to TAF projections for air taxi/commuter operations for the appropriate year. The Baseline Forecast and PAL 1 Forecast for air taxi/commuter operations are shown in **Table 3.12**.

Table 3.12 – Air Taxi/Commuter Operations Forecast

	Baseline Forecast (FAA TAF)	Airline #2			PAL 1 Forecast
Year	Air Taxi/ Commuter Operations	Daily Departures*	Daily Operations	Annual Operations	Total Air Taxi/ Commuter Operations
2016	8,982	N/A	N/A	N/A	8,982
2017	9,054	3	6	720	9,774
2018	9,127	3	6	2,190	11,317
2019	9,200	3	6	2,190	11,390
2020	9,274	3	6	2,190	11,464
2021	9,348	3	6	2,190	11,538
2022	9,423	3	6	2,190	11,613
2023	9,498	3	6	2,190	11,688
2024	9,574	3	6	2,190	11,764
2025	9,650	3	6	2,190	11,840
2026	9,728	3	6	2,190	11,918
2027	9,806	3	6	2,190	11,996
2028	9,885	3	6	2,190	12,075
2029	9,964	3	6	2,190	12,154
2030	10,044	3	6	2,190	12,234
2031	10,124	3	6	2,190	12,314
2032	10,206	3	6	2,190	12,396
2033	10,288	3	6	2,190	12,478
2034	10,371	3	6	2,190	12,561
2035	10,454	3	6	2,190	12,644
2036	10,537	3	6	2,190	12,727

Source: County of San Diego; Prepared by: Kimley-Horn, 2017.
Notes: * Assumes 120 days in operation in 2017; Airline #2 is referenced for consistency from Table 3.8

As shown in **Table 3.12**, the Baseline Forecast projects 10,537 air taxi/commuter operations by 2036, and the PAL 1 Forecast projects 12,727 operations. For the purposes of this Airport Master Plan Update, the PAL 1 Forecast is the preferred methodology for air taxi/commuter operations.

3.9.3 General Aviation Operations Forecast

General aviation operations include all operations that are not categorized as air carrier, air taxi/commuter, or military. General aviation operations have declined steadily in recent years. Despite a 10-year peak of 196,100 general aviation operations in 2007, activity has declined to 139,091 operations in 2016. Despite this decline, general aviation activity is anticipated to remain relatively constant throughout the projection period. Due to the historical decline in general aviation activity at CRQ, typical forecast methodologies such as regression analysis and market share result in projected linear decline in operations throughout the 20-year projection period. Furthermore, because the Airport experiences a high proportion of itinerant activity (approximately 62 percent compared with 38 percent local), it is not estimated that local socioeconomic factors such as population, income, or employment are the primary drivers of general aviation activity. As such, comparing operations to local socioeconomic trends is not an adequate forecast methodology.

Two forecasts have been developed for general aviation operations at CRQ: Baseline Forecast and PAL 1 Forecast. The Baseline Forecast mimics the TAF, which identifies 0.32 percent annual growth through the 20-year planning horizon. The PAL 1 Forecast applies modest growth in general aviation operations driven by national economic recovery and the high proportion of corporate/business activity at CRQ. This forecast produces a 1.07 percent annual growth rate over the 20-year planning horizon. In its Aerospace Forecast 2017-2037, the FAA projects significant general aviation growth in hours flown, operations, and aircraft fleet for jet, rotorcraft, and turboprop category aircraft, all of which are anticipated to grow at CRQ over the 20-year planning horizon.

Bolstered by local and national growth in these aircraft categories, the PAL 1 Forecast assumes an initial three percent increase in general aviation operations from 2016 to 2017 as economic recovery continues. General aviation operations growth is then projected to decrease to 1.5 percent per year from 2017 to 2018, one percent per year from 2018 to 2027, 0.75 percent per year from 2028 to 2032, and 0.5 percent per year from 2033 to 2037. The average annual growth rate for general aviation operations in the PAL 1 Forecast from 2016 to 2036 is 1.07 percent, which is slightly above the FAA Aerospace Forecast 2017-2037, which projects 0.90 percent annual growth in total general aviation hours flown at all NPIAS airports.

Historical and projected general aviation operations for the Baseline Forecast and the PAL 1 Forecast are shown in **Table 3.13**. As shown, the Baseline Forecast projects 148,018 operations by 2036, while the PAL 1 Forecast projects 168,958 operations. Based on the factors identified in this section, the PAL 1 Forecast is the recommended methodology for this Airport Master Plan Update. This methodology also projects a slight increase in the proportion of itinerant general aviation operations at CRQ during the 20-year planning horizon. This increase, while slight, is attributed to a decrease in training operations at the Airport, supplanted by an increase in corporate/business activity and potential scheduled passenger service at the Airport.

Table 3.13 – General Aviation Operations Forecast

Year	Baseline Forecast GA Operations (FAA TAF)	PAL 1 Forecast GA Operations	% Local	Local General Aviation Operations	% Itinerant	Itinerant General Aviation Operations
Historical						
2007	196,100	196,100	30.7%	60,300	69.3%	135,800
2008	177,403	177,403	33.8%	59,978	66.2%	117,425
2009	164,608	164,608	38.5%	63,363	61.5%	101,245
2010	129,466	129,466	33.9%	43,944	66.1%	85,522
2011	131,213	131,213	32.6%	42,835	67.4%	88,378
2012	132,542	132,542	37.6%	49,813	62.4%	82,729
2013	137,476	137,476	39.2%	53,910	60.8%	83,566
2014	137,297	137,297	42.0%	57,606	58.0%	79,691
2015	117,479	117,479	37.7%	44,317	62.3%	73,162
2016	139,091	139,091	38.6%	53,746	61.4%	85,345
Forecast						
2021	143,577	150,220	36.6%	57,910	63.4%	92,310
2026	145,039	158,029	34.9%	60,877	65.1%	97,152
2031	146,520	164,490	33.6%	63,361	66.4%	101,128
2036	148,018	168,958	32.8%	65,130	67.2%	103,828
Average Annual Growth Rates						
2016-2036	0.32%	1.07%		1.07%		1.07%

Source: FAA TAF Issued January 2017; Prepared by: Kimley-Horn and Associates, 2017.

3.9.4 Military Operations

Military activity accounts for the smallest portion of operational traffic at the Airport. Historical military operations were obtained from the TAF database and are presented in **Table 3.14**. As shown, military operations at CRQ have fluctuated significantly between 2007 and 2016, and they can be difficult to predict, since military activity at public use airports is typically not tied to the same drivers that impact general aviation or commercial operations. As a result, the TAF forecast is the preferred methodology for military operations at CRQ. The TAF depicts 707 itinerant, 248 local, and 955 total military operations annually throughout the projection period.

Table 3.14 – Military Operations Forecast

Year	Itinerant Military Operations	Local Military Operations	Total Military Operations
Historical			
2007	1,104	373	1,477
2008	1,099	517	1,616
2009	531	294	825
2010	638	215	853
2011	483	240	723
2012	754	170	924
2013	934	325	1,259
2014	992	358	1,350
2015	879	210	1,089
2016	707	248	955
Forecast			
2021	707	248	955
2026	707	248	955
2031	707	248	955
2036	707	248	955

Sources: FAA TAF issued January 2017; Prepared by: Kimley-Horn, 2017.

3.9.5 Operations Forecast Summary

Table 3.15 provides a summary of the Baseline and PAL 1 (recommended) aircraft operations forecasts developed for the CRQ Master Plan Update. As shown, the PAL 1 Forecast projects an increase in total operations from 149,029 in 2016 to 195,050 in 2036. It should be noted that the Baseline Forecast has been reviewed and approved by the FAA, however, for the purposes of this Airport Master Plan Update, the PAL 1 Forecast will be used to identify facility needs and development alternatives. As noted, Cal Jet by Elite Airways began scheduled commercial service in September 2017 using 64-seat CRJ-700 aircraft, and it is anticipated that scheduled commercial service will continue to increase in the future.

Table 3.15 – Aircraft Operations Forecast Summary

Year	Air Carrier Operations	Air Taxi/ Commuter Operations	General Aviation Operations	Military Operations	Total Operations
Historical					
2016	1	8,982	139,091	955	149,029
Forecast – PAL 1 (Recommended)					
2021	8,760	11,538	150,220	955	171,473
2026	10,220	11,918	158,029	955	181,122
2031	12,410	12,314	164,490	955	190,169
2036	12,410	12,727	168,958	955	195,050
Average Annual Growth Rates					
2016-2036	N/A	2.08%	1.07%	0.00%	1.54%

Year	Air Carrier Operations	Air Taxi/ Commuter Operations	General Aviation Operations	Military Operations	Total Operations
Historical					
2016	1	8,982	139,091	955	149,029
Forecast – Baseline (TAF)					
2021	1	9,348	143,577	955	153,881
2026	1	9,728	145,039	955	155,723
2031	1	10,124	146,520	955	157,600
2036	1	10,537	148,018	955	159,511
Average Annual Growth Rates					
2016-2036	0.00%	0.87%	0.32%	0.00%	0.35%

Source: FAA TAF Issued January 2017, County of San Diego. Prepared by: Kimley-Horn, 2017.

3.9.6 Instrument Operations Forecast

A specific component of this Airport Master Plan Update is to identify the number of projected annual instrument operations at CRQ. According to data identified in the FAA's TFMSC database, 20.5 percent of total operations at CRQ in 2016 were instrument operations. It is assumed that all future scheduled commercial air taxi/commuter and air carrier category operations will be instrument operations. The 20.5 percent figure of instrument operations to total operations in base year 2016 is applied to all non-commercial operations throughout the 20-year planning horizon, then added to projected commercial operations, all of which are projected to be instrument operations, to determine total instrument operations (see **Table 3.16**).

Table 3.16 – Instrument and Visual Flight Rules Operations Forecast

Year	Total Operations	% IFR	IFR Operations	% VFR	VFR Operations
	Historical				
2016	149,029	20.5%	30,564	79.5%	118,465
	Forecast				
2021	171,473	24.8%	42,509	75.2%	128,964
2026	181,122	24.5%	44,347	75.5%	136,775
2031	190,169	24.7%	46,922	75.3%	143,247
2036	195,050	24.3%	47,314	75.7%	147,736

Source: FAA TFMSC Database. Prepared by: Kimley-Horn, 2017.

3.10 DESIGN HOUR ACTIVITY

A primary consideration for facility planning at airports is related to peak hour (or design hour) activity. For the purposes of this Master Plan Update, design hour activity is defined as activity that occurs during the peak hour of an average day during the peak month. The derivation of design hour activity is outlined in the following sections.

3.10.1 ENPLANED PASSENGERS

Design hour enplanements are used to size passenger-related airport facilities, specifically as it relates to the terminal building and associated facilities. As noted in previous sections of this Airport Master Plan Update, scheduled commercial service has historically been provided on 30-seat EMB 120 aircraft, which are no longer in operation at CRQ and are not anticipated to be in operation in the future. Commercial service is currently provided on CRJ-700 aircraft operated by Cal Jet by Elite Airways. Because the type of commercial aircraft that are anticipated to operate at CRQ in the future have not operated at the Airport in the past, assumptions have been identified that incorporate a realistic airline schedule that is able to function within existing facilities by adjusting timing and tempo—maximizing the Airport's airside and landside facility capacities by regulating the number of scheduled commercial departures that can occur within a specific timeframe.

Based on conversations with County Staff, it has been determined that optimizing timing and tempo could allow scheduled commercial departures to occur no closer together than approximately every 25-30 minutes. Although this does not allow for a totally unconstrained flight schedule (multiple flights departing within a shorter timeframe), it is estimated that this could be offset by larger aircraft with more seats that are anticipated to operate in the future, thus satisfying projected passenger demand.

Design hour enplanement forecasts represent the number of departing passengers who are anticipated to utilize the Airport during a typical busy hour. Although hourly passenger activity can vary significantly based on seasonal travel patterns, changes in ticket fares, economic conditions, and other factors, identification of high levels of passenger activity that will occur on a regular basis assists in the development of accurate facility needs as they pertain to terminal and other landside facilities. To estimate design hour enplanements for CRQ, the following assumptions were used:

- Annual Commercial Departures are utilized from Section 3.7.
- Commercial flights in the future will use a fleet of 19-seat, 30-seat, and up to 70-seat aircraft.
- Passenger demand and scheduled service will remain constant throughout the calendar year (no changes for seasonality).
- Passenger load factor for the design hour will be 90%. Although this figure is unlikely to occur on all departing aircraft, flights that occur during high-demand times of day are anticipated to reach 90% capacity regularly.

Design hour passenger enplanements are shown in **Table 3.17**. The forecast for design hour passengers is a function of typical aircraft that could operate at CRQ with a realistic load factor applied. With the understanding that the Airport's timing and tempo limits may remain in place throughout the 20-year planning period, design hour enplanements are generated by incorporating the largest type of aircraft anticipated to be in operation (70 seats) and applying a realistic passenger load factor during busy periods that could occur on a semi-regular basis (90 percent). This application results in 63 design-hour passengers. Although it is anticipated that there will be hours when passenger demand exceeds and falls short of these estimates (such as an additional smaller commercial aircraft in operation if demand dictates), these figures represent a typical busy hour that could occur on a typical flight aboard a 70-seat aircraft.

Table 3.17 – PAL 1 Design Hour Enplanements Forecast - 2036

Forecast Element	PAL 1 Forecast
Annual Commercial Departures	7,300
Annual Enplanements	304,673
Weekly Enplanements	5,859
Typical Busy Day Departures	20
Typical Busy Day Enplanements	837
Design Hour Enplanements	63

Source: Prepared by: Kimley-Horn, 2017.

3.10.2 Aircraft Operations

Design hour aircraft operations were calculated based on the following assumptions:

- The percentage of peak month operations to annual operations based on historical operations data for the Airport was determined to be 9.8 percent. This ratio was applied to total annual operations projections to determine peak month aircraft operations.
- Average day conditions for the peak month are estimated by dividing peak month operations by 31 (average number of days in the peak months at the Airport).
- Based on historical data, design hour operations are estimated to consist of 12 percent of the daily operations.
- As shown in **Table 3.18**, design hour operations are forecasted to increase from 57 in 2016 to 74 in 2036.

Table 3.18 – PAL 1 Design Hour Operations

Forecast Element	Historical	Forecast			
	2016	2021	2026	2031	2036
PAL 1 Forecast					
Aircraft Operations					
Annual Operations	149,029	171,473	181,122	190,169	195,050
Peak Month	14,605	16,804	17,750	18,637	19,115
Average Day	471	542	573	601	617
Design Hour	57	65	69	72	74

Sources: FAA TAF Issued January 2017, County of San Diego; Prepared by: Kimley-Horn, 2017.

In the PAL 1 Forecast, it is anticipated that the Airport will experience continued growth through 2036 in all areas of aviation activity including passenger enplanements, aircraft operations, and based aircraft. If passenger activity shifts from SAN to CRQ, as assumed as part of the RASP, and if the new airlines start operating sustainable long-term service, commercial service at CRQ should exceed levels of activity previously experienced at the Airport.

The enplaned passengers, based aircraft, and aircraft operations forecast presented in this section were developed as unconstrained forecasts. The evaluation of whether existing Airport facilities can accommodate projected demand will be addressed in the demand/capacity analysis and facility requirements phases of the Airport Master Plan Update. The determination of whether additional facilities can be incorporated at the Airport to meet the projected demand will be addressed in the Facility Requirements, Alternatives Analysis, Financial Plan, and Environmental Overview phases of the Airport Master Plan Update.

3.10.3 DESIGN AIRCRAFT

Facility planning for general aviation airports is impacted by existing and anticipated levels of aviation-related demand, both based aircraft and annual aircraft operations, and the size and type of aircraft that currently operate and are projected to operate at an airport.

As defined in FAA AC 150/5300-13A, Change 1, the FAA classifies airports by Airport Reference Code (ARC), which identifies the overall planning and design criteria for the Airport. The ARC is assigned based on the size of the largest aircraft that generally records at least 500 operations annually at an airport; this aircraft is known as the airport's "design aircraft." The design aircraft can consist of multiple aircraft that are considered collectively.

The ARC is based on the highest RDC of an airport. The RDC is comprised of the AAC, the Aircraft Design Group (ADG), and the approach visibility minimums. The AAC is based on the approach speed of the airport's design aircraft, and the ADG is based on the design aircraft's wingspan and tail height. Approach visibility minimums are expressed by runway visual range values in feet and relate to the lowest visibility minimums with the instrument approach procedure. Existing infrastructure at the Airport, including runway-taxiway separation, dictates that the Airport's RDC is currently listed as B-II-4000; however, based on an analysis of information provided in the FAA's TFMSC database combined with the Instrument Landing System's ¾ mile visibility approach minimums, the Airport's RDC should be C-III-4000, with an ultimate recommendation of D-III-4000.

The ARC provides the guidelines for pavement surfaces, safety area dimensions, runway lengths, separation standards, and taxiway criteria to ensure that the airfield layout and geometry provide a safe and efficient operating environment for the aircraft that typically use the airport. The ARC consists of a letter and a numeric identifier. The letter represents the AAC; the numeral represents the ADG.

Aircraft approach speeds included in categories A and B are typically small, piston-engine aircraft, whereas C, D, and E are normally larger turboprop or turbine-powered aircraft. Similarly, the wingspan and tail height of small, piston-engine aircraft normally correspond to design group I. Typical aircraft in design group II include Beechcraft King Air, Cessna Citation, or smaller Gulfstream business jets. Design groups III, IV, and V represent air carrier aircraft, such as Boeing 737, B-757, and B-747, respectively. Group VI would include the largest of aircraft such as Airbus A-380 or C-5 military cargo aircraft.

The ARC provides the guidelines for pavement surfaces, safety area dimensions, runway lengths, separation standards, and taxiway criteria to ensure that the airfield layout and geometry provide a safe and efficient operating environment for the aircraft that typically use the airport.

The Airport's existing ARC is B-II, represented by a critical design aircraft that includes the Cessna Citation Sovereign, which conducted 820 operations in 2016. For this Airport Master Plan Update, the FAA's TFMSC database was analyzed to identify the recommended future critical design aircraft. The most demanding group of aircraft that conducted at least 500 operations in 2016 had an ARC of C-III, represented by a combination of the Bombardier BD-700 Global 5000 (317 operations in 2016) and the Gulfstream G500 (405 operations in 2016). In 2016, these aircraft accounted for 722 operations. It is anticipated that annual operations conducted by these aircraft will increase at the same rate as total operations at CRQ throughout the 20-year planning horizon. Historical and projected design aircraft operations are shown in **Table 3.19**. As shown, operations conducted by the combination of the Bombardier BD-700 Global 5000 and the Gulfstream G500 are anticipated to increase from 722 in 2016 to 945 in 2036, which represents an average annual growth rate of 1.54 percent.

Table 3.19 – PAL 1 Design Aircraft Operations

Forecast Element	Historical	Forecast			
	2016	2021	2026	2031	2036
PAL 1 Forecast					
Aircraft Operations					
Annual Operations	149,029	171,473	181,122	190,169	195,050
Current Design Aircraft Operations (C-III)*	722	831	878	921	945
Future Design Aircraft Operations (D-III)*	405	466	492	517	530

Sources: FAA TFMSC database, Prepared by: Kimley-Horn, 2017.
*Note: Current Design Aircraft is grouping of aircraft types that includes the Bombardier BD-700 Global 5000 and the Gulfstream G500. Future Design Aircraft has been identified as a Gulfstream 650, which conducted 340 operations in 2016.

Also shown in **Table 3.19** are the 405 operations conducted by D-III aircraft in 2016, represented by the Gulfstream G650 and Gulfstream G550 models. If operations conducted by these aircraft also increase at the same rate as total operations, the 500-operation threshold for a D-III designation would occur sometime in the 10- to 15-year timeframe (2021-2026). This table identifies that in the near-term and intermediate term (0-10 years), the Airport should design facility improvements to accommodate C-III operations, and in the long term (11-20 years), facilities should be designed to D-III standards. As such, the following are recommended existing and future critical design aircraft, ADG, RDC, and ARC for the Airport:

- Existing Critical Design Aircraft: Cessna Citation Sovereign
- Existing ADG: II
- Existing RDC: B-II-4000
- Existing ARC: B-II
- Future Critical Design Aircraft: Gulfstream G650
- Future ADG: III
- Future RDC: D-III-4000
- Future ARC: D-III

In sum, while the Airport's existing design aircraft is the Cessna Citation Sovereign, which merits a B-II ARC, existing activity exceeds this designation, and any future facility improvements should be constructed to accommodate the future design aircraft, represented by a Gulfstream G650, which carries a D-III ARC designation.

3.10.4 Comparison to Federal Aviation Administration (FAA) Terminal Area Forecast (TAF)

The FAA template for summarizing and documenting airport planning forecasts is depicted in **Tables 3.20** and **3.21** for the PAL 1 Forecast presented in this Section. As noted, the FAA has reviewed and approved the Baseline Forecast, however, because the PAL 1 Forecast is considered the most reasonable and most likely forecast of aviation activity at the Airport, the PAL 1 Forecast is presented in the tables below and is used for facility needs and development alternatives presented in subsequent sections of this Airport Master Plan Update.

Table 3.20 – FAA Forecast Summary Template

Template for Comparing Airport Planning and TAF Forecasts (1)

AIRPORT NAME: McClellan-Palomar Airport (CRQ)

	Year	Airport Forecast	TAF	AF/TAF % Difference
Passenger Enplanements				
Base yr.	2016	131	131	0.0%
Base yr. + 5yrs.	2021	172,244	141	122058.9%
Base yr. + 10yrs.	2026	233,929	151	154819.9%
Base yr. + 15yrs.	2031	279,670	161	173608.1%
Commercial Operations				
Base yr.	2016	1	1	0.0%
Base yr. + 5yrs.	2021	10,950	1	1094900.0%
Base yr. + 10yrs.	2026	12,410	1	1240900.0%
Base yr. + 15yrs.	2031	14,600	1	1459900.0%
Total Operations				
Base yr.	2016	149,029	149,029	0.0%
Base yr. + 5yrs.	2021	171,473	153,881	11.4%
Base yr. + 10yrs.	2026	181,122	155,723	16.3%
Base yr. + 15yrs.	2031	190,169	157,600	20.7%

Note: TAF data is on a U.S. government fiscal year basis (October through September).

(1) Table is developed from Appendix C in the FAA Report, "Forecasting Aviation Activity By Airport."

Prepared by: Kimley-Horn, 2017.

Table 3.21 – FAA Forecast Appendix B

Appendix B
Template for Summarizing and Documenting Airport Planning Forecasts (1)

A. Forecast Levels and Growth Rates (Sample Data Shown)

Airport Name: McClellan Palomar Airport (CRQ) Specify base year: 2016

	2016 Base Yr. Level	2021 Base Yr.+5yrs.	2026 Base Yr.+10yrs.	2031 Base Yr.+15yrs.	Average Annual Compound Growth Rates Base Yr. to +5	Base Yr. to +10	Base Yr. to +15
Passenger Enplanements							
Air Carrier	0	154,176	212,576	257,660	N/A	N/A	N/A
Commuter	131	18,068	21,353	22,010	167.9%	66.4%	40.7%
TOTAL	131	172,244	233,929	279,670	320.5%	111.4%	66.7%
Operations							
Itinerant							
Air Carrier	1	8,760	10,220	12,410	N/A	N/A	N/A
Commuter/Air Taxi	8,982	11,538	11,918	12,314	5.1%	2.9%	2.1%
Total Commercial Operations	8,983	20,298	22,138	24,724	17.7%	9.4%	7.0%
General aviation	85,345	92,310	97,152	101,128	1.6%	1.3%	1.1%
Military	707	707	707	707	0.0%	0.0%	0.0%
Local							
General aviation	53,746	57,910	60,877	63,361	1.5%	1.3%	1.1%
Military	248	248	248	248	0.0%	0.0%	0.0%
TOTAL OPERATIONS	149,029	171,473	181,122	190,169	2.8%	2.0%	1.6%
Instrument Operations	30,564	42,509	44,347	46,922	6.8%	3.8%	2.9%
Peak Hour Operations	57	65	69	72	2.7%	1.9%	1.6%
Cargo/mail	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Based Aircraft							
Single Engine (Nonjet)	187	188	190	191	0.1%	0.2%	0.1%
Multi Engine (Nonjet)	15	16	17	18	1.3%	1.3%	1.2%
Turboprop	15	19	22	27	4.8%	3.9%	4.0%
Jet Engine	67	78	90	104	3.1%	3.0%	3.0%
Helicopter	14	17	20	24	4.0%	3.6%	3.7%
Other	0	0	0	0	N/A	N/A	N/A
TOTAL	298	318	339	364	1.3%	1.3%	1.3%

B. Operational Factors

	Base Yr. Level	Base Yr.+5yrs.	Base Yr.+10yrs.	Base Yr.+15yrs.
Average aircraft size (seats)				
Air Carrier	N/A	70	70	70
Commuter	N/A	30	30	30
Average enplaning load factor				
Air Carrier	N/A	55%	65%	64%
Commuter	N/A	55%	65%	67%
GA operations per based aircraft	467	472	466	452

(1) Table is developed from Appendix B in the FAA Report, "Forecasting Aviation Activity By Airport."

Prepared by: Kimley-Horn, 2017.

3.10.5 FACILITY PLANNING FORECAST

The recommended forecast (or most probable forecast) as displayed in Section 3.10.4, will be referred to as PAL 1 in Section 4 for facility planning purposes. In the event that the aviation activity exceeds the recommended forecast at CRQ, a secondary facility planning scenario, referred to as PAL 2, was identified in order to examine additional facility requirements that may be necessary within the 20-year planning horizon. PAL 2 activity forecasts are based on potential activity levels identified in the RASP. As described in Section 4.2, PAL 2 generally reflects projected growth rates of passenger enplanements and resultant increase in commercial aircraft operations outlined in the RASP Baseline Forecast, which equates to 575,000 annual enplanements and 208,004 total aircraft operations by 2036. The methodologies employed to determine total operations are detailed in Section 4.2.

Section 4 - DEMAND/CAPACITY AND FACILITY REQUIREMENTS ANALYSIS

4.1 INTRODUCTION

This section provides a technical analysis of demand/capacity and facility requirements for CRQ. The purpose of this analysis is to compare the Airport's existing facilities to the projected aviation-related activity levels and identify any enhancements that may be needed to meet user demand and/or FAA design standards.

As discussed in preceding sections, the principal challenge facing CRQ is accommodating changes in the aviation industry and future development within the geographical footprint at CRQ. Airport development is costly, particularly within constrained environs. Since each project is typically planned to last many years, care must be taken to ensure that each development project adequately accommodates airport activity to the maximum extent practicable and does so safely.

Thus, it is important that airport owners/managers capitalize on opportunities to develop facilities and resources and identify those trends and events that occur in the airport vicinity that may create opportunities or pose challenges to the future viability of the airport. When these challenges are not planned for or when opportunities are missed, the airport can face external limits on its ability to operate, lose potential revenues, inhibit tenants' maximum lease benefits, and provide an overall lower standard of service to airport users.

Equally as important is the need for airport sponsors to consider the quality of life of nearby residents when planning facility improvements and for sponsors to proactively address concerns and, to the extent possible, mitigate impacts that may exist. Communities make significant investments in these public facilities to the benefit of the entire region that is served. Protection of this investment is responsible public policy that benefits the entire community.

This section of the Airport Master Plan Update includes the following elements:

- Planning Activity Levels
- Airfield Capacity
- Airfield Facility Requirements
- Landside Facility Requirements
- Passenger Terminal Facility Requirements
- Support Facility Requirements

4.2 PLANNING ACTIVITY LEVELS

For the analysis in the remainder of this Airport Master Plan Update, references to specific years will be minimized. Instead, planning activity levels are utilized to relate facility needs to the specific level of activity creating a specific facility requirement over the 20-year planning period. This will assist Airport staff and officials in determining the level of operational activity that triggers a capacity constraint that would be sufficient to support the need for some form of improvement or upgrade to airfield facilities. It is recognized that actual demand may vary from the forecasts but that demand will ultimately trigger facility needs, not a specific point in time.

Two specific planning scenarios have been developed for this Master Plan Update. The first, identified as Planning Activity Level 1 (PAL 1) incorporates the preferred forecasts of passenger enplanements and total aircraft operations identified in Section 3. The second scenario (PAL 2) describes a contingency scenario in the event that commercial aircraft operations and passenger enplanements exceed projected demand. PAL 2 generally reflects projected growth rates of passenger enplanements and resultant increase in commercial aircraft operations outlined in the RASP which was described in Section 3 (see

Table 4.1). Extrapolation of the RASP Baseline Forecast identifies 575,000 annual enplanements and 208,004 aircraft operations by 2036.

The number of total operations developed for PAL 2 were determined by combining GA, military, and non-scheduled air taxi operations in PAL 1 with the number of scheduled commercial operations required to accommodate 575,000 passenger enplanements using the same load factor and aircraft seat configuration criteria for scheduled airline operations described in Sections 3.9.1 and 3.9.2. The required number of daily air carrier departures and operations, commercial air taxi departures and operations, and total commercial operations needed to accommodate 575,000 passenger enplanements is presented in **Tables 4.1** and **4.2**.

It should be noted that these tables reflect the average number of daily departures and operations required, and when projected daily operations conducted by airlines 1, 2, and 3 are totaled and multiplied by the number of days in a calendar year, the result equates to 27,740 annual commercial operations by 2036. This number of operations would support a slightly higher number of enplanements than the 575,000 identified in PAL 2. Because there cannot be a fraction of a daily flight, the actual number of annual commercial operations required to accommodate 575,000 enplanements based on load factor and aircraft seat configuration criteria identified in Sections 3.9.1 and 3.9.2 by 2036 is 27,554 (23,421 air carrier, 4,133 air taxi). This forecast is used as the commercial operations planning metric for PAL 2.

Table 4.1– Air Carrier Operations Forecast – PAL 2

	Airline #1			Airline #3			Total
Year	Daily Departures	Daily Operations	Annual Operations	Daily Departures	Daily Operations	Annual Operations	Air Carrier Operations
2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2021	23	46	16,790	N/A	N/A	N/A	16,790
2026	27	54	19,710	N/A	N/A	N/A	19,710
2031	27	54	19,710	5	10	3,650	23,360
2036	27	54	19,710	5	10	3,650	23,360

Source: County of San Diego. Kimley-Horn, 2017. Note: N/A=Not applicable.

Table 4.2– Scheduled Air Taxi Operations Forecast – PAL 2

	Airline #2				Total
Year	Daily Departures	Daily Operations	Scheduled Air-Taxi Operations	Air Carrier Operations*	Total Commercial Operations**
2016	N/A	N/A	N/A	N/A	N/A
2021	6	12	4,380	16,790	21,170
2026	6	12	4,380	19,710	24,090
2031	6	12	4,380	23,360	27,740
2036	6	12	4,380	23,360	27,740

Source: County of San Diego. Kimley-Horn, 2017. * Airline 1 and 3 from Table 4.1. ** Represents rounded figures based on daily flights. Actual forecasted commercial operations in 2036 equal 27,554 (23,421 air carrier, 4,133 scheduled air taxi). Note: N/A= Not applicable.

A comparison of annual aircraft operations by type and passenger enplanements for PAL 1 and PAL 2 is presented in **Table 4.3**. It should be noted that both scheduled (airline) and non-scheduled air taxi operations are included within the air taxi category.

Since the forecasts developed for PAL 1 reflect recommended activity levels of the Airport Master Plan Update, facility planning should be based on needs developed for this scenario. Facility needs described for PAL 2 are intended solely for planning purposes in the event that activity in the future exceeds PAL 1.

It should be noted that activity levels identified in the Baseline Forecast in Section 3 are not used for facility planning purposes in this Airport Master Plan Update because it reflects the FAA TAF, which projects nominal passenger activity over the 20-year planning period and existing facilities are deemed adequate to accommodate such levels of demand.

Table 4.3– Facility Planning Demand Scenarios - 2036

Activity Type	PAL 1	PAL 2
Passenger Enplanements	304,673	575,000
Air Carrier Operations	12,410	23,421
Air Taxi Operations	12,727	14,670
General Aviation Operations	168,958	168,958
Military Operations	955	955
Total Operations	195,050	208,004

Source: RASP Forecasts, Final Report, Jacobs Consultancy, March 2011.
Prepared by: Kimley-Horn, 2017

4.3 AIRFIELD CAPACITY

The ability of an airport to serve its role in the regional and national airspace systems and to meet the current and future needs of the traveling public is dependent on unconstrained access to its facilities. The operational capacity of the surrounding airspace and of the airfield were evaluated using guidance contained in *FAA AC 150/5060-5, Airport Capacity and Delay*. Calculating airfield capacity, relative to forecast activity levels, also provides an indication of when airfield improvements or additional infrastructure may be needed so as not to increase aircraft congestion or delay.

Airfield capacity is the estimated number of total operations that an airfield configuration can facilitate in an established period of time and under a given set of assumptions regarding fleet mix, separation minima rules, weather conditions, and technological aides. The calculations of airfield capacity and delay are the basis for evaluating the adequacy of the runway and taxiway system to meet existing and future airport activity levels. The following analysis was conducted using the process outlined in FAA AC 150/5060-5, *Airport Capacity and Delay*, which identifies specific inputs/factors that must be considered in the development of capacity calculations.

A calculation of the runway system's capacity as presented in the guidance is based on a methodology that determines both hourly airfield capacity and Annual Service Volume (ASV) of the airfield. As defined by AC 150/5060-5, ASV is a reasonable estimate of an airport's annual capacity, accounting for differences in runway use, aircraft mix, prevailing weather conditions at the airport, and other factors that would be encountered over a year's time. Hourly capacity is the number of aircraft operations (departures and arrivals) that can be accommodated in a one-hour-time-period, given the configuration of the airfield (e.g., runway, taxiways) and the specific runway use strategy. Hourly capacity is calculated for both VFR conditions (i.e., generally clear visibility) and IFR conditions (i.e., periods of limited visibility and/or low cloud ceilings) and is expressed as the number of landings and takeoffs that can be accommodated within a one-hour period. Generally, more landings and takeoffs can be accommodated in visual conditions than during periods of reduced visibility.

4.3.1 CAPACITY FACTORS

Numerous factors are taken into account when evaluating airfield capacity, including runway use and configuration, meteorological conditions, aircraft fleet mix, touch and go operations, exit taxiways, and frequency of arrivals and departures. These conditions are described in the following sections.

Airfield Characteristics and Runway Use Configuration

The spatial configuration and number of runways, parallel taxiways, and exit taxiways have a direct influence on an airfield's ability to accommodate both the number of landings and takeoffs at an airport as well as the various types of aircraft in a given timeframe. The types of navigational aids, airfield lighting, surveillance radar, and other airfield instrumentation also affect runway capacity by facilitating flight operations at times when weather conditions do not allow for visual approaches. It is also important to consider the type and direction of operations in the particular timeframe.

At CRQ, there is a single runway alignment and two potential operational directions. Aircraft typically operate into the wind, so the orientation of a runway is typically established based on a review of historical wind direction and speed. The alignment of the runway is typically oriented to maximize the percent of time that operations can occur based on prevailing winds. In the case of CRQ, the runway is oriented in a northeast to southwest alignment. Runway use configuration (easterly vs. westerly flow) is tied to the percent of time that an aircraft can land or take off in a specific direction and not experience a direct tailwind or a crosswind that can, based on the crosswind speed, preclude its ability to operate. Therefore, runway use configuration is a significant input factor in determining airfield capacity for airports.

Meteorological Conditions

Runway capacity is highest during good weather conditions when visibility is at its best and visual flight rules are in effect. When visibility and cloud ceilings drop below certain FAA-established levels (3 statute mile visibility and a 1,000-foot ceiling), IFR go into effect, which results in greater horizontal separations between arriving and departing aircraft. Operating under these conditions increases runway occupancy times. Meteorological factors such as fog, low cloud ceilings, rain, and in some cases man-made conditions such as smoke, and in rare cases inversion events, all impact runway capacity when visibilities are low. These conditions may even cause runway closures at times when visibility drops below approach minimums. In the case of CRQ, the lowest approach minimums are associated with operations on Runway 24, which has a minimum required horizontal visibility of three-quarters of a mile and a 200-foot vertical ceiling for aircraft with approach speeds of less than 121 knots. Approach minimums are three-quarters of a mile horizontal visibility and a vertical ceiling of 300 feet above the published Airport elevation for aircraft with approach speeds of between 121 knots and 141 knots.

Based on the meteorological (wind and visibility) data obtained from the National Oceanic and Atmospheric Administration's National Climatic Data Center for CRQ, VFR weather conditions prevail approximately 88 percent of the time, while IFR conditions occur approximately 12 percent of the time. This information is based on weather observation data collected over a period of a minimum of least 10 years. The VFR/IFR percentages are input into the capacity assessment formula set forth in *FAA AC 150/5060-5 Airport Capacity and Delay* to calculate both hourly and annual throughput capacity of the airfield.

Aircraft Fleet Mix

Fleet mix, in the context of the capacity analysis, is used to describe the composition of various aircraft types that operate at an airport and is based on aircraft size and approach speeds. This metric affects airfield capacity because the size, weight, approach speed, and braking ability of operating aircraft affect the length of time the aircraft occupies the runway and the manner in which the air traffic controllers direct and horizontally separate activity. Variations in approach speeds and landing distance performance can affect the amount of time an aircraft occupies the runway (runway occupancy time), which in turn affects runway capacity. Larger aircraft generally have higher approach speeds and require more airspace compared to smaller aircraft. As such, a fleet mix comprised of a greater proportion of larger aircraft results in a decrease of airfield capacity.

The aircraft fleet mix is divided into four classes when estimating capacity. These classes are identified by the letters A through D and represent the group of aircraft by general type and weight. **Table 4.4** summarizes representative aircraft types found in each aircraft class and employs an alphabetic category reference. It is important to note that, although they share similar alphabetic designations, the fleet mix classes identified for the purposes of calculating airfield capacity are not the same as those used to determine the Aircraft Approach Category referenced in Section 2.2.1.

Table 4.4– Aircraft Classifications for Airfield Capacity Analysis

Class		Aircraft Type	
Class A		**Small Single-Engine (Gross Weight: 12,500 pounds or less)**	
Examples		Cessna 172/182	Mooney 201
		Beech, Bonanza	Piper Cherokee/Warrior
Class B		**Small Twin-Engine (Gross Weight: 12,500 pounds or less)**	
Examples		Beech Baron	Mitsubishi MU-2
		Cessna 402	Piper Navajo
		Lear 25	Cessna Citation I
Class C		**Large Aircraft (Gross Weight: 12,500 to 300,000 pounds)**	
Examples		Lear 35/55	Gulfstream (I thru V, G350/450/500/550/650)
		Embraer 120/135/ 145/170/175/190/195	Canadair CRJ100/200/700/900
		Saab 340	CRJ-700 Series
		BBJ	McDonald Douglas MD-88/90
		Boeing B737	Airbus A-318/A-319/A-320
Class D		**Large Aircraft (Gross Weight: more than 300,000 pounds)**	
Examples		Lockheed L-1011	Airbus A-300/A-310/A-330/A-340/A-350/A-380
		Boeing B767/B777	Douglas DC-8-60/70
		Boeing B747	McDonald Douglas MD-11

Note: Fleet mix classes identified here for the purposes of calculating airfield capacity are not the same as the Aircraft Approach Category referenced in Section 2.2.1.

Sources: *FAA Advisory Circular 150/5060-5, Airport Capacity and Delay; FAA AC 150/5300-13A, Airport Design.* Prepared by: Kimley-Horn, 2017

Table 4.5 presents the estimated percentage of operations by aircraft class for Base Year 2016, PAL 1 and PAL 2 as identified in **Table 4.3**. Projected operations by aircraft category are based on a review of historical operations by aircraft type at CRQ as well as the anticipated increase in commercial operations under PAL 1 and PAL 2.

Table 4.5 – Aircraft Fleet Mix Index

Weight Class	Air Carrier	Air Taxi	GA	Military	Total	Mix Index
Operational Fleet Mix - 2016						
A/B	0	2,695	75,109	745	78,549	53%
C	1	6,287	63,982	210	70,480	47%
D	0	0	0	1	1	0%
Total	1	8,982	139,091	955	149,029	100%
Operational Fleet Mix – PAL 1						
A/B	0	3,818	91,237	745	95,800	49%
C	12,410	8,909	77,721	210	99,249	51%
D	0	0	0	0	0	0%
Total	12,410	12,727	168,958	955	195,050	100%
Operational Fleet Mix – PAL 2						
A/B	0	3,818	91,237	745	95,800	46%
C	23,421	10,852	77,721	210	112,203	54%
D	0	0	0	0	0	0%
Total	23,421	14,670	168,958	955	208,004	100%

Sources: FAA Operational Network (OPSNET); FAA TFMSC Database; Prepared by: Kimley-Horn, 2017

Class B and C aircraft make up the bulk of the operational aircraft fleet mix currently at CRQ, a trend anticipated to continue throughout the planning period. The projected aircraft fleet mix classes at the Airport are then used to calculate a mix index. The formula established in *FAA AC 150/5060-5 Airport Capacity and Delay* for calculating the mix index is C+3D, with C representing the percentage of aircraft greater than 12,500 pounds but less than 300,000 pounds, and D representing the percentage of aircraft greater than 300,000 pounds. The lower the calculated mix index, the higher the percentage of A and B aircraft that make up the composition of the fleet.

Based on the anticipated mix of aircraft expected to utilize the Airport throughout the planning period, the mix index calculation for CRQ designated in the "C" category is anticipated to increase from 47 percent in 2016 to 51 percent by the end of the 20-year planning horizon for PAL 1, and 54 percent for PAL 2. No operations by Category D aircraft are anticipated at any point in the planning horizon. Mix indices between 21 percent to 50 percent yield different values for taxiway exit factors than mix indices between 51 percent and 80 percent. This is discussed in greater detail in the subsequent section entitled, "Taxiway Exit Factor."

Touch and Go Operations

Touch and go operations are conducted primarily for practice and flight training and have the ability to significantly affect runway capacity. Because touch-and-go operations result in lower runway occupancy times than full-stop landing operations, a runway will typically be able to accommodate more touch and go operations in a given time period. As noted in the 1997 Master Plan, touch and go operations were estimated to comprise approximately 33 percent of general aviation operations at the Airport. Since the last master plan, the level of touch and go operational activity has declined as a percentage of total aircraft operations. Based on discussions with the ATCT and review of their data, it was determined that touch and go operations currently comprise approximately 10 percent of operations at the Airport. For the purposes of the capacity analysis, this level of activity is assumed to continue throughout the planning period.

Taxiway Exit Factor

Similar to runways, the presence of well-placed taxiways can significantly affect the level of air traffic an airfield may ultimately accommodate. Well-placed exit taxiways can help reduce runway occupancy times by enhancing the efficiency with which aircraft can exit the active runway and allow other operations to take place on the runway. A well-placed set of exit taxiways can preserve or enhance levels of operational capacity on the runway they serve. Utilizing the methodology contained in AC 150/5060-5, an exit factor is determined based on the number and placement of exit taxiways along the runway alignment within a specified distance identified in the FAA guidance for the calculated aircraft mix index.

At CRQ, there is a mix of aircraft types that range from relatively low speed, single-engine piston aircraft to high-performance corporate jets. These aircraft types possess significantly different landing speeds, which may vary by as much as 50 to 70 knots (57 to 80 mph), and the location along the runway that these varying aircraft can safely exit the runway after landing also varies considerably. The period of time that a landing aircraft must remain on the runway corresponds with that runway's capacity. This can be addressed by placing taxiway exits at optimum locations for the mix of aircraft types that operate at an airport.

The Airport's projected fleet mix index for each forecast demand scenario determines the prescribed exit location range from the threshold for exit taxiways to be considered (see **Table 4.6**).

Table 4.6 – Aircraft Fleet Mix Index and Affiliated Taxiway Exit Ranges

Aircraft Fleet Mix Index	Taxiway Exit Ranges (Feet from Landing Threshold)
0 to 20	2,000 feet to 4,000 feet
21 to 50	3,000 feet to 5,500 feet
51 to 80	3,500 feet to 6,500 feet
81 to 120	5,000 feet to 7,000 feet
121 to 180	5,500 feet to 7,500 feet

Sources: FAA Advisory Circular AC 150/5060.5 Airport Capacity Delay. Prepared by: Kimley-Horn, 2017

In terms of operations for the Base Year 2016, the estimated mix index is between 21 and 50, which results in a prescribed exit range for taxiway exits between 3,000 and 5,500 feet from the landing thresholds. The exit range under current operational activity is indicative of an aircraft fleet mix comprised of a higher percentage of light aircraft (under 12,500 pounds) activity. This mix would be typified by a predominance of single- and twin-engine piston aircraft that often require shorter landing distance. For a mix index of 21 to 50, the optimum placement of taxiway exits should be between 3,000 and 5,500 feet from the landing threshold that is in use at the time of the landing operation.

Based on FAA guidance, if a runway has four or more taxiway exits within the prescribed distances for the mix index then a value of 1.0 is assigned. If there are less than four exits in the range, then a reduced value based on the number of exits is assigned. The specific taxiway exit values are delineated based on the airfield configuration and are presented in the FAA guidance. Runway 06 and 24 both have two existing exit taxiways located within the prescribed range for the 21 to 50 mix index. The resulting Taxiway Exit Factor values for both VFR and IFR conditions as set forth in FAA guidance are presented in **Table 4.7**.

For PAL 1 and PAL 2, an operational scenario that involves a higher level of commercial operations, the fleet mix index, range increases to the 51 to 80 category. This increase is triggered by the anticipated increase in commercial operational activity and an increase in the size of the commuter aircraft that typically occurs as a result of the higher level of passenger activity assumed under the PAL 1 and PAL 2 scenarios. Thus, the mix index is indicative of a fleet with higher commuter jet activity and a greater number of aircraft with weights over 12,500 pounds.

The change in the mix index triggers a change in the prescribed taxiway exit range. This results from the fact that the fleet is incorporating more operations by aircraft heavier than 12,500 pounds that, as a result, often have longer landing roll-outs. For the mix index of 51 to 80, the prescribed distance for taxiway exits as set forth in the FAA guidance is 3,500 feet to 6,500 feet from the runway landing thresholds.

For the 51 to 80 mix index and its affiliated taxiway exit range, Runway 06 has two exit taxiways, and Runway 24 has one exit taxiway within the prescribed taxiway exit range (3,500 to 6,500 feet). The resultant taxiway exit factor values for Runway 06 and Runway 24 for the 51 to 80 mix index under both VFR and IFR conditions are presented in **Table 4.7**.

Table 4.7 – Taxiway Exit Factor Values

Runway	Activity Scenario	Mix Index	Exit Range	Visibility	Exit Factor
Runway 06	Existing	21 to 50	3,000 to 5,500	VFR	0.93
Runway 06	Existing	21 to 50	3,000 to 5,500	IFR	0.92
Runway 24	Existing	21 to 50	3,000 to 5,500	VFR	0.83
Runway 24	Existing	21 to 50	3,000 to 5,500	IFR	0.83
Runway 06	PAL 1 & 2	51 to 80	3,500 to 6,500	VFR	0.83
Runway 06	PAL 1 & 2	51 to 80	3,500 to 6,500	IFR	0.83
Runway 24	PAL 1 & 2	51 to 80	3,500 to 6,500	VFR	0.83
Runway 24	PAL 1 & 2	51 to 80	3,500 to 6,500	IFR	0.83

Sources: FAA Advisory Circular 150/5060.5 Airfield Capacity Delay Handbook. Prepared by: Kimley-Horn, 2017.

Arrivals/Departures

The percentage of aircraft arrivals and the sequencing of aircraft departures are two other operational characteristics that affect overall airfield capacity. The percentage of aircraft arrivals is the ratio of landing operations to total airport operations during a given timeframe. This percentage is important because arriving aircraft require higher runway occupancy time than departing aircraft. The FAA methodology provides for the use of 40 percent, 50 percent, or 60 percent of aircraft arrivals in the computation of airfield capacity. For CRQ, a 50 percent aircraft arrivals figure was inputted, as the Airport does not typically experience significant peaks of arriving or departing aircraft often associated with busier commercial service airports.

4.3.2 Hourly Capacity

Hourly capacity is a measure of the maximum number of aircraft operations that can be accommodated at the airport in an hour. Hourly capacity is compared to peak hour activity projections, the busiest hour at the airport each day, to determine if an airport can accommodate projected peak hour operations. The hourly capacity during VFR and IFR conditions was calculated using the methodology described in Section 3 of FAA AC 150/5060-5. Based on the hourly capacity methodology set forth in this AC, the calculated hourly capacity of the Airport that incorporates mix index, taxiway exit factor, runway use percentages, and prevailing weather/visibility conditions, was determined to vary between 54 and 63 hourly aircraft operations in VFR conditions and 47 to 52 hourly IFR aircraft operations.

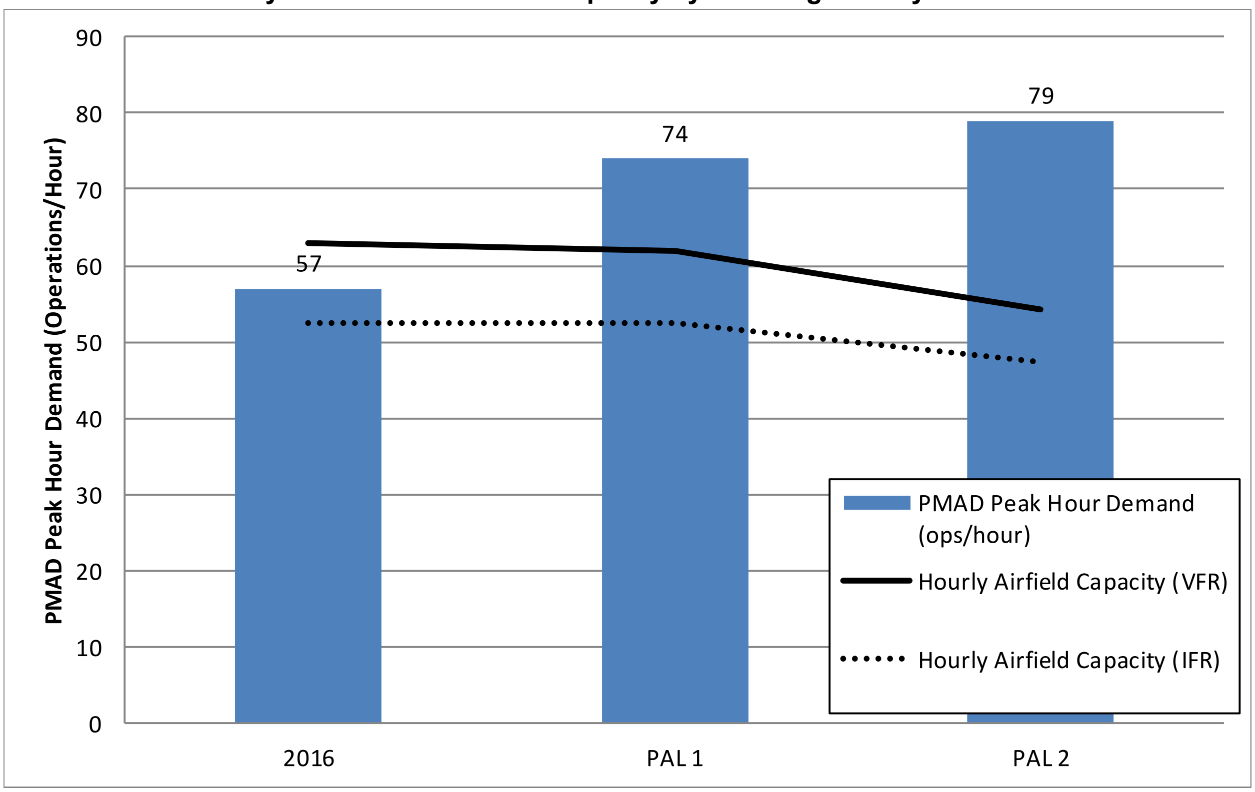
Peak hour demand was determined by applying a 12 percent value of peak month average day operations forecasts and is projected to increase from 57 operations in 2016 to 74 in PAL 1 and 79 in PAL 2. It should be emphasized that the peak hour would only occur occasionally throughout the year, during the busiest hours of the peak season. **Exhibit 4.1** shows projected hourly operational demand for each of the PALs compared to hourly airfield capacity based on the FAA methodology identified in the AC. The dashed line in **Exhibit 4.1** represents the hourly capacity when the Airport is operating under IFR (during periods of inclement weather or other period of limited visibility). The solid line on the chart represents the hourly capacity of the existing runway system during VFR conditions (when visibility is not below three miles). Hourly capacity during IFR is typically less than during VFR due to increased spacing between landing aircraft and greater horizontal spacing between departing aircraft.

The decrease in IFR and VFR capacity from Base Year 2016 to PAL 1 and PAL 2 is a result of the change in the projected aircraft fleet mix index. By the time demand reaches the level identified in PAL 1, the number of Category C aircraft (aircraft greater than 12,500 lbs. but less than 300,000 lbs.) is projected to increase with additional airline service.

As depicted in **Exhibit 4.1**, the level of projected hourly operational demand, based on the peak demand hour, is anticipated to exceed IFR and VFR capacities for both PAL 1 and PAL 2 by 2036. This is attributed to changes in the fleet mix, under the level of demand occurring at the operational demand level associated with PAL 1 and PAL 2.

As operational demand approaches the capacity of the runway/taxiway system at an airport, aircraft operational delays, the number of minutes an aircraft is delayed from the originally scheduled arrival or departure, increase. As demand further approaches airfield capacity, this delay increases exponentially. A significant increase in aircraft delay corresponds with a decrease in the level of service provided to airport users and tenants not only at CRQ, but the national airspace system as well. At the same time, operational costs increase as aircraft have longer queues to depart and longer queues to land. This results in greater aircraft fuel use, and higher costs to passengers and persons waiting. Further details on the delay levels at CRQ and potential mitigation measures are discussed in Section 4.3.3.

Exhibit 4.1 Hourly VFR and IFR Airfield Capacity by Planning Activity Level



Sources: *FAA Advisory Circular 150/5060-5, Airport Capacity and Delay; Prepared by: Kimley-Horn, 2017*

4.3.3 Annual Service Volume (ASV)

ASV represents an approximation of an airport's annual capacity, taking into consideration weighted hourly capacities and the hourly, daily, and monthly operational patterns. *FAA AC 150/5060-5 Airport Capacity and Delay* refers to ASV as "a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time."

The weighted peak hour capacity (C_w) was developed using the previous analyses and the methodology in Chapter 3 of *AC 150/5060-5 Airport Capacity and Delay*. Weighting factors are established in the FAA's guidance and relate to annual demand as a percentage of maximum capacity, the percent of maximum capacity under VFR conditions, and the percent of maximum capacity under IFR conditions by mix index (see Table 3.1 of AC 150/5060-5). The C_w is multiplied by two operational ratios to obtain the airport's estimated ASV: D (the ratio of annual demand to average daily demand in the peak month) and H (the ratio of average daily demand to average peak hour demand during the peak month).

The data used for calculating these two ratios for each PAL was based on the peaking characteristics outlined in Section 3.9. ASV is then calculated through the following formula:

- ASV = C_w x D x H

The resulting ASV estimates compared to the projected annual operations for the forecast scenarios are summarized below in **Table 4.8.**

Table 4.8 – ASV Demand/Capacity Summary

Year/Planning Level	Projected Annual Operations	Annual Service Volume	Ratio of Annual Operations to ASV
Base Year (2016)	149,029	194,000	76.8%
PAL 1	195,050	193,300	100.9%
PAL 2	208,004	195,400	106.4%

Prepared by: Kimley-Horn, 2017

Based on projected activity and type of aircraft in operation, the Airport's ratio of annual operations to ASV would be expected to be 100.9 percent by the end of PAL 1 and 106.4 percent by the end of PAL 2. FAA airport planning guidelines recommend planning for airfield capacity improvements when projected demand reaches 60 percent of capacity and implementing those improvements when an airport reaches 80 percent of its calculated ASV. At CRQ, the taxiway exit factor and fleet mix index are anticipated to remain relatively consistent (no monumental changes) throughout the planning period. As such, the only action that would significantly increase airfield capacity would be an additional runway, which, due to geographical constraints and the type of users that the Airport serves, is not a viable option.

It should be noted that ASV is not an absolute limit of operational capacity. An airport can operate at a level of activity that exceeds ASV but will do so at a degradation to the level of service provided and with potential operational delays. As airports approach their ASV level, delay begins to expand exponentially, and operators will often choose other airports if that option is available. Aircraft delay calculations are identified in *FAA AC 150/5060-5 Airport Capacity and Delay*, Table 2-2. As noted in previous sections of this Airport Master Plan Update, activity levels are not anticipated to surpass the PAL 1 forecast. The average delay per (which incorporates both IFR and VFR conditions) for 195,050 annual operations (PAL 1) would be approximately 2 minutes per aircraft operation.

The ability of the Airport to fully address the requisite level of operational capacity necessary to accommodate demand scenarios may be challenging; however, it should be noted that the Airport has had annual operational levels exceeding 208,004 (total operations forecast in PAL 2) in the past. As recently as 2007, CRQ experienced over 215,000 aircraft operations. Extensive on-airport development, the limited property envelope associated with the Airport, and adjacent off-Airport development all pose challenges to accommodate projected levels of demand. Actions that would significantly increase operational capacity such as development of a parallel runway are simply not possible due to the cost and environmental impacts such an action would generate. Adjustments to the placement of taxiway exits from the runway to parallel taxiways should be considered in order to better meet the demands of the changing aircraft fleet. This will be addressed in greater detail in the Airport Master Plan Update sections that pertain to development alternatives.

4.4 AIRFIELD FACILITY REQUIREMENTS

As an element of the existing facility requirements analysis, airfield facility needs presented in this section identify improvements to existing CRQ runways and taxiways necessary to meet forecasts of operational demand associated with the PAL scenarios. This section reviews the existing facilities from both a capability and a design standards perspective to define the airfield requirements necessary to accommodate current activity and changes in the complexion of aircraft operations that may occur in the future.

The analysis of airfield facility requirements builds off the previously documented inventory of existing facilities and considers both the demand projections contained in the activity forecasts and the operational capacity calculations in this section to determine potential improvements to accommodate future activity at the Airport. The result of this analysis is the identification of excess or deficient capacity/capability of the airfield's ability to provide for current and projected levels of activity and the type of aircraft responsible for that activity.

As noted, this analysis is intended to present the optimum improvement that should be evaluated. The improvements recommended in this section will be described in greater detail in the Alternatives Analysis Section of this Airport Master Plan Update. In short, the facility requirements assessment provides a listing of needed improvements, while the alternatives analysis reviews the environmental, operational, financial, and feasibility considerations that determine whether or not a desired improvement can realistically be implemented. Before the airfield facilities requirements at CRQ are evaluated, it is important to review criteria that are employed by the FAA for the planning and design of airports. These criteria establish certain benchmarks used to define the adequacy of specific airport areas and facilities.

4.4.1 RUNWAY ORIENTATION

The orientation of a runway at an airport is primarily a function of wind direction and velocity. Ideally, a runway is oriented with the prevailing wind, as taking off and landing into the wind enhance aircraft performance. The FAA recommends that the primary runway have at least 95 percent wind coverage, which means that 95 percent of the time, the wind at an airport is within acceptable crosswind limitations. Crosswind coverage is calculated using the highest crosswind component that is acceptable for the types of aircraft expected to use the runway system. Larger aircraft have a higher tolerance for crosswind than smaller aircraft due to their size, weight, and operational speed. If 95 percent coverage cannot be met by the primary runway, an additional "crosswind runway" may be needed to safely accommodate the aircraft needing the additional crosswind coverage. FAA guidance recommends that an airport's runway configuration provide runway availability of at least 95 percent on the basis of the most applicable crosswind velocity component. Crosswind threshold criteria vary depending upon aircraft size and approach category. The FAA criteria are delineated in **Table 4.9**.

Table 4.9 – Allowable Crosswinds by Design Code

Runway Design Code	Allowable Crosswind Component
A-I and B-I (including A-I/B-I small aircraft)	10.5 knots
A-II and B-II	13 knots
A-III, B-III, C-I through C-III, D-I through D-III	16 knots
A-IV and B-IV, C-IV through C-VI, D-IV through D-VI	20 knots
E-I through E-VI	20 knots

Source: FAA Advisory Circular AC 150/5300.13A, Change 1. Prepared by: Kimley-Horn, 2017

Runway 06-24 is aligned in a northeast-southwest direction. The prevailing winds at CRQ are predominantly from the southwest from the Pacific Ocean. According to the wind data analysis for the Airport, CRQ has 99.25 percent wind coverage for the 10.5-knot component and 99.94 percent coverage at 16.0 knots based on the existing single runway alignment. As a result, the existing runway orientation not only meets but exceeds the wind coverage threshold criteria, and no further airfield enhancements are necessary from a wind coverage perspective.

It should be noted that, although the wind coverage is adequate for Runway 06-24, the magnetic variation of the Runway has changed over time. As noted on the Airport Layout Plan, magnetic variation changes at a rate of approximately 0 degrees, 5 minutes, 0 seconds each year. As such, when adjusting for the magnetic variance of 12 degrees, 4 minutes, the true bearing Runway 06-24 has been determined to be approximately 67 degrees, 2 minutes, 32 seconds. According to *FAA AC 150/5340-1L, Standards for Airport Markings*, the runway designation number is defined as the whole number nearest the one-tenth of the magnetic azimuth along the runway centerline when viewed from the direction of the approach. As such, based on the gradual shift of the Earth's magnetic poles, the actual true bearing of the existing runway is calculated to be 07-25.

The process to change a runway's designation number must be formally approved by the FAA and can take a significant amount of time to be completed. As such, references to the existing runway in this Airport Master Plan Update and the updated Airport Layout Plan remain as 06-24; however, it is recommended that the Airport consult with the FAA to pursue a formal change in the Runway's designation number.

4.4.2 Runway Requirements

Airport commercial service briefly discontinued in April 2015, and a new carrier resumed air service in June 2015. This carrier has since halted operations. Cal Jet by Elite Airways started commercial service in September 2017 utilizing 64-seat CRJ-700 aircraft, which has an AAC/ADG of C-II. Previously, commercial service had been conducted by the Embraer EMB-120, which carries a B-II designation. Although the CRJ-700 is now in operation, as has been noted, the critical aircraft is anticipated to remain the Gulfstream G650 or a comparably sized general aviation business jet because they are larger, faster aircraft types. The only facility that is the exception to this is the EMAS, which should be designed to accommodate the critical design aircraft. The analysis of future runway requirements includes criteria such as runway length, dimensional standards including pavement width and safety areas, and pavement strength.

4.4.2.1 Runway Length Requirements

The Airport is utilized by a large variety of general aviation aircraft, ranging from single-engine propeller-driven aircraft to large corporate jet aircraft such as the Gulfstream G550, G650 and Bombardier Global Express. Until May 2015, it served regional aircraft, notably the Embraer-135 and currently serves, 64-seat CRJ-700 aircraft operated by Cal Jet by Elite Airways. The national commuter airline fleet has been transitioning away from both turboprops and smaller regional jet models. In the latter case, this has occurred as the 35- to 50-seat commuter jets have become less profitable given their operational costs.

Table 4.10 delineates runway takeoff and landing length requirements of typical general aviation jet aircraft that utilize the Airport. The requirements were developed using aircraft manufacturer airport and flight planning manuals, published Airport elevation, and mean maximum daily temperature of the warmest month data from the National Climatic Data Center and are consistent with FAA analytical procedures. Distances highlighted in **blue** indicate that an aircraft's required takeoff length is at or very close to the existing available length at CRQ, while distances highlighted in **red** represent aircraft whose takeoff distances exceed Runway 06-24's available length of 4,897 feet by at least 100 feet.

Table 4.10 – Runway Takeoff and Landing Length Requirements

Aircraft Type	Takeoff Length at Maximum Takeoff Weight (MTOW)	Takeoff Length at 75% MTOW	Takeoff Length at 50% MTOW	Landing Length at Maximum Landing Weight (MLW)	Landing Length at 50% of MLW
Regional Commuter Aircraft					
CRJ-900	6,900	6,300	5,600	5,800	4,900
CRJ-700	5,500	4,900	4,400	5,100	4,600
CRJ-200	6,600	5,700	4,800	4,900	4,200
EMB-190	5,400	4,800	4,100	4,000	3,700
EMB-175	5,200	4,900	4,300	4,700	4,300
EMB-170	4,900	4,400	3,800	4,100	3,700
EMB -145	6,600	5,400	4,600	4,600	4,300
EMB–120	5,900	5,100	4,400	4,400	4,200
DASH 8 Q400	5,200	4,700	4,300	2,600	2,500
DASH 8-200	4,000	3,600	3,400	1,600	1,500
General Aviation Jet Aircraft					
Cessna Citation Encore	4,100	3,400	3,000	2,900	2,600
Cessna Citation XLS	4,000	3,500	3,100	3,320	2,900
Cessna Citation X	5,700	4,700	3,900	3,600	2,900
Cessna Citation Sovereign	3,900	3,500	3,400	2,770	2,400
Bombardier Global Express XRS	6,190	N/A	N/A	2,670	N/A
Gulfstream G450	5,700	4,610	3,800	5,380	4,600
Gulfstream G550	6,200	4,730	3,780	4,613	3,800
Gulfstream G650	6,500	5,200	4,100	3,508	2,800
Hawker 800	7,140	5,700	4,500	2,800	2,300
Hawker 400/Beechjet	5,900	5,200	4,300	3,550	3,200

Highlighted values indicate required runway lengths in excess of the available runway length at CRQ
Sources: Runway length values based on aircraft performance charts from manufacturer aircraft characteristics manuals. Prepared by: Kimley-Horn, 2017.

Based on the runway length requirements of several different types of aircraft shown above, the existing length is adequate for most aircraft when operating at reduced loads, including the CRJ-700, which currently provides scheduled commercial service. However, takeoffs at maximum takeoff weight (MTOW) or even 75 percent of MTOW are not possible for several mid-to-large size corporate and regional/commuter airline aircraft. Additional length for Runway 06-24 would be beneficial to support operations of aircraft currently operating at CRQ and forecasted aircraft.

Larger corporate aircraft often stop and refuel at nearby airports with longer runways such as SAN in order to reach their destination. This poses a significant inconvenience to operators, leads to lower fuel sales at CRQ, and increases the amount of fuel aircraft consume and emissions released into the environment.

The 2013 Feasibility Study recommended that Runway 06-24 be extended by 900 feet to provide a total runway length of 5,800 feet. This length was essentially defined as being the greatest runway extension possible at CRQ given surrounding constraints and conforming to the airfield design dimensional criteria for B-II aircraft only and did not consider other design group criteria. While the Airport Master Plan Update runway length analysis considers an extension of Runway 06-24 to the extent identified in the 2013 Feasibility Study, the analysis of the 2013 Feasibility Study did not establish or address the viability of an extension that could be reasonably achieved given the constraints that exist off the runway ends at CRQ. Proposed runway extensions of varying lengths are identified in the Alternatives Analysis; for the purposes of this Airport Master Plan Update, in order to accommodate existing and projected operating aircraft at CRQ including the anticipated future design aircraft (Gulfstream G650), an extension of up to 800 feet is recommended to provide the Airport with approximately 5,700’ of runway length.

4.4.2.2 Runway Dimensional Standards

Runway dimensional standards are determined by the RDC of the runway. The AAC and ADG are combined with the visibility minimums of the runway to form the RDC. Dimensional standards pertaining to runways and runway-related separations are essential to provide clearances from potential hazards affecting routine aircraft movements on the runways. These standards relate to separations for parallel runways, hold lines, parallel taxiways, aircraft parking, obstacle free areas, and safety areas.

Currently, Runway 06-24 is classified with an RDC of B-II-4000 (AAC B, ADG II, Runway Visual Range 4,000 feet). As noted in Section 3, there are a significant number of aircraft operations at CRQ that exceed the B-II designation. As such, facility improvements and development alternatives should be geared toward achieving design standards based on aircraft that currently operate, and that are projected to operate at an airport. Any transition from ADG II to ADG III along with the change from AAC B to an AAC D triggers an increase in the runway related safety dimensions.

Table 4.11 presents the existing runway-related dimensional standards for Runway 06-24 and compares them to the existing dimensional standards (B-II-4000), and those recommended in the future (D-III-4000). The design standards requirements will be further addressed as needed in the Alternatives Analysis Section. Runway 06-24 meets or exceeds the design standards of B-II. **Table 4.11** also identifies that Runway 06-24 does not meet most of the separation and safety design standards required for a D-III facility.

An example from **Table 4.11** for the impact of the change in ARC from B-II to D-III is the dimensional requirements associated with the Runway Safety Area (RSA) and ROFA. The RSA length for AAC B is 240 feet from the runway end, while a D category RSA is 1,000 feet in length. Implementation of a 1,000-foot RSA at CRQ would reduce the available length off the end of the runway for a runway extension and inhibit operational capabilities. A potential option for addressing RSA length requirements (but not width) could involve the construction of an engineered materials arresting system (EMAS) and in some cases, the use of declared distances. When runway thresholds have been displaced, enhanced operational safety or additional utility for turbine powered aircraft may sometimes be acquired through the use of declared distances per FAA AC 150/5300-13A. Declared distances identify what distances are available for takeoff, landing, and rejected-takeoff aircraft performance requirements as approved by the FAA. In some specific cases, declared distances can help satisfy design standards for runways with displaced thresholds while minimizing their dimensional impacts to runway length. As it pertains to CRQ, in order for the airfield to satisfy D-III runway design standards, a combination of EMAS as well as declared distances may enhance operational safety and provide an efficient use of limited runway length.

Table 4.11 – Runway Dimensional Standards

Design Criteria	B-II-4000 Design Standard	Existing Runway Dimensions		D-III-4000 Design Standard
		6	24	
Runway:				
Width	75	150		100
Safety Area Width	150	150		500
Safety Area Prior to Landing Threshold	300	300	300	600
Safety Area Length Beyond R/W End	300	300	300	1,000
OFA Width	500	500		800
OFA Length Beyond R/W End	300	300	300	1,000
Approach RPZ Length	1,000(vis)/1,700**	1,000	1,700	1,700(vis)/1,700**
Approach RPZ Inner Width	500(vis)/1,000**	500	1,000	500(vis)/1,000**
Approach RPZ Outer Width	700(vis)/1,510**	700	1,510	1,010(vis)/1,510**
Runway Centerline to:				
Parallel Taxiway Centerline	240	297-300		400
Aircraft Hold Line	200	250		250
Aircraft Parking Limit Line	250	370		500

Sources: FAA Advisory Circular 150/5300-13A, Change 1; Prepared by: Kimley-Horn, 2017.

4.4.2.3 Runway Width

The standard runway width for aircraft in the D-III category is typically 150 feet; however, for aircraft with a maximum certificated takeoff weight of 150,000 pounds or less and an airport with approach visibility minimums of not less than ¾-mile, the standard runway width is 100 feet. Runway 06-24 is presently 150 feet in width. The aircraft that currently operate on a routine basis and those projected to operate at CRQ all have maximum certificated takeoff weights of less than 150,000 pounds.

The lowest approach visibility minimum at CRQ is ¾ mile, given the visibility conditions that typically occur at the Airport, the requirement of lowering minimums is not anticipated. Retention of the existing 150-foot width, while beneficial, does present limitations on the ultimate length the runway can be.

While retaining a runway width of 150 feet is ideal, it increases maintenance costs, limits the runway's length in its existing configuration due to associated safety areas and geographical constraints, and may not be eligible for future FAA funding since it exceeds the required dimensional standards. Despite these impacts, it is preferable that the runway maintains its 150-foot width, as additional width enhances safety and operational capability.

4.4.2.4 Runway Shoulder Width

Shoulder areas adjacent to the runway pavement are designed to prevent jet-blast erosion and support the occasional passage of aircraft, maintenance equipment, or emergency equipment under dry conditions. Paved shoulders are required for airfield pavements that accommodate Airplane Design Group (ADG) IV and higher aircraft, and are recommended for pavements supporting ADG-III aircraft. Turf, aggregate-turf, soil cement, lime or bituminous stabilized soil are acceptable for airfield pavements accommodating ADG-I and II aircraft. Similar to the criteria for runway width, the width of a paved shoulder is reduced from 25 feet to 20 feet on runways serving aircraft with a maximum takeoff weight of less than 150,000 pounds and approach minima of not less than ¾-mile. If Runway 06-24 is narrowed to 100 feet, 20-foot paved shoulders are recommended in order to prevent erosion.

4.4.2.5 Runway Blast Pads

Runway blast pads are required to be paved and extend beyond the ends of the runway to minimize erosion associated with aircraft jet blast. CRQ currently has paved blast pads off both ends of Runway 6-24. The blast pad on the Runway 06 end (west end of runway) is 200 feet wide by 265 feet in length, while the Runway 24 blast pad (east end of runway) is 150 feet wide and 200 feet long. The required blast pad width for D-III is typically 200 feet; however, for aircraft with maximum certificated takeoff weight of 150,000 pounds or less and approach visibility minimums of not less than ¾-mile, the standard width is 140 feet. The required runway blast pad length for D-III standards is 200 feet. Both blast pads exceed the dimensional criteria contained in FAA guidance and no improvements, other than maintenance of the blast pad surface and markings, are required.

4.4.2.6 Pavement Strength Requirements

According to the 5010 Airport Master Record, Runway 06-24 has a published pavement strength of 60,000 pounds for single-wheel landing gear configuration, 80,000 pounds for dual-wheel landing gear configuration, and 110,000 pounds for dual-tandem wheel landing gear configuration. There are no known aircraft with a single gear configuration in the active fleet that exceed a 60,000-pound maximum takeoff weight. As a result, the current weight bearing capacity for aircraft with a single gear configuration is sufficient to meet both the current fleet of these aircraft types as well as any future aircraft types anticipated to operate at CRQ.

The Airport experiences a significant number of operations by aircraft that are equipped with dual wheel landing configuration. Only a few of these operations occur by aircraft that have landing weights that exceed the existing 80,000-pound dual wheel strength rating. Aircraft that do routinely operate at CRQ are close to the pavement strength include the Gulfstream G650 (maximum takeoff weight of up to 99,600 pounds) and the Gulfstream G500/550 (91,000 pounds) that have in the past and are currently based at the Airport.

Using TFMSC data from a 2016 sample of 20 percent of the annual operational activity by aircraft type at CRQ (approximately 30,500 operations sampled), operations by the Gulfstream G 500/550/650 accounted approximately 750 landings and takeoffs. Combined, these aircraft exceed the operational threshold for use as a design aircraft for runway pavement strength purposes and support the contention that no additional runway pavement strengthening would be needed to meet projected demand. It should be noted that runway pavement strength requirements are based off different activity thresholds standards than runway dimensional standards. While the threshold remains 500 annual operations, this is based off aircraft weight rather than wingspan and approach speed. While pavements can withstand operations that exceed design strength, based on the current runway length at CRQ, heavier corporate aircraft are unlikely to operate at or near maximum takeoff weight and it is estimated that existing runway pavement strength is adequate for dual wheel configurations.

It should also be noted that the existing 110,000-pound dual wheel loading (DWL) strength of Runway 06-24 is sufficient to meet the fleet of commercial aircraft that could operate throughout the planning horizon.

4.4.3 Taxiway Requirements

Taxiway requirements are grouped into design standards based on ADG, and design standards based on Taxiway Design Group (TDG). Design standards based on ADG are designed to enhance safety of operating aircraft, and address lateral separation between other parallel taxiways, the taxiway and the runway, and object clearing areas. Standards based on TDG include pavement dimensions such as taxiway width, shoulder width, and fillet size.

The Airport's existing taxiway system primarily consists of two parallel taxiways along Runway 06-24, and various connector taxiways along both the north and south sides of the runway. For Taxiway A requirements, the existing critical/design aircraft is the Cessna Citation Sovereign, which is an ADG II aircraft with a landing gear configuration that garners a TDG 2 designation. Taxiway safety areas and object free areas, however, conform to ADG II standards. The future critical/design aircraft is the Gulfstream G650, which is an ADG III aircraft with a TDG 2 designation. When the Airport's ADG changes to III, the associated taxiway safety areas identified in *FAA AC 150/5300-13A* for that classification will need to be adhered to.

Taxiway N is 35 feet wide and serves the North Apron, which is limited to small aircraft (less than 12,500 lbs.) As such, Taxiway N is designed to accommodate ADG I aircraft. **Table 4.12** presents taxiway dimensional standards to be applied at the Airport relative to ADG II and TDG 2 design standards for Taxiway A and ADG I and TDG 2 standards for Taxiway N. As shown, CRQ meets or exceeds applicable taxiway dimensional requirements.

Table 4.12 – Taxiway Dimensional Requirements

Item	ADG II / TDG 2 Design Standards	*Taxiway A*	ADG I/ TDG 2 Design Standards	*Taxiway N*
Taxiway Width (ft.)	35	*50*	35	*35*
Taxiway Safety Area Width (ft.)	79	*79*	49	*49*
Taxiway OFA Width (ft.)	131	*131*	89	*89*
Taxilane OFA Width (ft.)	115	*115*	79	*79*
Taxiway Centerline to:				
Fixed or Moveable Object (ft.)	65.5	*65.5*	44.5	44.5
Taxiway/Taxilane Centerline Parallel Runway Centerline (ft.)	240	*297*	225	*300*

Sources: FAA Advisory Circular 150/5300-13A. Prepared by: Kimley-Horn, 2017.
Note: All distances in feet

4.4.4 Other Airfield Requirements

4.4.4.1 Navigational Aids (NAVAIDS)

The Airport's on-site electronic NAVAIDS consist of an instrument landing system (ILS) installation that includes a localizer antenna and glideslope antenna supporting Runway 24. The Airport has a published ILS approach procedure to Runway 24 that provides visibility minima of ¾-mile horizontal visibility and a ceiling of 200 feet. Additionally, the Airport has several GPS-based approach procedures with higher visibility minimums as discussed in Section 2.2.6. The ¾-mile, 200-foot ceiling does not provide for Category I visibility, which is a ½ mile visibility and a 200-foot ceiling. A review was conducted to identify the potential impacts of implementing these lower minima. Based on the review, it was found that to address off-Airport obstacle penetrations east of the Airport and the associated reduction in the horizontal visibility to ½-mile, there would be a significant increase in the length and overall size of the Runway Protection Zone (RPZ) off the east end of Runway 24.

The added length of the RPZ associated with changing the approach minimum from ¾-mile to ½-mile would result in the surface encompassing two large office buildings and would bring significant concentrations of persons into the RPZ; an action that is strongly discouraged in existing FAA guidance. Given the impacts associated with such an action, potential costs, the unlikelihood of achieving an acceptable cost versus benefit finding, and the limited time that the lower minima would be needed, no action to achieve a full Category I approach minimum is recommended for the purposes of this Airport Master Plan Update.

Currently there is no defined non-precision or precision approach to Runway 06. The closest such capability is a general Airport approach identified as a VOR-A approach that provides guidance to the Airport and allows the pilot to execute a circling approach to either end of the runway based on ATCT direction and prevailing winds. This approach has horizontal visibility minima of 1¼-mile for approach category “A” aircraft, 1½-mile for approach category “B” aircraft, and 3 miles for approach category “C” aircraft and a minimum ceiling of 1,300 feet. It is not anticipated that the Airport will require any additional NAVAIDS, as approaches to Runway 06 are relatively rare given the prevailing wind conditions at CRQ.

4.4.4.2 Lighting, Marking, and Signage

Runway 06-24 is currently equipped with HIRL, and the approach to Runway 24 is equipped with a Medium Approach Light System with Runway Alignment Indicator Lights (MALSR) as well as REILs. Both runway ends are also equipped with visual descent guidance via Precision Approach Path Indicator (PAPI) installations. The Airport is anticipated to maintain its current ¾-mile instrument visibility minimum and 200-foot ceiling for the approach to Runway 24 throughout the planning period. The lighting standards associated with the Category I capability are met by the equipment that is presently in place. Signage and markings should continue to comply with the current FAA standards per FAA AC guidance and FAR Part 139 regulation. It should be noted that runway approach lighting will need to be relocated in the event of a runway extension and relocation.

The taxiway network is equipped with medium intensity taxiway edge lighting (MITL). Since low visibility aircraft operations below a RVR value of 1,200 feet are not anticipated, the current taxiway lighting are sufficient for the planning period.

4.4.4.3 Aircraft Hangars and Apron

As noted in the Inventory section of this Airport Master Plan Update, there are numerous commercial and non-commercial aircraft parking aprons and hangars available at CRQ. Although the forecasts identify an increase in the number of based aircraft at the Airport from 298 in 2016 to 398 in 2036, the physical constraints of the airfield, such as available land and safety clearances, do not a significant increase in the size of existing aircraft parking facilities. As such, since the Airport is near capacity for based aircraft and will continue to become closer to full capacity, it is anticipated that the availability of aircraft parking will dictate the ultimate number of based aircraft at the Airport in the future. Although there is demand for additional aircraft parking apron and hangar space, there are existing physical constraints and additional facilities that will be needed for CRQ to remain functional long-term such as the runway shift. This shift will result in the loss of the north parking apron for GA aircraft, which will need to be relocated on the airfield or to another airport entirely.

In order to mitigate the potential loss of the north parking apron and to satisfy a portion of anticipated future demand, the Airport has identified an area east of Royal Jet approximately 2.5 acres in size that is designated for future GA aircraft parking. This area is depicted in **Exhibit 5.9** in Section 5 of this Airport Master Plan Update.

4.5 LANDSIDE FACILITY REQUIREMENTS

This section focuses on the landside circulation and access system at CRQ and includes the following components:

- Airport roadway and curbfront facilities
- Parking facilities including public, employee, and rental cars
- Airport access and circulation

The majority of landside and passenger terminal facilities are based on design hour enplanements and a realistic portrayal of commercial aircraft that could operate in the near and long term at CRQ. These aircraft include models such as the Embraer ERJ 140 (typically configured with 44 seats) and the CRJ 700 (configured up to 70 seats). Design hour passenger enplanements are shown in **Table 4.13**. Design hour enplanements are generated by incorporating the type of aircraft anticipated to be in operation, identifying how many operations would need to occur annually in order to achieve that figure, and applying a passenger load factor that could occur, paired with a realistic daily airline schedule. Although it is anticipated that there will be hours when passenger demand exceeds and falls short of these estimates, these figures represent a typical busy hour that could occur on a typical weekday using a realistic airline schedule.

Table 4.13 – Design Hour Enplanements

PAL	Annual Enplaned Passengers	Hourly ERJ 140 or Similar Aircraft Operations	Typical Seat Config.	Passengers at 90% Load Factor	Hourly CRJ 700 or Similar Aircraft Operations	Typical Seat Config.	Passengers at 90% Load Factor	Design Hour Enplanements
Base Year (2016)	N/A	0	44	0	0	70	**0**	**N/A**
PAL 1	304,673	0	44	0	1	70	**63**	**63**
PAL 2	575,000	1	44	**39**	2	70	**126**	**165**

Source: Kimley-Horn, 2017. Note: N/A=Not applicable.

As shown, 63 enplanements represent the design hour figure for PAL 1 when annual enplanements are 304,673 and 165 enplanements for PAL 2 when annual enplanements are 575,000. It should be reiterated that based on conversations with County Staff, it has been determined that optimizing timing and tempo could allow scheduled commercial departures to occur no closer together than approximately every 25-30 minutes. While passenger activity in PAL 2 is not anticipated to occur, a design hour where three commercial departures occur within an hour is achievable. The values presented in **Table 4.13** are used to identify facility needs for landside, passenger terminal, and support facilities. For landside facility planning, this Airport Master Plan Update anticipates PAL 1 to be the primary forecast.

4.5.1 Airport Roadway and Curbfront

The vehicular curbfront adjacent to the terminal building consists of two lanes for its entire length (approximately 400 feet of loading zone area) between McClellan Way and Palomar Airport Way. Approximately 270 feet of this curbfront is located between two crosswalks where it is ideal to pick up and drop off passengers. Each crosswalk provides pedestrian access to the short-term parking lot. Dwelling for vehicles picking up and dropping off passengers occurs in the inner lane closest to the terminal building, while the outer lane serves as the single through lane. An analysis was conducted to identify the required length of curbfront needed compared to design hour passenger demand and is shown in **Table 4.14**.

Curbfront requirements incorporated the following assumptions:

- The percentage of vehicles in the peak hour that will arrive in the peak 15-minute period is 30 percent.
- Vehicle dwell time for private autos is 3 minutes, 1.5 minutes for taxis, 2 minutes for limos, vans, and shuttles.
- Average length of private autos and taxis is 22 feet, 30 feet for limos, and 25 feet for vans/shuttles.
- 75 percent of passengers will use curbfront; 25 percent will park vehicles. Vehicle fleet mix for curbside pickups and drop offs is 80 percent private autos, 15 percent taxis, and 5 percent vans/shuttles.

Table 4.14 – Passenger Curbfront Requirements

	Design Hour Enplanements	Peak 15 Minute Vehicle Demand	Peak 15 Minute Curbfront (LF)
PAL 1	63	16	64
PAL 2	165	41	165

Source: Kimley-Horn, 2017.

As shown, the Airport's 270 feet of curbfront is adequate to accommodate design hour passenger demand for both PAL 1 and PAL 2. No additional curbfront is anticipated in the near-term; however, the Airport should continue to monitor airline activity and examine options for improvements in the event that hourly demand significantly exceeds 165 passengers.

4.5.2 Auto Parking

According to County Staff, it was identified that CRQ has approximately 625 public auto parking spaces (40 short-term, 585 long-term) and 25 spaces for employees. The employee parking estimates do not include parking designated for FBOs or other on-Airport businesses. According to the Airport Cooperative Research Program (ACRP) Report 25, Airport Passenger Terminal Planning and Design[14], the recommended number of public auto parking spaces should be between 900 and 1,400 per a million annual enplanements. For employee parking, it is recommended that there be between 250 and 400 spaces per a million annual enplanements. Based on these recommendations, auto parking requirements were calculated and are shown in **Table 4.15**.

Table 4.15 – Auto Parking Requirements

	Annual Enplanements	Public Parking (Low)	Public Parking (High)	Employee Parking (Low)	Employee Parking (High)
PAL 1	304,673	274	427	76	122
PAL 2	575,000	518	805	144	230

Source: Kimley-Horn, 2017.

Based on the industry planning principals, the existing number of 625 public parking spaces is adequate to meet demand for PAL 1 and possibly PAL 2. Though it should be noted that when commercial activity took place at CRQ previously, the public lots were occasionally filled to capacity during peak passenger activity. As such, it is recommended that the Airport continue to monitor passenger activity and examine options to enhance existing public parking facilities, such as off-site parking lots with shuttle service, if annual enplanements approach 500,000. The existing 25 employee parking spaces are adequate to meet existing demand as well as demand identified in PAL 1, although some re-configuration or designation of public spaces to employee spaces may be needed. It should be noted that a total of approximately 75 parking spaces in the public lot are designated for Airport employees, rental cars, and visitors.

4.5.3 Sources

Airport access roadways and average daily traffic are described in detail in the Section 2.7. Primary vehicular access to the Airport is via Palomar Airport Road at the signalized intersection of Palomar Airport Way / Yarrow Drive. To the east, Palomar Airport Road turns into W. San Marcos Boulevard when entering into the City of San Marcos. On the east side of the Airport, El Camino Real provides primary north/south access to the immediate area. In August 2017, a Transportation Impact Analysis was completed based on the recommendations identified in this Airport Master Plan Update. This Analysis

[14] Airport Cooperative Research Program Report 25, Airport Passenger Terminal Planning and Design

identified existing roadway segment volumes and intersection delays as well as future roadway segment volumes and intersection delays based on the passenger enplanements described in **Table 4.16**.

Table 4.16– Passenger Activity Assumptions

	Existing	PAL 1	PAL 2
Year	2016	2036	2036
Annual Operations	149,029	195,050	208,004
Annual Enplanements	131	304,673	575,000
Design Hour Enplanements	--	63	165
Average Daily Enplanements	--	835	1,575

Source: Transportation Impact Analysis McClellan-Palomar Airport Plan Update (Linscott Law & Greenspan, August 2017). Kimley-Horn, 2017.

The vehicle trips associated with PAL 1 and PAL 2 were allocated to the surrounding street system. Trip distribution assumptions were based on trip distribution percentages from the Transportation Impact Analysis McClellan-Palomar Airport Plan Update (Linscott Law & Greenspan, August 2017).

Analysis of the traffic impacts associated with PAL 1 and PAL 2 was conducted at the following locations:

- Intersections:
  1. Palomar Airport Road at College Boulevard
  2. Palomar Airport Road at Camino Vida Roble
  3. Palomar Airport Road at Yarrow Drive
  4. Palomar Airport Road at El Camino Real

- Roadway Segments:
  1. Palomar Airport Road west of College Boulevard
  2. Palomar Airport Road between Yarrow Drive and El Camino Real
  3. Palomar Airport Road east of El Camino Real

The analysis was conducted for existing conditions and for Build-out 2036 Forecast conditions (detailed below in **Tables 4.17-4.19**), with and without inclusion of PAL 1 and PAL 2 levels of activity.

4.5.4 Peak Hour Traffic Volumes for Roadways near CRQ

Traffic volume count data for the existing analysis and traffic forecasts for the Build-out analysis were obtained from the following sources:

- *Transportation Impact Analysis McClellan-Palomar Airport Plan Update (Linscott Law & Greenspan, August 2017)*

Roadway Analysis

The roadway segment capacity analysis compares the volume of traffic traveling in each direction along that segment of roadway during the morning and evening peak hours to the hourly capacity of the roadway. The City of Carlsbad uses a one-direction maximum capacity of 1,800 vehicles per lane, per hour, in the peak period.[15] The resulting volume-to-capacity (v/c) ratio translates into a corresponding Level of Service (LOS) measure A through F, with LOS A representing uncongested, free-flowing conditions; and LOS F representing congested, over-capacity conditions. The City considers LOS C or better to be acceptable for mid-block roadway operations during the AM and PM peak hours.

[15] Source: *2016 Traffic Monitoring Program Summer 2016– City of Carlsbad Growth Management Plan (Michael Baker International)*

The results of the roadway segment analysis are presented below. **Table 4.17** shows the roadway segment capacity analysis for Existing Conditions. **Table 4.18** and **Table 4.19** present the roadway segment capacity analysis for 2036 Build-out Conditions with the addition of projected traffic associated with PAL 1 and PAL 2 level of passenger enplanement activity, respectively.

Table 4.17– Roadway Segment Analysis – Existing Conditions

Roadway	Segment	Direction	# of Lanes	Capacity	AM Peak Hour			PM Peak Hour		
					Volume	V/C	LOS	Volume	V/C	LOS
Palomar Airport Road	West of Camino Vida Roble (to College Blvd)	EB	3	5,400	1,851	0.34	A	1,406	0.26	A
		WB	3	5,400	1,183	0.22	A	1,911	0.35	A
	Camino Vida Roble to Yarrow Drive	EB	3	5,400	1,521	0.28	A	2,088	0.39	A
		WB	3	5,400	1,347	0.25	A	1,338	0.25	A
	Yarrow Drive to El Camino Real	EB	3	5,400	1,153	0.21	A	2,064	0.38	A
		WB	3	5,400	1,941	0.40	A	1,333	0.25	A
	East of El Camino Real (to Loker Ave)	EB	3	5,400	1,640	0.30	A	2,700	0.50	A
		WB	3	5,400	2,654	0.49	A	1,927	0.36	A

Source: Transportation Impact Analysis McClellan-Palomar Airport Plan Update (Linscott Law & Greenspan, December 2017).

Table 4.18 – Roadway Segment Analysis – Build-out 2036 Forecast with PAL 1 Activity

Roadway	Segment	Direction	# of Lanes	Capacity	AM Peak Hour			PM Peak Hour		
					Volume	V/C	LOS	Volume	V/C	LOS
Palomar Airport Road	West of Camino Vida Roble (to College Blvd)	EB	3	5,400	2,237	0.41	A	1,737	0.32	A
		WB	3	5,400	1,417	0.26	A	2,257	0.42	A
	Camino Vida Roble to Yarrow Drive	EB	3	5,400	1,794	0.33	A	2,454	0.45	A
		WB	3	5,400	1,668	0.31	A	1,764	0.33	A
	Yarrow Drive to El Camino Real	EB	3	5,400	1,514	0.28	A	2,485	0.46	A
		WB	3	5,400	2,475	0.46	A	1,815	0.34	A
	East of El Camino Real (to Loker Ave)	EB	3	5,400	2,038	0.38	A	3,211	0.60	A
		WB	3	5,400	3,191	0.59	A	2,441	0.45	A

Source: Transportation Impact Analysis McClellan-Palomar Airport Plan Update (Linscott Law & Greenspan, December 2017).

Table 4.19 – Roadway Segment Analysis – Build-out 2036 Forecast with PAL 2 Activity

Roadway	Segment	Direction	# of Lanes	Capacity	AM Peak Hour			PM Peak Hour		
					Volume	V/C	LOS	Volume	V/C	LOS
Palomar Airport Road	West of Camino Vida Roble (to College Blvd)	EB	3	5,400	2,260	0.42	A	1,760	0.33	A
		WB	3	5,400	1,433	0.27	A	2,279	0.42	A
	Camino Vida Roble to Yarrow Drive	EB	3	5,400	1,806	0.33	A	2,466	0.46	A
		WB	3	5,400	1,677	0.31	A	1,775	0.33	A
	Yarrow Drive to El Camino Real	EB	3	5,400	1,534	0.28	A	2,517	0.47	A
		WB	3	5,400	2,507	0.46	A	1,847	0.34	A
	East of El Camino Real (to Loker Ave)	EB	3	5,400	2,044	0.38	A	3,221	0.60	A
		WB	3	5,400	3,201	0.59	A	2,451	0.45	A

Source: Transportation Impact Analysis McClellan-Palomar Airport Plan Update (Linscott Law & Greenspan, December 2017).

Review of **Table 4.17** indicates that under Existing Conditions, each roadway segment is currently operating at Level of Service A during both peak hours. The volume of traffic on each roadway segment is well within the roadway capacity, and satisfies the City's Level of Service standard of LOS C or better.

Review of **Tables 4.18** and **4.19** indicates that with the Build-out 2036 forecast traffic demand, each roadway segment would continue to operate at Level of Service A during both peak hours. The forecasted traffic growth would result in peak hour volumes that would still be well within the roadway capacity in the vicinity of the Airport. Furthermore, with the addition of traffic associated with the ultimate PAL 1 and PAL 2 passenger activity levels, each roadway segment would continue to operate at Level of Service A during both peak hours.

It should be noted that the Transportation Impact Analysis McClellan-Palomar Airport Plan Update (2017) also identified impacts associated with intersection delay based on projected levels of activity described in PAL 1 and PAL 2. The entire document is presented in its entirety in Appendix 3.

4.6 PASSENGER TERMINAL FACILITY REQUIREMENTS

The passenger terminal building at CRQ was constructed in 2009 and has an interior area of approximately 12,590 square feet. The total terminal complex includes awnings and outdoor space for the baggage claim, restaurant, Customs, rental car, and holdroom that when included with the passenger terminal building footprint, encompasses a total area of approximately 22,139 square feet. However, for the purposes of passenger terminal facility requirements, the interior space that is contained within the passenger terminal building (12,590 square feet) is evaluated for existing and projected passenger demand. General areas of the terminal building and their sizes are shown in **Table 4.20**.

Table 4.20 – Passenger Terminal Facilities

Facility	Area (SF)
Ticketing/Check-In	2,996
TSA Baggage Screening	558
TSA Passenger Screening	1,552
Holdrooms*	2,507
Baggage Claim*	1,800
Passenger Circulation	1,367
Airline Office Space	1,918
Auxiliary Space**	1,602
Restrooms	569
Total Terminal Building	12,590

Source: FAA Advisory Circular 150/5300-13A, Change 1; Prepared by: Kimley-Horn, 2017.
*Notes: Baggage claim is located outside of the terminal and is not included in the existing terminal building calculation. Holdroom includes 479 square feet of exterior space that is not included in the existing terminal building calculation but is used in determination of facility needs.
** Auxiliary Space includes non-Airline office space, janitorial space, electrical, employee break room, and wall space.

Landside facilities will be evaluated for adequacy for both existing conditions as well as for PAL 1 and PAL 2. This will provide the Airport with spatial needs in the event that commercial service increases significantly in the 20-year planning period.

4.6.1 Boarding Gate Demand

Boarding gates provide areas for passengers awaiting flights. Typically, gates include seating areas/holdrooms, airline counters, doorways, and jet bridges. At CRQ jet bridges are not used so the gate area consists of a holdroom, an airline counter, and doorways to the aircraft on the ramp. The number of gates required is determined based on the number of flights that will depart during the design hour. These figures are identified using the design hour passenger enplanement figures described in the previous section and are compared to the anticipated types of aircraft that are projected to be used in the future (EMB 135 and CRJ 700/EMB 170). Hourly gate demand is based on design hour enplanement figures identified previously in **Table 4.13**. It is assumed that gate turnaround time is 1 hour, meaning that one hour of time is needed to process passengers arriving, waiting, and departing for a flight. Projections of gate demand are shown in **Table 4.21**.

Table 4.21 – Passenger Gate Requirements

Item	Existing (2016)	PAL 1	PAL 2
Annual Enplanements	N/A	304,673	575,000
Design Hour Enplanements	N/A	63	165
Design Hour Operations	N/A	1	3
Boarding Gates Required	N/A	1	3

Sources: ACRP Report 25. Airport Passenger Terminal Planning and Design.

Notes: Assumes 0 operations during “quiet hours.” N/A=Not applicable.
Prepared by: Kimley-Horn, 2017.

As shown, it is anticipated that the existing gate can accommodate demand generated under PAL 1; however, two additional gate areas will be required to meet the demand projected in PAL 2. Economies of scale can be achieved by utilizing one large holdroom with multiple airline counters. CRQ does not use jet bridges; therefore, passengers boarding different flights may be able to utilize the same door to board aircraft. However, if airline activity increases and more than 2 flights depart per hour, (as is the case with PAL 2) multiple doors for boarding flights may be needed to avoid confusion and maintain efficiency. The Airport should continue to monitor airline operations to determine if additional gate capacity is needed. The existing boarding gate is anticipated to accommodate projected levels of demand under PAL 1, unless airlines need to cluster flights around typical high demand periods to remain in operation.

4.6.2 Holdrooms

The existing holdroom at CRQ is approximately 2,028 square feet in size with an additional 479 square feet of exterior space available for waiting passengers that equates to a total of 2,507 square feet of total holdroom area. Holdroom needs have been developed using planning parameters identified in ACRP Report 25, "Airport Passenger Terminal Planning and Design," and are identified in **Table 4.22**. The following assumptions have been incorporated into the spatial requirements of the holdroom area:

- 8 square feet of space is required for standing passengers, 9 square feet of space is required for seated passengers;
- 50 percent of passengers will be seated; 50 percent will be standing;
- 92 square feet of space is required for each podium and associated queuing area;
- 150 square feet of space is required for each boarding corridor area; and
- The number of podiums and boarding corridors is equal to the number of corresponding boarding gates required as shown in Section 4.6.2.

Table 4.22– Passenger Holdroom Requirements

Item	Existing (2016)	PAL 1	PAL 2
Design Hour Passengers	N/A	63	165
Seating and Standing Area (sf)	2,107	610	1,590
Podium and Queuing Area (sf)	200	92	276
Boarding Corridor Area (sf)	200	300	450
Holdroom Area Required (sf)	N/A	1,002	2,316

Sources: ACRP Report 25. Airport Passenger Terminal Planning and Design. Note: N/A=Not applicable.
Prepared by: Kimley-Horn, 2017.

As shown, it is anticipated that the overall size of the existing holdroom and exterior holdroom area is adequate to accommodate passenger demand for both PAL 1 and PAL 2: however, reconfiguration of the interior holdroom area may be needed if multiple flights depart within an hour timeframe and additional podium and boarding corridor areas are needed.

4.6.3 Ticketing/Check-In Area

The ticketing and check-in area provides the immediate interface between the passenger and the airline. This area includes airline counter positions and passenger queuing areas. The eight counter positions and area around them account for approximately 700 square feet, while the queuing area is approximately 2,296 square feet in size. Spatial requirements for the ticketing and check-in area are determined using the Spreadsheet Models for Terminal Planning and Design for ACRP Report 25. This model incorporates the following assumptions:

- A queuing (LOS "C," which is optimal, is achieved by providing 14 square feet per passenger. (A LOS of "A" or "B" indicates that facilities are underutilized while a LOS of "D" or "F" suggests that facilities are insufficient.
- The average processing time once a passenger reaches a counter is 4 minutes.
- The maximum time a passenger should wait in the queuing area is 15 minutes.
- The number of counter positions required is determined by maintaining the 4-minute processing and no more than 15-minute processing times.
- The average space per ticket counter required is 87.5 square feet, which is the same size as existing counter positions at CRQ.
- The percentage of design hour passengers who arrive at the ticketing/check-in area during a peak 30-minute period is 50 percent.
- The percentage of passengers who utilize the ticket counter is 75 percent.

Ticketing/check-in facility needs are shown in **Table 4.23**.

Table 4.23 – Ticketing and Check-In Requirements

Item	PAL 1	PAL 2
Design Hour Enplanements	63	165
Peak 30 Min. Enplaned Passengers Utilizing Ticket-Counter	24	62
Counter Positions Required	3	6
Counter Area Required (SF)	263	525
Queuing Area Required(SF)	331	868
Total Area Required (SF)	593	1,393

Sources: ACRP Report 25 Airport Passenger Terminal Planning and Design.
Prepared by: Kimley-Horn, 2017.

As shown, the existing ticketing and check-in areas are sufficiently sized to meet passenger demand for PAL 1 and PAL 2. With the number of passengers who print out boarding passes at home or check-in online increasing, this figure could actually decline in the future. Airport Management should monitor passenger activity and counter utilization to identify any capacity constraints in the future.

4.6.4 Airline Office Space

The passenger terminal building at CRQ holds 9 rooms used by airlines for office and supply/storage purposes. These rooms encompass approximately 1,918 square feet of space. There are no known planning parameters to determine the total office space needed by airlines; however, it is logical to assume that office space required would mimic ticketing and check-in areas. In other words, the change in passenger demand is assumed to impact the space needed for airline office areas at the same rate as it impacts passenger ticketing and check-in areas. Airline office space requirements are shown in **Table 4.24**.

Table 4.24 – Airline Office Space Requirements

Item	PAL 1	PAL 2
Design Hour Enplanements	63	165
Airline Office Space Required (SF)	380	892

Source: ACRP Report 25 Airport Passenger Terminal Planning and Design. Kimley-Horn, 2017.

As shown, the existing 1,918 square feet of airline office space at the Airport is sufficient to meet projected demand for both PAL 1 and PAL 2.

4.6.5 Transportation Security Administration (TSA) Baggage Screening

Checked baggage is loaded from the airline ticketing counters onto a conveyor where it is screened manually by TSA personnel. The screening area inside the terminal building that includes the scanning machine encompasses a total of approximately 582 square feet. TSA Baggage Screening requirements are shown in **Table 4.25** These calculations incorporate the following assumptions:

- 75 percent of passengers check baggage, an average of 1.0 bags per person.
- A TSA surge factor is applied based on recommendations identified in ACRP Report 25.
- Processing rate per scanner is 400 bags/hour.

Table 4.25 – Baggage Screening Requirements

Item	PAL 1	PAL 2
Design Hour Enplanements	63	165
Bags to Process*	47	124
TSA Surge Factor	1.71	1.44
Oversize Bags (not passible through Scan Unit)	2	5
Bags to pass through Scan Unit	78	173
Screening Units Required	1	1
Area Required (SF)	558	558

Sources: ACRP Report 25 Airport Passenger Terminal Planning and Design. Kimley-Horn, 2017.

*Note: Adjusted for oversize bags and surge rate factor peak 10 minute/hour

The existing screening area and equipment is adequate to accommodate existing levels of passenger demand for both PAL 1 and PAL 2. As the screening equipment can accommodate 400 bags per hour, it is likely that existing facilities are suited to accommodate passenger activity throughout the 20-year planning horizon.

4.6.6 Baggage Makeup Area

After checked luggage is screened, it continues down a conveyor belt that leads to the exterior of the passenger terminal building’s north side. Baggage is temporarily stored outside before it is transferred onto departing aircraft. Based on conversations with Airport management, it has been determined that there is enough space to accommodate typical amounts of passenger baggage. However, despite the favorable climate of the Carlsbad/San Diego area, storing luggage outside is not ideal as the bags themselves are exposed to the elements, often for extended periods of time. Although the Airport doesn’t have a designated baggage makeup area, it is recommended that one be planned for in the future, especially if passenger demand increases. Baggage makeup spatial requirements are based off recommendations identified in ACRP Report 25, and are shown in **Table 4.26**. The following assumptions are incorporated into spatial needs for a baggage makeup area:

- 2 staged carts are required per gate in use.
- The number of gates in use is obtained from Table 4.21.
- ACRP Report 25 recommends 1,500-2,200 square feet of makeup area per gate in use. For the purposes of this Airport Master Plan Update, 1,500 square feet per gate is recommended.

Table 4.26 – Baggage Makeup Area Requirements

Item	PAL 1	PAL 2
Design Hour PAX	63	165
Boarding Gates in Use	1	3
Average Makeup Area/Gate	1,500	1,500
Makeup Area Required (SF)	1,500	4,500

Sources: ACRP Report 25 Airport Passenger Terminal Planning and Design. Kimley-Horn, 2017.

Although it is likely that the Airport can continue to operate without an indoor baggage makeup area through PAL 1, such a facility is desirable to protect luggage from rain, heat, etc. As such, it is recommended that the Airport plan for such a facility. For the purposes of this Airport Master Plan Update, facilities that are desirable, but not essential for operation such as a baggage makeup area will be recommended, but will not be identified in overall spatial requirements for the passenger terminal building. If flights are staged according to the Airport's timing and tempo limits, one baggage makeup area should be able to accommodate one incoming and one outgoing flight within an hour.

4.6.7 Transportation Security Administration (TSA) Passenger Screening

Prior to entering the secure portion of the terminal, passengers must pass through the TSA screening area. The passenger screening area, 1,552 square feet in size, is comprised of two components: the queuing area and the checkpoint area. The existing queuing area is 481 square feet in size, while the checkpoint is a single lane with a metal detector for passengers and a Rapidscan620DV scanner for baggage. The checkpoint area accounts for 780 square feet and an additional 291 square feet of office and private screening areas. The required space for these areas is directly tied to the number of passengers that pass through the facility during a particular time period. Spatial requirements for the TSA screening area are shown in **Table 4.27** and are based on recommendations identified in ACRP Report 25 and incorporate the following assumptions:

- The scanning and throughput rate for equipment and personnel can accommodate 135 passengers per hour.
- The queuing area should be sized for 280 square foot per security lane. This is based on the International Air Transport Association (IATA) standard LOS "D" of 8.6 square feet per queued passenger.
- Maximum queue time is 10 minutes.
- Peak 30-minute passenger period is ½ design hour passengers.

Table 4.27 – TSA Passenger Screening Requirements

Item	PAL 1	PAL 2
Design Hour PAX	63	165
Peak 30 Min. PAX	32	83
Lanes Required	1	2
Queuing Area Required (SF)	280	560
Checkpoint Area Required (SF)	938	1,876
Total Area Required (SF)	1,218	2,436
Additional Area Required (SF)	N/A	1,175

Sources: ACRP Report 25 Airport Passenger Terminal Planning and Design. Kimley-Horn, 2017.

As shown, the total area designated for TSA passenger screening area is anticipated to accommodate demand through PAL 1. It should be noted that the recommended 938 square feet for the checkpoint area under PAL 1 represents a typical layout that includes tables, equipment, and search area. A second lane with scanning capabilities is not needed until reaching the passenger levels associated with the PAL 2. As such, additional TSA screening equipment, queuing area, or checkpoint area over the next 20 years is not required.

4.6.8 Baggage Claim

Currently, the 1,800-square foot baggage claim area is located outside the passenger terminal building and includes an airside baggage drop, tug movement area, baggage claim devices, and queuing and waiting areas. Similar to baggage makeup, although having an interior baggage claim facility is not essential to the functionality of the passenger terminal, it is desirable to have an indoor facility so luggage and passengers are not exposed to the outdoor elements. Although the existing facility may be acceptable for current levels of passenger activity, any significant increase in passenger enplanements should trigger an examination of an indoor baggage claim facility. **Table 4.28** presents recommended sizes for a typical baggage claim facility based on parameters identified in ACRP 25. The following assumptions are incorporated into these requirements:

- A typical baggage claim for smaller commercial airports is often T-shaped with room for baggage carts on the exterior of the building. Each “T” segment is sized approximately 90 linear feet and 2,700 square feet not including additional passenger queuing area.
- According to ACRP Report 25, a LOS “C” for the queuing area is achieved by providing 12 square feet per waiting passenger.
- 50 percent of passengers deplane in the peak 20-minute period.
- 75 percent of passengers check baggage.

Table 4.28 – Baggage Claim Facility Requirements

Item	PAL 1	PAL 2
Design Hour Deplanements	63	165
Total Deplaning Passengers at Baggage Claim	20	52
PAX Queuing (SF)	240	624
Baggage Unit Segments	1	1
Baggage Unit (SF)	2,700	2,700
Total Baggage Claim (SF)	2,940	3,324

Sources: ACRP Report 25 Airport Passenger Terminal Planning and Design. Kimley-Horn, 2017.

As shown, by PAL 1, one baggage claim unit with 240 square feet of queuing area for a total footprint of 2,940 square feet is recommended. The existing baggage claim may be adequate for existing and projected levels of passenger activity through PAL 1; however, the Airport should monitor efficiency of baggage delivery and congestion if commercial operations increase. Signs of inefficiency could trigger the need to install an interior or enhanced baggage claim facility. For the purposes of the Airport Master Plan Update, it is recommended that the Airport examine options for an indoor baggage claim facility; however, spatial requirements for such a facility are not included in the overall terminal needs summary presented at the end of Section 4.6.

4.6.9 Restroom Facilities

Public restrooms should be provided in the main terminal locations (ticketing, baggage claim, and central concession areas) and the concourses. According to ACRP 25, observations of passenger activity indicate that deplaning passengers are the principal demand driver for concourse restrooms. Short-haul flights will also generally produce a greater demand for restrooms on arrival than long-haul flights.

Currently, the passenger terminal has one men's and one women's restroom in the post-security checkpoint portion of the building (concourse) that comprise a total of 116 square feet. There is also a pre-security checkpoint men's and women's restroom facility (terminal) with a vestibule that totals 459 square feet. The concourse restroom facility has two gender neutral restrooms.

ACRP Report 25, Terminal Building Facilities, identifies restroom requirements based on design hour passenger demand. For non-secure restrooms (terminal), the Report identifies a range of 2 to 2.5 square feet of restroom space per person during the design hour (passenger enplanements, deplanements, and well-wishers). For the purposes of this Master Plan Update, 2 square feet per person is used in conjunction with a 25 percent contingency for well-wishers. For concourse restroom facility needs, 2 square feet per person is also applied; however, because these facilities are on the secure side, there is no contingency for well-wishers.

Restroom facility requirements are shown in **Table 4.29**. As shown, secure (terminal) restroom facilities are anticipated to be adequate through PAL 1; however, non-secure restrooms are anticipated to need an additional 136 square feet of space. Re-configuration of existing non-secure areas of the terminal may negate any building footprint improvement needs. It is recommended that the Airport continue to monitor passenger activity in non-secure areas to identify if restroom enhancements may be needed in the future.

Table 4.29 – Restroom Facility Requirements

Item	PAL 1	PAL 2
Secure Side Restrooms		
Design Hour Persons	158	413
Space Required (SF)	315	827
Additional Space Required (SF)	(144)	368
Non-Secure Side Restrooms		
Design Hour Persons	126	331
Space Required (SF)	252	661
Additional Space Required (SF)	136	545
Total Area Required (SF)	567	1,488
Total Additional Area Required (SF)	N/A	913

Sources: ACRP Report 25 Guidebook for Airport Passenger Terminal Planning and Design. Kimley-Horn, 2017.

4.6.10 PASSENGER CIRCULATION

Passenger circulation elements provide the necessary public, non-public, and sterile links to tie the functional elements of the terminal together. Secure circulation typically consists of the main corridor of the concourses, plus the security checkpoints. General public circulation includes the vertical circulation elements of all of the corridors and other architectural spaces, which tie the public functional elements of the terminal together. Non-public circulation provides access to airline operations, airport administration areas, concession support, and other areas typically not used by the traveling public.

The provision of ample circulation space, especially a calculated over-provision for the design flows, allows a terminal building to accommodate unforeseen changes in use. Approximately 1,367 square feet of the existing passenger terminal building is dedicated for passenger circulation. This accounts for approximately 11 percent of the overall passenger terminal building footprint. Based on passenger utilization and observed traveler patterns, it is estimated that this ratio of passenger circulation square footage to overall building footprint is adequate for projected levels of demand. As such, circulation space for CRQ is determined by applying this ratio to the total spatial requirements for all elements identified in this section. Recommended circulation space is identified in **Table 4.30**.

Table 4.30 – Passenger Circulation

Item	PAL 1	PAL 2
Total Terminal Space Required (less circulation and auxiliary space) (SF)	4,318	9,083
Circulation Area Required (SF)	614	1,291

Source: Kimley-Horn, 2017.
*Note: Calculations are based on Terminal Space Required less Passenger Circulation and Auxiliary Space.

As shown, the existing circulation space in the passenger terminal is adequate to accommodate demand through PAL 1 and PAL 2. The Airport should continue to monitor hourly peak passenger enplanements and deplanements to identify when planning for additional circulation area may be needed.

4.6.11 AUXILIARY SPACE

For the purposes of this Airport Master Plan Update, auxiliary space includes non-airline office space, non-circulation hallways, employee break rooms, public concessions, electrical rooms, janitor closets, communications rooms, and all wall and utility space in the passenger terminal. In total, the areas of the passenger terminal building that are designated auxiliary space account for 1,602 square feet. Because these are primarily support facilities to ensure the functionality of the terminal, it is assumed that the demand for these areas will be consistent with the overall footprint of the passenger terminal building. As such, to estimate auxiliary space needs, it is assumed that the current proportion of auxiliary space compared with the terminal building as a whole will remain constant throughout the projection period. It is estimated that auxiliary space occupies approximately 13 percent of the total building footprint, and should continue to compose this proportion in the future. Auxiliary space requirements are shown in **Table 4.31**. As shown, it is anticipated that the existing auxiliary space for the passenger terminal building is adequate to meet passenger demand for both PAL 1 and PAL 2. The Airport should continue to monitor hourly peak passenger enplanements and deplanements to identify when planning for additional auxiliary space area is needed.

Table 4.31 – Auxiliary Space

Item	PAL 1	PAL 2
Total Terminal Space Required (less circulation and auxiliary space) (SF)	4,318	9,083
Auxiliary Space Required (SF)	719	1,512

Source: Kimley-Horn, 2017.

*Note: Calculations are based on Terminal Space Required less Passenger Circulation and Auxiliary Space

4.6.12 PASSENGER TERMINAL SUMMARY

Table 4.32 Provides a summary of existing and recommended passenger terminal facility requirements for PAL 1 and PAL 2. As noted previously, it is not anticipated that passenger demand will exceed PAL 1 during the 20-year planning horizon. In order for CRQ to experience PAL 1 passenger enplanement levels of activity, significant increases in airline operations will be needed. Considering the scarcity of developable land at CRQ, and based on a comparison of other passenger terminal facilities that experience similar levels of activity as described in PAL 1 and PAL 2, it is recommended that the Airport preserve space for potential terminal enhancements that may be needed in the future should activity exceed the levels presented in this Airport Master Plan Update.

Table 4.32 – Passenger Terminal Facility Requirements - Summary

Item	Existing	PAL 1	PAL 2
Annual Enplanements	N/A	304,673	575,000
Design Hour Enplanements	N/A	63	165
Passenger Boarding Gates	1	1	3
Public Parking Spaces	600	274	518
Employee Parking Spaces	25	76	144
Curbfront (Linear Feet)	270	64	165
Ticketing/Check-In (SF)	2,996	593	1,393
Holdrooms	2,507	1,002	2,316
Airline Office Space (SF)	1,918	380	892
TSA Baggage Screening (SF)	558	558	558
Baggage Makeup Area	N/A	1,500	4,500
TSA Passenger Screening (SF)	1,552	1,218	2,436
Baggage Claim Facility (SF)	1,800 (exterior)	2,700	2,700
Passenger Circulation (SF)	1,367	614	1,291
Auxiliary Space (SF)	1,602	719	1,512
Restrooms (SF)	569	567	1,488
Total Terminal Building (SF)	12,590	5,651	11,886

Sources: ACRP Report 25 Guidebook for Airport Passenger Terminal Planning and Design. Kimley-Horn, 2017.

Notes: Exterior spaces are not included in the total terminal building area calculations. Terminal spatial requirements do not include baggage make-up area or interior baggage claim. N/A=Not applicable.

Based on an analysis of existing passenger terminal building facilities, it is estimated that the existing square footage of the terminal building can accommodate projected levels of demand through PAL 1. However, as noted previously, there are facilities including an interior baggage makeup area and baggage claim that although are not necessarily essential to the functionality of the terminal building, would enhance the overall operational capability of the terminal. As such, while there are no passenger terminal improvements that would alter the footprint of the building under PAL 1, it is recommended that adjacent areas currently occupied by the ARFF facility that is slated for relocation, and portions of the outdoor seating area of the restaurant be preserved for potential long-term terminal improvements.

The following facility requirements are recommended to meet the passenger demand projected in PAL 1:

- Baggage makeup area:
  It is anticipated that a facility sized for 1,500 square feet would be adequate for the design hour passenger forecast under PAL 1 and should be planned for as a long-term improvement. While the current system of keeping baggage outside is functional, an indoor area for baggage storage prior to flights is recommended. This recommendation is not a specific improvement for the passenger terminal; however, it is a desired facility that should be included as a development option.
- Additional restroom space (specifically in the post-security portion of the terminal):
  While the overall space of the passenger terminal dedicated to restroom facilities is adequate through PAL 1, additional space may be needed for the secure portion of the concourse as hourly passenger demand increases. It is recommended that the Airport consider reconfiguration/enhancement of the non-secure restroom facilities as passenger demand increases.
- Indoor baggage claim:

As with baggage makeup, an indoor baggage claim sized 2,700 square feet in size is recommended to protect baggage and passengers from the elements. An interior baggage claim facility is not required for the terminal to function; however, as passenger demand increases, it will aid terminal capacity and throughput capabilities. This recommendation is not a specific improvement for the passenger terminal, however, it is a desired facility that should be included as a development option if passenger demand approaches PAL 1.

- One additional boarding gate:
  The Airport's timing and tempo limits identify acceptable frequencies of commercial operations at CRQ. However, in the future, airlines may wish to cluster flights during high-demand periods to take advantage of traveler behavior. The Airport should be cognizant of this, and may need to preserve space for an additional boarding gate to accommodate peak levels of activity.

4.7 SUPPORT FACILITY REQUIREMENTS

Airport support facilities include those needed to ensure the airport continues operating in an efficient and safe manner. These facilities include CBP, rental car, ARFF, Airport maintenance, and fueling facilities.

4.7.1 U.S. Customs and Border Protection

The building immediately west of the passenger terminal houses the CBP facility, which processes passengers who arrive from destinations outside the U.S. The area of the building dedicated to CBP facilities encompasses approximately 1,490 square feet and includes a waiting room, search room, office and lab space, electrical and IT rooms, restrooms, and auxiliary space. Although passenger enplanements and aircraft operations are anticipated to increase throughout the 20-year planning horizon, it is anticipated that the existing CBP facilities can accommodate future demand.

4.7.2 Rental Car Facilities

Rental car facilities are located in the same building as the CBP and occupy a space approximately 260 square feet in size. Currently, there are three rental car vendors in operation, Hertz, Budget and Avis. Arriving passengers pick-up their vehicles at the short-term and long-term parking lot. Departing customers with rental cars are directed to park in the long-term parking lot and walk to the terminal. Approximately seven of the short-term parking lot spaces in front of the terminal building are presently allocated to the rental car operation. The remaining rental car vehicles are stored in the long-term parking lot.

The three existing rental car companies are sufficient to accommodate existing and projected demand. However, compared with other airports of similar size and passenger activity levels identified PAL 1 and PAL 2, the County may want to consider reserving space for one additional vendor.

Furthermore, as passenger enplanements are anticipated to increase, the need for rental car parking will increase as well. It is anticipated that the long-term parking lot can accommodate such an increase, but the short-term lot will need enhancement. The two logical locations for enhancement/relocation would be either in the existing lot, which would require removal of landscaping, or relocation to the parking lot adjacent to the short-term lot to the west that is currently part of Jet Source. Because it would not disturb existing tenants and the roadway infrastructure is already in place, it is recommended that the existing short-term lot be enhanced to accommodate future demand. This enhancement would likely result in the loss of a few on-street parking spaces along the Airport Access Road.

4.7.3 Aircraft Rescue and Firefighting

The Airport has an onsite ARFF facility. This facility is located directly adjacent to the passenger terminal, and is a canopy structure which houses two ARFF vehicles, one primary and one backup, allowing direct apron access. The FAA identifies the ARFF as Index "B." An Index "B" classification requires an ARFF facility to accommodate air carrier aircraft (scheduled or non-scheduled) up to 90-126 feet in length. According to the FAA, "Except as provided in §139.319(c), if there are five or more average daily departures of air carrier aircraft in a single Index group serving that airport, the longest aircraft with an average of five or more daily departures determines the Index required for the airport. When there are fewer than five average daily departures of the longest air carrier aircraft serving the airport, the Index required for the airport will be the next lower Index group than the Index group prescribed for the longest aircraft."

The requirements for Index "B" ARFF equipment are:

(a) *Index B.* Either of the following:

(1) One vehicle carrying at least 500 pounds of sodium-based dry chemical, halon 1211, or clean agent and 1,500 gallons of water and the commensurate quantity of AFFF for foam production.

(2) Two vehicles—

(i) One vehicle carrying the extinguishing agents as specified in paragraphs (a)(1) or (a)(2) of this section; and

(ii) One vehicle carrying an amount of water and the commensurate quantity of AFFF so the total quantity of water for foam production carried by both vehicles is at least 1,500 gallons.

While existing response times are adequate, the existing building is not in an ideal location, especially if there is a need to enhance the passenger terminal building. Because there is very little land available for terminal footprint enhancement, the ARFF building, should be examined for a new location that would provide adequate response time and enough space for vehicles and equipment. Options for relocation will be addressed in the Alternatives Section of this Airport Master Plan Update. According to general parameters outlined in *FAA AC 150/5210-15A, Aircraft Rescue and Firefighting Station Building Design*, a future ARFF building at CRQ should include the following elements:

- 2 Vehicle Bays
- Watch Room – 130 Square Feet
- 1st Aid Room – 120 Square Feet
- Self-Contained Breathing Apparatus (SCBA) room – 200 Square Feet
- Administration Room/Kitchen/Break Room – 500 Square Feet
- Restroom – 50 Square Feet

According to *FAA AC 150/5210-15A*, the vehicle bays should be designed to accommodate clearances of 5 feet from the front of vehicles to the bay doors, 6 feet between vehicles and all walls, 8 feet between vehicles, and 7 feet between the vehicles and the ceiling. The typical dimensions of Index "B" ARFF vehicles that carry 1,500 gallons of water are 30 feet long, 10.2 feet wide, and 12.5 feet high. When adjusted for safety clearances, the ARFF building area that contains the vehicle bays should be designed to be 40.4 feet wide, 46 feet long, and 17.2 feet high. This results in a footprint of 1,858 square feet, and 31,964 cubic feet. The overall ARFF building footprint with the recommended rooms and vehicle bays should be sized approximately 2,858 square feet.

It should be noted that several of the recommended areas and equipment identified in *FAA AC 150/5210-15A* are already located in the Airport's Maintenance and Operations Building. Therefore, some of the recommended areas identified in the AC are not deemed necessary.

According to *FAA AC 150/5210-15A*, the ARFF apron must be at least equal to the distance between the outermost left and right vehicle bay door openings plus 3 feet to each side. This distance is estimated to be 34.4 feet. The apron length must extend from the vehicle bay doors at full-width for at least 1.5 vehicle lengths of the longest vehicle. This distance is estimated to be 52.5 feet. The minimum apron size for the ARFF should be 1,806 square feet.

The recommended minimum employee parking area is one space per person on duty. It is anticipated that an Index "B" ARFF facility have 2 persons on duty. However, there is ample parking at the nearby Maintenance and Operations Building; therefore, auto parking is not recommended as a component of an ARFF facility. There is also auto parking available in nearby lots that may be able to accommodate ARFF employees.

Below is a summary of recommended ARFF facility requirements:

- Vehicle Bay Area – 1,858 Square Feet
- Admin/Storage Rooms – 1,000 Square Feet
- ARFF Vehicle Apron – 1,806 Square Feet
- Total ARFF Building and Apron – 4,664 Square Feet

Potential locations for a future ARFF facility will be identified in the Alternatives Section of this Master Plan Update.

4.7.4 Airport Operations and Maintenance Building

The Airport has one airfield operations and maintenance building located south of the passenger terminal along the north side of Palomar Airport Road. This building is approximately 9,500 square feet and houses a wide variety of equipment for performing airport operations and maintenance, including trucks, tool equipment, a wheel loader, backhoe, and various other machines. The Airport has its own maintenance staff, which handles nearly all of the routine airfield maintenance needs at the Airport including maintaining airfield lighting, airfield pavement, and facilities. Based on projections of aviation demand and conversations with Airport Staff, it is anticipated that the existing operations and maintenance facility is equipped to accommodate future activity.

4.7.5 Aircraft Fueling

There are several fueling facilities located at the Airport. Each fuel provider at CRQ maintains its own fuel storage, inventory, and distribution system. There are no fuel distribution lines at the Airport; all fuel is delivered to the storage tanks by tanker truck.

Based on estimates identified in Section 2.8 of this Master Plan Update, it is estimated that the Airport has the capacity for approximately 140,000 gallons of Jet "A" fuel and 80,000 gallons of AvGas. There is no common use fuel storage facility or fuel distribution system maintained by the Airport; however, it is anticipated that the existing aircraft fueling facilities are projected to accommodate future demand.

4.8 DEMAND CAPACITY/FACILITY REQUIREMENTS SUMMARY

The preceding analysis of airfield and landside capacity under both PAL 1 and PAL 2 scenarios establishes a basis for airfield facility requirements. The capacity analysis incorporates demands and design standards for the existing aircraft fleet as well as the projected operating fleet. The airfield and landside facility requirements analysis provides basic planning parameters that should be accommodated for near-term and long-term planning purposes. The facility needs identified in this section include:

Airfield Facilities:

- Extension of Runway 06-24 (up to 800')
- Shift Runway 06-24 to satisfy runway-taxiway separation standards and be in compliance with D-III FAA design criteria
- Relocation of approach lighting in conjunction with improvements to Runway 06-24
- Equip Runway 06-24 with 20-foot-wide paved shoulders
- Improve taxiway system to accommodate ADG III/TDG 2 aircraft and/or receive MOS from FAA

Landside and Terminal Facilities:

- Construct an indoor baggage makeup area (1,500 square feet in size). This is recommended, but not required for functionality of the passenger terminal.
- Construct an indoor baggage claim (2,700 square feet in size). This is recommended, but not required for functionality of the passenger terminal.
- Reconfiguration or enhancement of restroom facilities on the secure side.

Support Facilities:

- Enhance short-term auto parking to accommodate anticipated increase of rental car activity.
- Relocate ARFF facility. Building should be sized approximately 2,800 square feet, with an additional 1,800 square feet for apron space.

Locations and development scenarios for specific facility requirement recommendations will be addressed in Section 5.

Section 5 - ALTERNATIVES ANALYSIS

5.1 INTRODUCTION

This Section presents development alternatives that accommodate the facility requirements described in Section 4 of this Airport Master Plan Update. The overall goal of the Alternatives Analysis is to provide a balanced airport complex that not only satisfies projected airport demand, but also successfully integrates with the community in which it lies. Development alternatives described in this Section are categorized as airside (runways, taxiways, safety areas) and landside (passenger terminal, aircraft rescue, and ARFF facilities). In order to compare alternative development concepts and identify the preferred strategy, this Section addresses the following:

- Review of previous Airport plans
- Identification of on-and off-airport land use considerations
- Identification of airfield and landside alternatives that meet the projected aviation demand as well as maintain a safe aviation environment in and around CRQ
- Comparison of the various alternatives based on evaluation criteria that reflect the priorities and concerns of the Airport, County, and surrounding community
- Identification of the preferred development concept

Each development alternative as it pertains to the Airport and the community that it serves is evaluated based on economic feasibility, environmental and safety impacts, and ability to accommodate projected aviation-related demand.

5.2 REVIEW OF PREVIOUS AIRPORT PLANS

The 1997 Airport Master Plan Update for CRQ evaluated facility requirements through the 2015 planning horizon and identified the following recommended improvements:

- Design and improve Runway 06-24 to Aircraft Design Group (ADG) D-III standards
- Extend runway length to 6,000 feet
- Installation of high-speed exit taxiways
- Additional aircraft storage hangar and apron space
- Enhancement of the passenger terminal and general aviation terminal buildings
- Enhancement of auto parking facilities
- Land acquisition for Runway Protection Zones

The 2013 Feasibility Study identified several runway extension alternatives that were technically feasible, fiscally responsible, and economically viable. The options that satisfied these evaluation criteria included:

- A runway extension of 200 feet, for a total length of approximately 5,100 feet maintaining the existing ARC of B-II, minimal impact to the unlined landfill
- A runway extension of 900 feet, for a total length of approximately 5,800 feet, maintaining the existing ARC of B-II, best meet the forecasted demand for runway length

5.3 ALTERNATIVES DEVELOPMENT AND EVALUATION

The process for formulation and refinement of airport development alternatives requires an assessment of future airport requirements and generation of a series of reasonable alternatives that satisfy those requirements. These include but are not limited to the Airport's airfield, passenger terminal and auto parking, and aircraft support facilities including Aircraft Rescue and Firefighting.

Based on an analysis of existing facilities inventory at CRQ, forecasts of aviation activity, and facility requirements, development alternatives for the following categories have been identified for the Airport:

- Airfield Alternatives (Runway 06-24 and associated taxiways)
- Passenger Terminal and Auto Parking Alternatives
- ARFF Facility Alternatives

Within each of these categories, development options have been identified and evaluated based on the following criteria:

- Ability to accommodate projected demand
- Impact on existing facilities
- Ability of improvements to remain on Airport-owned property
- Environmental impacts
- Implementation cost
- Safety Considerations
- Impacts to surrounding environs including businesses, roadways and neighborhoods
- Airport development potential
- Eligibility for FAA funding

It should be noted that some of the facility requirements and resultant development alternatives are based on resumption of scheduled passenger service at the Airport, which is currently provided by Cal Jet by Elite Airways. Regardless of the current state of commercial service at CRQ, it is assumed that the Airport market area has the potential for the initiation of new service during the planning period and that the proposed alternatives should be developed with that potential in mind. It is also important to identify that recommended airfield improvements are solely based on accommodating existing and projected aircraft operations and are not contingent on scheduled commercial activity in any way. As noted in several sections of this Airport Master Plan Update, general aviation aircraft exceeding the Airport's B-II RDC currently operate, and are anticipated to continue to operate at CRQ in the future.

5.4 EXISTING CONDITIONS

Runway 06-24 at CRQ is currently designated with an RDC of B-II. The Airport is being financed by the FAA and the County of San Diego Department of Public Works, Airports Division. Until April 2015, CRQ accommodated more than 10,000 annual passengers and remains classified as a Primary Airport in the National Plan of Integrated Airport Systems.

Since the Airport was first developed in the late 1950s, the facility has undergone significant improvements. The runway has been extended and widened, taxiways have been installed, FAA facilities and safety features have been constructed, and most recently a new 12,590 square foot terminal building was opened in 2009.

The airside facilities at CRQ consist of Runway 06-24, two parallel taxiways: Taxiway "A" to the south of the runway and Taxiway "N" to the north, nine connecting taxiways, aircraft parking aprons on the north and south of the airfield, navigational aids, communication equipment, and airfield lighting. When it was first opened, Runway 06-24 was 3,700 feet long and 100 feet wide. Today, the runway is 4,897 feet long and 150 feet wide with a strength rating of 80,000 pounds for dual-wheel loading and 110,000 pounds for dual-tandem wheel loading. The runway is capable of supporting the weight of aircraft that currently use it, but it is not long enough to allow certain based aircraft or future commercial aircraft to operate at maximum capacity.

Throughout the 1960s and 1970s, airport marking aids, runway lighting, an Airport Traffic Control Tower, an Instrument Landing System (ILS), and approach lighting were installed to aid with Airport identification and navigation. High intensity approach lighting was added during the 1990s and additional navigation systems at the Airport today include an airport beacon with optical system, lighted wind cones, taxiway lighting, visual approach slope indicators, threshold lights, pavement markings, and others.

Landside facilities at CRQ consist of accommodations for pilots, passengers, and aircraft while they are on the ground. These facilities include aircraft hangars, parking aprons, fuel storage tanks, vehicle parking areas, and the passenger terminal building. Landside services also include fuel and oil sales, emergency aircraft removals, inspections, and facilities for aircraft cleaning, maintenance, and storage. Enhancements and improvements to the current landside facilities at CRQ will do little to increase the capacity of the Airport. These systems need to be continuously monitored and maintained to ensure that they remain in good working order, but there is not a significant need to pursue any upgrades in the near future.

5.4.1 CURRENT CONSTRAINTS

The facility requirements analysis indicated that an increase in runway length, addressing a change in design standards and the resultant dimensional changes that occur, and addressing landside and support facility capacity and capability is necessary for the long term economic viability of CRQ. There are several constraints on the potential project area that limit development options. These constraints include but are not limited to surrounding development, restrictions on land use and zoning around the Airport, environmental regulations, safety concerns, and limitations on aircraft operations. The following subsections provide a description of these.

Runway Design Standards – Aircraft Approach Category (AAC) and Aircraft Design Group (ADG)

As noted in previous sections, at CRQ, several based and itinerant aircraft with AAC and ADG classifications that exceed the current airport design group operate on a regular basis. Several thousand operations occur annually by aircraft with AAC approach C and D with approach speeds that exceed those associated with the current approach category B designation. Nearly 1,000 operations conducted by aircraft whose wingspans range in the ADG III and IV categories occur annually at the Airport, higher than the current II designation.

The existing runway length often limits takeoff capabilities of types of departing aircraft. For commercial operations, this has resulted in passenger load limits, while corporate general aviation aircraft are often forced to make fuel stops before reaching a final destination that would not be required with sufficient runway length at CRQ. It is important to note that airports that do not meet FAA design standard guidelines for a particular classification of aircraft are not necessarily unsafe for operations by those aircraft. Unless an airfield is determined to be inherently unsafe by the FAA, the final decision to use an airfield is up to the pilot. This, however, does not negate the responsibility of the airport sponsor to make every effort to conform to the appropriate design criteria to meet the characteristics of the aircraft the airport serves.

Runway-Taxiway Separation Criteria

Another major factor to consider in the development of airfield alternatives is the non-standard separation between Runway 06-24 and Taxiway A if the runway designation changes from an Approach Category B to a Category C or D and the design group were changed from an ADG-II to an ADG-III facility. Approach Category C and D coupled with ADG III standards require 400 feet of separation between a runway and a parallel taxiway. This is a 160-foot increase from the ADG II design standard of 240 feet. The existing separation between Runway 06-24 and Taxiway N is 300 feet and between Runway 06-24 and Taxiway

A, this distance is 297 feet. Achieving these separation distances and the affiliated runway and taxiway safety areas associated with a potential ADG III designation is difficult on a constrained airfield such as CRQ.

5.4.2 Environmental Factors

FAA Order 1050.1E and Environmental Desk Reference for Airport Actions describe the resource/impact categories that must be considered in an FAA environmental review. Though not evaluated to the level of detail required for official NEPA processing, the following explores the potential for impacts resulting from the recommended Airport development program within the various environmental categories.

In addition to being subject to environmental approval under both the NEPA and the CEQA, any Airport construction project must be proven to be economically practical and feasible in order to be eligible for FAA funding. This requirement creates a difficult situation at CRQ as it was built on top of a mesa with steep vertical drops on almost all sides and a closed landfill beneath the ground surface of the eastern end, which substantially increases construction costs in these areas.

The landfill material underneath the east side of the airfield is unsuitable to use as a stabilized base due to issues with settlement. Special considerations must be made to mitigate these issues before any construction over the landfill area may be considered feasible. The landfill area is equipped with a methane gas extraction system that consists of extraction wells, header piping, and condensate pumps—all of which may require reconstruction, protection, or relocation, depending on which improvement alternative is selected.

In addition to issues related to methane gas, the presence of the landfill underneath the airfield also creates constraints with future ground settlement. Conceptual settlement mitigation options that were considered include structural options—bridging of the landfill or a structural slab supported by driven piles; soil improvement options—fill supported on stone columns, fill supported on drilled displacement columns, accelerated settlement by surcharging, deep dynamic compaction, injection grouting, and excavation and backfilling of the landfill material; and maintenance options—placing lightweight or standard fill to grade with periodic asphalt concrete overlays.

Each of the landfill mitigation options was thoroughly analyzed according to how well they addressed current and future settlement issues, impacts to operations, and initial and future life cycle costs. It was determined that drilled displacement columns (DDC) would be the best option to mitigate the landfill underneath the airfield. DDCs would provide the most cost effective ground improvement option for increasing the bearing capacity and load transfer capabilities of the underlying materials while reducing the potential for future settlement on the airfield.

The 2013 Feasibility Study included a thorough evaluation of environmental impacts that would be incurred from an extension to Runway 06-24, Taxiway A, and Taxiway N. Much of the environmental documentation below has been taken from the 2013 Feasibility Study and updated because of the similarities between the proposed improvements evaluated in that Study and this Airport Master Plan Update.

5.4.2.1 General Environmental and Land Use Constraints

The Airport is situated on a mesa that was originally crossed by several canyons. These canyons were utilized as landfills by the County of San Diego until 1975. The filled canyons were then graded and capped and methane extraction facilities were installed along with monitoring wells. The landfills are unlined. Portions of the Airport, which are used for airfield and aircraft parking, were then constructed on a portion of the previously closed municipal landfill. The Airport is surrounded primarily by light industrial and commercial development as well as a municipal golf course (The Crossings) directly to the west. Northeast of the Airport across El Camino Real is a natural canyon associated with Agua Hedionda Creek. The area has moderate topography and is wooded with natural trees and other vegetation. The closest residential areas are more than 0.4 miles from the airfield.

Conditional Use Permit 172

Conditional Use Permit 172 (CUP 172) was issued by the City of Carlsbad for the Airport in 1980. CUP-172 was voluntarily obtained by the County as a means of coordinating County Airport planning with the City. At the time CUP-172 was obtained, the Federal Aviation Administration (FAA) used a weight based standard to describe the design characteristics of airports. These standards were replaced shortly after CUP-172 was issued with an Airport Reference Code (ARC) system that primarily looks at approach speed and airframe dimensions to develop airfield design criteria. The reference to the Airport in CUP-172 as a General Aviation Basic Transport Airport is an older weight based classification that has become functionally obsolete as the FAA no longer uses this terminology or the methodology on which it was based to establish design criteria for airports. In any event, design criteria are established by the FAA based on the design characteristics of the most demanding aircraft regularly using an airport so that the ARC for the Airport can change without any action being taken by the County or City. While this aspect of CUP-172 has become obsolete, the authority given to the County by CUP-172 to make changes to Airport facilities necessary to support aircraft activities and allow airlines, scheduled and non-scheduled, has provided the flexibility needed for the County to operate the Airport in accordance with federal requirements. While the County has immunities from City land use requirements, including the requirement to obtain a new CUP or amended CUP, and the County hereby asserts those immunities, the County notes that the design changes to the Airport addressed by this Master Plan remain consistent with the portions of CUP-172 that have not been rendered moot by the FAA.

The Airport is located entirely within the jurisdictional limits of the City of Carlsbad. While the County is generally immune from City land use regulations (See, for example, Government Code § 53090 et seq.) and hereby assert those immunities, the County has voluntarily made an effort to involve the City in decisions related to the development of the Airport. County staff coordinated with the City during their 2015 General Plan Update to discuss the Airport's Airport Master Plan Update. In September 1980, the County obtained a zone change and CUP-172 from the City for the Airport. In 2004, CUP-172 was amended by CUP-172(B) to allow an additional auto parking area at the Airport to be developed on adjacent industrial lots.

CUP 172, as amended to date, allows for the construction or modification of "[a]irport structures and facilities that are necessary to the operation of the airport and to the control of air traffic in relation thereto …" The CUP further allows for a range of aeronautical activities, including airlines, air freight and supporting activities such as aircraft hangar, fueling and repair facilities. While certain components of CUP-172 have become obsolete as more particularly described in Section 5.4.1 above, the scope of the operable components of CUP-172 remains sufficient to allow for changes in airfield design necessary to accommodate existing and forecasted uses of the airfield up to a C-III/D-III design standard. The County will continue to voluntarily comply with CUP-172 as long as compliance can be achieved consistent with the County's federal obligations and objectives.

CUP-172 does not define the term, "General Aviation Basic Transport," but this term was in use by the FAA at the time the CUP was adopted. The term was used by the FAA to identify design standards for airports based on the type of aircraft using a facility. The FAA no longer uses this classification and instead uses an alpha-numeric system to define the design classification of airports. The General Aviation Basic Transport standard included aircraft up to a D-III design classification. The maximum D-III design standard proposed by the Airport Master Plan Update is consistent with the "General Aviation Basic Transport" language in CUP-172.

In addition to voluntarily seeking input from the City through the City's use permit process, the County has remained mindful of the wishes of Carlsbad residents as reflected in Carlsbad Municipal Code § 21.53.01. In response to a proposal to expand the Airport by adding a second runway to the north, Carlsbad residents sponsored an initiative petition that, if passed, would have required a vote of the people for any expansion of the Airport. The City, on its own initiative, adopted Ordinance No. 9558 in August of 1980 to add Section 21.52.01 to the City's Municipal Code. This section provides that, "[t]he city council shall not approve a zone change, general plan amendment or any other legislative enactment necessary to authorize expansion of any airport in the city nor shall the city commence any action to spend any funds preparatory to or in anticipation of such approvals without having first been authorized to do so by a two-thirds vote of the qualified electors of the city voting at an election for such purposes."

Section 21.53.01 would only be applicable if the County were to expand the Airport beyond its current boundaries and a City legislative enactment or City expenditure in support of such an expansion were required. The County in developing the Master Plan has voluntarily avoided any property acquisition to support the expansion of airport facilities beyond current property boundaries. There is no proposal to build a second runway or expand the existing runway outside of the existing Airport footprint. All facilities needed to support existing and forecast aviation activities (e.g., runways, taxiways, hangars, terminal building, etc.) are proposed to remain on existing airport property. Moreover, no legislative enactment or funding is needed from the City to develop the Airport in accordance with the Master Plan. Accordingly, Section 21.53.01 does not prevent the County from meeting the objectives of the Master Plan.

5.4.2.2 Air Quality

Federal *Clean Air Act* and NEPA Compliance - The United States (U.S.) Environmental Protection Agency (EPA) has adopted air quality standards that specify the maximum permissible near-term and long-term concentrations of various air contaminants based on potential health effects. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants, which include: ozone (O3), carbon monoxide (CO), sulfur dioxide (SO2), nitrogen oxide (NO), particulate matter (PM10 and PM2.5), and lead (Pb).

Potentially significant air quality impacts associated with an FAA project or action is demonstrated by the project or action exceeding one or more of the NAAQS for any of the time periods analyzed. To ensure that a federal action complies with the NAAQS, the *Clean Air Act* (CAA) establishes a General Conformity Rule for all general federal actions, including airport improvement projects, if the action is located within a nonattainment area.

In 2012, all of the County of San Diego, California was a nonattainment area for the 2008 federal 8-hour ozone standard and was classified as Marginal1. Therefore, a General Conformity analysis would be required for the proposed runway improvements. Under the NEPA, the FAA requires that an air quality emissions inventory be prepared for federal actions at airports where forecast general aviation operations exceed 180,000. The Airport is forecast to have future total operations of 175,000 by the year 2035 if the runway improvements are constructed. Therefore, an operational air quality emissions inventory would not be required under NEPA at this time. Construction-related air quality impacts are discussed in the section on Construction Impacts.

California Ambient Air Quality Standards—In California, the California Air Resources Board (CARB) manages air quality, regulates mobile emissions sources, including aircraft and ground vehicles, and oversees the activities of county and regional air districts. CARB also regulates local air quality indirectly by establishing California Ambient Air Quality Standards (CAAQS) and vehicle emissions standards, and by conducting research, planning, and coordination activities. California has adopted ambient standards that are more stringent than the federal standards for the criteria air pollutants. The County of San Diego

Air Pollution Control District (APCD) is comprised of all of the County of San Diego and is in nonattainment for ozone and particulate matter (CARB 2012).

Greenhouse Gases The impact of proposed projects on climate change is another issue of growing concern. Greenhouse gases (GHGs) are those that trap heat in the earth's atmosphere. Greenhouse gases can be either naturally occurring or anthropogenic (man-made) and include water vapor (H2O) and carbon dioxide (CO2). Several classes of halogenated substances that contain fluorine, chlorine, or bromine are also GHGs, but they are, for the most part, solely a product of industrial activities. All GHG inventories measure CO2 emissions, but beyond CO2, different inventories include different greenhouse gases (such as methane [CH4], nitrous oxide [N2O], and O3). No federal significance thresholds for the creation of GHGs have been promulgated to date. However, research has shown that there is a direct link between fuel combustion and GHG emissions. Therefore, sources that require fuel or power at an airport are the primary sources that would generate GHGs.

Aircraft jet engines, like many other vehicle engines, produce CO2, H2O, nitrogen oxides (NOx), CO, oxides of sulfur (SOx), unburned or partially combusted hydrocarbons (known as volatile organic compounds, VOCs), particulates, and other trace compounds. The scientific community is developing areas of further study in order to more precisely estimate aviation's effects on the global atmosphere. The FAA is currently leading or participating in several efforts intended to clarify the role that commercial aviation plays in greenhouse gases and climate changes. The most comprehensive and multi-year program geared towards quantifying climate change effects of aviation is the Aviation Climate Change Research Initiative (AC- CRI) funded by the FAA and the National Aeronautics and Space Administration (NASA).

ACCRI hopes to reduce key scientific uncertainties in quantifying aviation-related climate impacts and provide timely scientific input to inform policy-making decisions. The FAA also funds Project 12 of the Partnership for Air Transportation Noise & Emissions Reduction (PARTNER) Center of Excellence re-search initiative to quantify the effects of aircraft exhaust and contrails on global and U.S. climate and atmospheric composition.

Although federal regulations under the *Clean Air Act* regarding the reduction of GHG emissions have yet to be approved, the State of California has adopted the following regulations related to GHG emissions: The *California Global Warming Act of 2006* (Assembly Bill [AB] 32)—establishes a state goal of reducing GHG emissions to 1990 levels by 2020. AB 32 Climate Scoping Plan—this plan, adopted by CARB in December 2008, provides a range of GHG- reducing actions. State Bill (SB) 97amended CEQA to require an analysis of GHG emissions and their effects (effective July 1, 2009). The 2009 amendments to the CEQA guidelines (California Public Resources Code [PRC], Division 13, §15064.4) revised the guidelines to include a determination of the significance of GHG emissions. SB 375—identified regional councils as the agencies responsible for the establishment of goals for emissions-reduction at the local level.

The runway improvements at McClellan-Palomar Airport would improve the efficiency of business jets operating in the County of San Diego. Currently, due to the runway limitations, certain cross-country and international business jet flights must make fuel stops enroute. This requires an additional landing-takeoff cycle which increases the amount of fuel burned in reaching the destination. While the fuel stop could be at one of numerous locations enroute, in some cases, a business jet will depart CRQ and make the fuel stop at nearby San Diego International Airport, which has sufficient runway length. In these cases, the additional landing-takeoff cycle occurs locally in the County of San Diego Air Basin. With the runway improvements, the efficiency or “green benefits” of the project would help to offset overall fuel usage and, hence, greenhouse gas and other air quality emissions.

5.4.2.3 Coastal Resources

Federal activities involving or affecting coastal resources are governed by the *Coastal Barriers Resource Act* (CBRA), the *Coastal Zone Management Act of 1972* (CZMA), and Executive Order (E.O.) 13089, *Coral Reef Protection*. In California, CZMA (Title 16 United States Code [USC] §1451 et seq.) is implemented through the *California Coastal Act of 1976* (PRC §30000 et seq.). Protected habitats within Coastal Zones include intertidal and near shore waters, wetlands, bays and estuaries, riparian habitat, certain woods and grasslands, streams, lakes, and habitat for rare or endangered plants or animals.

The City of Carlsbad has a Local Coastal Program (LCP) that has been certified by the California Coastal Commission (1996, amended 2016). The Airport is located outside of the Coastal Zone and the City's LCP boundary. However, there is one area, located within the City LCP's Mello II segment which is located immediately adjacent to Airport property to the north. This parcel is part of the city-owned golf course and contains sensitive biological resources that are protected in the City's *Habitat Management Plan* (HMP) (2004), but would not be impacted by proposed improvements in this Airport Master Plan Update.

5.4.2.4 Compatible Land Use/Noise

The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of the airport's noise impacts. Federal land use compatibility guidelines established under Title 14 CFR Part 150, *Airport Noise Compatibility Planning,* indicate that residential land uses and schools are considered incompatible within a 65 decibel (dB) or higher noise contour. Other noise-sensitive land uses include hospitals and places of worship. FAA Orders 1050.1E and 5050.4B define a significant noise impact as one which would occur if the proposed action would cause noise-sensitive areas to experience an increase in noise of 1.5 dB or more at or above the 65 Day-Night Equivalency Level (DNL) noise contour when compared to a No Action alternative for the same timeframe.

In California, the FAA allows the use of CNEL rather than DNL to define a significant noise impact. Development of noise contours were developed for the 2013 Feasibility Study and in the 2017 Program EIR for the Airport Master Plan Update with a proposed runway extension, projected 65 dB noise contours would extend off the Airport to the north, south, and west; none of these contours, however, are located over noise-sensitive land uses. The closest noise-sensitive land uses to the east end of the Airport are a church (Holy Cross Episcopal Church) and a residential neighborhood, located approximately 0.3 to 0.4 mile southeast of the Airport off Gateway Road, respectively.

The closest noise-sensitive land uses to the west side of the Airport are more than 0.5 mile away. If the runway is extended to the east, the noise contours would also shift to the east. In this scenario, the 65 dB noise contour would extend past the eastern Airport boundary very slightly. On the west side, the 65 dB would cover a smaller portion of the golf course than presently occurs. In all of the future scenarios considered, however, the Airport, both now and with the proposed runway extension, would remain a compatible land use within the area.

Compatible land use also addresses nearby features that could pose a threat to safe aircraft operations. These features include land uses that attract wildlife (for example, active landfills and water features) or structures within approach and departure zones. Existing land use near the Airport includes a golf course and commercial and light industrial development. There are no land uses that would pose a safety hazard to the Airport. The closest water features to the Airport are a pond, located approximately 0.5-mile north of the airfield within a light industrial area and two ponds located within the golf course approximately 0.65 mile to the west.

Airports inherently generate noise and although CRQ meets standards, it is acknowledged that noise may still be considered intrusive to those who may be within the flight path. In order to be a good neighbor, VNAP have been established to preserve quality of life for the community and place minimal voluntary restrictions on aircraft arriving and departing CRQ; the VNAP are presented in Exhibit 2.9

In addition, the City of Carlsbad has addressed development surrounding the Airport in its 2015 General Plan. To limit noise impacts on noise-sensitive land uses, the area surrounding the Airport is designated primarily as Planned Industrial with an Open Space designation over the golf course and a small area of General Commercial on the southwestern corner of El Camino Real and Palomar Airport Road. The Airport itself is identified as P, Public. Additionally, two areas are designated as Special Planning Considerations as the Airport Influence Area (AIA) Review Area 1 and Review Area 2.

The Airport itself is designated as a Government Facility in Carlsbad's General Plan. The City of Carlsbad *Land Use & Community Design Element* of the General Plan includes the following goals and policies related to the Airport:

- Land Use 2-G.9 - Accommodate a diversity of business establishments in appropriately-scaled settings, including large-scaled industrial and research and development establishments proximate to the McClellan-Palomar Airport, regionally-scaled shopping centers, and neighborhood-serving commercial centers with smaller-sized stores, restaurants and offices to meet shopping, recreation, and service needs of residents and visitors.

- Land Use 2-G.13: Maintain land use compatibility between McClellan-Palomar Airport and surrounding land uses, and encourage the airport's continued operations while ensuring it does not unduly impact existing neighborhoods and communities.

- Airport 2-P.37: Require new development located in the Airport Influence Area (AIA) to comply with applicable land use compatibility provisions of the McClellan–Palomar ALUCP through review and approval of a site development plan or other development permit. Unless otherwise approved by City Council, development proposals must be consistent or conditionally consistent with applicable land use compatibility policies with respect to noise, safety, airspace protection, and overflight notification, as contained in the McClellan-Palomar ALUCP. Additionally, development proposals must meet FAA requirements with respect to building height as well as the provision of obstruction lighting when appurtenances are permitted to penetrate the transitional surface (a 7:1 slope from the runway primary surface). Consider SDCRAA Airport Land Use Commission recommendations in the review of development proposals.

- Airport 2-P.38: Coordinate with the SDCRAA Land Use Commission, and the FAA to protect public health, safety and welfare by ensuring the orderly operation of the airport and the adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards within areas around the airport.

- Airport 2-P.39: Prohibit approval of any zone change, general plan amendment or other legislative action that authorizes expansion of McClellan-Palomar Airport, unless authorized to do so by a majority vote of the Carlsbad electorate. (Section 21.53.015, Carlsbad Municipal Code.)

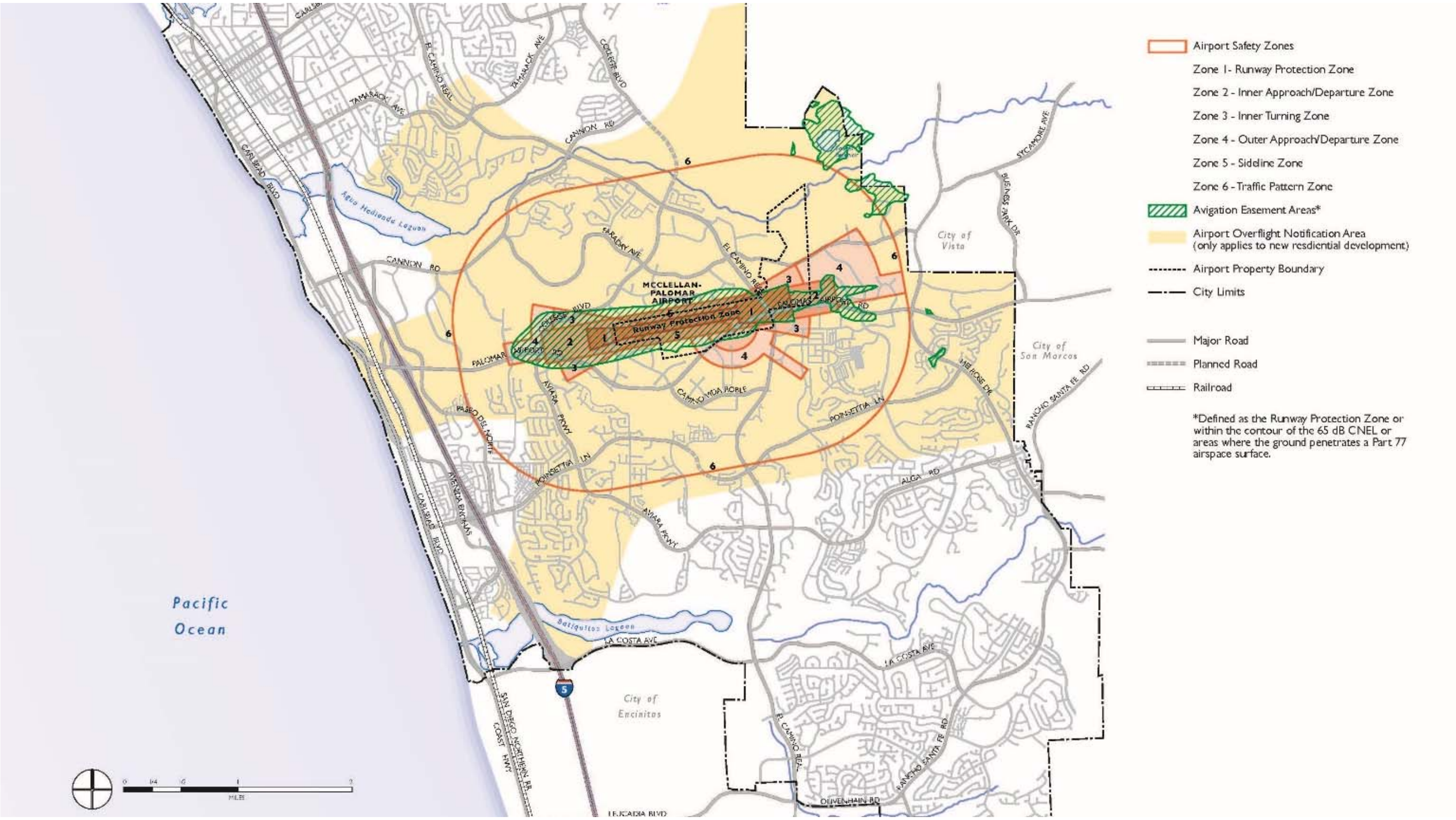
- Community Character 2-P.45(k): Evaluate each discretionary application for development of property with regard to consistency with applicable provisions of the Airport Land Use Compatibility Plan for McClellan-Palomar Airport.

The City's *Public Safety Element* of the General Plan contains a discussion on Airport Hazards that reference the ALUCP's measures to minimize the public's exposure to excessive noise and safety hazards within areas around the airport such as the AIA, the Clear Zone, and the Flight Activity Zone, as illustrated in **Exhibit 5.1.** Other policies in the Carlsbad General Plan specific to the Airport include:

- 5-G.4: Ensure long-term compatibility between the Airport and surrounding land use
- 5-P.12: Use noise policies in the McClellan-Palomar Airport Land Use Compatibility Plan to determine acceptability of a land use within the Airport's influence area (AIA) as depicted in the ALUCP. Additional disclosure actions for new development in the AIA, such as avigation easements, deed restrictions, recorded notice, etc., are required of developers/sellers of noise impacted residential units.
- 5-P.13: For projects within the AIA, utilize the noise standards contained in the McClellan-Palomar ALUCP, as well as the noise standards contained in this element. However, reserve the right to overrule the ALUCP as provided for in State Public Utilities Code Section 21676.
- 5-P.14: Recognize that procedures for the abatement of aircraft noise have been identified in the Fly Friendly Program for McClellan-Palomar Airport. The city expects the widespread dissemination of, and pilot adherence to, the adopted procedures.
- 5-P.15: Expect the airport to control noise (to the extent of its limited authority granted by the FAA to indirectly regulate aircraft noise through airport design and scheduling) while the city shall control land-use this sharing responsibility for achieving and maintaining long-term noise/land-use compatibility in the vicinity of McClellan-Palomar Airport.
- 5-P.16: Require new nonresidential development to comply with the noise compatibility criteria in the ALUCP. Require dedication of avigation easements for new developments designated as conditionally compatible for noise in the ALUCP, and which are located within the 65 dB CNEL noise contour as mapped on Figure 5-4: Airport Noise Compatibility Policy Map.

ALUCP restrictions also implement land use controls to protect individuals below airspace and make sure buildings and other development are not located in areas where incidents could occur

Exhibit 5.1 City of Carlsbad Public Safety Element – Airport Influence Area/Safety Zones



The City requires review of all proposed development projects within the AIA through a site development plan that must be found consistent or conditionally consistent with the applicable land use compatibility policies with respect to noise, safety, airspace protection, and overflight, as listed in the ALUCP. Additionally, all development proposals are required to comply with FAA regulations concerning the construction or alteration of structures that may affect navigable airspace, such building heights and obstruction lighting. The following goals and policies are related to the Airport:

- 6-G.2: Minimize safety hazards related to aircraft operations in areas around the McClellan-Palomar Airport.
- 6-P.18: Ensure that development in the McClellan-Palomar Airport Influence Area is consistent with the land use compatibility policies contained in the McClellan-Palomar Airport Land Use Compatibility Plan.

The City's *Noise Element* of the General Plan, identifies several noise generators, including the Airport. The Plan bases the Airport's noise contours on the 2011 ALUCP, which had 289,100 annual aircraft operations. The following goals and policies are related to the Airport:

- 5-G.4: Ensure long-term compatibility between the airport and surrounding land use.
- 5-P.7: Mitigation Cost. The City of Carlsbad shall not fund mitigation of existing or future noise impacts from streets, railroad, airport or any other source for existing or future private development within the city.
- 5-P.12: Use the noise policies in the McClellan-Palomar Airport Land Use Compatibility Plan (ALUCP) to determine acceptability of a land use within the airport's influence area (AIA) as depicted in the ALUCP. Additional disclosure actions for new development in the AIA, such as avigation easements, deed restrictions, recorded notice, etc., are required of developers/sellers of noise impacted residential units.
- 5-P.13: For projects within the Airport Influence Area, utilize the noise standards contained in the McClellan-Palomar ALUCP, as well as the noise standards contained in this element. However, reserve the right to overrule the ALUCP as provided for in State Public Utilities Code Section 21676
- 5-P.14: Recognize that procedures for the abatement of aircraft noise have been identified in the Fly Friendly Program for McClellan-Palomar Airport. The city expects the widespread dissemination of, and pilot adherence to, the adopted procedures.
- 5-P.15: Expect the airport to control noise (to the extent of its limited authority granted by the FAA to indirectly regulate aircraft noise through airport design and scheduling) while the city shall control land-use thus sharing responsibility for achieving and maintaining long-term noise/land-use compatibility in the vicinity of McClellan-Palomar Airport.
- 5-P.16: Require new nonresidential development to comply with the noise compatibility criteria in the ALUCP. Require dedication of avigation easements for new developments designated as conditionally compatible for noise in the ALUCP, and which are located within the 65 dB CNEL noise contour.

5.4.2.5 Construction Impacts

Airport construction impacts can include dust, air emissions, traffic, storm water runoff, and noise. Construction-related dust impacts are typically mitigated below a level of significance through the use of best management practices (BMPs), such as those identified in FAA Advisory Circular (AC) 150/5370-10F, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control* (FAA 2011).

A generalized list of BMPs is as follows:

Site Preparation and Construction

- Minimize land disturbance
- Suppress dust on traveled paths which are not paved through wetting, use of watering trucks, chemical dust suppressants, or other reasonable precautions to prevent dust from entering ambient air
- Cover trucks when hauling soil
- Minimize soil track-out by washing or cleaning truck wheels before leaving construction site
- Stabilize the surface of soil piles
- Create windbreaks

Site Restoration

- Revegetate or stabilize any disturbed land not used
- Remove unused material
- Remove soil piles via covered trucks or stockpile dirt in a protected area

In addition to the creation of dust, construction projects planned at the Airport could have temporary air quality impacts due to emissions from the operation of construction vehicles and equipment. Thus, air emissions inventories related to construction activities may be required for NEPA or CEQA documentation efforts.

Construction traffic impacts could occur when trucks or heavy equipment need to access a site through a residential neighborhood or other sensitive area or on already congested streets or intersections. In the case of CRQ, no construction traffic impacts would occur since access to the Airport does not involve residential neighborhoods or congested streets, but would occur directly from Palomar Airport Road or El Camino Real.

According to the Transportation Impact Analysis McClellan-Palomar Airport Plan Update (Linscott Law & Greenspan, August 2017), all roadway segment and intersections along El Camino Real and Palomar Airport Road near the Airport operate at acceptable levels of service (i.e., LOS A, B or C), even in the A.M. and P.M. peak hours. Water quality concerns could occur if there are storm events during the construction period.

The *Clean Water Act* (CWA) requires that each state regulate point and nonpoint sources of water pollution, including storm water discharges. State water resources are also protected under California's *Porter-Cologne Water Quality* Control *Act of 1967*. This Act establishes regional water quality control boards (RWQCBs) to oversee water quality on a day-to-day basis at the regional/local level.

There are nine RWQCBs in California. The County of San Diego is under the administration of the San Diego RWQCB. The applicable water quality control plan for the County of San Diego is the updated *Water Quality Control Plan for the San Diego Basin* (Basin Plan), with amendments effective on, or before

April 4, 2011. The State of California and its RWQCB's work with the EPA to administer the National Pollutant Discharge Elimination System (NPDES) permit program, including the regulation of storm water.

The use of BMPs is a requirement of construction-related permits such as the NPDES Construction General Permit and is incorporated into approved storm water pollution prevention plans (SWPPPs). The Airport has a current SWPPP.

Construction projects at the Airport would result in temporary noise. The closest noise-sensitive receptors to the Airport that could be affected by construction noise are within a residential neighborhood located approximately 2,000 feet southeast of the east end of the Airport. Proposed development at the east end of the Airport includes the operational recommendation of an extension of the runway up to 800 feet and the potential construction of a full-length parallel taxiway on the south side. On the west end, the construction of an EMAS system is at least 2,500 feet from the closest noise-sensitive land uses.

According to the City of Carlsbad Noise Ordinance, Section 8.48.020, since there are no inhabited dwellings within 1,000 feet of proposed construction areas, there are no limitations on hours of construction, and construction noise is not expected to have adverse effects.

5.4.2.6 Department of Transportation (DOT) Act: Section 4(f)

Section 4(f) of the *Department of Transportation Act of 1966* (49 USC 303) protects against the loss of significant publicly-owned parks and recreation areas, publicly-owned wildlife and waterfowl refuges, and historic sites as a result of federally funded transportation projects. The Act states that a project which requires the "use" of such lands shall not be approved unless there is no "feasible and prudent" alternative and the project includes all possible planning to minimize harm from such use. In addition, the term "use" includes not only the physical taking of such lands, but "constructive use" of such lands. "Constructive use" of lands occurs when "a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired" (23 CFR Part 771.135).

There are several publicly-owned recreational areas within proximity to the Airport. The closest of these public recreational areas is the city-owned golf course, The Crossings, located adjacent to the Airport on its western and northwestern ends. In addition, Aviara Community Park is just over 0.5 mile south of the Airport. There are also several neighborhood parks located from 0.5 to 1.0 mile southeast of the Airport within the Bressi Ranch residential development.

Currently, the 65 dB CNEL for the Airport, extends over a portion of The Crossings golf course. As a result of the proposed improvements, this CNEL would cover a slightly different area in the future. With a runway extension, the CNEL would cover less of the golf course than if the runway is not extended. Since the improvements would not increase the amount of Section 4(f) lands affected by noise levels between 65 and 70 CNEL, and may actually reduce the amount of Section 4(f) land affected by Airport noise, no loss of Section 4(f) land or its uses would occur.

5.4.2.7 Farmland

Based on the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service's Web Soil Survey map, most of the Airport is comprised of the following soils: HrD2, Huerhuero loam, 9 to 15 percent slopes; HuC, Huerhuero-Urban land complex, 2 to 9 percent slopes; and LvF3, Loamy alluvial land-Huerhuero complex, and 9 to 50 percent slopes.

These soils are not considered to be prime farmland or other farmland categories protected under the *Farmland Protection Policy Act* (FPPA) (7 USC 4201 et seq.). Other soils located along the northern Airport property, however, are considered to be farmland of statewide importance, (i.e., DaC, Diablo clay, 2 to 9 percent slopes, and HrC and HrC2, Huerhuero loams 2 to 9 percent slopes). Therefore, the USDA's Farmland Conversion Impact Rating (Form AD-1006) may need to be completed if potential airport development projects disturb soils located on northern portions of the airfield.

5.4.2.8 Fish, Wildlife, and Plants

Section 7 of the *Endangered Species Act* (ESA), as amended (16 USC 1531 et seq.), applies to federal agency actions and sets forth requirements for consultation to determine if a proposed action "may affect" a federally endangered or threatened species. If an agency determines that an action "may affect" a federally protected species, then Section 7(a) (2) requires the agency to consult with U.S. Fish and Wildlife Service (USFWS) to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally listed endangered or threatened species, or result in the destruction or adverse modification of critical habitat.

If a species has been listed as a candidate species, Section 7(a) (4) states that each agency must confer with USFWS. The *Fish and Wildlife Coordination Act* requires that agencies consult with the state wildlife agencies and the Department of the Interior concerning the conservation of wildlife resources where the water of any stream or other water body is proposed to be controlled or modified by a federal agency or any public or private agency operating under a federal permit.

The *Migratory Bird Treaty Act* (MBTA) prohibits private parties and federal agencies in certain judicial circuits from intentionally taking a migratory bird, their eggs, or nests. The MBTA prohibits activities which would harm migratory birds, their eggs, or nests unless the Secretary of the Interior authorizes such activities under a special permit. E.O. 13112, *Invasive Species*, directs federal agencies to use relevant programs and authorities, to the extent practicable and subject to available resources, to prevent the introduction of invasive species and provide for restoration of native species and habitat conditions in ecosystems that have been invaded.

The FAA is to identify proposed actions that may involve risks of introducing invasive species on native habitat and populations. "Introduction" is the intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity. "Invasive species" are alien species whose introduction does, or is likely to, cause economic or environmental harm or harm to human health.

FAA Order 1050.1E, Appendix A, Paragraph 8.3, states that a significant impact to federally listed threatened or endangered species occurs when USFWS or National Marine Fisheries Service (NMFS) determines that the proposed action would likely jeopardize the continued existence of the species in question, or would result in the destruction or adverse modification of federally designated critical habitat in the affected area. Paragraph 8.3 also states that an action need not involve a threat of extinction to federally listed species to result in a significant impact; lesser impacts, including impacts on non-listed species, could also constitute a significant impact. Therefore, agencies or organizations having jurisdiction or special expertise concerning the protection and/or management of non-listed species can provide additional significance thresholds.

The Airport is located within the San Luis Rey quadrangle of the County of San Diego. Therefore, the California Natural Diversity Data Base (CNDDB) for this quadrangle was consulted to develop a list of federally listed and regionally protected species within the area. There are seven birds, two crustaceans, two fish, three mammals, and six plant species listed as endangered or threatened in the federal ESA that are known to occur within the San Luis Rey quadrangle; there are twelve birds, one mammal, and four plant species listed as endangered or threatened in the state ESA that are known to occur within the San Luis Rey quadrangle. It should be noted that nine of these are listed on both the federal and state ESA.

It is not likely that impacts to federal or state listed species would occur as a result of the proposed Airport improvements since the areas around the runway have been previously disturbed and graded and suitable habitat is not present. Proper procedures and best practices should be followed prior to any design or construction project.

Beyond the federal and state ESA, additional species are known to occur within the San Luis Rey quadrangle that are considered Fully Protected or Species of Special Concern by the California Department of Fish and Wildlife (CDFW) or are considered locally or regionally rare, threatened, or endangered on the California Native Plant Society's (CNPS) California Rare Plant Ranks. These species do not need to be listed on the federal or state ESA to be protected. CDFW designated species include 31 types of birds, three species of bats, San Diego black-tailed jackrabbit, three types of pocket mice, San Diego desert woodrat, American badger, western spadefoot (amphibian), and 12 species of reptiles.

Since there are numerous species known to occur in the area that are designated by the CDFW as Fully Protected or Special Species of Concern or listed as rare plants by the CNPS, biological resource surveys were completed as part of the required environmental documentation for proposed runway improvements. In addition, nesting surveys for migratory birds protected by the MBTA may be necessary depending on the time of year and the areas to be disturbed by grading. The proposed Airport projects would not control or modify any water resources; therefore, the *Fish and Wildlife Coordination Act* is not applicable. In addition, per E.O. 13112, no invasive species are likely to be introduced into native habitats as a result of airport development projects; any revegetation plans should utilize native plants to the extent feasible.

5.4.2.9 Floodplains

As defined in FAA Order 1050.1E, agencies are required to "make a finding that there is no practicable alternative before taking action that would encroach on a base floodplain based on a 100-year flood." E.O. 11988, *Floodplain Management,* directs federal agencies to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by the floodplains. Natural and beneficial values of floodplains include providing ground water recharge, water quality and maintenance, fish, wildlife and plants, open space, natural beauty, outdoor recreation, agriculture, and forestry. FAA Order 1050.1E (9.2b) indicates that "if the proposed action and reasonable alternatives are not within the limits of, or if applicable, the buffers of a base floodplain, a statement to that effect should be made" and no further analysis is necessary. The limits of base floodplains are determined by Flood Insurance Rate Maps (FIRMs) prepared by the Federal Emergency Management Agency (FEMA).

The Airport is mapped on FIRM map panels 06073C0768G and 06073C0769G, and is designated as Zone X, which includes areas of 0.2 percent annual chance of flood, areas of one percent annual chance flood with average depths of less than one foot or with drainage areas less than one square mile, and areas protected by levees from one percent annual chance flood. The closest 100-year floodway is associated with Agua Hedionda Creek, located north and east of the Airport (FEMA 2012).

5.4.2.10 Hazardous Materials, Pollution Prevention, and Solid Waste

There are four primary federal laws that govern the handling and disposal of hazardous materials, chemicals, substances, and wastes, all of which fall under the jurisdiction of the U.S. Environmental Protection Agency (EPA). The two statutes of most importance to the FAA in proposing actions to construct and operate facilities and navigational aids are the *Resource Conservation Recovery Act* (RCRA) (as amended by the *Federal Facilities Compliance Act of 1992*) and the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), as amended (also known as Superfund).

RCRA governs the generation, treatment, storage, and disposal of hazardous wastes; CERCLA provides for cleanup of any release of a hazardous substance (excluding petroleum) into the environment. Other laws include the *Hazardous Materials Transportation Act*, which regulates the handling and transport of hazardous materials and wastes, and the *Toxic Substances Control Act* (TSCA), which regulates and controls the use of polychlorinated biphenyls (PCBs) as well as other chemicals or toxic substances in commercial use.

Per FAA Order 1050.1E, Appendix A, thresholds of significance are typically only reached when a resource agency has indicated that it would be difficult to issue a permit for the proposed development. A significant impact may also be realized if the proposed action would affect a property listed on the National Priorities List (NPL). According to the EPA's EnviroMapper EJView Tool, there are no Superfund or NPL sites located at the Airport. There are also no hazardous waste and substances sites listed for the City of Carlsbad on the State's Site Cleanup (Cortese) List.

Construction of airport development projects would result in earthwork disturbances. These projects would primarily involve the reuse of paved or graded areas. Previous construction at the Airport has not resulted in the uncovering of hazardous materials; therefore, it is unlikely that future Airport development projects would do so.

Pollution prevention at the Airport is regulated through several laws, including the hazardous materials regulations cited above and the CWA. As discussed previously in the Construction Impacts section, the use of BMPs is a requirement of construction-related permits such as the State's NPDES Construction General Permit and should be incorporated into the Airport's current SWPPP.

Solid waste in the City of Carlsbad is collected by Waste Management and is taken to the Palomar Transfer Station, located at 5960 El Camino Real, before being transported to one of the County's six sub regional landfills: Miramar, Sycamore, Otay/OtayAnnex, Ramona, Borrego Springs, or Gregory Canyon landfill for solid waste disposal. CRQ is partially located over a closed Class III landfill, known as Landfill Unit 3, that operated from 1962 to 1975. A landfill gas control system was completed in 1995 to safely extract naturally occurring methane gas that is produced by closed landfills.

5.4.2.11 Historical, Architectural, Archaeological, and Cultural Resources

Historical, architectural, and archaeological resources as well as Native American cultural resources are protected by several different federal laws including, but not limited to, the *Archaeological Resources Protection Act* (ARPA) *of 1979*, the *National Historic Preservation Act of 1966*, and the *Native American Graves Protection & Repatriation Act*. In particular, Section 106 of the *National Historic Preservation Act* requires the FAA to consider the effects of proposed actions on sites listed on, eligible for listing on, or potentially eligible for listing on, the NRHP.

To assist with this determination, an area of potential effect (APE) is defined in consultation with the State Historic Preservation Officer (SHPO). The APE includes the areas that would be directly or indirectly impacted by proposed actions. Once the APE is defined, an inventory is taken of NRHP-eligible properties within the APE and an assessment of impacts is undertaken. The determination regarding significant impacts on protected resources occurs in consultation with the SHPO as well.

According to the National Register of Historic Places (NRHP), the closest listed resource on the NRHP, Ranchos de los Kiotes, is more than two miles from the Airport. It is not likely that there are significant historic sites located on the Airport since the Airport was constructed partially over a closed municipal landfill. However, any runway improvements that would occur in previously undisturbed and un-surveyed areas should be subject to a cultural resources literature search and field survey to confirm this conclusion. No historic aboveground structures are present as the Airport was constructed in the late 1950s as a replacement for Del Mar Airport. However, any runway improvements that would occur in previously undisturbed and un-surveyed areas should be subject to a cultural resources literature search and field survey. Cultural resources impacts could occur if the proposed runway improvements disturb any cultural resource sites that have historical, architectural, archaeological, or Native American cultural resources. This would be monitored during any potential construction.

5.4.2.12 Light Emissions, and Visual Effects

Airport lighting is characterized as either airfield lighting (i.e., runway, taxiway, approach and landing lights) or landside lighting (i.e., security lights, building interior lighting, parking lights, and signage). The following airfield lighting is in place at the Airport:

- A rotating beacon located atop the Airport terminal
- HIRL
- REILs (i.e., strobe lights set to the side of the runway landing threshold on the approach to Runway 24)
- Precision approach path indicator lights (PAPI-P4L) serving both ends of the runway
- Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) at the end of Runway 24
- One lighted windsock located northwest of the Runway 24 threshold
- Lighted airfield signs located throughout the airfield system.

Security and building lights are also present landside.

The airfield lighting runs consistently when the tower is open. There is also a pilot-controlled lighting system (PCL), which allows the pilot to turn on or increase the intensity of these lights from the aircraft using the aircraft's transmitter when the tower is closed. FAA significance thresholds for light emissions are generally when an action's light emissions create an annoyance that would interfere with normal activities. For example, if a high intensity strobe light, such as a REIL system, would produce glare on any adjoining site, particularly residential uses, this could constitute a significant adverse impact.

The visual sight of aircraft, aircraft contrails, or aircraft or airport lighting, especially from a distance that is not normally intrusive, is not assumed to be an adverse impact. For visual effects, an action is considered significant when consultation with federal, State, or local agencies, tribes, or the public shows that visual effects contrast with the existing environments and the agencies state that the effect is objectionable.

Visual and lighting impacts relate primarily to the presence of sensitive visual receptors in proximity to an airport. These would normally be residents or users of a designated scenic resource such as a scenic corridor. The Airport is located on a mesa that is bordered by Palomar Airport Road, El Camino Real, commercial and light industrial development, and a golf course. The existing slopes at the Airport are significant partially in part of the existence of a landfill on the eastern portion of the airfield. Both El Camino Real and Palomar Airport Road are categorized as Community Theme Corridors within the City of Carlsbad's General Plan Circulation Element (2015). The purpose of such corridors is to connect Carlsbad with adjacent municipalities and present the City of Carlsbad to persons entering and passing through the community. Proposed improvements described in this Section include potential runway and taxiway extensions that would alter existing slopes and likely require a retention wall. The City of Carlsbad Landscape Manual (February 2016) identifies policies and requirements that correspond with Community Theme Corridors. Due to the existing landfill and methane collection system, and steep slopes associated with a potential retention wall, adherence to these policies and requirements may be challenging, however, they should be followed to the extent possible.

The primary visual and lighting changes proposed as a result of the runway improvements involve extending runway and taxiway lighting approximately up to 900 feet east from their current location. In addition, the existing MALSR for runway approaches from the east would need to be extended east to accommodate the proposed shift in the runway approach threshold. All but the last station would either be in-pavement or utilize an existing light station foundation as they are currently set 200 feet apart. Thus, it is estimated that with a runway extension, there would be one additional foundation 200 feet farther east. This area is currently open space owned by the Airport and is surrounded by industrial development.

On the west end of the runway, planned improvements involve the placement of an EMAS designed to accommodate the critical design aircraft, and the relocation of an existing localizer and vehicle service road on the west end. Again, a retaining wall and fill slopes would be necessary to support the EMAS, potential runway and taxiway improvements, and the relocated vehicle service roadway. While these improvements may not incur significant alterations to lighting effects, they would impact visual effects.

5.4.2.13 Natural Resources and Energy

The FAA considers an action to have a significant impact on natural resources and energy when an action's construction, operation, or maintenance would cause demands that exceed available or future (project year) natural resource or energy supplies. Therefore, in instances when proposed actions necessitate the enhancement of utilities, power companies or other suppliers of natural resources and energy would need to be contacted to determine if the proposed project demands can be met by existing or planned facilities.

San Diego Gas and Electric (SDG&E) Company provides natural gas and electricity to the Carlsbad area, including the Airport. The use of energy and natural resources at the Airport would occur both during construction of planned facilities and during operation of the Airport as it grows. However, none of the planned airport improvement projects are major or are anticipated to result in significant increases in the demand for natural resources or energy consumption beyond what is readily available by SDG&E.

5.4.2.14 Secondary (Induced) Impacts

FAA Order 1050.1E, Appendix A, states that secondary impacts should be addressed when the proposed project is a major development proposal that could involve shifts in patterns of population movement and growth, public service demands, and changes in business and economic activity due to airport development. The City of Carlsbad's General Plan Land Use Plan updated in 2015 discusses in detail the impact that the Airport has on business development in the northern part of San Diego: "Factor 3: Regional Employment Center. "As a result of the nonresidential nature required of the lands surrounding the Airport, Carlsbad has designated and zoned most of these lands for industrial and, to a lesser degree, office development.

The size of the affected acreage is very substantial, with the result that Carlsbad has created one of the largest inventories of aggregated industrial land and, correspondingly, one of the largest potential employment generators in North San Diego County. When fully developed, this generator will provide jobs not only in Carlsbad, but in the entire region as well. This role as regional employment generator will increasingly have major implications for the City's identity, its role in the region, and its future development patterns."

However, the proposed runway improvements at the Airport would not be considered major development nor would they involve shifts of population movement or growth. Rather, they would involve the phased extension of the east end of the runway and parallel taxiway to allow the runway to fully meet C-III and D-III standards. EMAS would be installed on the west and possibly the east end of the runway to improve safety at the Airport. The proposed runway improvements themselves are not anticipated to specifically generate additional aircraft operations had they not been constructed in the first place. The amount of annual growth anticipated in aircraft activity at the Airport in the future years is not anticipated to result in secondary impacts on the County or the City of Carlsbad.

As discussed in Section 4 of this Airport Master Plan Update, the proposed improvements would not significantly affect ground traffic or change traffic patterns. Construction-related work generated by planned Airport improvements would provide economic benefits to the County and City in the form of increased employment and income.

5.4.2.15 Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks

Socioeconomic impacts known to result from airport improvements are often associated with relocation activities or other community disruptions. These impacts can include alterations to surface transportation patterns, division or disruption of existing communities, interferences with orderly planned development, or an appreciable change in employment related to the project. Social impacts are generally evaluated based on areas of acquisition and/or areas of significant project impact, such as noise sensitive areas encompassed by noise levels in excess of 65 DNL.

Per FAA Order 1050.1E, Appendix A, the thresholds of significance for this impact category are reached if the project negatively affects a disproportionately high number of minority or low-income populations or if children would be exposed to a disproportionate number of health and safety risks. E.O. 12898, *Federal Action to Address Environmental* Justice *in Minority Populations and Low-Income Populations* and the accompanying Presidential Memorandum, and DOT Order 5610.2, *Environmental Justice* requires the FAA to provide for meaningful public involvement by minority and low-income populations as well as analysis that identifies and addresses potential impacts on these populations that may be disproportionately high and adverse.

Pursuant to E.O. 13045, *Protection of Children from Environmental Health Risks and Safety Risks,* federal agencies are directed to identify and assess environmental health and safety risks that may disproportionately affect children. These risks include those that are attributable to products or substances that a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, soil, or products to which they may be exposed. The acquisition of residences and farmland is required to conform with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (Uniform Act). These regulations mandate that certain relocation assistance services be made available to homeowners and tenants of effected properties. This assistance includes help finding comparable and decent substitute housing for the same cost, moving expenses, and in some cases, loss of income.

The U.S. Census, most recently taken in 2010, provides information regarding socioeconomic conditions in the County of San Diego. Approximately 10.5 percent of the households in the same census tract as the Airport are living below the poverty rate. (The 2010 Census does not provide poverty rate data by block group.) This includes residential neighborhoods to the southwest and northwest of the Airport. The closest residential neighborhood to the Airport is actually located to the southeast in a different census tract than the Airport. This census tract has only 6.5 percent of its population living below the poverty rate. Approximately 20 percent of the population in the block group that contains the Airport is from minority groups. Population in the block group directly south of the Airport is approximately 33 percent from minority groups. The nearest such neighborhood to the Airport is located almost 0.5 mile to the south and west.

Since the proposed runway improvements do not involve expanding airport operations beyond the existing Airport boundaries, the relocation of housing or businesses would not be necessary to implement the proposed project. Existing communities, transportation patterns, and planned development would not be disrupted. The Airport's projected annual growth in the future would not significantly change future growth in the Carlsbad area or have disproportionate adverse impacts on minority, low-income, or child populations. Therefore, no socioeconomic impacts would be associated with improvements proposed in this Airport Master Plan Update.

5.5 AIRFIELD ALTERNATIVES

The following section describes five airfield alternatives that have been developed for CRQ, based upon the facility requirements from Section 4, while taking into account the site constraints that were alluded to earlier in this Section. Prior to identification of these final alternatives, an initial group of multiple development scenarios were developed. These scenarios were reviewed by the planning team and the Airport sponsor, discussed in general with an advisory group, presented at a public workshop, and refined into a final list of options to move forward for detailed evaluation. In short, a very standard process of alternatives development and refinement consistent with industry practice was undertaken to arrive at five options for detailed review. A no-build or "do nothing" alternative was examined as part of this Airport Master Plan Update, to gain perspective of what impacts would arise from taking no action and to provide a baseline condition for subsequent environmental analysis. Because this option did not accommodate projected levels of aviation demand nor did it enhance airfield safety, (notably not addressing standards issues affecting both existing and projected operations by ARC C-III and D-III aircraft), it was not examined further.

The airfield development alternatives are described in the following sections of this document. The descriptions are accompanied by visual depictions and discussion of the potential issues associated with the proposed improvements. These alternatives include:

- Alternative 1 – B-II Enhanced Facility
- Alternative 2 – D-III Full Compliance
- Alternative 3 – D-III Modified Standards
- Alternative 4 – D-III On Property
- Alternative 5 – D-III Modified Standards Compliance
- Alternative 6 – C-III Modified Standards Compliance

Specific evaluation criteria have been developed and are used to determine the feasibility of implementing the proposed alternatives. The overall objective of this Section is to identify a preferred development alternative that best fits the evaluation criteria. The evaluation criteria are listed below:

- Safety – The preferred alternative must preserve and/or enhance the safety of Airport users. Airport users include passengers, pilots, Airport staff, tenants, and other operators. Safety criteria encompass FAA airport design standards, State and local regulations, and account for the operational functionality of aircraft and Airport users.
- Financial Feasibility – The preferred development alternative must address the near and long-term Airport needs in a manner that is financially achievable, financially responsible, and environmentally and operationally sustainable.
- Avoid Impacts to Airport Businesses – Avoid operational or physical changes to Airport tenants and leaseholds in order to avoid disruptions to Airport businesses.
- Ability to Accommodate Existing and Future Demand – Forecasts of aviation-related demand have been developed for this Airport Master Plan Update. These forecasts are used as a gauge to determine what Airport improvements will be required to maintain or expand service at the Airport and at what point in time improvements should be implemented. The preferred alternative should be able to accommodate projected levels of aviation demand as warranted.

- Ability of Facility Improvements to Remain on Airport-owned Property – Despite existing physical constraints at the Airport, it is desirable to keep all facility improvements within the existing airport fence line. This minimizes project cost and the potential for environmental and land use impacts.
- Environmental Impacts – A goal of recommended alternatives is to minimize impacts to the environment. This includes on and off-Airport impacts.
- Offsite Impacts to surrounding environs including businesses and roadways – Major reconstruction of existing businesses, infrastructure, and transportation systems can have significant impacts on an airport and the surrounding area. Such projects add cost, impact operations, capacity, and can have unintended environmental impacts. The preferred alternative should minimize changes to the surrounding community and infrastructure.
- Eligibility for FAA Funding – Proposed improvements should adhere to FAA design criteria and be financially reasonable in order to be eligible for FAA grant funding for design and construction.

5.6 AIRPLANE DESIGN GROUP (ADG) II AIRFIELD ALTERNATIVES

As noted previously CRQ is currently designed in conformity with ARC of B-II. This section describes the attributes and constraints of a development alternative that maintains FAA B-II design standards with an extension to Runway 06-24 in its existing location. Existing conditions at CRQ that have been granted modifications to standards from the for a B-II facility include:

- Runway 06-24 to Taxiway “A” Separation = 296.5’, B-II Design Standard = 300’
- Portions of the Runway Safety Area extending beyond Runway End 06 and blast pad exceed grade limitations for B-II design standards.

It should be noted that all airfield alternatives presented in the following subsections depict ultimate conditions and do not include any interim actions required to achieve these conditions.

5.6.1 AIRFIELD ALTERNATIVE 1 – B-II ENHANCED FACILITY

Proposed improvements outlined in Airfield Alternative 1 have been developed to meet FAA B-II design standards (see **Exhibit 5.2**) and to meet other key airfield facility needs noted under the Facility Requirements analysis. It has been determined that aircraft that exceed the B-II designation regularly operate at CRQ. Therefore, based on large corporate activity and commercial aircraft already operating at CRQ, Alternative 1 includes the installation of a 350 ft. x 150 ft. Engineered Materials Arrestor System (EMAS) serving Runway 24 designed to accommodate aircraft such as a CRJ-700 (ARC C-II) and similar models. An EMAS constructed to these specifications would support projected corporate jet aircraft activity at the Airport, but would not designed to accommodate larger commercial aircraft such as the Boeing 737 or similar models.

An EMAS is a bed of engineered materials built at the end of a runway. Engineered materials are defined in FAA Advisory Circular 150/5220-22A as "high energy absorbing materials of selected strength, which will reliably and predictably crush under the weight of an aircraft." The purpose of an EMAS is to stop an aircraft overrun with no human injury and minimal aircraft damage. The aircraft is slowed by the loss of energy required to crush the EMAS material. Although an EMAS is not a substitute for additional runway length, it does enhance safety by minimizing the impact of an aircraft overrun.

The proposed location of the EMAS starts 35 feet beyond Runway End 06 to provide clearance for aircraft operations under standard operating procedures without wing overhang of the EMAS. This provides a total length of 350 feet for the EMAS bed beyond the end of the runway. A retaining wall to provide support for fill has been proposed 10 feet to the west of the relocated localizer. This wall would wrap around both the north and the south edges of the existing runway to allow for the relocation of the Vehicle Service Road (VSR) while remaining out of the runway safety area. The retaining wall is proposed to be approximately 1,020 feet long and 12 feet tall at its highest point. In addition to the installation of the EMAS and retaining wall, the existing ground to the north of the runway is proposed to be re-graded to achieve slope requirements outlined in FAA Advisory Circular 150/5300-13A within the runway safety area. West side upgrades will also include the installation of new drainage facilities and re-vegetation of the entire project area.

The proposed action would alleviate areas, including those on the blast pad on Runway End 06, that currently exceed grade limitations for B-II design standards. The proposed action would not, however, mitigate any other non-conformities to ARC B-II design standards outlined at the beginning of this section. This alternative allows for a feasible extension of up to 900’ (200’ near-term, plus 700’ long-term) while keeping critical safety areas associated with B-II design requirements on-Airport property.

Exhibit 5.2 Airfield Alternative 1 – B-II Facility

Prepared by: Kimley-Horn, 2017

Airfield Alternative 1 also maintains the existing runway width of 150', which has been noted as being in excess of design requirements, however, based on meetings with tenants and Airport users was also identified as a desirable asset. The width design standard for a B-II runway with approach minimums not less than ¾ miles is 75 feet. Added runway width is beneficial for aircraft and pilot safety, however, because it actually exceeds design standards, the FAA may decide to withhold AIP funding for improvements to the percentage of the facility that exceeds that standard. The following bullets summarize the benefits and constraints of Airfield Alternative 1.

5.6.1.2 Benefits of Airfield Alternative 1

- Construction of EMAS enhances airfield safety
- Lower estimated construction cost as runway maintains existing configuration
- Improves areas at Runway End 06, including areas on blast pad that exceed B-II grading design standards
- Improvements remain on Airport property, minimal adverse impact to landside or off-Airport activity
- Minimal impact (encroachment) on general aviation/FBO operations
- Satisfies Airport users who have identified that maintaining existing runway width is extremely important
- The alternative does not impact existing North Ramp area or aircraft parking in that area
- No change in the size of runway protection zones
- No direct impacts to immediately adjacent offsite development or roadways

5.6.1.3 Constraints Regarding Airfield Alternative 1

- Maintaining B-II standards at a facility that regularly experiences operations conducted by aircraft with higher ARCs than B-II poses significant safety concerns for the airport sponsor, regardless of a proposed EMAS and regardless of the pilot in command decision to operate at CRQ.
- Remaining a B-II facility may have significant negative impacts on large corporate and regional air carrier operations.
    - For general aviation aircraft operators, it is at the discretion of the pilot to determine the safety of an airfield and whether or not to utilize that facility.
    - For commercial operators, an aircraft whose design criteria exceeds an airfield's design standards may be prohibited from operating at that facility. Remaining a B-II facility may discourage potential commercial service providers from initiating service. This is particularly problematic as regional commuter airlines modify fleets to include larger versions of regional commuter aircraft; both turbo-prop and turbine aircraft.
- The issue and need to conform to higher FAA design standards was identified in the 1997 Airport Master Plan and has been clearly reaffirmed in this Airport Master Plan Update. Knowledge of the ongoing airfield concerns triggers a need to address these issues to the extent practicable.

5.7 AIRPLANE DESIGN GROUP (ADG) III AIRFIELD ALTERNATIVES

Based on a representative sample of 2016 operational data compared with forecasts presented in Section 2 of this Airport Master Plan Update, the future critical aircraft for CRQ was determined to be the Gulfstream G650, which has an ARC of D-III. The recommendation to ultimately classify the Airport as a D-III facility was also made in the 1997 Airport Master Plan. The 1997 Plan sought the following modifications to FAA design standards to accommodate aircraft that were already in operation at the Airport rather than to accommodate future aircraft activity:

- Permit an RSA for Runway 24 to extend only 200 feet beyond the runway end where 1,000 feet are required. To reduce the distance required in the modification, the runway threshold will be displaced 300 feet and an additional 100 feet will be filled and graded. A modification to Standards would be required for the remaining 400 feet.
- Permit an OFA for Runway 24 of 700 feet where 1,000 feet are required.
- Permit a runway-taxiway separation of 287.5 feet where 400 feet are required.
- Permit an RSA width of 440 feet where 500 feet are required.
- Permit an OFA width of 740 feet where 800 feet are required.
- Permit a runway centerline to aircraft parking separation of 370 feet where 500 feet are required.
- Permit a taxiway OFA of 136 feet where 186 feet are required. This is to accommodate a proposed drainage project which would eliminate the drainage curb.

On May 14, 1997, the FAA conditionally approved the ALP including these seven Modifications to Standards that would preclude a potential change the ARC from B-II (existing) to D-III. Subsequent to the approval of the ALP, new standards, and criteria were issued by the FAA that specifically removed all modifications to design standards for Runway Safety Areas and precluded the granting of modifications to standard for RSAs. Thus, the Modification of Standards associated with any RSA at CRQ was rendered null and void. Based on existing and projected levels of aircraft activity, six airfield alternatives with an ultimate condition of ADG III have been developed.

5.7.1 Airfield Alternative 2 - D-III Full Compliance

Airfield Alternative 2 maintains all existing services at CRQ and fully adheres to ARC D-III design standards (see **Exhibit 5.3**). This alternative will accommodate current and projected needs for general aviation and existing and future commercial activity at the Airport. Alternative 2 expands the Airport property boundary northward to ensure that all projected levels of demand can be accommodated. This would provide for unconstrained forecasted growth and provide for full FAA design standards compliance.

This alternative shifts the centerline of Runway 06-24 104 feet to the north and narrows the Runway to 100 feet (ADG III standard). Taxiway A would remain in its existing location, while Taxiway N would be relocated approximately 200 feet north to establish 400 feet of separation between Runway 06-24 and Taxiway N. This results in the full removal of the existing aircraft parking on the North Ramp.

In order to keep critical safety areas on-Airport property, and to accommodate projected aircraft parking needs, this alternative also includes the acquisition of approximately 22 acres of land and eight buildings zoned light industrial that total approximately 473,000 square feet. The land acquired would be used for lost aircraft parking on the North Ramp area and keep Taxiway N and associated safety areas on Airport property. This alternative includes a runway extension of up to 800 feet to the east of Runway 24 end.

This maximum extension is 100 feet shorter than Airfield Alternative 1 due to the ARC D-III design standards which require greater separation and both longer and wider safety areas and object free areas. Any extension greater than 800 feet to the east would require relocation of El Camino Real and any extension to the west would require massive infill as the airfield topography drops significantly off Runway End 06. Both of these options would likely present huge financial and environmental costs. Airfield Alternative 2 also includes the installation of a 350-foot-long EMAS systems on both ends of Runway 06-24 to enhance safety. These systems would be sized to accommodate the Airport's critical design aircraft.

Even with only an 800-foot extension to the east, this alternative has the most significant cost of all proposed alternatives that have been developed for this Airport Master Plan Update. This development option is not necessarily feasible for implementation; rather, it is intended to identify all of the aspects and costs that would be incurred to accommodate projected levels of aviation-related activity at CRQ while adhering to ARC D-III design standards. The following bullets summarize the benefits and constraints of Airfield Alternative 2.

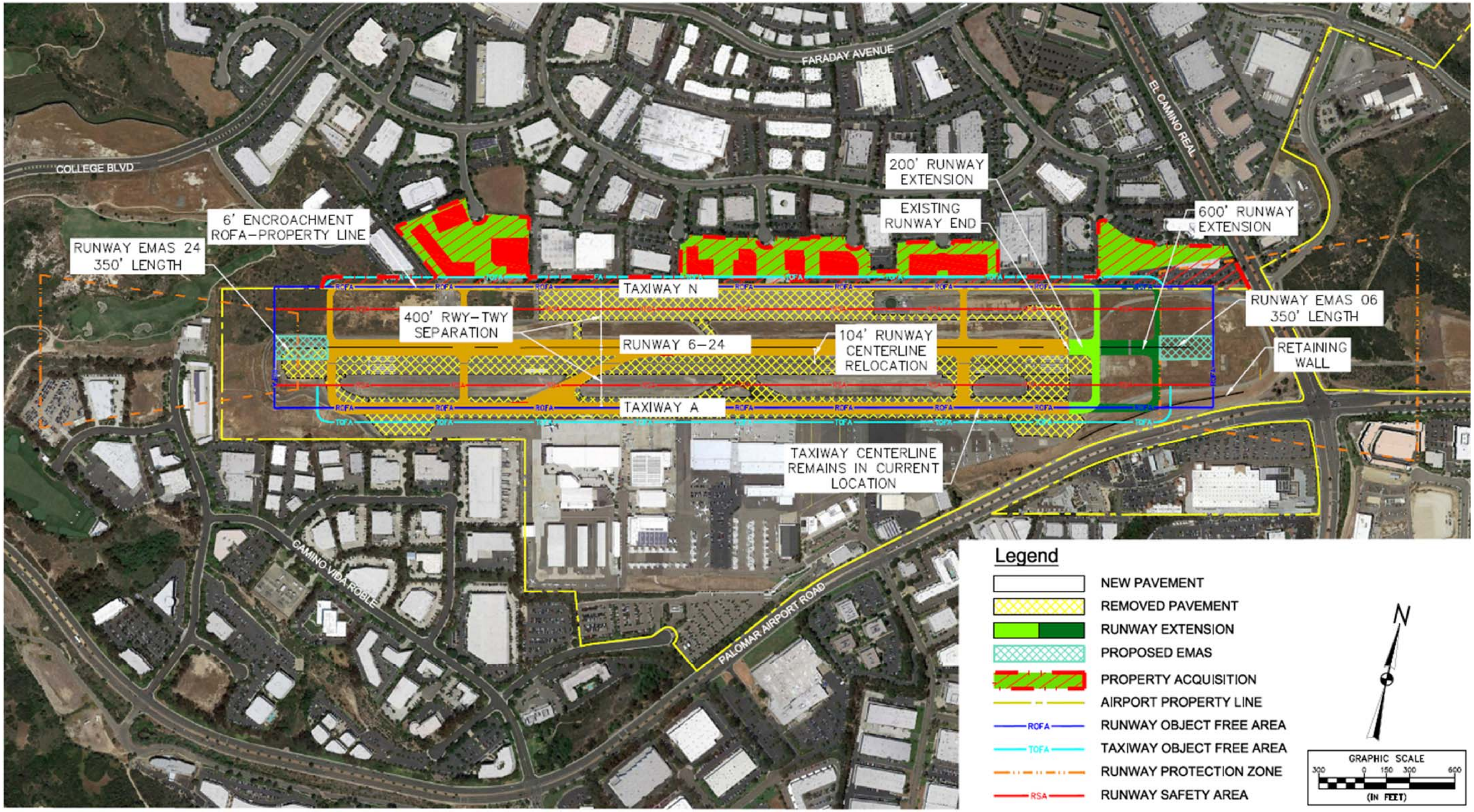
5.7.1.1 Benefits of Airfield Alternative 2

- Compliant with FAA D-III design standards with exception of TOFA on east end of TWY A
- Safety enhancements with EMAS systems on both ends of Runway 06-24
- Accommodates projected levels of aviation-related activity
- Would not require MOS for runway-taxiway separation
- Consolidation and construction of connector taxiways to improve airfield safety and capacity
- RPZ dimensions shift, but do not change; no new buildings would be incorporated into the RPZ by this shift

5.7.1.2 Constraints Regarding Airfield Alternative 2

- Requires significant land and building acquisition with affiliated acquisition and relocation impacts and cost
- Improvements would have significant environmental impacts and impacts to surrounding community
- Runway relocation poses significant potential for operational impacts for current tenants during construction including potential for extended airport closure
- Enhancement and operational recommendation of runway extension would occur over existing landfill requiring special construction techniques and increased cost of construction
- Would require relocation of the approach lighting system
- Negates airport perimeter roadway
- Structures already within the RPZ will require coordination with FAA Airports Planning and Environmental Division (APP-400)
- Expansion of Airport would trigger vote of Citizens of Carlsbad in accordance with Section 21.53.015 of the City’s Municipal Code provide due to the need to acquire additional land to accommodate airport facilities and City of Carlsbad to amend CUP-172
- High cost of EMAS on both ends along with ongoing maintenance costs

Exhibit 5.3 Airfield Alternative 2 – ARC D-III Full Compliance Facility



Prepared by: Kimley-Horn, 2017

5.7.2 Airfield Alternative 3 - D-III Modified Standards

Airfield Alternative 3 represents an option that attempts to meet FAA safety criteria, specifically the RSA and ROFA while enhancing the lateral separation between Runway 06-24 and Taxiway A. This alternative also recognizes the reality posed by the limited available land area that surrounds the Airport. This option proposes a limited modification to design standard for runway-taxiway separation similar to modifications to standard currently in place at other airports where similar taxiway separation issues exist. This option would minimize on-site impacts to developed facilities and not create any improvements beyond the current Airport footprint. (see **Exhibit 5.4**).

This alternative shifts the centerline of Runway 06-24 75 feet to the north and the centerline of Taxiway "A" 4 feet to the north to establish 367.5 feet of runway-taxiway separation. In order to achieve this, a modification of standards is required as the FAA requires a runway-taxiway separation of 400 feet. Additionally, coordination with the ATCT and receipt of concurrence that this option maintains an acceptable level of operational safety (similar to what has been done at other airports) would be sought. Under this scenario, the runway object free area (ROFA) expands from 500 feet in width to 800 feet; as such the ROFA would be situated approximately 23 feet to the south of the northern property boundary, which would eliminate aircraft parking on the north apron area but provide adequate space for the vehicle service road (VSR) and navigational aids. Furthermore, the northward shift of the runway would move the runway's primary surface (FAR Part 77) more significantly onto the existing aircraft parking on the North Apron area. Airfield Alternative 3 would also narrow the width of Runway 06-24 to 100 feet, which is the FAA standard for a D-III facility.

The proposed change to the taxiway system from accommodating ADG-II aircraft to ADG-III aircraft has a resultant change in the associated safety areas. For this alternative, the taxiway object free area increases from 131 feet (ADG-II) to 186 feet (ADG-III) which encroaches onto existing FBO parking. Although most leaseholds would largely be unaffected, the encroachment onto the existing Magellan leasehold is approximately 15 feet. This encroachment would be mitigated by the existing zipper line.

In addition to the shift of the runway and taxiway, this alternative includes the installation of EMAS systems on both the east and west ends of Runway 06-24, which allows for a potential extension of up to 800 feet on the eastern end of the runway. These measures, when combined, would appropriately accommodate D-III aircraft as a result of the enhanced conformity with the appropriate airfield design standards, greater lateral separation between the runway and Taxiway A, and through the provision of added length to the runway for departures.

5.7.2.1 Runway-Taxiway Separation Criteria

Under current ADG-III criteria for runway-taxiway separation, the distance between the edge of the Runway Safety area and the boundary of the Taxiway Object Free Area (TOFA) nearest the runway is 57 feet, which assumes full ADG III aircraft can operate simultaneously on the runway and the taxiway. The maximum allowable wingspan under ADG-III is 117.99 feet.

It is assumed that simultaneous ADG III operations on Runway 06-24 and parallel taxiway A are not possible at the current runway separation and would likely only be allowed with a full 400' separation.

To provide a defensible basis for a reduced lateral separation between Runway 06-24 and Taxiway A, the 57-foot separation between the RSA and TOFA identified was applied as an FAA acceptable safety margin that could be used for simultaneous ADG III/ADG II operations. With this value applied to an ADG II on the Taxiway with ADG III on the runway, the resultant lateral distance between runway and taxiway can be reduced to 367.5 feet.

This action is viable for the following reasons.

- It is based on a separation distance that currently exists within a FAA lateral separation standard.
- It is based on lateral separation standards for full ADG III aircraft and CRQ is not projected nor expected to employ a fleet mix with full ADG III wingspans (such as large commercial ADG III aircraft).
- ADG III aircraft activity at CRQ is anticipated to remain driven by general aviation business jet models such as the Gulfstream G500/550/650 and Bombardier Global Express. The largest of these have a wing span of just under 105 feet (Global 7000/8000).
- Commercial service aircraft having the potential to operate at CRQ are projected to consist of models such as the CRJ-700 and the Embraer EMB 170/175 or 190. (EMB 170/175 - 85.33-foot wingspan, EMB 190 - 94.25-foot wingspan).
- While the TOFA for ADG III taxi operations is larger than that for ADG II, it is anticipated that this is offset by the smaller wingspans for ADG II (no more than 79') when operating on the runway despite the 250' RSA requirement.

If runway development options are based on the 105' wingspan, this provides an added margin of approximately 13 additional feet. As mentioned previously, the 367.5 feet would still maintain a separation of 57 feet between the runway safety area and the taxiway object free area. In the event of a commercial ARC D-III aircraft operating on Runway 06-24 or Taxiway A, the pilot would be required to obtain clearance from ATCT personnel before proceeding. Such an agreement would require approval from the FAA, CRQ, and the ATCT. It should be noted that such an operational agreement has been sought at other U.S. airports that face similar constraints as CRQ.

The following bullets summarize the benefits and constraints of Airfield Alternative 3.

5.7.2.2 Benefits of Airfield Alternative 3

- Compliant with FAA D-III design criteria with modifications to standards including runway to taxiway separation and both ROFA and TOFA on the east end of the field
- Safety enhancements with EMAS systems on both ends of Runway 06-24
- Improvements remain on Airport property-no direct impacts to off-site development
- Allows for commercial operations by ADG-III aircraft (with operational conditions)
- Consolidation and construction of connector taxiways to improve airfield safety and capacity
- Approach RPZ dimensions do not change
- Provides sufficient space for vehicle service road and navigational aids north of Runway 06-24

5.7.2.3 Constraints Regarding Airfield Alternative 3

- Eliminates north aircraft parking, reducing accommodation of projected levels of aviation demand
- Requires runway centerline relocation and full runway reconstruction
- Runway relocation poses significant potential for operational impacts for current tenants during construction including potential for extended airport closure
- Minor impacts to FBO/leasehold areas
- High cost of EMAS on both ends along with ongoing maintenance costs
- Would require relocation of the approach lighting system
- Environmental concerns associated with construction on landfill and special construction requirements add to alternative cost

- Structures already within the RPZ will require coordination with FAA Airports Planning and Environmental Division (APP-400)
- FAA approval needed for separation of runway and taxiway

It is important to note that this alternative was presented to the FAA and the feedback received identified that although the specific conditions outlined in the proposed development have been utilized at other facilities, it would not be a preferable course of action at CRQ. The FAA concluded that granting a modification of standards for the Runway Object Free Area on the north side of the runway was preferable to granting a modification of standards for runway-taxiway separation. This understanding led to the development of Airfield Alternative 4 and 5 presented in subsequent sections of this Airport Master Plan Update.

Exhibit 5.4 Airfield Alternative 3 – ARC D-III Modified Standards

Prepared by: Kimley-Horn, 2017

5.7.3 Airfield Alternative 4 - D-III – On Property

Airfield Alternative 4 adheres to FAA design criteria for a D-III facility with one modification to standards for the runway object free area. It also keeps all recommended improvements on the existing Airport property. The proposed action would shift the centerline of existing Runway 06-24 70 feet to the north and shift the centerline of Taxiway A 34 feet to the south. This results in 400 feet of lateral separation between Runway 06-24 and Taxiway A (see **Exhibit 5.5**). Achieving this separation would allow commercial ADG III aircraft to operate on Runway 06-24 and Taxiway A simultaneously without a modification of standard for runway-taxiway separation.

Under this scenario however, a modification of standards would be needed for a small segment of the runway object free area (approximately 1/10th of an acre) that would extend over Palomar Airport Road. It should be noted that in addition to the environmental complications that would arise from extending the runway and taxiway over existing landfill areas, a taxiway extension with a 34-foot southern shift would require significant grading and soil retention measures as the extension itself is proposed over an area that has an approximate drop-off of 50 feet from the airfield.

Similar to Airfield Alternative 3, shifting the runway 70 feet to the north would place the existing north aircraft parking apron within the runway's primary surface and runway object free area. In order to accommodate ADG III design criteria and still remain on existing Airport property, the north aircraft parking ramp would require removal. This action would trigger the need to accommodate the 30+ aircraft that currently use the north ramp somewhere in the southern portion of the Airport, which is already crowded, or these uses would need to relocate to another facility.

Also, similar to the previous alternative, Airfield Alternative 4 includes EMAS systems to both Runway End 06 and 24 and up to an 800-foot extension to increase operational capability and enhance safety. Alternative 4 would also reduce the width of Runway 06-24 to 100 feet and increase the ROFA from 500 feet in width to 800 feet. This would result in a separation of approximately 27 feet between the ROFA and the Airport property line on the north side of the airfield, which provides sufficient space for the vehicle service road and relocation of required navigational aids.

One of the major differences between Airfield Alternative 4 and the other proposed development scenarios is the impact to aircraft parking and FBO leaseholds south of Runway 06-24. Relocating Taxiway A 34 feet to the south and updating the facility to accommodate ARC D-III aircraft would shift the TOFA onto areas that are currently leased by FBOs for transient and corporate general aviation aircraft parking. It should be noted, however that these ramp areas to the north of the FBO buildings is within the Part 77 Primary Surface and as a result the parking of aircraft in these areas technically violates the primary surface criteria. Because CRQ already has a constricted land envelope in which to occupy and operate, Airfield Alternative 4 cannot provide additional aircraft parking for the amount of displaced apron space that would be lost. The expanded TOFA would encroach on existing FBO leaseholds by 35 feet in some areas, and as much as 53 in others. Although leasehold dimensions and rates can be negotiated, the loss of useable apron would be permanent. This action would likely limit the size and number of aircraft that the existing FBOs could accommodate, which could severely impact not only revenues generated by aircraft parking, but fueling as well. The following bullets summarize the benefits and constraints of Airfield Alternative 4.

5.7.3.1 Benefits of Airfield Alternative 4

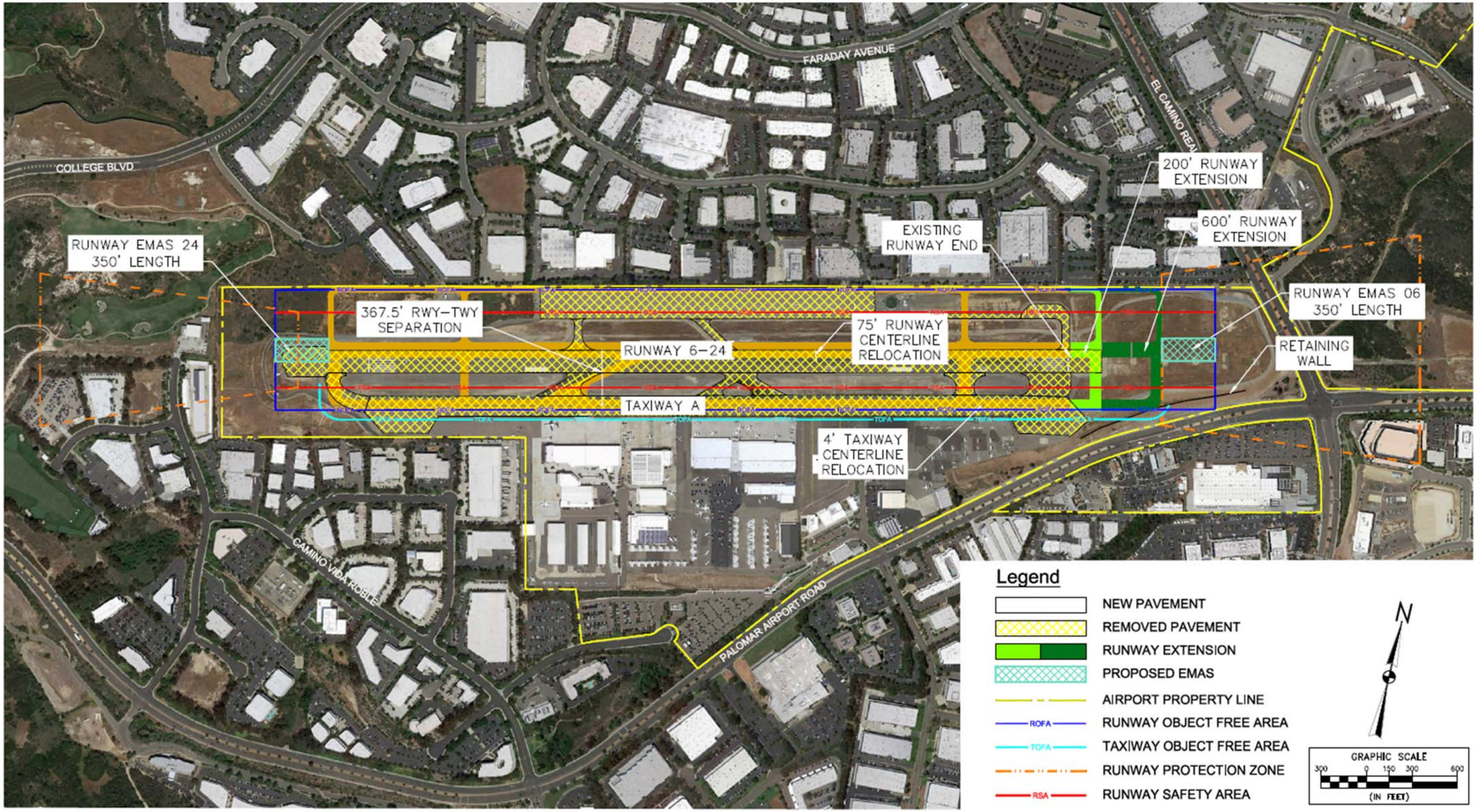
- Conforms to FAA D-III design criteria except requires modifications to standard for ROFA and TOFA
- Keeps all proposed improvements on existing Airport property
- Accommodates corporate and potential regional commuter aircraft
- Safety enhancements with EMAS systems on both ends of Runway 06-24

- Allows for up to an 800-foot extension to runway, which enhances safety and increases airfield capability
- Consolidation and construction of connector taxiways between Taxiway A and Runway 06-24 to improve airfield safety and capacity
- Approach RPZ dimensions do not change
- Provides adequate space for VSR and navigational aids north of Runway 06-24

5.7.3.2 Constraints Regarding Airfield Alternative 4

- Eliminates north aircraft parking, reducing accommodation of projected levels of aviation demand
- Significant costs associated with construction over existing landfill areas, as well as earthwork and soil retention measures required for extension of Taxiway A
- Significant impacts to FBO leaseholds and aircraft parking aprons south of Runway 06-24
- 800' extension only viable with construction of EMAS on both ends
- EMAS on both ends adds considerably to the cost of the alternative both from an initial capital perspective and from ongoing EMAS maintenance
- Requires shifting the approach lighting system
- 800-foot extension would require modification of standards for ROFA and TOFA over existing Palomar Airport Road
- Runway relocation poses significant potential for operational impacts for current tenants during construction including potential for extended airport closure

Exhibit 5.5 Airfield Alternative 4 – ARC D-III – On Property



Prepared by: Kimley-Horn, 2017

5.7.4 AIRFIELD ALTERNATIVE 5 – D-III MODIFIED STANDARDS COMPLIANCE

Alternative 5 meets all D-III design criteria with the exception of one item that would require two modifications of standards. Airfield Alternative 5 shifts the centerline of Runway 06-24 123 feet to the north, and the centerline of Taxiway A 19 feet north in order to establish 400 feet of separation between the runway and Taxiway A, which satisfies the runway-taxiway separation standard for a D-III runway (see **Exhibit 5.6**). The non-standard components of this alternative are that it does not meet design criteria for the ROFA to the north of Runway 06-24, and does not meet runway-aircraft parking separation criteria to the south. The standard width of the runway object free area for a D-III runway is 800 feet (400 feet either side of runway centerline). In its proposed location, Alternative 5 provides a 762-foot-wide runway object free area, 362 feet to the north of the runway centerline and 400 feet south of the runway centerline on the east end of Runway 06-24. The standard runway-aircraft parking separation distance is 500 feet. The proposed distance for runway-aircraft parking is 493 feet. As such, Alternative 5 requires approval of two modifications of standards from the FAA, which had been sought at the time this Airport Master Plan Update was prepared.

Alternative 5 maintains the existing runway width of 150 feet, which is the design standard for a D-III runway with approach minimums not lower than ¾ of a mile. This runway width is adequate for large corporate aircraft as well as regional commercial aircraft.

The proposed alternative does not introduce any new impacts to existing FBO leaseholds south of Runway 06-24. The TOFA will abut existing FBO leasehold lines closest to Taxiway A. Alternative 5 does however eliminate the north aircraft parking due to the enhancement of the ROFA and would require finding a location for the 30+ aircraft that currently operate from this location. Alternative 5 also requires removal of the self-service fuel facility on the north side of the airfield.

This alternative also includes a recommended extension of the runway of up to 800 feet off the east end of Runway 24 and Taxiway A, as well as EMAS systems on both runway ends, which enhances safety. It also removes Taxiway N as it would be within the ROFA and with the removal of the north apron the need for a partial parallel runway on this side of the field no longer exists.

Based on discussions with the County and the FAA, Alternative 5 has been identified as the most feasible airfield development option that adheres to most D-III criteria. The following bullets summarize the benefits and constraints of Airfield Alternative 5.

5.7.4.1 Benefits of Airfield Alternative 5

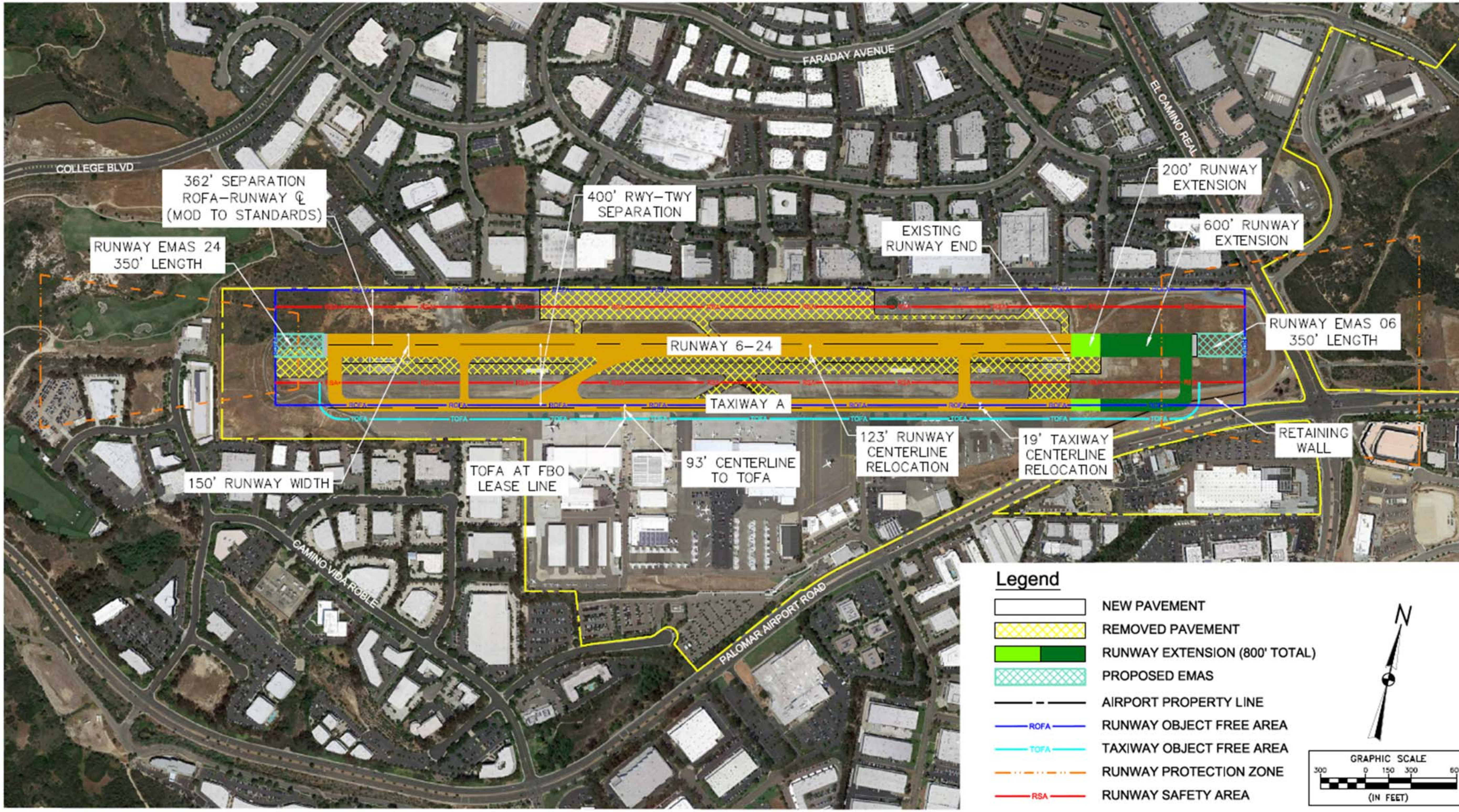
- Compliant with FAA D-III design criteria with modifications to standard for ROFA
- Accommodates both the current corporate fleet and potential regional commuter aircraft
- EMAS systems to both Runway End 06 and 24 enhances safety
- Allows for up to an 800-foot extension to runway, which enhances safety and increases airfield capability
- Consolidation and construction of connector taxiways between Taxiway A and Runway 06-24 to improve airfield safety and with proper placement can enhance operational capacity
- No impacts to existing FBO leaseholds
- Approach RPZ dimensions do not change

5.7.4.2 Constraints Regarding Airfield Alternative 5

- Eliminates north aircraft parking, reducing accommodation of projected levels of aviation demand
- Significant costs and environmental impacts for extensions of Runway 06-24 and Taxiway A over existing landfill areas, earthwork, retaining wall for taxiway

- Requires shifting the approach lighting system
- Requires relocation of existing NAVAIDs
- FAA approval needed for modification of standards
- 800’ runway extension only viable with EMAS at both runway ends
- Runway relocation poses significant potential for operational impacts for current tenants during construction including potential for extended airport closure
- High cost of EMAS on both ends along with ongoing maintenance costs

Exhibit 5.6 Airfield Alternative 5 – ARC D-III Modified Standards Compliance



Prepared by: Kimley-Horn, 2017

5.7.5 Airfield Alternative 6 – C-III Modified Standards Compliance

As defined in FAA Advisory Circular 150/5300-13A, runway design standards for C-III and D-III aircraft are identical. Accordingly, although Alternative 6 is intended to meet the safety requirements of C-III aircraft, this alternative provides separation distances and protection zones functionally equivalent to the D-III Alternative 5. It also generally follows the same airfield layout as Alternative 5. Because both Alternative 5 and Alternative 6 provide safety enhancements for the “III” classification for wingspan width, the runway design, safety area, object free area, runway protection zones and runway separation distances are identical. The exact sizing of EMAS at the end of runways would be based on the designation of a design critical aircraft for the “C” ADG, but would be very similar to the dimensions in Alternative 5. As noted in Section 2.2.1, aircraft with an ADG (the letter component of the ARC) of C have approach speeds between 121 and 140 knots while aircraft with an ADG of D have approach speeds between 141 knots and 165 knots. Despite the slight difference in approach speed, FAA’s runway safety requirements are consistent between the “C” and “D” classification.

The Airport’s safety requirements and design standards are defined by the classification of the most demanding aircraft that has over 500 annual itinerant operations[16]. Based on long-term forecasts of aircraft activity by ARC presented in Section 3.10.3, it is anticipated that the Airport may experience 500 annual D-III aircraft operations between 2027 and 2029. Alternative 6 provides safety improvements to the airfield using the same FAA design standards as the long-term forecast but does not classify the Airport as meeting the “D” standard. The airfield would be improved to accommodate the anticipated forecast for the intermediate term, and meet the needs of foreseeable commercial operations. Because the runway safety improvements are identical between C-III and D-III, the Airport would maximize safety to the current and future users.

As such, Alternative 6 includes a shift of the centerline of Runway 06-24 123 feet to the north, and the centerline of Taxiway A 19 feet north in order to establish 400 feet of separation between the runway and Taxiway A (see Exhibit 5.7). As with Alternative 5, two modification of standards (identified in Section 5.7.5 Airfield Alternative 6 – C-III Modified Standards Compliance) would be needed in Alternative 6 for the ROFA north of Runway 06-24 and for the runway-aircraft parking separation to the south.

The following summarizes the benefits and constraints of Airfield Alternative 6:

5.7.5.1 <u>Benefits of Airfield Alternative 6</u>

- Compliant with FAA C-III design criteria with modifications to standard for ROFA and runway- aircraft parking
- EMAS systems to both Runway End 06 and 24 enhances safety
- Allows for up to an 800-foot extension to runway, which enhances safety and increases airfield capability
- Consolidation and construction of connector taxiways between Taxiway A and Runway 06-24 to improve airfield safety and with proper placement can enhance operational capacity
- No impacts to existing FBO leaseholds
- Runway design, safety area, object free area, runway protection zones and runway separation distances dimensions are identical to Alternative 5

[16] Itinerant operations are defined by the FAA as operations performed by an aircraft that lands at an airport, arriving from outside the airport area, or departs an airport and leaves the airport area.

5.7.5.2 Constraints Regarding Airfield Alternative 6

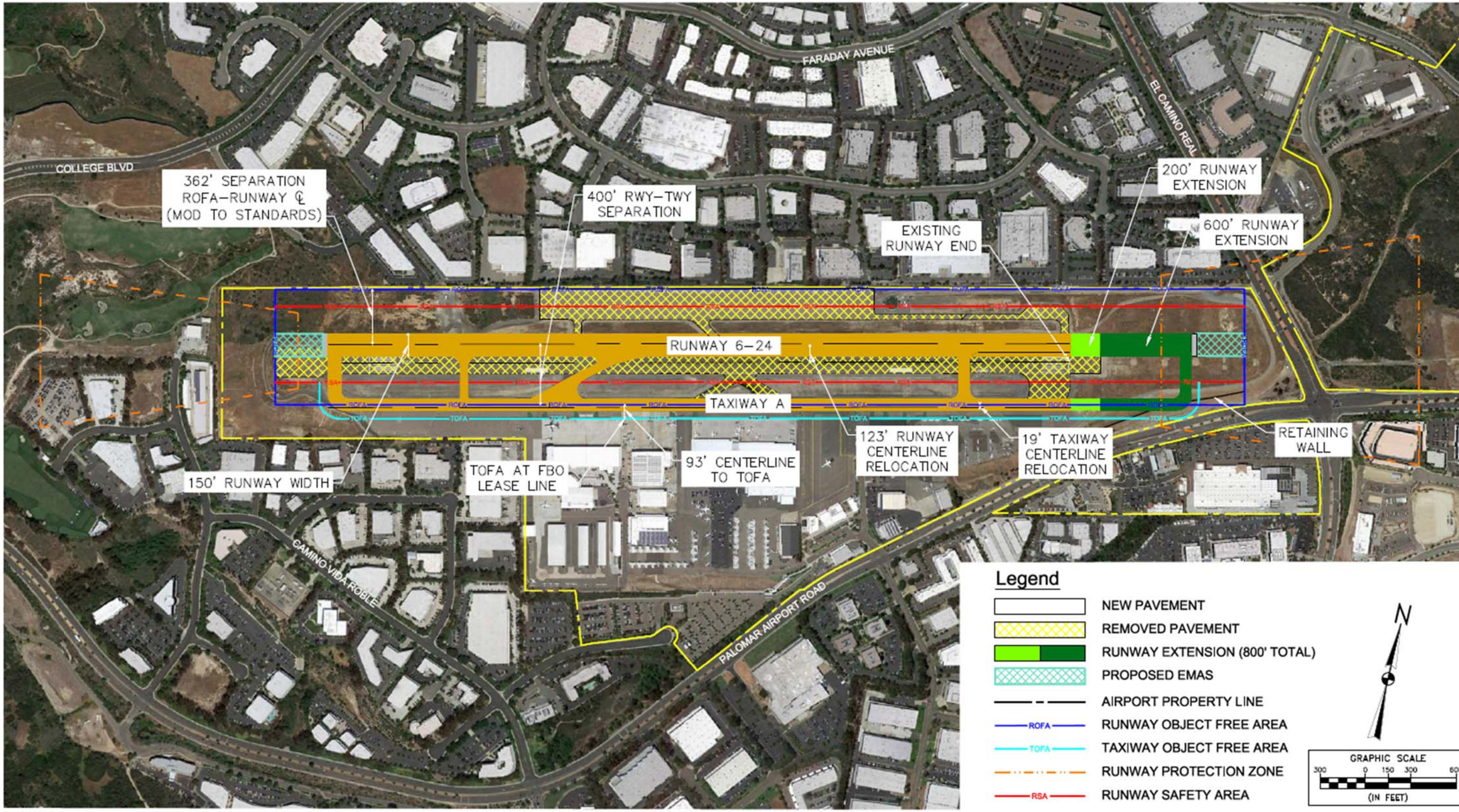
- Eliminates north aircraft parking, reducing accommodation of projected levels of aviation demand
- Does not accommodate long-term projected classification of the Airport to accommodate D-III aircraft, but could modify C-III in the future to achieve D-III EMAS standards.
- Significant costs and environmental impacts for extensions of Runway 06-24 and Taxiway A over existing landfill areas
- Requires shifting the approach lighting system
- Requires relocation of existing NAVAIDs
- FAA approval needed for modification of standards
- 800’ runway extension only viable with EMAS at both runway ends
- Runway relocation poses significant potential for operational impacts for current tenants during construction including potential for extended airport closure
- High cost of EMAS on both ends along with ongoing maintenance costs

The following summarizes the difference between Alternative 5 and Alternative 6:

Criteria	**Alternative 5: D-III Modified Standards Compliance**	**Alternative 6: C-III Modified Standards Compliance**
Runway Design	Identical	
Runway Protection	Identical	
Runway Separation	Identical	
EMAS	D-III slightly larger*	
Impacts to FBOs	Identical	
Stay within Airport Property	Identical	

*Note: EMAS is designed to stop the design aircraft that departs the runway travelling at 70 knots. D-III aircraft typically weigh more than C-III aircraft, which impacts the design criteria of the EMAS.

Exhibit 5.7 Airfield Alternative 6 – ARC C-III Modified Standards Compliance



Prepared by: Kimley-Horn, 2017

5.7.6 Preferred Airfield Alternative

Based on the analysis of the airfield alternatives presented in this Airport Master Plan Update as well as an examination of other potential development alternatives that were eliminated because they did not adequately meet the evaluation criteria identified at the beginning of this Section, it has been determined that Airfield Alternative 5 with an extension of Runway 06-24 and Taxiway A is the recommended development option for CRQ. While Alternative 6 presents the same improvements as Alternative 5, based on forecasted demand, it is anticipated that 500 annual operations conducted by D-III aircraft will occur within the 20-year planning horizon.

The proposed improvements identified in Alternative 5 allow the Airport to accommodate D-III aircraft operations with the need for only two minimal modifications of standards for the ROFA north of Runway 06-24 and runway-aircraft parking south of Runway 06-24. For long-term development, an 800-foot runway extension should be considered to provide adequate length for corporate and potential commercial operations without the necessity of significant weight restrictions. As documented in Section 4 of this Airport Master Plan Update, several corporate aircraft that commonly operate at CRQ such as the Gulfstream 450, 550, Cessna Citation X, cannot operate at maximum takeoff weight due to the existing length of Runway 06-24. The same is true for regional commuter aircraft such as the EMB-175 and CRJ-700, both of which could operate at maximum takeoff weight at the Airport with an additional 800 feet of runway.

This Airport Master Plan Update identifies recommendations for a 20-year planning period. In order to achieve all of the proposed actions of Alternative 5, a phased approach is recommended that addresses action items that can be completed in the near-term (0-7 years), intermediate-term (8-12 years), and long-term (13-20 years). For example, while it is recommended that the Airport Layout Plan depict an ultimate relocation and extension of 800 feet to Runway 06-24, depending on funding availability, it may be prudent to pursue an initial 200-foot extension, followed by the remainder of the needed length as AIP or State grant dollars become available.

Of significant importance is the issue of ownership and control of safety areas that extend off existing Airport property, specifically as it pertains to RPZs. The FAA issued a Memorandum in September 2012 clarifying the agency's policy on land uses within the RPZ that notes, "Airport owner control over the RPZ land is emphasized to achieve the desired protection of people and property on the ground. Although the FAA recognizes that in certain situations the airport sponsor may not fully control land within the RPZ, the FAA expects airport sponsors to take all possible measures to protect against and remove or mitigate incompatible land uses."

Per FAA AC 150/5300-13A, "Land acquisition to protect all possible airspace intrusions is generally not feasible, and is usually supplemented by local zoning, easements, or other means to mitigate potential incompatible land uses and potential obstacle conflicts."

From FAA AC 150/5100-17 Land Acquisition and Relocation Assistance for Airport Improvement Program (AIP) Assisted Projects: "On AIP-assisted projects, the sponsor must acquire real property rights of such nature and extent that are adequate for the construction, operation, and maintenance of the grant-assisted project. Normally the sponsor will acquire fee title to all land within the airport boundaries and for the runway protection zone (RPZ). If fee acquisition for the RPZ is not practical, then an avigation easement is required. This easement must secure the right of flight with inherent noise and vibration above the approach surface, the right to remove existing obstruction, and a restriction against the establishment of future obstructions.

It is a specific recommendation of this Airport Master Plan Update that the Airport obtain avigation easements for existing and ultimate approach RPZs, and if possible, obtain avigation easements for existing and ultimate departure RPZs. It is also recommended that the Airport pursue land acquisition for any and all existing and ultimate RPZs although this action may not be determined as practical.

Pursuance of land ownership of some parcels will likely be extremely expensive. At a minimum, the Airport should demonstrate that it is taking all steps possible to protect land uses within existing and ultimate RPZs. These actions should not fall under the definition of “expansion” identified in CUP-172 as the size of the RPZs represent existing conditions.

5.7.6.1 Near-Term Improvements for Alternative 5

Preceding the implementation of the proposed development alternative, there are smaller, less expensive actions that can be taken in order to meet FAA design criteria in the near- and intermediate-term. Accomplishing these action items will demonstrate the County’s willingness to address the issue of larger, more demanding aircraft regularly operating at the Airport. These include:

- Relocation of the lighting vault north of Runway 06-24
- Removal of the North Apron Area fuel farm
- Relocation of the glideslope building north of Runway 06-24
- Relocation of the wind cone equipment and segmented circle
- Relocation of the Vehicle Service Road (ATCT Controlled)

The items listed here should be considered a precursor to the proposed actions of the preferred airfield alternative as they enable long-term airfield improvements to occur. The specific purpose for their relocation/removal is because they will be located within the RSA of Runway 06-24 when the runway is shifted 123 feet to the north. As such, it is recommended that they be accomplished within the near-term (0-7 years) timeframe. These and all other airport development alternatives and their recommended timeframes of completion are shown in **Exhibit 5.9** at the end of this Section.

Based on the environmental overview conducted in the 2013 Feasibility Study, the proposed improvements identified in the preferred airfield alternative are not anticipated to have significant environmental impacts. It should be noted however, that any change to the existing layout of the airfield will require an Environmental Assessment to be eligible for FAA AIP funding.

5.7.7 INTERIM AIRFIELD ALTERNATIVE

The preferred alternative described in Section 5.7.5 has been developed as a long-term improvement in the phasing plan (Section 5.11), meaning that its implementation is recommended 13-20 years from the approval date of this Airport Master Plan Update. The County has identified that an interim airfield alternative be included in the Airport Master Plan Update as a near-term (within 7 years) solution to address issues pertaining to the existing runway length. As such, this section outlines a preferred Interim Airfield Alternative that incorporates the same evaluation criteria as previously documented alternatives, but with a shorter implementation timeframe.

As noted, aircraft with designations greater than B-II regularly operate at CRQ. Often, these aircraft must takeoff with reduced weights or make fuel stops before reaching their final destination. In order to reduce takeoff weight penalties and frequency of fuel stops, the Interim Airfield Alternative proposes a 200-foot extension to Runway End 24 and the east end of Taxiway A, while maintaining the existing widths of those facilities. This action does not impact the displaced threshold on Runway End 06.

This alternative is similar in principle to Airfield Alternative 1 (Remain B-II); however, the intent of the Interim Airfield Alternative is to provide additional takeoff length as a temporary placeholder while the Airport transitions to a D-III facility. Furthermore, this alternative allows the Airport to incrementally implement the pre-alternative action items described in the previous section as well as an EMAS on Runway End 06 without significantly interfering with the operational functionality of the airfield. It should be noted that because the extensions to Runway 06-24 and Taxiway A are not direct improvements based on D-III FAA design standards reflects the ultimate recommended ARC for the Airport, they may not be eligible for FAA AIP funding.

The following bullets summarize the benefits and constraints of the Interim Airfield Alternative:

5.7.7.1 Benefits of Interim Airfield Alternative

- Enhances safety by providing additional runway length for existing and future users
- Allows for phased improvements to occur without interference
- Improvements remain on Airport property
- No change in size of runway or taxiway protection areas
- No encroachment on existing general aviation/FBO operations

5.7.7.2 Constraints Regarding Interim Airfield Alternative

- Although the proposed actions are temporary in nature, this alternative does not satisfy FAA D-III design standards
- Proposed action may not be eligible for FAA AIP funding
- Similar to Alternative 1, the proposed action may have significant impacts to large corporate and commercial aircraft operators:
    - For general aviation aircraft operators, it is at the discretion of the pilot to determine the safety of an airfield and whether or not to utilize that facility.
    - For commercial operators, an aircraft whose design criteria exceeds an airfield's design standards may be prohibited from operating at that facility. Remaining a B-II facility may discourage potential commercial service providers from initiating service. This is particularly problematic as regional commuter airlines modify fleets to include larger versions of regional commuter aircraft, both turbo-prop and turbine aircraft.

Based on an examination of the existing airfield configuration, as well as the understanding that funding for a significant portion of the Preferred Airfield Alternative presented in Section 5.7.5 may not be eligible for FAA or State grants, it is recommended that the Interim Airfield Alternative be considered as a temporary solution to provide additional length for Runway 06-24 and Taxiway A. Although the proposed action does not permanently provide the ultimate desired runway length, nor does it directly adhere to ARC D-III design standards, it provides an incremental improvement that enhances the safety of the airfield and would not interfere with ultimate plans to achieve the action items identified in the Preferred Airfield Alternative. The Interim Airfield Alternative and the Preferred Airfield Alternative are presented graphically in **Exhibit 5.8** at the end of this Section.

5.8 PASSENGER TERMINAL ALTERNATIVES

The passenger terminal building at CRQ is a structure that was constructed in 2007 and encompasses approximately 12,590 square feet. At the time it was completed, the facility was designed to accommodate smaller commercial aircraft such as the 30-seat Embraer EMB 120 that have been phased out of many airlines' fleets. As identified in Section 4 of this Airport Master Plan Update, although the existing footprint of the passenger terminal building is anticipated to meet demand identified in both PAL 1 and PAL 2, it is recommended that the Airport preserve approximately 8,400 square feet of space for potential terminal improvements in the event that passenger activity exceeds forecasted demand. The County now owns Hangar 1, a 23,000 square-foot hangar adjacent to the passenger terminal. Hangar 1 sits on a 1.2-acre parcel that includes adjacent vehicle parking and an aircraft parking apron.

Several development alternatives for a new passenger terminal were initially examined that included a terminal relocation and a “no-build” alternative. A no-build option was determined to be non-feasible because it would not accommodate projected levels of passenger activity. Even in the event that projected passenger activity forecasts are not realized in the future, failure to reserve area for added terminal space could permanently jeopardize any commercial operations as airlines transition to larger, more fuel-efficient aircraft. As airlines attempt to maximize revenues by providing fewer flights aboard larger aircraft, passenger and airline facilities at several airports need to be improved accordingly, in order to satisfy changing trends.

A terminal relocation alternative was also examined early in the alternatives development process but was deemed infeasible. This finding was based on the lack of developable land on the existing airfield and because of the relative age of the existing passenger terminal building. A relocation of the passenger terminal building would require either significant land acquisition, which would incur significant cost, or would require the removal of existing facilities critical to the functionality of the Airport.

Since both a no-build and a relocation alternative for the passenger terminal building have been determined to be unfeasible, the only legitimate alternative is an enhancement of the existing facility. Keeping in mind that any development alternative should minimize negative impacts to existing facilities, three primary areas have been identified for potential terminal improvements.

Initially, improvements to the terminal building to the north toward Runway 06-24 was examined; however, it was determined that this action would reduce aircraft parking on the commercial apron and reduce the overall functionality of the airfield. Another option that was examined was enhancement of the terminal building to the south; however, this action would require significant reconfiguration and reconstruction of the terminal access road, auto parking, and curbfront areas.

Therefore, the preferred development alternative for improvements to the passenger terminal building entails “in-filling” areas to the east and west of the existing structure (see **Exhibit 5.7**). To the east, there is an area approximately 3,000 square feet in size that is currently occupied by an outdoor courtyard and seating area for the restaurant.

The second space available for terminal improvements is located immediately west of the terminal building and east of the Customs and Border Protection facility that also houses rental car counters. This triangular shaped parcel is a courtyard area that encompasses approximately 2,400 square feet, although an additional 600 square feet to the south may be utilized if needed. Although some reconfiguration of the passenger terminal interior would be likely, the existing layout of the building indicates that this area could provide added passenger circulation, auxiliary space, and restroom space.

The third parcel of land that could be utilized for terminal improvements is to the west of the CBP building that is currently occupied by the ARFF facility and apron. Use of this area requires relocation of the ARFF facility, which is described in the subsequent section. This area allows for an additional 5,200 square feet of terminal improvement space.

Another area potentially available for terminal improvements is the 1.2-acre County-owned parcel west of the current ARFF facility that houses Hangar 1. This parcel is occupied by an aircraft storage and office building, as well as by several small businesses with short term rental agreements. These businesses can be relocated into existing facilities at FBOs so the area can be redeveloped for passenger terminal use if needed. While it is not anticipated that this area will be required for passenger terminal improvements, it is recommended it be preserved as an option for potential long-term terminal improvements or additional vehicle parking in the event that passenger demand exceeds projected levels of activity.

The previously mentioned areas for terminal improvements total approximately 33,600 square feet. A limited amount of additional space is also available to the south of the existing passenger terminal building, although utilization of this area may reduce the width of the passenger walkway/access area. In order to maximize space and functionality, it is likely that some reconfiguration to the existing layout of the passenger terminal will be required if and when improvements become necessary.

The proposed action is not anticipated to incur any significant environmental impacts as improvements will occur on already graded/disturbed areas.

5.9 AUTO PARKING ALTERNATIVES

In conjunction with preserving space for potential improvements to the passenger terminal building, Section 4 similarly recommended preserving areas that could be used for short-term and rental car parking in the event that passenger activity exceeds projected levels of demand in the future.

Two alternatives for enhancement/relocation of auto parking were examined to accommodate projected demand. The first entails repurposing the previously mentioned lot owned by the County that houses Hangar 1. This option is not preferred in the near-term because this lot is currently utilized by small businesses operating in the adjacent hangar. This area could be used for parking as a long-term solution if the adjacent hangar is ultimately redeveloped and projected levels of passenger activity exceed what is forecasted in PAL 1.

The second alternative entails a southward enhancement of the existing short-term lot (see **Exhibit 5-6**). This option provides an additional area approximately 7,000 square feet in size (±20 parking spaces) and would not disturb existing tenants. Furthermore, access and roadway infrastructure is already in place to accommodate additional parking spaces. Improvements to this lot could result in the loss of a small number of existing on-street parking spaces though this could be mitigated by utilizing other available parking areas or by striping the proposed enhancement area in a fashion that creates longer, more angular spaces. Because this alternative accommodates projected levels of passenger demand and does not impact other aviation uses, it is the preferred development alternative. The proposed action would increase impervious surface by approximately 7,000 square feet but is not anticipated to incur any significant environmental impacts as improvements will occur on already graded/disturbed areas.

Exhibit 5.8 Passenger Terminal and Short-Term Parking Improvements

Source: Kimley Horn, 2017

5.10 AIRCRAFT RESCUE AND FIREFIGHTING FACILITY

As noted in Section 4, one of the specific components of this Airport Master Plan Update is to identify alternatives for the relocation of the existing ARFF facility. The existing ARFF facility located on the western side of the Airport terminal is not designed to meet the forecasted aviation demand. While the facility, classified by the FAA as “Index B,” as the appropriate equipment to accommodate “Index B” operations, the structure needs to be relocated to accommodate additional vehicle bays and associated parking areas per FAA Advisory Circular (AC) 150/5210-15A.The new facility should encompass approximately 4,664 square feet and be relocated south of the existing ATCT and east of the passenger terminal apron. The new facility should include two vehicles bays, watch room, first aid room, storage room, and administrative offices. The proposed relocation site is currently a parking lot and adjacent lots could accommodate the parking spaces lost to the relocation of the ARFF. Such a facility has been determined to require the following spatial components:

- Vehicle Bay Area – 1,858 Square Feet
- Admin/Storage Rooms – 1,000 Square Feet
- ARFF Vehicle Apron – 1,806 Square Feet
- Total ARFF Building and Apron – 4,664 Square Feet

5.10.1 FAA SITE SELECTION CRITERIA

Several areas on the airfield were initially examined for potential relocation of the ARFF facility. Site selection parameters for ARFF locations are identified in *FAA AC 150/5210-15-A*. These parameters include:

Operational Factors. The site should allow for:

(1) Immediate, straight access to the airfield network.

(2) Unimpeded access routes with a minimum of turns to the airfield network and aircraft aprons.

(3) Direct access to the terminal aprons minimizing the crossing of active runways, taxiways, or difficult terrain.

(4) Non-interference with the ATCT’s line of sight (LOS).

(5) Maximum surveillance of the airfield.

(6) Adherence to the Building Restriction Line (BRL) as determined using AC 150/5300-13A, Airport Design.

(7) Future expansion of the ARFF station without:

> (a) Limiting or reducing airport surveillance.
>
> (b) Blocking fire traffic lanes.
>
> (c) Impacting adjacent roads, buildings, aircraft pavement and parking areas, and ATCT's unless the structure or paved area is to be eliminated for other reasons.
>
> (d) Requiring significant structural changes to the ARFF station itself.

(8) Planned airfield improvements that will not create emergency response runs that will negatively impact FAR Part 139 response time requirements. However, in this event, an additional (satellite) ARFF station(s) may provide an alternative.

(9) Non-interference by ARFF vehicles or the ARFF station's communications equipment or with navigational facilities.

(10) Close proximity to a rescue boat launch facility for those airports with an aircraft water rescue program. This need is particularly important if the rescue boat is stored at the ARFF station, thus requiring a tow for launching.

(11) Adherence to FAR Part 77.25, Civil Airport Imaginary Surfaces.

(12) Minimum obstructions or interference from existing facilities or uses such as:

(a) Access roads.

(b) Aircraft fuel storage areas.

(c) Aircraft taxiing operations or parking areas.

(13) Ease of connection to and integration with the airport's security system.

Site Size. The site should allow for:

(1) The accommodation of the ARFF station and future expansion(s) such as increasing the apparatus bays for larger ARFF apparatus or an increase in ARFF Index (as defined in FAR Part 139, Sub-part D) and/or personnel requiring larger living quarters, employee parking, etc.

(2) Exterior amenities, such as employee parking, exterior patio, and ARFF vehicle resupply (water and/or foam) operation and servicing area.

(3) ARFF apparatus apron to accommodate the largest current or anticipated vehicle.

(4) Removal of trash.

Proximity to Utilities and Roads. The site should offer reasonable access to:

(1) Electrical power and, if any, alternate energy sources, e.g., gas.

(2) Essential communication and telecommunication networks, including proximity to fiber optic and copper network backbones. This is particularly critical for the ARFF station's security design components and integration with the airport's security system.

(3) Existing and future airport access and airfield service roads.

(4) Existing and future water supply system and sanitary sewer hookups.

Topography and Station Orientation.

(1) A level site is preferred, however, an irregular un-level site can at times be used if it is superior in other aspects (response times, etc.) and construction costs are reasonable.

(2) Proper station orientation can help to reduce yearly energy operating costs by moderating the effects of the wind and the sun's rays. The design team should strive to earn Leadership in Energy and Environmental Design (LEED) certification from the U.S. Green Building Council (http://www.usgbc.org/), which is a voluntary national standard for designing high-performance and sustainable buildings.

(3) Proper station orientation can help to mitigate exterior noise levels and associated costs for acoustical treatment.

(4) The primary objective in locating and orienting an ARFF station is "to provide a timely response, protect life and property, and minimize the effects of an aircraft accident or incident or catastrophic event occurring primarily on airport property." (See Scope 1.2.) The factors identified in 2.3 Site Selection A

through C should be the operational priorities of the Site Selection phase. Section D provides important considerations but must be evaluated carefully against any impact with critical operational and performance issues that might add delays in response, compromise safety, or affect any mission critical objectives.

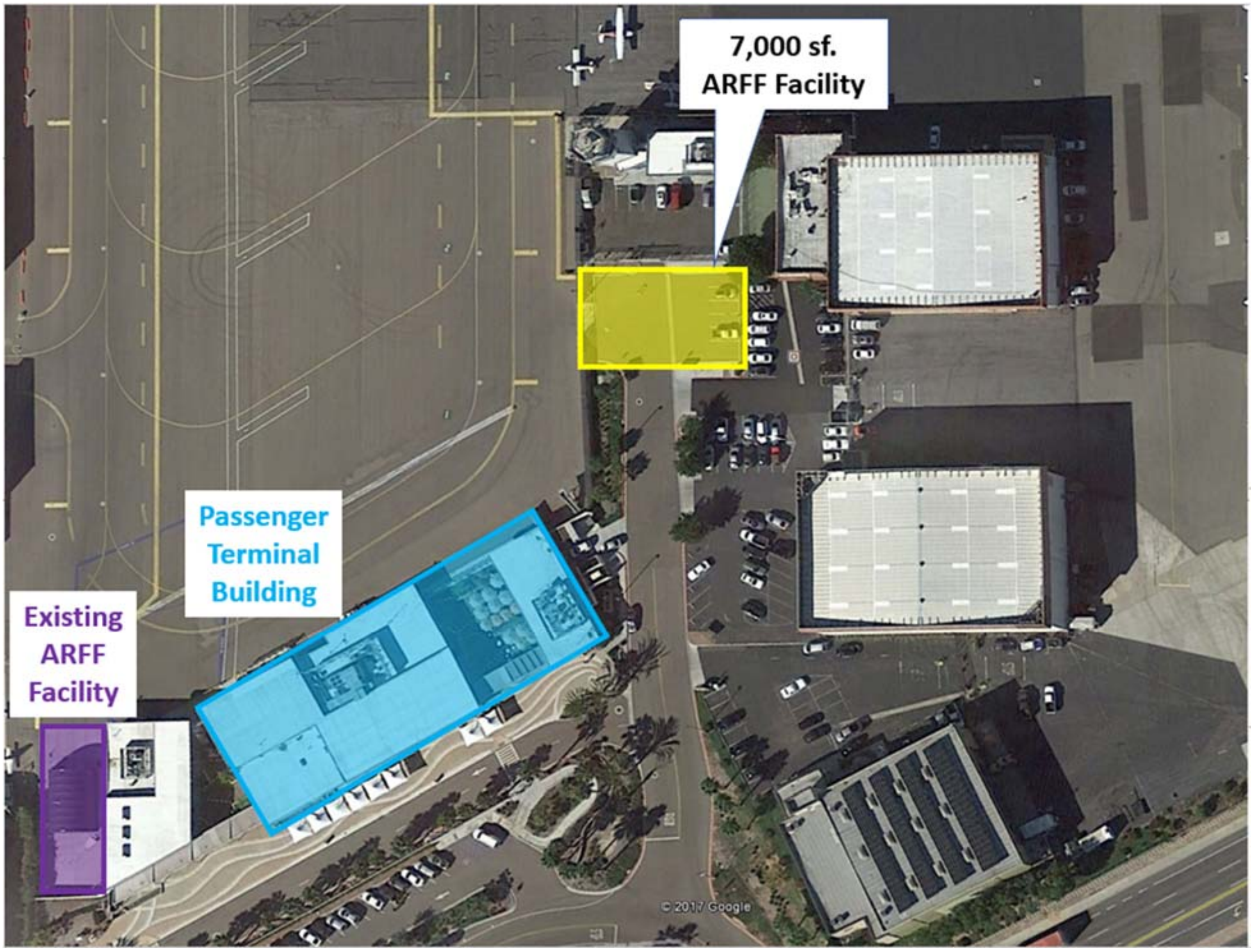
5.10.2 PREFERRED ALTERNATIVE

The 2010 Approved Airport Layout Plan depicts the location of the future ARFF facility between the existing Airport Traffic Control Tower and Western Flight; however, this location does not provide enough space for an Index B ARFF facility without relocation of either the tower, auto or aircraft parking, or Western Flight. Two other options were initially examined as potential sites for relocation of the ARFF. The first was located immediately northwest of the control tower on an existing aircraft parking apron. Although this site provided optimal airfield access, it eliminated aircraft parking on an already congested airfield, and was therefore was dismissed from further evaluation.

The second site examined is located immediately north of the existing restaurant abutting an access road. Although this site provides adequate airfield access, it is constrained on the west side by the existing commercial aircraft parking apron and could impact taxiing operations in this area. As such, this option was also dismissed from further evaluation.

When all of the applicable site selection parameters are taken into account in conjunction with the congested airfield and lack of developable land, a preferred site was identified that could accommodate an ARFF facility without incurring negative impacts to other airfield uses such as aircraft parking or taxiways (see **Exhibit 5.8**). The recommended site is located south of the existing airport traffic control tower and west of an access road and encompasses approximately 7,000 square feet. This area is owned by the Airport and is currently occupied by a parking lot. Based on discussions with Airport Management, it was identified that this lot is underutilized and that adjacent lots could accommodate the parking spaces lost by relocation of the ARFF. The existing access road can also be modified to provide adequate access to the control tower and other tenants located in this area. Though environmental documentation such as an Environmental Assessment or more likely, a Categorical Exclusion (CATEX) would be needed prior to construction, relocation of the ARFF to this site is not anticipated to incur any significant environmental impacts as the site is currently paved and used as an auto parking lot.

Exhibit 5.9 ARFF Relocation



Source: Kimley Horn, 2017

5.11 PREFERRED DEVELOPMENT STRATEGY

With consideration of a 20-year planning horizon, projected aviation-related activity, and the interests of the County, the recommended facility improvements and development alternatives are presented as near-term (±0-7 years), intermediate-term (±8-12 years), and long-term (±13-20 years) projects. Cumulatively, these projects make up the *preferred development strategy* for CRQ.

In general, the strategy in the near-term (0-7 years) is to pursue action items that will enhance safety and allow for future improvements to the runway and taxiway system toward D-III design standards, as described in Section 5.7.5.1. These projects include clearing areas within runway and taxiway protection areas, relocating the ARFF facility, and constructing an EMAS system on Runway End 06 to accommodate aircraft departing Runway 24. This timeframe could also include the Interim Airfield Alternative, which proposes 200’ extensions to Runway 06-24 and Taxiway A in their existing locations.

Intermediate-term improvement projects (8-12 years) include removal of the North Parking Ramp Area, and removal of the fuel farm on the North Ramp. At some point in the seven to ten-year period, an Airport Master Plan Update study may also be needed to confirm or adjust the recommendations and strategy described in this document.

The long-term improvement program (13-20 years) is focused on the relocation and extension of Runway 06-24 and Taxiway A, consolidation of the connector taxiway system, relocation of the EMAS on Runway End 06, and construction of an EMAS on Runway End 24 to accommodate aircraft departing Runway 06. It has been determined through a cost and safety evaluation that the initial construction of an EMAS system on Runway End 06 and a subsequent relocation of the facility is preferable to delaying construction of the EMAS as a long-term project. The proposed long-term improvement actions will require agency and public coordination, environmental approvals, design and any remaining land acquisition needs. This overall strategy, including the generalized phasing, is depicted in **Exhibit 5.10**.

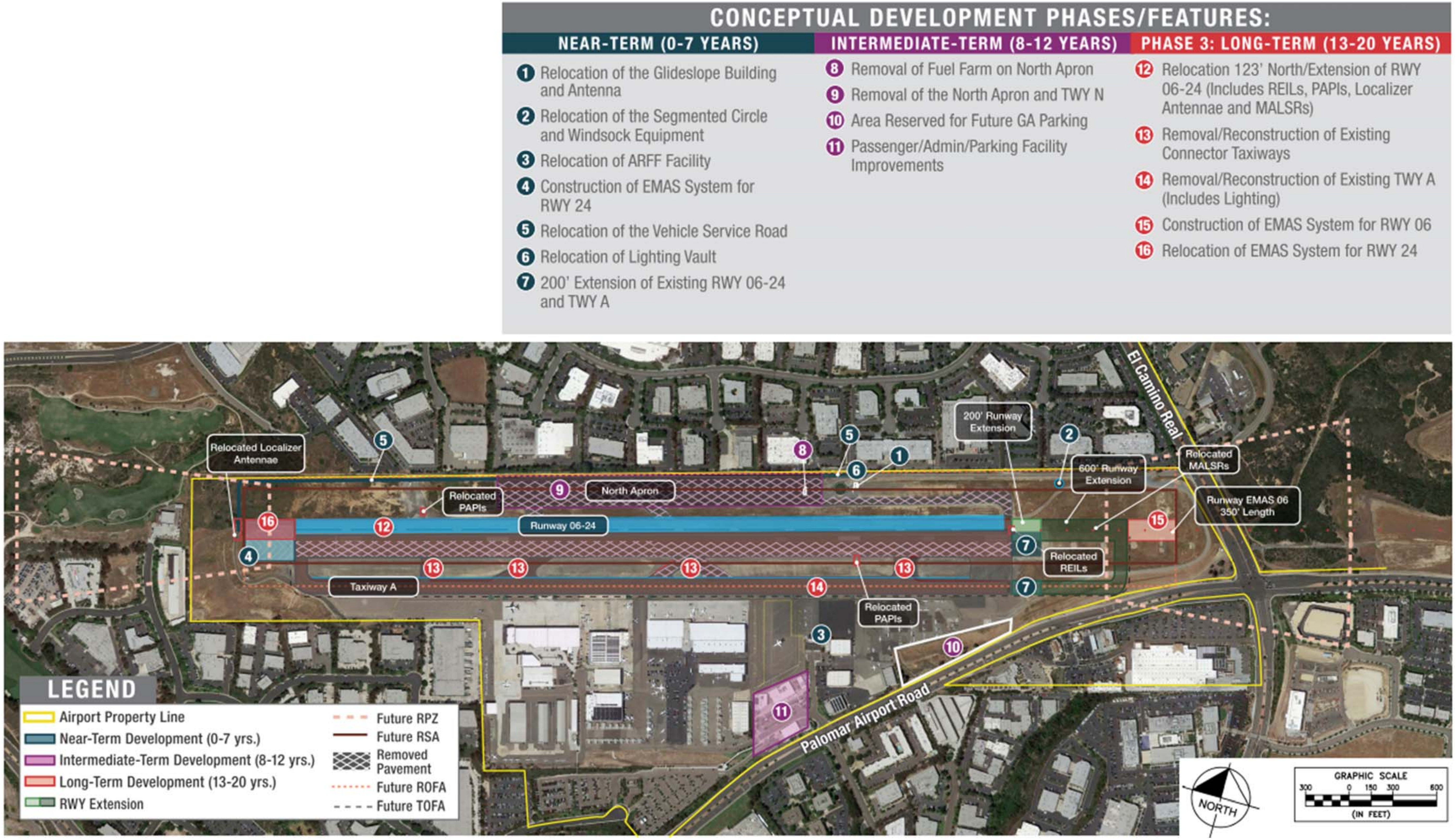
Table 5-1 lists the various recommended improvement projects and development programs by phase. These listed projects form the basis of the Airport Capital Improvement Program (ACIP).

Table 5.1 – Preferred Development Strategy by Phase

Near-Term (±0-7 Years)	Project Description	Estimated Cost	Exhibit 5.9 #
Relocation of Segmented Circle	Pavement Removal/Installation	$150,000	2
Relocation of the Lighting Vault	Building Relocation 100 SF	$575,000	6
Relocation of the Glideslope Building and Antenna	Building Relocation ±360 SF	$350,000	1
Relocation of Windsock Equipment	Pavement Removal ±760 SY	$130,000	2
Construction of EMAS System serving RWY 24 (Includes Relocation of the Vehicle Service Road)	EMAS ±580 SY VSR ±9,100 SY	$25,000,000	4
Relocation of ARFF Facility	±4,700 SF Facility	$525,000	3
200’ Extension of Existing Runway 06-24 and Taxiway A (Interim condition)	±11,600 SY	$14,320,500	7
	Phase Subtotal	**$26,730,000**	
	Phase Subtotal*	**$41,050,500**	
Intermediate-Term (±8-12 Years)			
Removal of North Apron and Taxiway N	Pavement Removal ±43,000 SY	$684,000	9
Enhancement of Near-Term Auto Parking	±800 SY of pavement	$232,000	11
Removal of Fuel Farm on North Apron	±25,000 GAL	$45,000	8
Preservation of area reserved for GA aircraft parking	±3 acres	TBD	10
Passenger/Admin/Parking Facility Improvements	±4 acres	TBD	11
	Phase Subtotal	$961,000	
Long-Term (±13-20 Years)			
800’ Relocation/Extension of RWY 06-24 (if completed in one phase)	±81,610 SY	$27,850,000	12
Remove/Reconstruct Connector Taxiways	±13,000 SY	$1,760,000	13
Remove/Reconstruct TWY A	±39,070 SY	$14,360,000	14
Construction of EMAS System serving RWY 06	±580 SY	$12,160,000	15
Relocation of EMAS System serving RWY 24	±580 SY	$11,240,000	16
Relocation of NAVAIDS (ILS, GS, MALSR, PAPI)		$2,800,000	12
200’ Relocation/Extension of Runway 06-24 and Taxiway A (if completed in 2 phases)		$9,366,000	12/14
Additional 600’ Relocation/Extension of Runway 06-24 and Taxiway A (if completed in 2 phases)		$30,960,000	12/14
	Phase Subtotal (200’ Extension plus 600’ Extension)	$82,646,000	
	Phase Subtotal (800’ Extension)	$70,170,000	
Phased Development Total Costs			
	Total Estimated Program Cost (200’ Extension plus 600’ Extension)	$110,337,000	
	Total Estimated Program Cost (800’ Extension)	$97,861,000	
	Total Estimated Program Cost (200’ Extension plus 600’ Extension)*	$124,657,500	
	Total Estimated Program Cost (800’ Extension)*	$112,181,500	

Source: Kimley-Horn, 2017. * Includes interim 200’ extension to existing Runway 06-24 and Taxiway A

Exhibit 5.10 Phased Development Exhibit



Source: Kimley-Horn, 2017.

Section 6 - AIRPORT CAPITAL IMPROVEMENT PLAN (ACIP)

The previous analysis within this Airport Master Plan Update evaluated the Airport's forecasted needs to the existing infrastructure to develop a recommended development plan. From this recommended development plan, an ACIP can be formulated. An ACIP displays the recommended development plan in a tabular format with information on the individual project titles, phases, funding sources, timing, and environmental approvals. It is important to document the recommended development plan in such a way that it can be updated regularly to reflect new goals, priorities, opportunities, and constraints as well as assist other funding agencies by providing them information to determine their funding allocation and involvement. This Airport Master Plan Update ACIP will span the same 20-year planning horizon as the aviation forecasts, with more detailed information for the near-term projects.

In developing the ACIP, care must be taken to provide adequate lead-time for detailed planning, permitting, and construction to ensure that the proposed facilities are operational when warranted by the user demands. It is also important to minimize any disruptive scheduling where a portion of one facility may become inoperative due to the construction of another or to prevent extra costs resulting from improper project scheduling. An unrealistic or unusable plan can cause the airport to fall behind schedule quickly, which may jeopardize priority projects or future funding.

The actual timing or phasing of specific projects, or project elements, may change in response to tenant/user demands, unforeseen business opportunities, changes in the regulatory environment and availability of federal/state/local funds. Actual project costs may also vary from initial ACIP estimates as project designs progress and detailed engineering estimates are developed. All airports receiving federal AIP funding are required to update their ACIP with the FAA on an annual basis.

6.1 FUNDING SOURCES

Potential funding sources for any proposed improvements at CRQ come in the form of federal grants, County funds and Airport revenue, and third party investment. The amount of funding available from these sources will depend primarily on future levels of aviation activity at CRQ and future federal funding reauthorizations. As a non-hub primary facility, CRQ is eligible for certain types of funding as described below.

6.1.1 FEDERAL GRANTS

AIP grants, administered by the FAA, are a critical capital funding source to implement the projects recommended in this Airport Master Plan Update. For the purpose of this Airport Master Plan Update, it is assumed that the AIP will continue to be authorized and appropriated at levels consistent with H.R. 658, the FAA Modernization and Reform Act of 2012.

The FAA's National Plan of Integrated Airport Systems (NPIAS) classifies CRQ as a non-hub primary airport. Therefore, the AIP formula stipulates that the Airport Authority is entitled to receive 90 percent federal funding for AIP-eligible projects. AIP funds can be used for most Airport improvement needs, but not operating costs. However, AIP funds are typically not available for revenue-generating projects, so it may be difficult for the Airport Sponsor to use these funds for projects designated to generate revenue. The FAA's AIP consists of entitlement funds and discretionary funds, with entitlement funds being allocated before discretionary funds from the Congressional budget. Since 2005, CRQ has received approximately $35.5 million in federal aid for various projects including pavement rehabilitation, acquisition of necessary equipment, land acquisition, terminal improvements, updating the master plan, a wildlife hazard assessment, and security enhancements. There are no open capital improvements project utilizing federal funding at this time.

6.1.1.1 Entitlement Grants

Entitlement funds are distributed through grants by a formula currently based on the number of enplanements at individual airports and the amount of AIP funding available in that year as determined based on the authorization level from Congress. In cases where entitlement funds are not used during the current federal fiscal year, these funds are redistributed to other airport sponsors as discretionary funds and become what is known as protected entitlement funding in the next federal fiscal year. Funds must be used within four years of apportionment or will be considered expired and unavailable for use.

In 2015, CRQ was apportioned $1 million in primary entitlements as per the annual minimum in 49 USC § 47114(c)(1)(C). **Table 6.1** displays the potential entitlements that CRQ could be apportioned if passenger enplanement levels grew to the forecasted activity levels. To be conservative and ensure the Airport sponsor is prepared for future development costs, this ACIP assumes an entitlement of one million annually through the planning horizon. As noted, the additional grant money above $1 million is calculated by a formula based on passenger enplanements in the AIP Handbook Order 5100-38D, with the assumption that more than $3.2 billion of AIP funding is available in any given fiscal year.

Table 6.1 – Potential AIP Entitlements

	2021	2026	2031	2036
Forecasted Enplanements	172,244	233,929	279,670	304,673
Potential AIP Entitlements	$1,675,669	$1,996,431	$2,234,284	$2,364,300

Source: County of San Diego. Federal Aviation Administration. Kimley-Horn, 2017

6.1.1.2 Discretionary Grants

At the beginning of each federal fiscal year, the FAA sets aside the amount of discretionary funds to cover the Letter of Intent (LOI) payment schedules. The total discretionary funds in all LOIs subject to future obligation are limited to approximately 50 percent of the forecast discretionary funds available for that purpose. The authorizing statute directs the FAA to allocate certain discretionary funding to specific airport types and set aside categories such as noise, reliever airports, military airport program and projects relating to capacity, safety, security and noise. However, the FAA has some discretion in funding specific projects within these discretionary funding set-aside categories. The FAA approves discretionary funds for use on specific projects, after consideration of project priority and other selection criteria. CRQ is eligible for discretionary funding.

6.1.1.3 Other Federal Programs

The sponsor should also review current non-FAA Federal grant programs for eligibility on future projects. While not applicable to the ACIP at this time, there are typically grants available for special programs such as treatment of invasive species through the US Fish and Wildlife, security grants through the Department of Homeland Security, historical preservation through the Historical Preservation Fund, or energy rebates through Energy Star.

For example, in 2013, CRQ was awarded $119,600 from the Department of Homeland Security to acquire security enhancement requirements such as audio system, fingerprint scanners, hard drives, cameras lock upgrades, and electric gate motors.

6.1.2 Passenger Facility Charges (PFCs)

PFCs are authorized by Title 14 of the Code of Federal Regulations (CFR), Part 158 and are administered by the FAA. PFCs collected from qualified enplaned passengers are used to fund eligible projects. An airport operator can impose a PFC of $1, $2, $3, $4, or $4.50 per eligible, enplaned passenger. Once a PFC is imposed, it is included as part of the ticket price paid by passengers enplaning at the airport—collected by the airlines and remitted to the airport operator, less an allowance for airline processing expenses. The PFC legislation stipulates that if a medium to large hub airport institutes a PFC of less than $3, they must forego 50 percent of their AIP entitlement funds. This increases to 75 percent if they charge a $4 or higher PFC. Since CRQ is classified as a non-hub primary airport, it would not have to forego any of its annual AIP entitlement funds.

Projects must be approved by the FAA and preserve, enhance, or make a significant contribution to the safety, security, or capacity of the national air transportation system, reduce noise or mitigate noise impacts from the airport, improvement local quality, enhance competition between air carriers, or reduce congestion. PFCs cannot be used for revenue-generating facilities at airports, such as restaurants and other concession space, rental car facilities, public parking facilities or construction of exclusively-leased space or facilities. **Table 6.2** displays the historical PFCs received by CRQ.

Table 6.2 – Historical Passenger Facility Charges (PFCs)

	2011	2012	2013	2014	2015
PFCs	$155,000	$166,000	$207,000	$195,000	$162,000

Source: County of San Diego. Kimley-Horn, 2017.

Table 6.3 displays the potential PFCs that CRQ could collect, minus airline administration fees, at a $4.50 level if passenger enplanement levels grew to the forecasted activity levels.

Table 6.3 – Potential Passenger Facility Charges (PFCs)

	2021	2026	2031	2036
Forecasted Enplanements	172,244	233,929	279,670	304,673
Potential PFCs	$775,098	$1,052,681	$1,258,515	$1,371,029

Source: County of San Diego. Kimley-Horn, 2017

6.1.3 State Grants

Caltrans' mission in aviation is to foster and promote the development of a safe, efficient, dependable, and environmentally compatible air transportation system. As such, they provide funding through grants and loans as funds are available. The State funding programs are supported by the Aeronautics Account in the State Transportation Fund which is financed through taxes on fuel.

6.1.3.1 Annual Credit

Caltrans provides up to $10,000 annually for each eligible airport. Per Public Utilities Code (21682-21683.2), the Annual Credit is the first priority for distributing available funds. As CRQ is designated as a commercial service airport, it is not eligible for this credit.

6.1.3.2 State Matching Grant

Caltrans provides matching grants up to five percent of the total project cost on a first come, first serve basis to the FAA AIP grants. As a commercial service airport, CRQ is not eligible for this grant.

6.1.3.3 Acquisition & Development (A&D) Grants

A&D Grants provide up to 90 percent for eligible safety, capacity, and security construction projects from $20,000 to $500,000. ALUCPs may also be funded through A&D grants. CRQ would be eligible for this program. As this program is funded after state operations, annual credits, and AIP matching grants have been funded, it has not been considered as a funding source in this ACIP. CRQ may apply for inclusion for specific projects to assist with funding projects ahead of FAA funding.

6.1.3.4 California Airport Loan Program

Caltrans provides discretionary loans to eligible airports for construction and land acquisition projects that benefit an airport and/or improve its self-sufficiency. Projects cannot accommodate scheduled air carriers, but may be a revenue-producing project. The amount of the loan will depend on the funds available and are required to be paid back within 17 years. The interest rate would be the same as State general obligation bonds.

6.1.4 County and Airport Funds

The County operates CRQ through an Airport Enterprise Fund along with the other seven airports in the County. Revenues are used to operate the Airport as well as provide the local share of capital improvement projects, along with bonds. These methods described below will need to be analyzed by the Sponsor’s financial team prior to the start of each capital project to determine the best source of the local share.

6.1.4.1 Airport Operating Revenues & Expenses

Historical operating revenues through 2015 are shown in **Table 6.4** and range from $3.3 million to $4 million. Revenue is derived from interest, rent and concessions, aviation activities, royalties, customs, and other miscellaneous activities. Rents and concessions account for 72 percent of the revenue from 2011 to 2015. This category includes rents from the various tenants on the airfield and concessions from the rental cars and terminal.

Table 6.4 – Operating Revenues

Category	2011	2012	2013	2014	2015	Percent
PFCs	$155,000	$166,000	$207,000	$195,000	$162,000	4.9%
Interest on Deposits & Investments	$152,000	$134,000	$129,000	$117,000	$104,000	3.5%
Rents & Concessions	$2,514,000	$2,301,000	$2,505,000	$2,948,000	$2,835,000	72.3%
Parking Lot Use Fee	$173,000	$215,000	$224,000	$236,000	$177,000	5.7%
Tie Down Fees	$1,000	$3,000	$3,000	$1,000	$2,000	0.1%
Landing Fees	$27,000	$43,000	$45,000	$46,000	$43,000	1.1%
Royalties	$154,000	$174,000	$178,000	$182,000	$180,000	4.8%
Other Misc./Permits/ Reimbursements	$26,000	$15,000	$10,000	$15,000	$27,000	0.5%
Customs Services	$133,000	$154,000	$195,000	$351,000	$308,000	7.2%
Total	**$3,335,000**	**$3,205,000**	**$3,496,000**	**$4,091,000**	**$3,838,000**	

Source: County of San Diego. Kimley-Horn, 2017.

Operating expenses at CRQ include salaries and employee benefits and services and supplies. **Table 6.5** shows the operating expenses for the past five years. At 81 percent of the expenditures, services and supplies cover the day to operations and maintenance of the Airport along with utilities, legal, and administration costs, and various other day to day activities that must be undertaken by the Airport.

Table 6.5 – Operating Expenses

Category	2011	2012	2013	2014	2015	Percent
Salaries & Employee Benefits	$569,000	$594,000	$596,000	$761,000	$813,000	19%
Services & Supplies	$2,835,000	$2,262,000	$2,940,000	$3,258,000	$3,290,000	81%
Total	**$3,404,000**	**$2,856,000**	**$3,536,000**	**$4,019,000**	**$4,103,000**	

Source: County of San Diego. Kimley-Horn, 2017.

Table 6.6 Displays a comparison of the annual total for revenues and expenses for the past five years. CRQ appears to have a profit on an annual basis, but slipped in 2015 as operating expenses increased and revenue decreased slightly. This decrease is likely attributed to the loss of commercial service, which negatively impacts parking lot use fees, rents, and concessions.

Table 6.6 – Operating Revenues and Expenses

Category	2011	2012	2013	2014	2015
Operating Revenues	$3,335,000	$3,205,000	$3,496,000	$4,091,000	$3,838,000
Operating Expenses	$3,404,000	$2,856,000	$3,536,000	$4,019,000	$4,103,000
Difference	-$69,000	$349,000	$40,000	$72,000	-$265,000

Source: County of San Diego. Kimley-Horn, 2017.

6.1.4.2 Bonds

Bonds are a financial mechanism commonly used by municipalities to finance long-term capital projects.

- General Obligation (GO) – Backed by the creditworthiness and taxing power of the sponsor that usually requires voter approval. GO bonds typically have lower interest rates due to their high level of security.
- General Airport Revenue Bonds (GARB) – Usually used at larger commercial service airports. The bond is based on the sponsor's revenues to repay the debt. GARBs are popular choices when revenue is available as they do not place debt on the taxpayers or affect the bonding capacity of the sponsor. Interest rates may be higher than GO bonds due to their higher risk.
- Special Facility Revenue Bonds (SFB) – Customarily issued for construction of a facility and backed by the future revenue generated at the facility. SFBs are useful in developing special use or revenue producing not eligible for federal funding.

6.1.5 Third-Party or Private Funds

Private funds include parties separate from the County. This is typically a company or an individual looking to partner with or do business at the airport or sometimes aviation advocates hoping to assist the airport. Before accepting private funds, it is recommended to discuss any implications or restrictions with the FAA and FDOT to avoid any potential complications. It is important to note that the airport must still adhere to all federal and state regulations and standards when using these funds.

Funds provided by a third-party such as a developer or a tenant to finance a construction project, like corporate hangars, terminals, cargo facilities, etc. Typically, the third-party would lease the facility for a period of years in lieu of fees as they provided the funding for the project. It is important that the airport sponsor retains ownership of the underlying property if on-airport and the facility ownership reverts to the airport sponsor upon expiration of the lease.

As none of these types of projects are in the current ACIP, private funds are not assumed to be a source of funding in the analysis.

6.2 AIRPORT CAPITAL IMPROVEMENT PLAN (ACIP)

Table 6.7 displays the ACIP, based on **Exhibit 5.10** - Recommended Development Plan, for this Airport Master Plan Update. The cost estimates are in 2015 dollars and include contingencies, design costs, and construction management costs. The ACIP does not constitute all expenditures the Airport may incur on other projects, maintenance, or operating expenses. Additionally, approval of this Airport Master Plan Update does not commit the County to construct any facilities, carry out any improvements, or financially obligate the County to complete the projects as listed.

As shown, **Table 6.7** displays the ACIP for each planning period with totals ranging between $99 million and nearly $126 million over the planning horizon depending on the construction of an interim 200' extension to Runway 06-24 and Taxiway A and the phasing of ultimate runway/taxiway improvements. Of this, the County may be responsible for between $18 million to $25 million or more depending on federal eligibility for various components. It should be noted that while **Table 6.7** identifies the ARFF facility as eligible for FAA funding only certain portions of the project will be eligible and must be discussed with the FAA at the time of the planning and design. Additionally, FAA funding for the 200-foot Runway 06-24 and Taxiway A extension in the near-term may be challenging as discussed in Section 5.

Based on the review of the operating revenue and expenses in Section 6.1.4.1, the County will need to look for additional sources of funding to cover the local share. Even though commercial service has returned to CRQ, additional revenue beyond PFCs will be needed to fund the local share of the capital improvement projects.

Table 6.7 – ACIP

Fiscal Year	Project No. on Exhibit 5.8	Project Description	Federal Funds: Primary Entitlement	Federal Funds: Discretionary	State Funds	Sponsor/Local Funds	Private Funds	Total Funds
		Anticipated Entitlement Funding Available	*$7,000,000*					
0 to 7 Years	1	Relocation of the Glideslope Building and Antenna	$ 315,000		$ -	$ 35,000		$ 350,000
	2	Relocation of Segmented Circle	$ 135,000		$ -	$ 15,000		$ 150,000
	2	Relocation of Windsock Equipment	$ 117,000		$ -	$ 13,000		$ 130,000
	3	Relocation of ARFF Facility (4,700SF)[(1)] Including Catex	$ 472,500		$ -	$ 52,500		$ 525,000
	-	Environmental Assessment for EMAS	$ 180,000		$ -	$ 20,000		$ 200,000
	4	Construction of EMAS System serving RWY 24	$ 5,263,000	$ 17,237,000	$ -	$ 2,500,000		$ 25,000,000
	5	Relocation of the Vehicle Service Road[(2)]	$ -		$ -	$ -		$ -
	6	Relocation of the Lighting Vault	$ 17,500		$ -	$ 57,500		$ 575,000
	-	Environmental Assessment for Runway Extension	$ -		$ -	$ 200,000		$ 200,000
	7	200' Runway & Taxiway A Extension (Interim condition)	$ -	$ 12,888,450	$ -	$ 1,432,050		$ 14,320,500
		Total Near-Term	**$ 7,000,000**	**$ 30,125,450**	**$ -**	**$ 2,893,000**	**$ -**	**$ 27,130,000**
		Total Near-Term*	**$ 7,000,000**	**$ 30,125,450**	**$ -**	**$ 4,325,050**	**$ -**	**$ 41,450,500**
		Anticipated Entitlement Funding Available	*$ 4,000,000*					
8 to 12 Years	8	Removal of Fuel Farm on North Apron	$ 40,500		$ -	$ 4,500		$ 45,000
	9	Removal of North Apron and Taxiway N	$ 615,600		$ -	$ 68,400		$ 684,000
	11	Enhancement of Near-Term Auto Parking	$ 208,800		$ -	$ 23,200		$ 232,000
	-	Airport Master Plan Update	$ 594,000		$ -	$ 66,000		$ 660,000
	-	Environmental Assessment for Airfield Improvements	$ 180,000		$ -	$ 20,000		$ 200,000
	10	Preservation of area reserved for GA Aircraft Parking						TBD
	11	Passenger/Admin/Parking Facility Improvements						TBD
		Total Intermediate-Term	**$ 1,638,900**	**$ -**	**$ -**	**$ 182,100**	**$ -**	**$ 1,821,000**
		Anticipated Entitlement Funding Available	*$ 11,000,000*					
13-20 Years	12	Relocation of NAVAIDS (ILS, GS, MALSR, PAPI)	$ 1,000,000	$ 1,520,000	$ -	$ 280,000		$ 2,800,000
	13	Remove/Reconstruct Connector Taxiways	$ 1,000,000	$ 584,000	$ -	$ 176,000		$ 1,760,000
	14	Remove/Reconstruct TWY A	$ 1,000,000	$ 11,924,000	$ -	$ 1,436,000		$ 14,360,000
	15	Construction of EMAS System serving RWY 06	$ 1,000,000	$ 9,944,000	$ -	$ 1,216,000		$ 12,160,000
	16	Relocation of EMAS System serving RWY 24	$ 1,000,000	$ 9,116,000	$ -	$ 1,124,000		$ 11,240,000
		Subtotal Long-Term	**$ 5,000,000**	**$ 33,088,000**	**$ -**	**$ 4,232,000**	**$ -**	**$ 42,320,000**
Long-Term Runway Extension Options								
13 to 20 Years	-	200’ Extension Plus 600’ of Runway 6/24 and Taxiway A	$ 3,000,000	$ 1,195,600	$ -	$ 6,130,400		$ 0,326,000
	-	800’ Extension of Runway 6/24 and Taxiway A	$ 3,000,000	$ 13,710,000	$ -	$ 11,140,000		$ 27,850,000
		Total Long-Term (200' Extension plus 600’ Extension)	$ 8,000,000	$ 54,283,600	$ -	$ 20,362,400	$ -	$ 82,646,000
		Total Long-Term (800' Extension)	$ 8,000,000	$ 46,798,000	$ -	$ 15,372,000	$ -	$ 70,170,000
		Grand Total Long-Term (200' Extension plus 600’ Extension)*	**$ 16,638,900**	**$ 84,409,050**	**$ -**	**$ 24,869,550**	**$ -**	**$125,917,500**
		Grand Total Long-Term (800' Extension)*	**$ 16,638,900**	**$ 76,923,450**	**$ -**	**$ 19,879,150**	**$ -**	**$113,441,500**
		Grand Total Long-Term (200' Extension plus 600’ Extension)	**$ 16,638,900**	**$ 71,520,600**	**$ -**	**$ 23,437,500**	**$ -**	**$111,597,000**
		Grand Total Long-Term (800' Extension)	**$ 16,638,900**	**$ 64,035,000**	**$ -**	**$ 18,447,100**	**$ -**	**$99,121,000**

Source: County of San Diego. Kimley-Horn, 2017.
Notes: (1) FAA Approval Required on Eligibility of Specific Components; (2) Cost included in Construction of EMAS

The County should provide adequate lead-time for detailed design, permitting, and construction to ensure that the proposed facilities are operational when warranted by the user demands. It is intended that ACIP be reviewed and updated on an annual basis under guidance of the Sponsor, Caltrans, and FAA to consider the most recent conditions, opportunities, constraints, and desires. Airport development should be based on actual activity rather than a specific timeframe. The Department of Public Works will seek approval from the County Board of Supervisors as individual projects are fully designed and funding becomes available. Environmental approvals through the NEPA and CEQA will be necessary prior to receipt of funding.

APPENDIX 1 – AIRPORT LAYOUT PLAN

(DRAFT DOCUMENT IN PROGRESS)

APPENDIX 2 – GLOSSARY OF TERMS AND COMMON ACRONYMS

Glossary of Terms

Above Ground Level (AGL)	A height above ground as opposed to MSL (height above Mean Sea Level).
Advisory Circular (AC)	Publications issued by the FAA to provide a systematic means of providing non-regulator guidance and information in a variety of subject areas.
Airport Improvement Program (AIP)	The AIP of the Airport and Airways Improvement Act of 1982 as amended. Under this program, the FAA provides funding assistance for the design and development of airports and airport facilities.
Aircraft Mix	The number of aircraft movements categorized by capacity group or operational group and specified as a percentage of the total aircraft movements.
Aircraft Operation	An aircraft takeoff or landing.
Airport	An area of land or water used or intended to be used for landing and takeoff of aircraft; includes buildings and facilities, if any.
Airport Elevation	The highest point of an airport's useable runways, measured in feet above mean sea level.
Airport Hazard	Any structural or natural object located on or near a public airport, or any use of land near such airport, that obstructs the airspace required for flight of aircraft on approach, landing, takeoff, departure, or taxiing at the airport.
Airport Land Use Regulations	Are designed to preserve existing and/or establish new compatible land uses around airports, to allow land use not associated with high population concentration, to minimize exposure of residential uses to critical aircraft noise areas, to avoid danger from aircraft crashes, to discourage traffic congestion and encourage compatibility with non-motorized traffic from development around airports, to discourage expansion of demand for governmental services beyond reasonable capacity to provide services and regulate the area around the airport to minimize danger to public health, safety, or property from the operation of the airport, to prevent obstruction to air navigation, and to aid in realizing the policies of a County Comprehensive Plan and Airport Master Plan.
Airport Layout Plan (ALP)	A graphic presentation, to scale, of existing and proposed airport facilities, their location on the airport, and the pertinent applicable standards. To be eligible for AIP funding

	assistance, an airport must have an FAA-approved ALP.
Airport Master Record, Form 5010	The official FAA document, which lists basic airport data for reference and inspection purposes.
Airport Reference Code (ARC)	The ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport.
Airport Reference Point (ARP)	The latitude and longitude of the approximate center of the airport.
Airspace	Space above the ground in which aircraft travel is divided into corridors, routes, and restricted zones.
Air Traffic	Aircraft operating in the air or on an airport surface, excluding loading ramps and parking areas.
Approach Reference Code (APRC)	A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations.
Approach Surface	A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end.
Automated Weather Observing System (AWOS)	This equipment automatically gathers weather data from various locations on the airport and transmits the information directly to pilots by means of computer generated voice messages over a discrete frequency.
Based Aircraft	An aircraft permanently stationed at an airport.
Building Restriction Line	A line, which identifies suitable building area locations on airports.
Ceiling	The height above the earth’s surface of the lowest layer of clouds or other phenomena which obscures vision.
Conical Surfaces	A surface extending outward and upward form the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.
Controlled Airspace	Airspace in which some or all aircraft may be subject to air traffic control to promote safe and expeditious flow of air traffic.
Critical/Design Aircraft	In airport design, the aircraft which controls one or more design items such as runway length, pavement strength,

	lateral separation, etc., for a particular airport. The same aircraft need not be critical for all design items.
Day Night Level (DNL)	24-hour average sound level, including a 10-decibel penalty for sound occurring between 10:00 PM and 7:00 AM
Decibel	Measuring unit for sound based on the pressure level.
Departure Reference Code (DPRC)	A code signifying the current operational capabilities of a runway with regard to takeoff operations.
Design Type	The design type classification for an airport refers to the type of runway that the airport has based upon runway dimensions and pavement strength.
Expansion	City of Carlsbad: expand airport facilities beyond the current Boundaries of CUP-172. State of California: defined by State of California Public Utilities Code § 21664.5 such as acquisition property for runway protection zones, construction of a new runway, extension or realignment of an existing runway, or associated facilities.
Federal Aviation Administration (FAA)	The federal agency responsible for the safety and efficiency of the national airspace and air transportation system.
FAR Part 77	A definition of the protected airspace required for the safe navigation of aircraft.
Fixed Base Operator (FBO)	An individual or company located at an airport and providing commercial general aviation services.
Fuel Flowage Fees	A fee charged by the airport owner based upon the gallons of fuel either delivered to the airport or pump at the airport.
Global Positioning System (GPS)	The global positioning system is a space-based navigation system, which has the capability to provide highly accurate three-dimensional position, velocity, and time to an infinite number of equipped users anywhere on or near the Earth. The typical GPS integrated system will provide: position, velocity, time, altitude, groundspeed, and ground track error, heading and variation. The GPS measures distance, which it uses to fix position, by timing a radio signal that starts at the satellite and ends at the GPS receiver. The signal carries with It data that discloses satellite position and time of transmission and synchronizes the aircraft GPS system with satellite clocks.
Hazard to Air Navigation	An object which, as a result of an aeronautical study, the FAA determines will have a substantial adverse effect upon the safe

	and efficient use of navigable airspace by aircraft, operation of air navigation facilities, or existing or potential airport capacity.
Horizontal Surface	A horizontal plane 150 feet above the established airport elevation, the perimeter which is constructed by swinging arcs of specified radii form the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs.
Imaginary Surfaces	Surfaces established in relation to the end of each runway or designated takeoff and landing areas, as defined in paragraphs 77.25, 77.28, and 77.29 of FAR Part 77, Objects Affecting Navigable Airspace. Such surfaces include the approach, horizontal, conical, transitional, primary, and other surfaces.
Itinerant Operations	All operations at an airport, which are not local operations.
Jet Noise	The noise generated externally to a jet engine in the turbulent jet exhaust.
Knots	Nautical miles per hour, equal 1.15 statute miles per hour.
Large Airplane	An airplane of more than 12,500 pounds maximum certified takeoff weight.
Local Operations	Operations by aircraft flying in the traffic pattern or within sight of the control tower, aircraft known to be arriving or departing from flight in local practice areas, or aircraft executing practice instrument approaches at the airport.
Location Identifier	A three-letter or other code, suggesting where practicable, the location name that it represents.
Maneuvering Area	That part of an airport to be used for the takeoff and landing of aircraft and for the movement of aircraft associated with takeoff and landing, excluding aprons.
Master Plan/ Airport Master Plan Update	A planning document prepared for an airport, which outlines directions and developments in detail for 5 years and, less specifically, for 20 years. The primary component of which is the Airport Layout Plan.
Mean/Maximum Temperature	The average of all the maximum temperatures, usually for a given period of time.
Mean Sea Level (MSL)	Height above sea level.
Medium Intensity Runway Lights (MIRL)	For use on VFR runways or runway showing a non-precision instrument flight rule (IFR) procedure for either circling or

	straight-in approach.
Minimum Altitude	That designated altitude below which an IFR pilot is not allowed to fly unless arriving or departing an airport or for specific allowable flight operations.
National Airspace System	The common network of United States airspace, navigation aids, communications facilities and equipment, air traffic control equipment and facilities, aeronautical charts and information, rules, regulations, procedures, technical information and FAA manpower and material.
National Plan of Integrated Airport Systems (NPIAS)	A plan prepared annually by the FAA which identifies, for the public, the composition of a national system of airports together with the airport development necessary to anticipate and meet the present and future needs of civil aeronautics, to meet requirements in support of the national defense and to meet the special needs of the Postal Service. The plan includes both new and qualitative improvements to existing airports to increase their capacity, safety, technological capability, etc.
NAVAID	A ground based visual or electronic device used to provide course or altitude information to pilots.
Noise	Defined subjectively as unwanted sound. The measurement of noise involves understanding three characteristics of sound: intensity, frequency, and duration.
Noise Contours	Lines drawn about a noise source indicating constant energy levels of noise exposure. DNL is the measure used to describe community exposure to noise.
Noise Exposure Level	The integrated value, over a given period of time, of a number of different events of equal or different noise levels and durations.
Non-Precision Instrument	A runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance for which a straight-in non-precision instrument approach procedure has been approved.
Notice to Airmen (NOTAM)	A notice containing information (not known sufficiently in advance to publicize by other means concerning the establishment, condition, or change in any component (facility, service, or procedure) of or hazard in the National Airspace System, the timely knowledge of which is essential to personnel concerned with flight operations.
Object	Includes, but is not limited to, above ground structures,

	NAVAIDs, people, equipment, vehicles, natural growth, terrain, and parked aircraft.
Object Free Area (OFA)	A two-dimensional ground area surrounding runways, taxiways, and taxilanes which is clear of objects, except for objects whose locations are fixed by function.
Obstacle Free Zone (OFZ)	The airspace defined by the runway OFZ and, as appropriate, the inner-approach OFZ and the inner-transitional OFZ, which is clear of object penetrations other than frangible NAVAIDs.
Obstruction	An object which penetrates an imaginary surface described in the FAA's Federal Aviation Regulations (FAR), Part 77.
Parking Apron	An apron intended to accommodate parked aircraft.
Pattern	The configuration or form of a flight path flown by an aircraft or prescribed to be flown, as in making an approach to a landing.
Precision Approach Path Indicators (PAPI)	The visual approach slope indicator system furnishes the pilot visual slope information to provide safe descent guidance. It provides vertical visual guidance to aircraft during approach and landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that they are "on path" if they see red/white, "above path," if they see white/white, and "below path," if they see red/red.
Primary Surface	A surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway, but when the runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway.
Rotating Beacon	A visual NAVAID operated at many airports. At civil airports, alternating white and green flashes indicate the location of the airport.
Runway	A defined rectangular surface on an airport prepared or suitable for the landing or takeoff of airplanes.
Runway End Identifier	REILs are flashing strobe lights which aid the pilot in identifying
Lights (REIL)	The runway end at night or in bad weather conditions.
Runway Gradient	The average gradient consisting of the difference in elevation of the two ends of the runway divided by the runway length may be used provided that no intervening point on the runway profile lies more than five feet above or below a straight line joining the two ends of the runway. In excess of five feet, the runway profile will be segmented and aircraft data will be

	applied for each segment separately.
Runway Lighting System	A system of lights running the length of a system that may be either high intensity (HIRL), medium intensity (MIRL), or low intensity (LIRL).
Runway Orientation	The magnetic bearing of the centerline of the runway.
Runway Protection Zone (RPZ)	An area off the runway end used to enhance the protection of people and property on the ground.
Runway Safety Area (RSA)	A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.
Segmented Circle	A basic marking device used to aid pilots in locating airports and which provides a central location for such indicators and signal devices as may be required.
Small Aircraft	An airplane of 12,500 pounds or less maximum certified takeoff weight.
Taxiway	A defined path established for the taxiing of aircraft from one part of an airport to another.
Terminal Area	The area used or intended to be used for such facilities as terminal and cargo buildings, gates, hangars, shops and other service buildings, automobile parking, airport motels, restaurants, garages, and automobile services, and a specific geographical area within which control of air traffic is exercised.
Threshold	The beginning of that portion of the runway available for landing.
Touch and Go Operations	Practice flight performed by a landing touch down and continuous takeoff without stopping.
Traffic Pattern	The traffic flow that is prescribed for aircraft landing at, taxiing on or taking off, from an airport. The usual components are the departure, crosswind, downwind, and base legs; and the final approach.
Transitional Surface	These surfaces extend outward and upward at right angles to runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces.
Universal Communications (UNICOM)	A private aeronautical advisory communications facility for purpose other than air traffic control. Only one such station is

	authorized in any landing area. Services available are advisory in nature primarily concerning the airport services and airport utilization. Locations and frequencies of UNICOMs are listed on aeronautical charts and publications.
Visual Flight Rules (VFR)	Rules that govern flight procedures under visual conditions.
Visual Runway	A runway intended for visual approaches only with no straight-tin instrument approach procedure either existing or planned for that runway.

Common Acronyms

AAC	Aircraft Approach Category
AAGR	Average Annual Growth Rate
AC	Advisory Circular
ACIP	Airport Capital Improvement Plan
ACM	Airport Certification Manual
ACRP	Airport Cooperative Research Program
ADG	Airplane Design Group
ADO	Airports District Office
ADS-B	Automatic Dependent Surveillance - Broadcast
ADT	Average Daily Traffic
AGL	Above Ground Level
AIP	Airport Improvement Program
ALP	Airport Layout Plan
ALS	Approach Lighting System
ALSF	Approach Lighting System with Sequenced Flashing Lights
ALUCP	Airport Land Use Compatibility Plans
AOA	Aircraft Operations Area
APCD	Air Pollution Control District (County of San Diego)
APRC	Approach Reference Code
APV	Approach Procedure with Vertical Guidance
ARC	Airport Reference Code
ARFF	Aircraft Rescue and Firefighting
ARP	Airport Reference Point
ASDA	Accelerate Stop Distance Available
ASDE	Airport Surface Detection Equipment - (Radar)
ASOS	Automated Surface Observing System
ASR	Airport Surveillance Radar
ASV	Annual Service Volume
ATC	Air Traffic Control
ATCT	Airport Traffic Control Tower
AWOS	Automated Weather Observing Systems
BLF	Boarding Load Factors
BMPs	Best Management Practices
BRL	Building Restriction Line
CALTRANS	California Department of Transportation
CARB	California Air Resources Board
CAT	Category
CBP	Customs and Border Patrol
CEQA	California Environmental Quality Act
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations

CLUP	Comprehensive Land Use Plan
CMC	Carlsbad Municipal Code
CMG	Cockpit to Main Gear Distance
CNEL	City's Noise Element/Community Noise Equivalent Level
CNPS	California Native Plant Society
CRQ	McClellan-Palomar Airport
CUP	Conditional Use Permit
Cw	Weighted Peak Hour Capacity
CWA	Clean Water Act
DME	Distance Measuring Equipment
DNL	Day-Night Equivalency Level
DPRC	Departure Reference Code
DWL	Dual Wheel Loading
EAT	End-Around Taxiway
EMAS	Engineered Materials Arresting System
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FATO	Final Approach and Takeoff Area
FBO	Fixed Base Operator
FEMA	Federal Emergency Management Agency
FOD	Foreign Object Debris
FSROR	Federal Screening Resources and Other Requirements
DGL	Guidance Light Facility
GARB	General Airport Revenue Bonds
GIS	Geographic Information System
GO	General Obligation
GPS	Global Positioning System
GQS	Glide Path Qualification Surface
GS	Glideslope
HATh	Height Above Threshold
HIRL	High Intensity Runway Lights
IAP	Instrument Approach Procedures
IATA	International Air Transport Association
IFR	Instrument Flight Rules
ILS	Instrument Landing System
L18	Fallbrook Community Airpark
LAS	McCarran International Airport
LAX	Los Angeles International Airport
LDA	Landing Distance Available
LEED	Leadership in Energy and Environmental Design
LGB	Long Beach Airport
LNAV	Lateral Navigation

LOC	Localizer
LOS	Level of Service
LOS	Line of Sight
LPV	Localizer Performance with Vertical Guidance
MALS	MALS Medium Intensity Approach Lighting System
MALSF	MALS with Sequenced Flashers
MALSR	MALS with Runway Alignment Indicator Lights
MBTA	Migratory Bird Treaty Act
MGW	Main Gear Width
MIRL	Medium Intensity Runway Lights
MSL	Mean Sea Level
MTOW	Maximum Takeoff Weight
MYF	Montgomery-Gibbs Executive Airport
NAAQS	National Ambient Air Quality Standards
NAVAID	Navigation Aid
NCDC	National Climatic Data Center
NDB	Non-directional Beacon
NEM	Noise Exposure Maps
NEPA	National Environmental Protection Act
NextGen	Next Generation Air Transportation System
NGS	National Geodetic Survey
NPA	Non-Precision Approach
NPIAS	National Plan of Integrated Airport Systems
NPL	National Priorities List
NVGS	Non-Vertically Guided Survey
OAK	Oakland International Airport
OFA	Object Free Area
OFZ	Obstacle Free Zone
OKB	Oceanside Municipal Airport
PA	Precision Approach
PAL	Pilot Activated Lighting
PAPI	Precision Approach Path Indicator
PARTNER	Partnership for Air Transportation Noise & Emissions Reduction
PCBs	Polychlorinated Biphenyls
PCN	Pavement Condition Number
PCFC	Passenger Facility Charge
PHX	Phoenix Sky Harbor International Airport
PIR	Precision Instrument Runways
POFZ	Precision Obstacle Free Zone
RASP	Regional Aviation Strategic Plan
RCRA	Resource Conservation Recovery Act
RDC	Runway Design Code
REIL	Runway End Identifier Lighting

RNAV	Area Navigation
RNM	Ramona Airport
RO	Regional Airports Divisions
ROFA	Runway Object Free Area
ROFZ	Runway Obstacle Free Zone
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RTP	Regional Transportation Plan
RTR	Remote Transmitter/Receiver
RVR	Runway Visual Range
RW	Runway
RWQCBs	Regional Water Quality Control Boards
SAN	San Diego International
SANDAG	San Diego Association of Governments
SanGIS	The San Diego Geographic Information Source
SDCRAA	San Diego County Regional Airport Authority
SDG&E	San Diego Gas and Electric
SFB	Special Facility Revenue Bonds
SJC	Norman Y Mineta San Jose International Airport
SMF	Sacramento International Airport
SNA	John Wayne Airport
SOP	Standard Operating Procedures
SWPPP	Storm Water Pollution Prevention Plan
TAF	Terminal Area Forecast
TERPS	Terminal Instrument Procedures
TESM	Taxiway Edge Safety Margin
TFMSC	Traffic Flow Management System Counts
TH	Threshold
TL	Taxilane
TODA	Takeoff Distance Available
TOFA	Taxiway and Taxilane Object Free Area
TORA	Takeoff Run Available
TRACON	Terminal Radar Approach Control Facility
TSA	Taxiway/Taxilane Safety Area
TSA	Transportation Security Administration
TSCA	Toxic Substances Control Act
TSS	Threshold Siting Surface
TW	Taxiway
UAS	Unmanned Aircraft Systems
USC	United States Code
UHF	Ultra-High Frequency
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

USGS	U.S. Geological Survey
V	Visual
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VGS	Vertically Guided Survey
VGSI	Visual Guidance Slope Indicator
VHF	Very High Frequency
VNAP	Voluntary Noise Abatement Procedures
VNAV	Vertical Navigation
VOR	VHF Omnidirectional Range
VORTAC	VHF Omnidirectional Range Collocated Tactical Air
WAAS	Wide Area Augmentation System

APPENDIX 3 – TRANSPORTATION IMPACT ANALYSIS

LINSCOTT LAW & GREENSPAN engineers

TRANSPORTATION IMPACT ANALYSIS

MCCLELLAN-PALOMAR AIRPORT MASTER PLAN UPDATE

County of San Diego, California
December 7, 2017

LLG Ref. 3-17-2772

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TRANSPORTATION IMPACT ANALYSIS

MCCLELLAN-PALOMAR AIRPORT MASTER PLAN UPDATE

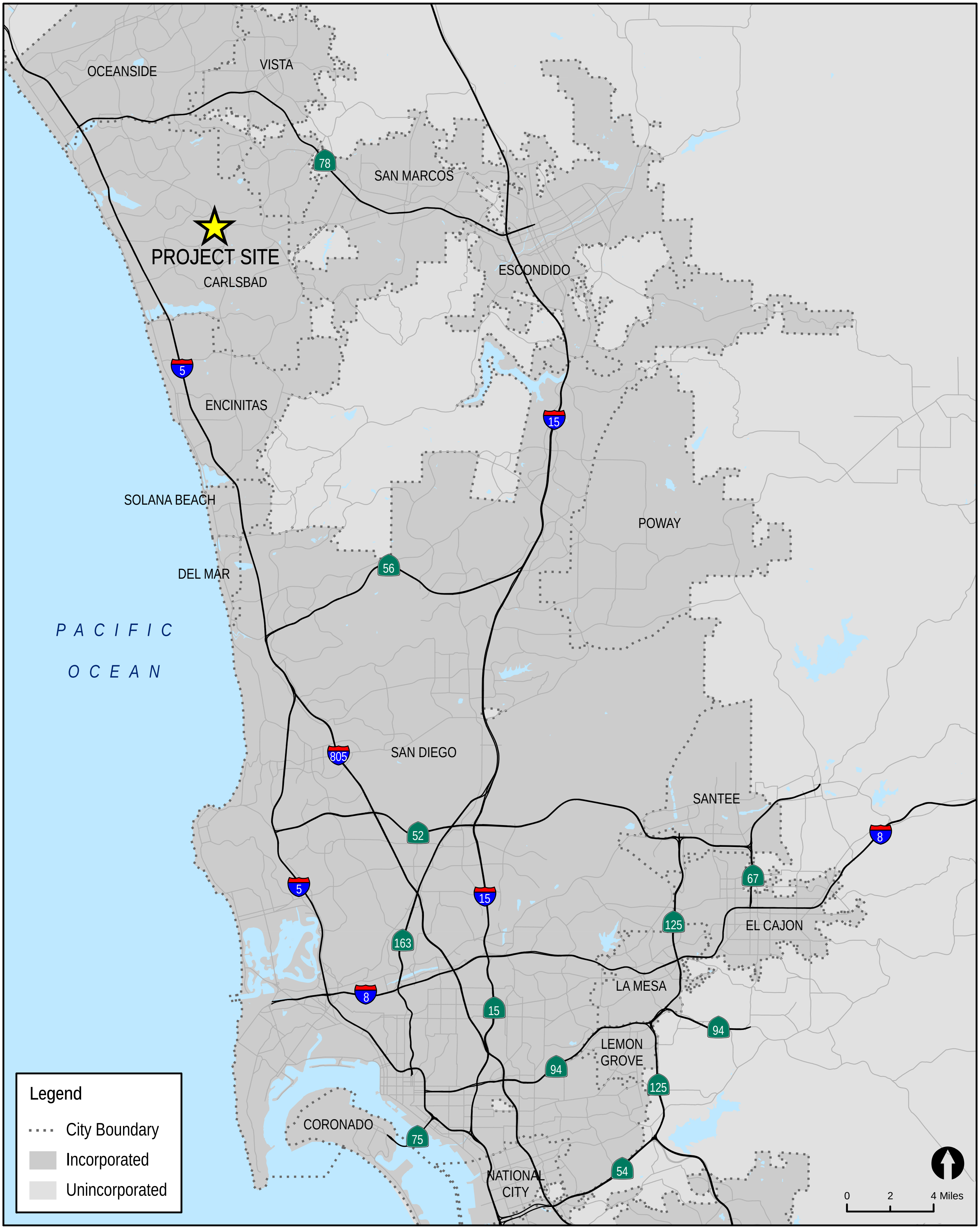
County of San Diego, California
December 7, 2017

1.0 INTRODUCTION

Linscott, Law & Greenspan Engineers (LLG) has been retained to assess the potential transportation impacts associated with the McClellan-Palomar Airport Master Plan Update ("Project"). The Project is a flexible, phased 20-year strategy to prioritize projects at the Airport that provide safety and operational enhancements. The Project is located within the municipal limits of the City of Carlsbad. Included in this transportation study are the following:

- Project Description
- Existing Conditions Discussion
- Analysis Approach and Methodology
- Significance Criteria
- Analysis of Existing Conditions
- Trip Generation/Distribution/Assignment
- Analysis of Existing + Project Scenarios
- Cumulative Projects Discussion
- Analysis of Near-Term Scenarios
- Analysis of Long-Term Scenarios
- Bicycle / Pedestrian / Transit Analysis
- Significant Impacts and Mitigation Measures

Figure 1–1 shows the vicinity map. ***Figure 1–2*** shows a more detailed Project area map.



LINSCOTT LAW & GREENSPAN engineers

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Figure 1-1

Vicinity Map

McClellan Palomar Airport Master Plan

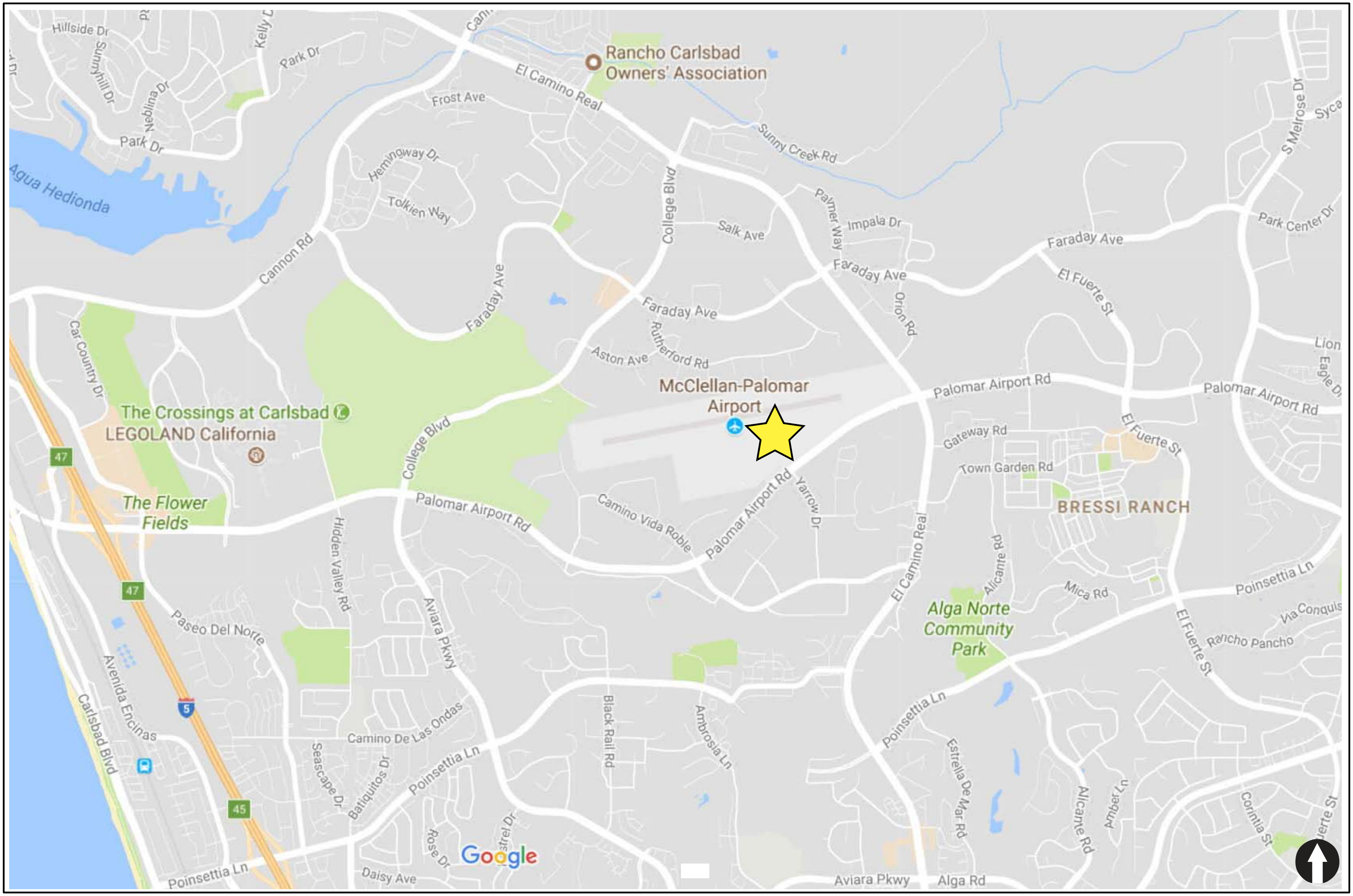

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Figure 1-2

Project Area Map

McClellan Palomar Airport Master Plan

2.0 PROJECT DESCRIPTION

The County of San Diego Department of Public Works (County) owns and operates McClellan Palomar Airport within the municipal boundary of the City of Carlsbad. Although the County's property in the vicinity totals approximately 450 acres, including aviation and non-aviation land, the approximately 250-acre Master Plan Project study area encompasses the active airfield, tenant leaseholds, aircraft and auto parking, passenger terminal building, and administrative facilities located north of Palomar Airport Road at Yarrow Drive.

The Master Plan is a flexible, phased 20-year strategy to prioritize projects at the Airport that provide safety and operational enhancements. The Project focuses on the "D-III Modified Standards Compliance" classification to meet the current and future needs at the airport.

The major objectives of the D-III Modified Standards Compliance design for the airport include:

- Meeting FAA-required safety areas around the runway and taxiways (requires shifting aircraft movement areas),
- Maintaining a 150-foot wide runway,
- Installation of Engineered Materials Arresting System (EMAS) as a safety enhancement to stop aircraft in overrun situations,
- Improvements to the capacity and efficiency of landside (i.e. emergency services and passenger/visitor administration) facilities.

A conceptual phasing plan for the Project is shown below.

Near-Term Projects (0-7 years):

- Elements to meet FAA's safety and design standards for the C/D-III airport classification, including the Runway Safety Area (RSA) of the existing runway/taxiway alignment
  - Relocation of the glideslope building, segmented circle, windsock equipment
  - Relocation of the vehicle service road
- New EMAS on the western end of runway 06-24
- Aircraft Rescue & Fire Fighting (ARFF) facility relocation
- 200-foot extension of the current runway and taxiway "A"
- Landslide improvements to meet near-term aviation forecasts

Intermediate-Term Projects (8-12 years):

- Elements to clear the RSA and the Runway Object Free Area (ROFA) of the ultimate runway/taxiway alignment
  - Removal of aircraft fueling tank and parking on north ramp
- Landslide improvements to meet intermediate aviation forecasts

Long-Term Projects (13-20 years):

- Movement of runway 06-24 123-foot to the north, and all associated actions
  - Reconstruction/removal of connector taxiways
  - Relocation of EMAS on western end of new runway alignment
  - Relocation of navigational aids
  - Additional 600-foot extension on the ultimate runway and taxiway “A”
- Landslide improvements to meet long-term aviation forecasts

Figure 2–1 shows the conceptual phasing plan for the Project. Access to the airport is provided via Yarrow Drive and Owens Avenue.

This transportation study focuses on the Project’s long-term forecasted increase in commercial passenger enplanements and associated traffic impacts. An enplanement is measured by one commercial air service passenger boarding a scheduled flight. The Master Plan studies the potential for growth of commercial air service at the airport over a 20-year planning period. ***Table 2–1*** shows the operations/enplanements for the existing conditions as well as for two (2) Project alternatives called Passenger Activity Levels (PAL) forecasts, which have different enplanement projections (PAL1, PAL2).

TABLE 2–1
PROJECT OPERATIONS/ENPLANEMENTS

	Existing	PAL1	PAL2
Year	2016	2036	2036
Annual Aircraft Operations	149,029	192,860	194,300
Annual Enplanements	131	304,673	575,000
Design Hour Enplanements	--	63	165
Average Daily Enplanements	--	835	1,575

CONCEPTUAL DEVELOPMENT PHASES/FEATURES:

NEAR-TERM (0-7 YEARS)

1. Relocation of the Glideslope Building and Antenna
2. Relocation of the Segmented Circle and Windsock Equipment
3. Relocation of ARFF Facility
4. Construction of EMAS System for RWY 24
5. Relocation of the Vehicle Service Road
6. Relocation of Lighting Vault
7. 200' Extension of Existing RWY 06-24 and TWY A

INTERMEDIATE-TERM (8-12 YEARS)

8. Removal of Fuel Farm on North Apron
9. Removal of the North Apron and TWY N
10. Area Reserved for Future GA Parking
11. Passenger/Admin/Parking Facility Improvements

PHASE 3: LONG-TERM (13-20 YEARS)

12. Relocation 123' North/Extension of RWY 06-24 (Includes REILs, PAPIs, Localizer Antennae and MALSRs)
13. Removal/Reconstruction of Existing Connector Taxiways
14. Removal/Reconstruction of Existing TWY A (Includes Lighting)
15. Construction of EMAS System for RWY 06
16. Relocation of EMAS System for RWY 24

3.0 EXISTING CONDITIONS

Effective evaluation of the traffic impacts associated with the proposed Project requires an understanding of the existing transportation system within the Project area. The City of Carlsbad uses San Diego Traffic Engineers' Council (SANTEC) criteria to determine the traffic report study area. This criteria utilizes the 50 peak hour trip threshold meaning intersections and segments were included where the Project adds 50 or more peak hour trips. The standard of practice is to not include more minor intersections such as unsignalized intersections, private driveways, and intersections where the Project does not add right or left-turn movements. The specific study area includes the following intersections and street segments. ***Figure 3–1*** shows the intersections and street segments included in the study area. ***Figure 3–2*** shows an existing conditions diagram, including signalized intersections and lane configurations.

Intersections:

1. Canon Road / Faraday Avenue
2. El Camino Real / College Boulevard
3. College Boulevard / Faraday Avenue
4. El Camino Real / Faraday Avenue
5. I-5 Southbound (SB) Ramps / Palomar Airport Road
6. I-5 Northbound (NB) Ramps / Palomar Airport Road
7. Palomar Airport Road / Paseo Del Norte
8. Palomar Airport Road / Armada Drive
9. Palomar Airport Road / Hidden Valley Road
10. Palomar Airport Road / College Boulevard
11. Palomar Airport Road / Camino Vida Roble
12. Palomar Airport Road / Yarrow Drive
13. Palomar Airport Road / El Camino Real
14. Palomar Airport Road / Loker Avenue
15. Palomar Airport Road / El Fuerte Street
16. Palomar Airport Road / Melrose Drive
17. El Camino Real / Town Garden Road
18. El Camino Real Camino Vida Roble
19. El Camino Real / Poinsettia Lane

Segments:

Palomar Airport Road

- I-5 Ramps to Paseo Del Norte

- Paseo Del Norte to Armada Drive
- Armada Drive to Hidden Valley Road
- Hidden Valley Road to College Boulevard
- College Boulevard to Camino Vida Roble
- Camino Vida Roble to Yarrow Drive
- Yarrow Drive to El Camino Real
- El Camino Real to Loker Avenue
- Loker Avenue to El Fuerte Street
- El Fuerte Street to Melrose Drive
- East of Melrose Drive

El Camino Real

- North of College Boulevard
- College Boulevard to Faraday Avenue
- Faraday Avenue to Palomar Airport Road
- Palomar Airport Road to Town Garden Road
- Town Garden Road to Camino Vida Roble
- Camino Vida Roble to Poinsettia Lane
- South of Poinsettia Lane

College Boulevard

- Faraday Avenue to Palomar Airport Road

3.1 Existing Street Network

The following is a description of the existing street network in the study area.

Palomar Airport Road is classified as an Arterial Street according to the *City of Carlsbad Mobility Element.* Palomar Airport Road is currently constructed as a six-lane divided roadway throughout the study area. The posted speed limit eastbound is 35 mph between the I-5 ramps and Paseo Del Norte and 55 mph between Paseo Del Norte and Melrose Drive. The posted speed limit westbound is 55 mph between Melrose Drive and Armada Drive and 35 mph between Armada and the I-5 ramps. Street parking is not permitted along Palomar Airport Road.

El Camino Real is classified as an Arterial Street according to the *City of Carlsbad Mobility Element*. El Camino Real is currently constructed as a five-lane divided roadway between Jackspar Drive and College Boulevard and a six-lane divided roadway between College Boulevard and Alga Road. The posted speed limit is 55 mph in both directions throughout the study area. On street parking is not permitted along El Camino Real

College Boulevard is classified as an Arterial Street according to the *City of Carlsbad Mobility Element.* College Boulevard is currently constructed as four-lane divided roadway throughout the study area. The posted speed limit is 50 mph throughout the study area. Street parking is not permitted along College Boulevard.

Cannon Road is classified as an Arterial Street in the *City of Carlsbad Mobility Element*. Within the study area, Cannon Road is currently constructed as a four-lane divided roadway. The posted speed limit is 50 mph. Curbside parking is not permitted along Cannon Road.

Melrose Drive is classified as an Arterial Street according to the *City of Carlsbad Mobility Element.* Melrose Drive is currently constructed as a six-lane divided roadway. The posted speed limit is 55 mph in both directions throughout the study area. On street parking is not permitted along Melrose Drive.

Faraday Avenue is classified as an Employment/Transit Connector Street according to the *City of Carlsbad Mobility Element.* Faraday Avenue is currently constructed as a two-lane roadway that is divided from Cannon Road to a mile southeast of Cannon Road and undivided with a two way left turn lane from a mile southeast of Cannon Road to Oak Ridge Way. The posted speed limit is 40 mph throughout the study area. On street parking is not permitted along Faraday Avenue.

Poinsettia Lane is classified as an Employment/Transit Connector Street between Carlsbad Boulevard and College Boulevard, an Arterial Connector Street between College Boulevard and Paseo Escuela, and a School Street between Paseo Escuela and Melrose Drive according to the *City of Carlsbad Mobility Element.* Poinsettia Lane is currently constructed as a four-lane divided roadway throughout the study area. The posted speed limit is 50 mph. Street parking is not permitted along Poinsettia Lane.

Camino Vida Roble is classified as an Industrial Street according to the *City of Carlsbad Mobility Element.* Camino Vida Roble is currently a two-lane undivided roadway with a two way left turn lane. The posted speed limit is 40 mph. On Street parking is not permitted along Camino Vida Roble.

Yarrow Drive is classified as an Industrial Street according to the *City of Carlsbad Mobility Element.* Yarrow Drive is currently constructed as a 4 lane undivided roadway and its northern terminus serves as the main entrance to the airport. The posted speed limit is 40 mph. On street parking is not permitted along Yarrow Drive.

Town Garden Road is classified as an Industrial Street according to the *City of Carlsbad Mobility Element.* Town Garden Road is currently constructed as a four-lane undivided roadway east of El Camino Real and a two-lane undivided roadway west of El Camino Real. The posted speed limit is 40 mph east bound and 10 mph going west bound. On street parking is not permitted along Town Garden Road.

Paseo Del Norte is classified as a Neighborhood Connector Street according to the *City of Carlsbad Mobility Element.* Paseo Del Norte is currently constructed as four-lane divided roadway between Cannon Road and Car Country Drive and a four-lane undivided roadway with left turn pockets intermittently between Car Country Drive and Palomar Airport Road. South of Palomar Airport Road, Paseo Del Norte continues as a four-lane undivided roadway with a two way left turn lane. There is no posted speed limit. On street parking is not permitted along Paseo Del Norte

Armada Drive is classified as an Industrial Street according to the *City of Carlsbad Mobility Element.* Armada Drive is currently constructed as a four-lane divided roadway with a short segment having a two way left turn lane in between Fleet Street. The post speed limit is 40 mph. On street parking is not permitted along Armada Drive.

Hidden Valley Road is classified as a Local/Neighborhood Street according to the *City of Carlsbad Mobility Element.* Hidden Valley Road is currently constructed as a two lane undivided roadway with a two way left turn lane. The posted speed limit is 40 mph. On street parking is not permitted along Hidden Valley Road.

Loker Avenue is classified as an Industrial Street according to the *City of Carlsbad Mobility Element.* Loker Avenue is currently constructed as a two-lane undivided roadway. The posted speed limit is 35 mph. On street parking is permitted along Loker Avenue.

El Fuerte Street is classified as an Industrial Street between Faraday Avenue and Palomar Airport Road, a Neighborhood Connect Street between Palomar Airport Road and Bressi Ranch Way, and a School Street between Bressi Ranch Way and Poinsettia Lane. The posted speed limit is 45 mph. On street parking is not permitted along El Fuerte Street.

3.2 Existing Bicycle Network

Currently, there is a Class 2 bike lane provided along each roadway within the study area with the exceptions of the following:

- Palomar Airport Road, west of Paseo Del Norte
- Faraday Avenue, between El Camino Real & Palmer Way
- Armada Drive, south of Palomar Airport Road
- Hidden Valley Road, north of Palomar Airport Road
- Camino Vida Roble, north of Palomar Airport Road
- Yarrow Drive
- Town Garden Road, west of El Camino Real

3.3 Existing Transit Conditions

Transit service in the vicinity of the Project is provided by North County Transit District (NCTD). The following NCTD bus routes serve the area with nearby stops along Palomar Airport Road at Camino Vida Roble, Yarrow Drive, and El Camino Real.

- Route 309 – Oceanside to Encinitas via El Camino Real – provides service between Encinitas Station, El Camino Real SPRINTER Station, and San Luis Rey Transit Center primarily via El Camino Real. Route 309 generally provides service at 30 minute headways Monday through Saturday, with headways increasing to 60 minutes in the evening after the afternoon peak period. Sunday and holiday service is at approximately 60 minute headways for the full day.

- Route 444 – Carlsbad Poinsettia COASTER Connection via Faraday Avenue & Rutherford Road – provides service between Carlsbad Poinsettia COASTER station and Cannon Road & Ground Pacific Drive primarily via Palomar Airport Road, College Boulevard, and Faraday Avenue. Route 444 generally provides service at 80 minute headways Monday through Friday with headways decreasing to 30 minutes in the evening hours. Route 444 does not provide service on weekends or holidays.

- Route 445 – Carlsbad Poinsettia COASTER Connection to Palomar College – provides service between Carlsbad Poinsettia Station and Palomar College primarily via Palomar Airport Road and San Marcos Boulevard. Route 445 generally provides service at 80 minute headways Monday through Friday with headways decreasing to 30 minutes in the even hours. Route 445 does not operate on weekends or holidays.

3.4 Existing Traffic Volumes

LLG confirmed with City of Carlsbad staff that existing weekday AM and PM peak hour (7:00-9:00 AM and 4:00-6:00 PM) traffic volumes should be obtained for the circulation element intersections from the City of Carlsbad's 2016 Traffic Monitoring Program (TMP). The TMP collected traffic during July 2016. At locations where the City has not collected data, counts were commissioned on Wednesday, June 21, 2017.

Figure 3–3 shows the Existing Traffic Volumes. ***Appendix A*** contains the manual count sheets.

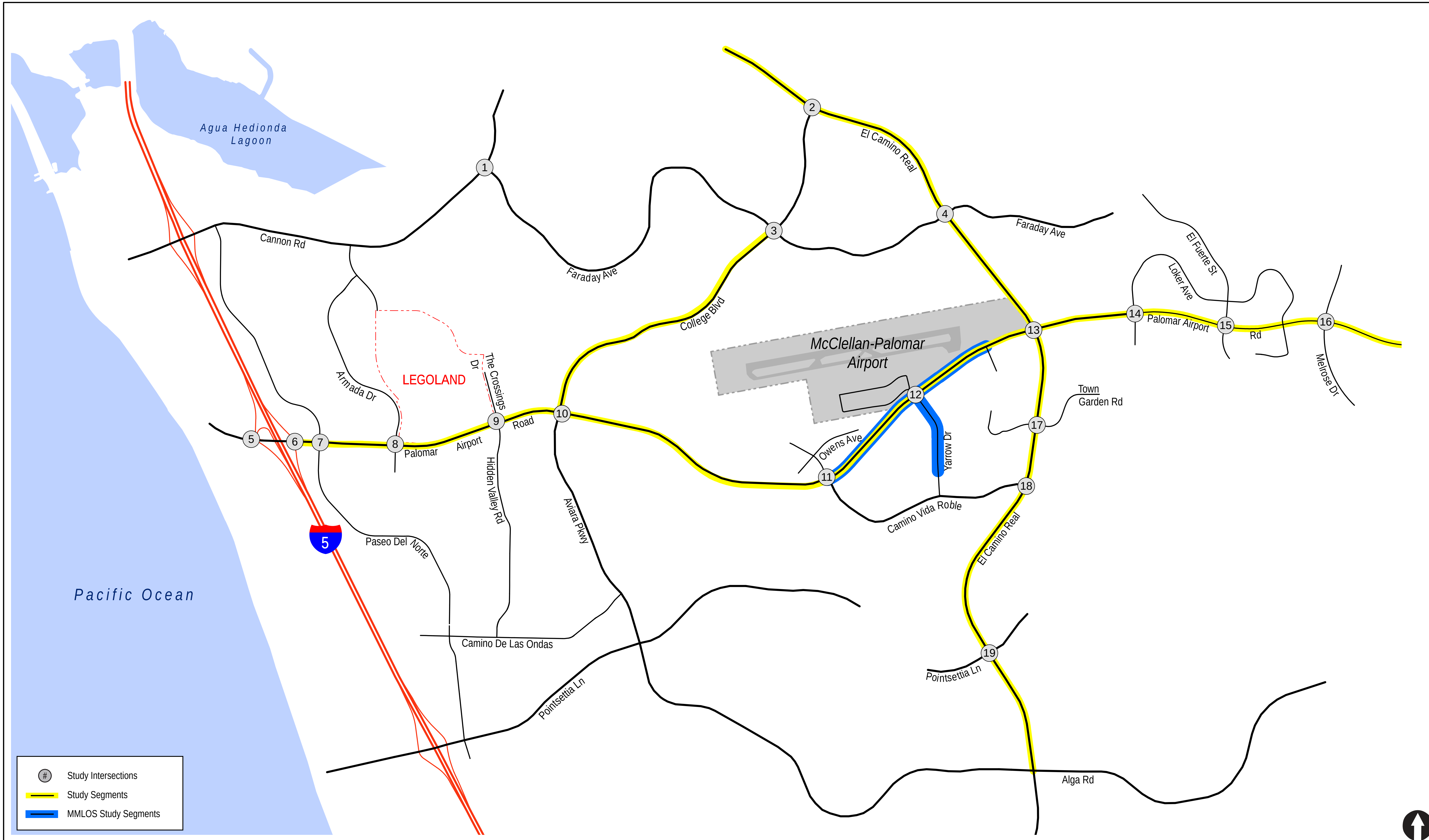

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Figure 3-1

Study Area Diagram

McCLELLAN-PALOMAR AIRPORT MASTER PLAN

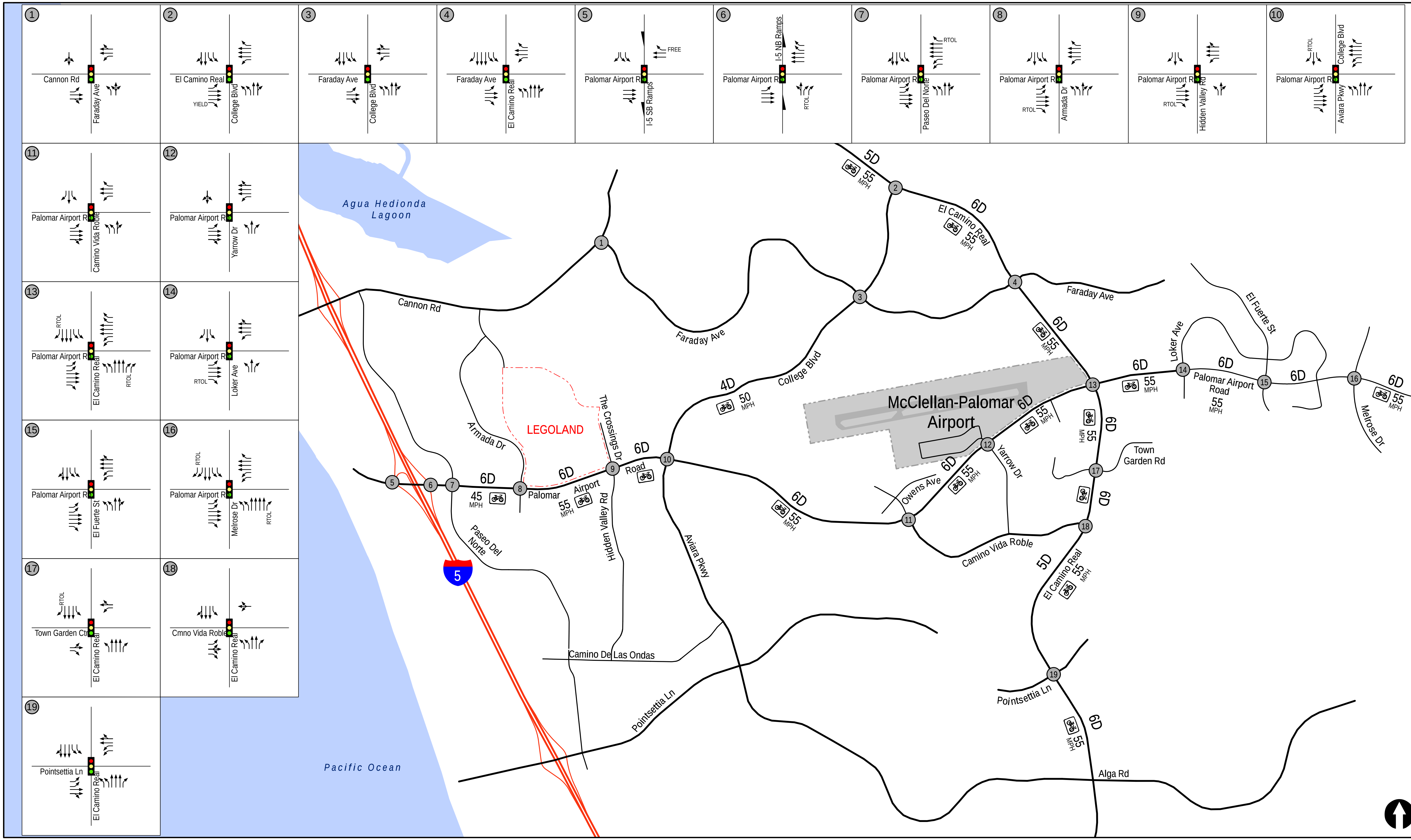

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Figure 3-2

Existing Conditions

McClellan-Palomar Airport Master Plan

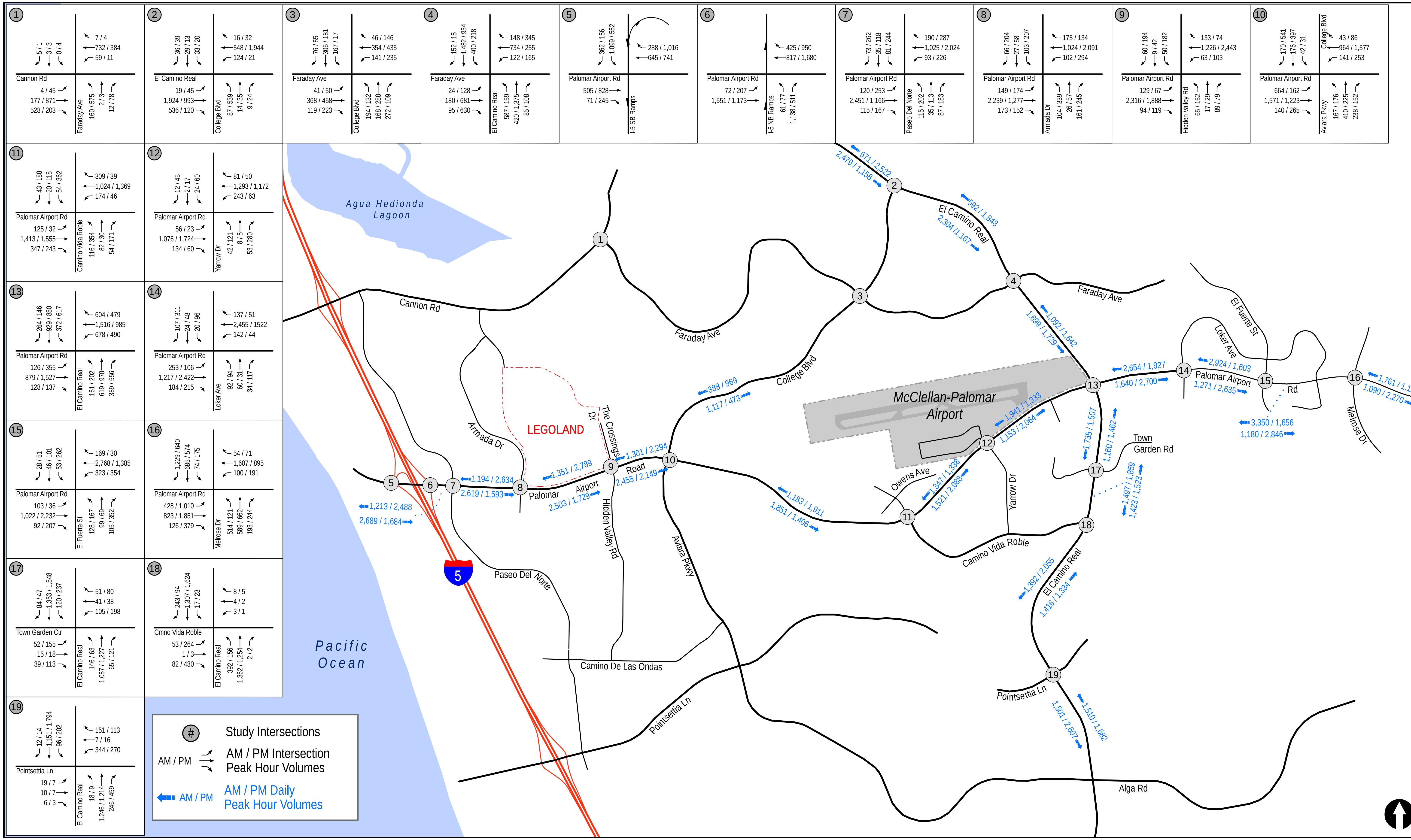

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Figure 3-3

Existing Traffic Volumes

McClellan-Palomar Airport Master Plan

4.0 ANALYSIS APPROACH AND METHODOLOGY

Level of service (LOS) is the term used to denote the different operating conditions which occur on a given roadway segment under various traffic volume loads. It is a qualitative measure used to describe a quantitative analysis taking into account factors such as roadway geometries, signal phasing, speed, travel delay, freedom to maneuver, and safety. Level of service provides an index to the operational qualities of a roadway segment or an intersection. Level of service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. Level of service designation is reported differently for signalized and unsignalized intersections, as well as for roadway segments.

Since the intersections and roadways within the study area are located within the City of Carlsbad, this report utilizes Carlsbad analysis methodologies as described below and CEQA thresholds of significance.

4.1 Intersections

Per City of Carlsbad standards, the study intersections were analyzed using the *Intersection Capacity Utilization (ICU)* method for Existing and Existing with Project under AM and PM peak hour conditions.

The ICU procedure is based on an article in the Institute of Transportation Engineers Journal, August 1978 and assumes the traffic flow characteristics of signalized intersections. It computes the Level of Service (LOS) for the total intersection based upon a summation of volume to capacity (V/C) ratios for the key conflicting movements. The ICU numerical value represents the percent of signal green time, and thus, the capacity required to serve the traffic demand. The LOS for signalized intersections varies from A (free flow, little delay) to F ("heavy congestion" conditions). ICU methodology and calculation worksheets can be found in ***Appendix B.***

Under Near-Term and Long-Term conditions, the study intersections were analyzed using the *2010 Highway Capacity Manual* (HCM) methodology. Intersections were analyzed under AM and PM peak hour conditions. Average vehicle delay was determined utilizing the methodology found in Chapter 18 of the HCM, with the assistance of the *Synchro* (version 10) computer software. The delay values (represented in seconds) were then converted to a corresponding intersection LOS. Signalized intersection calculation worksheets and a more detailed explanation of the methodology are attached in *Appendix B.*

4.2 Street Segments

Per City of Carlsbad standards, the study street segments in the Project area were analyzed on a peak hour basis. The midblock peak hour volumes were utilized to calculate volume to capacity ratio (V/C) for each direction of the street segment. The City of Carlsbad assumes a one-direction capacity of *1,800 vehicles per hour per lane* for through lanes. A LOS is determined by using V/C thresholds.

4.2.1 *Pedestrians/Bicyclists/Transit*

For pedestrian, bicycle, and transit level of service, only modes subject to multi-modal level of service (MMLOS) standards for a given segment need to be evaluated, as indicated in Table 3-1 of the City of Carlsbad Mobility Element. Segments to be analyzed for MMLOS are unique for each mode.

For pedestrian level of service, segments are to be defined from each pedestrian entry point from the project to the nearest intersection in both directions. In most cases, there will be two segments per entry point. LOS should be evaluated for the project side of the street only.

For bicycle level of service, segments are to be defined from each bicycle entry point from the project to the nearest intersection in both directions. Segments should be analyzed for both sides of the street and each side of the street should be assigned a separate level of service.

For transit level of service, segments are to be defined from each pedestrian entry point from the project to the nearest transit stop for both directions of transit service, up to ¼ mile.

In the case of the Project, the nearest intersections in either direction of the Project driveways are the intersections of Palomar Airport Road with Camino Vida Roble to the west and the Lowes Shopping Center driveway to the east. The location of the nearest transit stops are located on Yarrow Drive (200 feet south of Palomar Airport Road) and on Palomar Airport Road (200 feet east of Yarrow Drive). Thus, the applicable MMLOS study segments are as follows for the three modes and are illustrated in *Figure 3–1*:

<u>Pedestrian</u>

- Palomar Airport Road from Camino Vida Roble to Yarrow Drive
- Palomar Airport Road from Yarrow Drive to the Lowes Shopping Center Driveway (at 2501 Palomar Airport Road)

<u>Bicycle</u>

- Palomar Airport Road from Camino Vida Roble to Yarrow Drive
- Palomar Airport Road from Yarrow Drive to the Lowes Shopping Center Driveway (at 2501 Palomar Airport Road)

<u>Transit</u>

- Project frontage (northwest corner of intersection) to westbound transit stop on Yarrow Drive (200 feet south of Palomar Airport Road)
- Project frontage (northwest corner of intersection) to eastbound transit stop on Palomar Airport Road (200 feet east of Yarrow Drive)

Since Palomar Airport Road is classified as an Arterial Street, it is only subject to MMLOS standards for transit. Therefore this will be the only non-vehicular mode evaluated. Yarrow Drive is classified as an Industrial Street and is therefore subject to MMLOS standards for transit.

5.0 Significance Criteria

This section provides significance criteria for vehicle-related traffic only. For a description and analysis of multimodal criteria, please refer to Section 12.0.

As outlined in the *City of Carlsbad's Growth Management Plan*, a traffic impact is considered to be significant if the addition of project traffic causes the intersection or street segment LOS to decrease to worse than (below) LOS D.

For intersections analyzed under the ICU methodology which are currently operating worse than LOS D, a project impact will be considered significant if the project causes the ICU value at an intersection to increase by more than 0.02. For street segments which are currently operating worse than LOS D, a project impact will be considered significant if the project causes the volume-to-capacity ratio at a segment to increase by more than 0.02. ***Table 5–1*** shows the thresholds. For intersections analyzed under the HCM methodology which are currently operating worse than LOS D, a project impact will be considered significant if the project causes the delay at an intersection to increase more than 2 seconds (see ***Table 5–2***).

Table 5–1
City Of Carlsbad
Traffic Impact Significant Thresholds (ICU) for Existing Conditions

LOS[a] without Project	Allowable Increase Due to Project Impacts	
	Roadway Segments (V/C)[b]	Intersections (ICU)[c]
A,B,C,D	A project's impact is deemed significant if the LOS is degraded to LOS E or F	
E, F	0.02	0.02

Footnotes:

a. LOS = Level of Service

b. V/C = Volume to Capacity Ratio

c. ICU = Intersection Capacity Utilization

TABLE 5–2
TRAFFIC IMPACT SIGNIFICANT THRESHOLDS FOR INTERSECTIONS (HCM) FOR NEAR-TERM AND LONG-TERM CONDITIONS

LOS with Project[a]	Allowable Increase Due to Project Impacts[b]
	HCM Delay (sec.)
E & F	2

Footnotes:

a. All level of service measurements are based upon HCM procedures for peak-hour conditions. The acceptable LOS for intersections is LOS "D" in the City of Carlsbad during peak periods.

b. If a proposed project's traffic causes the values shown in the table to be exceeded, the impacts are deemed to be significant. These impact changes may be measured from appropriate computer programs or expanded manual spreadsheets. The project applicant shall then identify feasible mitigations (within the Transportation Impact Analysis [TIA] report) that will maintain the traffic facility at an acceptable LOS. If the LOS with the proposed project becomes unacceptable (see note a above), or if the project adds a significant amount of peak hour trips to cause any traffic queues to exceed on- or off-ramp storage capacities, the project applicant shall be responsible for mitigating significant impact changes.

General Notes:

1. Delay = Average stopped delay per vehicle measured in seconds for intersections, or minutes for ramp meters.
2. LOS = Level of Service

The project may also trigger a significant impact should the increase in traffic be substantial in relation to the existing street or site-access capacity causing congestion, increased delays / queuing or result in an unsafe condition. The project's impact shall also be reviewed on a non-motorized basis to ensure the needs of all users of the roadway are met including pedestrians, bicyclists, users of public transit, children, the elderly, and the disabled.

6.0 ANALYSIS OF EXISTING CONDITIONS

6.1 Peak Hour Intersection Levels of Service

AM and PM peak hour analysis of the study area intersections under existing conditions was performed using the ICU Methodology, consistent with the City's practice and their *Growth Management Plan*.

Table 6–1 shows that, under existing conditions, all study area intersections are calculated to currently operate at LOS D or better.

Appendix C contains the intersection analysis worksheets for the Existing scenario.

6.2 Peak Hour Street Segment Levels of Service

Analysis of the study area street segments was performed using the methodology outlined in *Section 5* of this report. ***Table 6–2*** shows that all of the study area street segments are calculated to operate at LOS B or better during both AM and PM peak hours.

TABLE 6–1
EXISTING INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing	
			ICU[a]	LOS[b]
1. Canon Road / Faraday Avenue	Signal	AM PM	0.47 0.51	A A
2. El Camino Real / College Boulevard	Signal	AM PM	0.52 0.61	A B
3. College Boulevard / Faraday Avenue	Signal	AM PM	0.54 0.44	A A
4. El Camino Real / Faraday Avenue	Signal	AM PM	0.70 0.77	B C
5. I-5 SB Ramps / Palomar Airport Road	Signal	AM PM	0.57 0.44	A A
6. I-5 NB Ramps / Palomar Airport Road	Signal	AM PM	0.68 0.63	B B
7. Palomar Airport Road / Paseo Del Norte	Signal	AM PM	0.65 0.69	B B
8. Palomar Airport Road / Armada Drive	Signal	AM PM	0.61 0.70	B B
9. Palomar Airport Road / Hidden Valley Road	Signal	AM PM	0.62 0.75	B C
10. Palomar Airport Road / College Boulevard	Signal	AM PM	0.59 0.72	A C
11. Palomar Airport Road / Camino Vida Roble	Signal	AM PM	0.59 0.77	A C
12. Palomar Airport Road / Yarrow Drive	Signal	AM PM	0.49 0.67	A B
13. Palomar Airport Road / El Camino Real	Signal	AM PM	0.64 0.82	B D
14. Palomar Airport Road / Loker Avenue	Signal	AM PM	0.78 0.74	C C
15. Palomar Airport Road / El Fuerte Street	Signal	AM PM	0.69 0.84	B D
16. Palomar Airport Road / Melrose Drive	Signal	AM PM	0.90 0.70	D B

TABLE 6–1
EXISTING INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing	
			ICU[a]	LOS[b]
17. El Camino Real / Town Garden Road	Signal	AM PM	0.51 0.64	A B
18. El Camino Real / Camino Vida Roble	Signal	AM PM	0.51 0.58	A A
19. El Camino Real / Poinsettia Lane	Signal	AM PM	0.44 0.50	A A

Footnotes:

a. Intersection Capacity Utilization (see *Appendix C*)
b. Level of Service (see *Appendix C*)

ICU	LOS
0.0 ≤ 0.60	A
0.61 to 0.70	B
0.71 to 0.80	C
0.81 to 0.90	D
0.91 to 1.00	E
> 1.00	F

TABLE 6–2
EXISTING STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Classification	Direction	Capacity (LOS E) [a]	AM Peak Hour			PM Peak Hour		
				Volume	LOS [b]	V/C	Volume	LOS	V/C
Palomar Airport Road									
I-5 Ramps to Paseo Del Norte	6-lane Prime Arterial	EB	5,400	2,689	A	0.498	1,684	A	0.312
		WB	5,400	1,213	A	0.225	2,488	A	0.461
Paseo Del Norte to Armada Drive	6-lane Prime Arterial	EB	5,400	2,619	A	0.485	1,593	A	0.295
		WB	5,400	1,194	A	0.221	2,634	A	0.488
Armada Drive to Hidden Valley Ranch	6-lane Prime Arterial	EB	5,400	2,503	A	0.464	1,729	A	0.320
		WB	5,400	1,351	A	0.250	2,789	A	0.516
Hidden Valley Ranch to College Boulevard	6-lane Prime Arterial	EB	5,400	2,455	A	0.455	2,149	A	0.398
		WB	5,400	1,301	A	0.241	2,294	A	0.425
College Boulevard to Camino Vida Roble	6-lane Prime Arterial	EB	5,400	1,851	A	0.343	1,406	A	0.260
		WB	5,400	1,183	A	0.219	1,911	A	0.354
Camino Vida Roble to Yarrow Drive	6-lane Prime Arterial	EB	5,400	1,521	A	0.282	2,088	A	0.387
		WB	5,400	1,347	A	0.249	1,338	A	0.248
Yarrow Drive to El Camino Real	6-lane Prime Arterial	EB	5,400	1,153	A	0.214	2,064	A	0.382
		WB	5,400	1,941	A	0.359	1,333	A	0.247
El Camino Real to Loker Avenue	6-lane Prime Arterial	EB	5,400	1,640	A	0.304	2,700	A	0.500
		WB	5,400	2,654	A	0.491	1,927	A	0.357
Loker Avenue to El Fuerte Street	6-lane Prime Arterial	EB	5,400	1,271	A	0.235	2,635	A	0.488
		WB	5,400	2,924	A	0.541	1,603	A	0.297
El Fuerte Street to Melrose Drive	6-lane Prime Arterial	EB	5,400	1,180	A	0.219	2,846	A	0.527
		WB	5,400	3,350	B	0.620	1,656	A	0.307
East of Melrose Drive	6-lane Prime Arterial	EB	5,400	1,090	A	0.202	2,270	A	0.420
		WB	5,400	1,761	A	0.326	1,157	A	0.214
El Camino Real									
North of College Boulevard	5-lane Prime Arterial	EB	3,600	2,479	B	0.689	1,158	A	0.322
		WB	5,400	671	A	0.124	2,522	A	0.467
College Boulevard to Faraday Avenue	6-lane Prime Arterial	NB	5,400	592	A	0.110	1,848	A	0.342
		SB	5,400	2,034	A	0..377	1,167	A	0.216

TABLE 6–2
EXISTING STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Classification	Direction	Capacity (LOS E) [a]	AM Peak Hour			PM Peak Hour		
				Volume	LOS [b]	V/C	Volume	LOS	V/C
Faraday Avenue to Palomar Airport Road	6-lane Prime Arterial	NB	5,400	1,092	A	0.202	1,642	A	0.304
		SB	5,400	1,699	A	0.315	1,729	A	0.320
Palomar Airport Road to Town Garden Center	6-lane Prime Arterial	NB	5,400	1,160	A	0.215	1,462	A	0.271
		SB	5,400	1,735	A	0.321	1,507	A	0.279
Town Garden Center to Camino Vida Roble	6-lane Prime Arterial	NB	5,400	1,423	A	0.264	1,523	A	0.282
		SB	5,400	1,497	A	0.277	1,859	A	0.344
Camino Vida Roble to Poinsettia Lane	5-lane Prime Arterial	NB	3,600	1,416	A	0.393	1,334	A	0.371
		SB	5,400	1,392	A	0.258	2,055	A	0.381
South of Poinsettia Lane	6-lane Prime Arterial	NB	5,400	1,510	A	0.280	1,682	A	0.311
		SB	5,400	1,501	A	0.278	2,067	A	0.383
College Boulevard									
Aston Avenue to Palomar Airport Road	4-lane Arterial	NB	3,600	1,117	A	0.310	473	A	0.131
		SB	3,600	388	A	0.108	969	A	0.269

Footnotes:

a. Capacities based on 1,800 vehicles per lane per hour

b. Level of Service.

c. Volume to Capacity.

7.0 TRIP GENERATION/DISTRIBUTION/ASSIGNMENT

The trip generation rate for the Project is based on the rate outlined in the Institute of Transportation Engineers (ITE) Journal[1], in addition to a review of trip generation methodologies at other similarly sized airports[2], which results in a rate of 2.67 daily trips per enplanement. Peak hour trip rates were not supplied in the ITE article and therefore SANDAG peak hour percentages were utilized. The trip generation rate accounts for traffic generated by passengers, employees, and airport operations associated with the increase in enplanements. The Project will not augment the non-commercial uses at the airport and therefore, non-commercial land uses did not need to be accounted for in the trip generation calculations.

7.1.1 *Near-Term Project*

For the purposes of this analysis, the near-term study year was determined to be Year 2020. Near-Term study years are typically chosen using the closest future 5 year increment year when additional project traffic will be generated. Therefore, the year 2020 was utilized as the Near-Term analysis year. To determine the forecasted near-term daily enplanements listed below, annual enplanements for each Project alternative were interpolated to Year 2020[3] using the existing and Year 2036 annual enplanements shown in *Table 2–1*. As shown below in ***Table 7–1***, PAL1 averages a year-over-year increase of 15,227 annual enplanements per year and PAL2 averages a year-over-year increase of 28,743 annual enplanements per year. By Year 2020, the Project is calculated to generate a total of 61,040 annual enplanements under the PAL1 alternative and 115,105 annual enplanements under the PAL2 alternative. These Year 2020 annual enplanements were then multiplied by approximately 0.274% to obtain the average daily enplanements. For the purposes of this transportation analysis, the following enplanements were calculated for analyzing Project impacts in the Existing (Section 8.0) and Near-Term (Section 10.0) scenarios:

TABLE 7–1
NEAR-TERM AVERAGE DAILY ENPLANEMENTS

Planning Scenario	Yearly Increase in Enplanements	Annual Enplanements at Year 2020	Ratio of Daily/Annual Enplanements *	Average Daily Enplanements at Year 2020
PAL 1	15,227	61,040	0.274%	**168**
PAL 2	28,743	115,105	0.274%	**316**

*Ratio of 1÷365 days.
Note: rounded up to whole number.

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1 ITE Journal, Airport Trip Generation, May 1998 [2.67-2.74 ADT per enplanement for airports with less than 1 million passengers]
2 San Luis Obispo County Regional Airport Master Plan Update, Final EA/EIR, July 2006 [2.67 ADT per enplanement]

Table 7–2 tabulates the near-term Project (PAL1) traffic generation. The near-term Project (PAL1) phase is calculated to generate approximately 449 ADT with 14 inbound / 9 outbound trips during the AM peak hour and 14 inbound / 13 outbound trips during the PM peak hour.

Table 7–3 tabulates the near-term Project (PAL2) traffic generation. The near-term Project (PAL2) phase is calculated to generate approximately 844 ADT with 26 inbound / 17 outbound trips during the AM peak hour and 26 inbound / 25 outbound trips during the PM peak hour.

TABLE 7–2
NEAR-TERM PROJECT (PAL1) TRIP GENERATION

Land Use	Size	Daily Trip Ends (ADTs)		AM Peak Hour				PM Peak Hour			
		Rate[a]	Volume	% of ADT[b]	In:Out Split	Volume In	Volume Out	% of ADT[b]	In:Out Split	Volume In	Volume Out
Airport	168 ENP	2.670 /ENP	449	5.0%	6:4	14	9	6.0%	5:5	14	13

Footnotes:

a. Trip generation rates obtained from "Airport Trip Generation" (ITE Journal, 1998) and San Luis Obispo County Regional Airport Master Plan Update, Final EA/EIR, July 2006.

b. Peak hour percentages obtained from SANDAG's *(Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region (April 2002).*

General Notes:

1. ENP = enplanements

TABLE 7–3
NEAR-TERM PROJECT (PAL2) TRIP GENERATION

Land Use	Size	Daily Trip Ends (ADTs)		AM Peak Hour				PM Peak Hour			
		Rate[a]	Volume	% of ADT[b]	In:Out Split	Volume In	Volume Out	% of ADT[b]	In:Out Split	Volume In	Volume Out
Airport	316 ENP	2.670 /ENP	844	5.0%	6:4	26	17	6.0%	5:5	26	25

Footnotes:

a. Trip generation rates obtained from "Airport Trip Generation" (ITE Journal, 1998) and San Luis Obispo County Regional Airport Master Plan Update, Final EA/EIR, July 2006.

b. Peak hour percentages obtained from SANDAG's *(Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region (April 2002).*

General Notes:

1. ENP = enplanements

7.1.2 *Long-Term Project*

For the Long-Term Project scenario analysis, the Year 2036 annual enplanements shown in *Table 2–1* were utilized. For the purpose of this transportation analysis, the following enplanements were calculated for analyzing Project impacts in the Long-Term (Section 11.0) scenarios:

- PAL1 = 835 average daily enplanements
- PAL2 = 1,575 average daily enplanements

Table 7–4 tabulates the long-term Project (PAL1) traffic generation. The long-term Project (PAL1) phase is calculated to generate approximately 2,230 ADT with 67 inbound / 45 outbound trips during the AM peak hour and 67 inbound / 67 outbound trips during the PM peak hour.

Table 7–5 tabulates the long-term Project (PAL2) traffic generation. The long-term Project (PAL2) phase is calculated to generate approximately 4,206 ADT with 127 inbound / 84 outbound trips during the AM peak hour and 127 inbound / 126 outbound trips during the PM peak hour.

TABLE 7–4
LONG-TERM PROJECT (PAL1) TRIP GENERATION

Land Use	Size	Daily Trip Ends (ADTs)		AM Peak Hour				PM Peak Hour			
		Rate[a]	Volume	% of ADT[b]	In:Out Split	Volume In	Volume Out	% of ADT[b]	In:Out Split	Volume In	Volume Out
Airport	835 ENP	2.670 /ENP	2,230	5.0%	6:4	67	45	6.0%	5:5	67	67

Footnotes:

a. Trip generation rates obtained from "Airport Trip Generation" (ITE Journal, 1998) and San Luis Obispo County Regional Airport Master Plan Update, Final EA/EIR, July 2006.

b. Peak hour percentages obtained from SANDAG's *(Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region (April 2002).*

General Notes:

1. ENP = enplanements

TABLE 7–5
LONG-TERM PROJECT (PAL2) TRIP GENERATION

Land Use	Size	Daily Trip Ends (ADTs)		AM Peak Hour				PM Peak Hour			
		Rate[a]	Volume	% of ADT[b]	In:Out Split	Volume In	Volume Out	% of ADT[b]	In:Out Split	Volume In	Volume Out
Airport	1,575 ENP	2.670 /ENP	4,206	5.0%	6:4	127	84	6.0%	5:5	127	126

Footnotes:

a. Trip generation rates obtained from "Airport Trip Generation" (ITE Journal, 1998) and San Luis Obispo County Regional Airport Master Plan Update, Final EA/EIR, July 2006.

b. Peak hour percentages obtained from SANDAG's *(Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region (April 2002).*

General Notes:

1. ENP = enplanements

7.2 Trip Distribution/Assignment

Project-generated traffic was distributed and assigned to the street system based on existing and historical traffic counts, the distribution of traffic at the Project access point, the proximity of the Project to Interstate 5 and arterials, and locations of residences and places of employment.

Figure 7–1 depicts the AM/PM peak hour Project traffic distribution percentages. ***Figure 7–2*** depicts the near-term Project (PAL1) assignment for the Existing + Project and Near-Term scenarios. ***Figure 7–3*** depicts the near-term Project (PAL2) assignment for the Existing + Project and Near-Term scenarios. ***Figure 7–4*** depicts the long-term Project (PAL1) assignment for the Long-Term scenarios. ***Figure 7–5*** depicts the long-term Project (PAL2) assignment for the Long-Term scenarios.

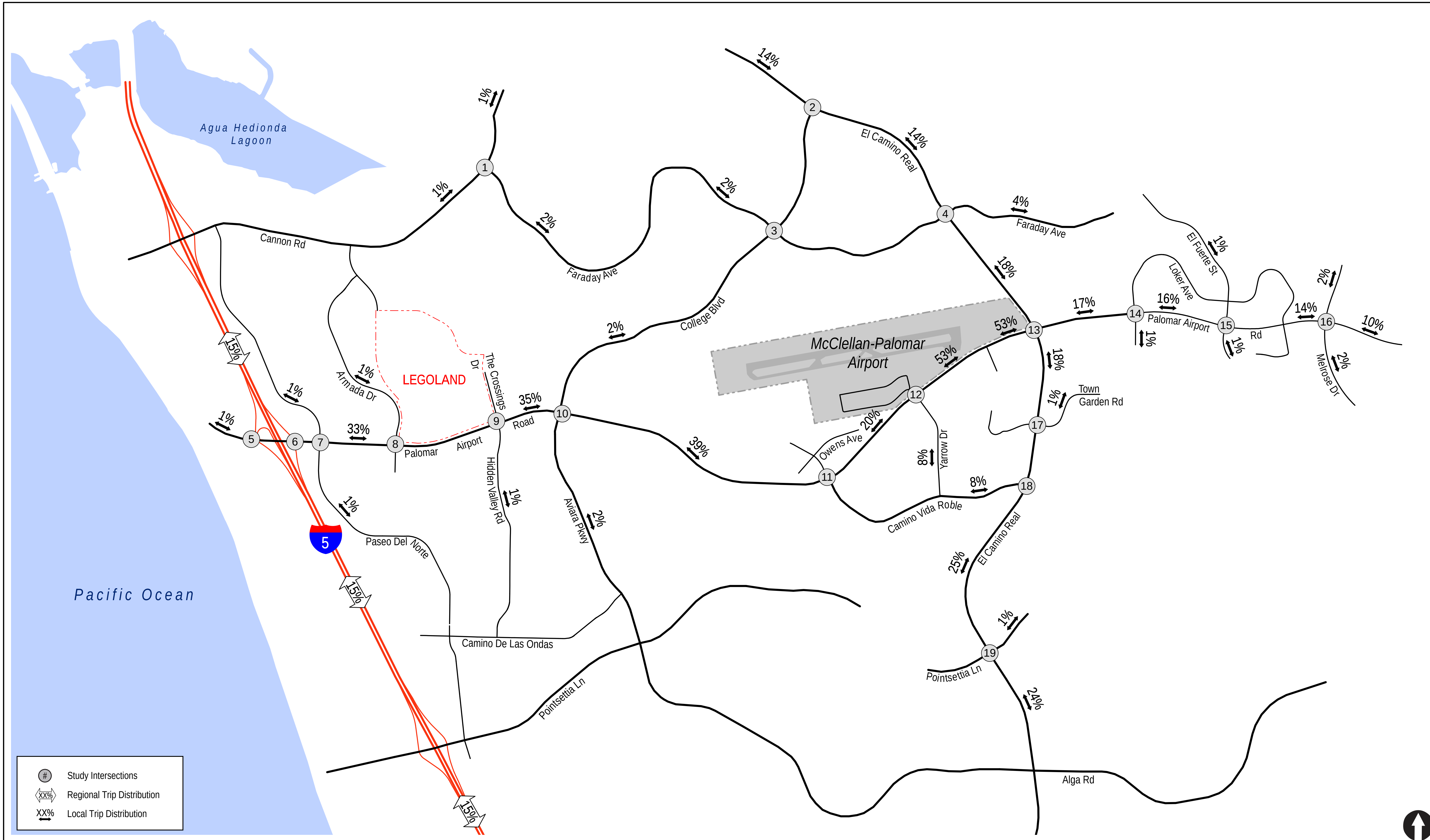

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Figure 7-1

Project Traffic Distribution

McCLELLAN-PALOMAR AIRPORT MASTER PLAN

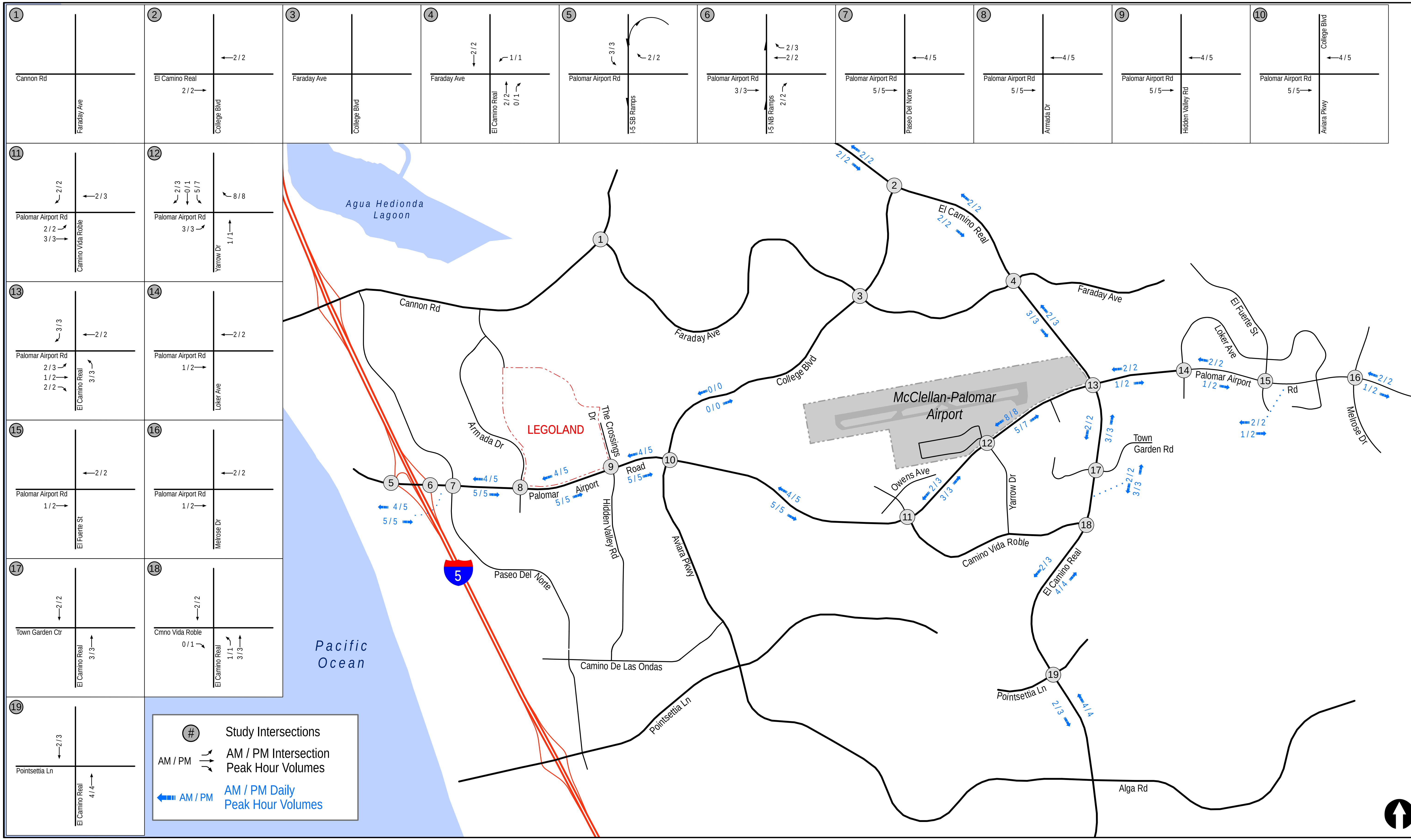

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Figure 7-2

Near-Term (PAL 1) Project Traffic Volumes

McClellan-Palomar Airport Master Plan

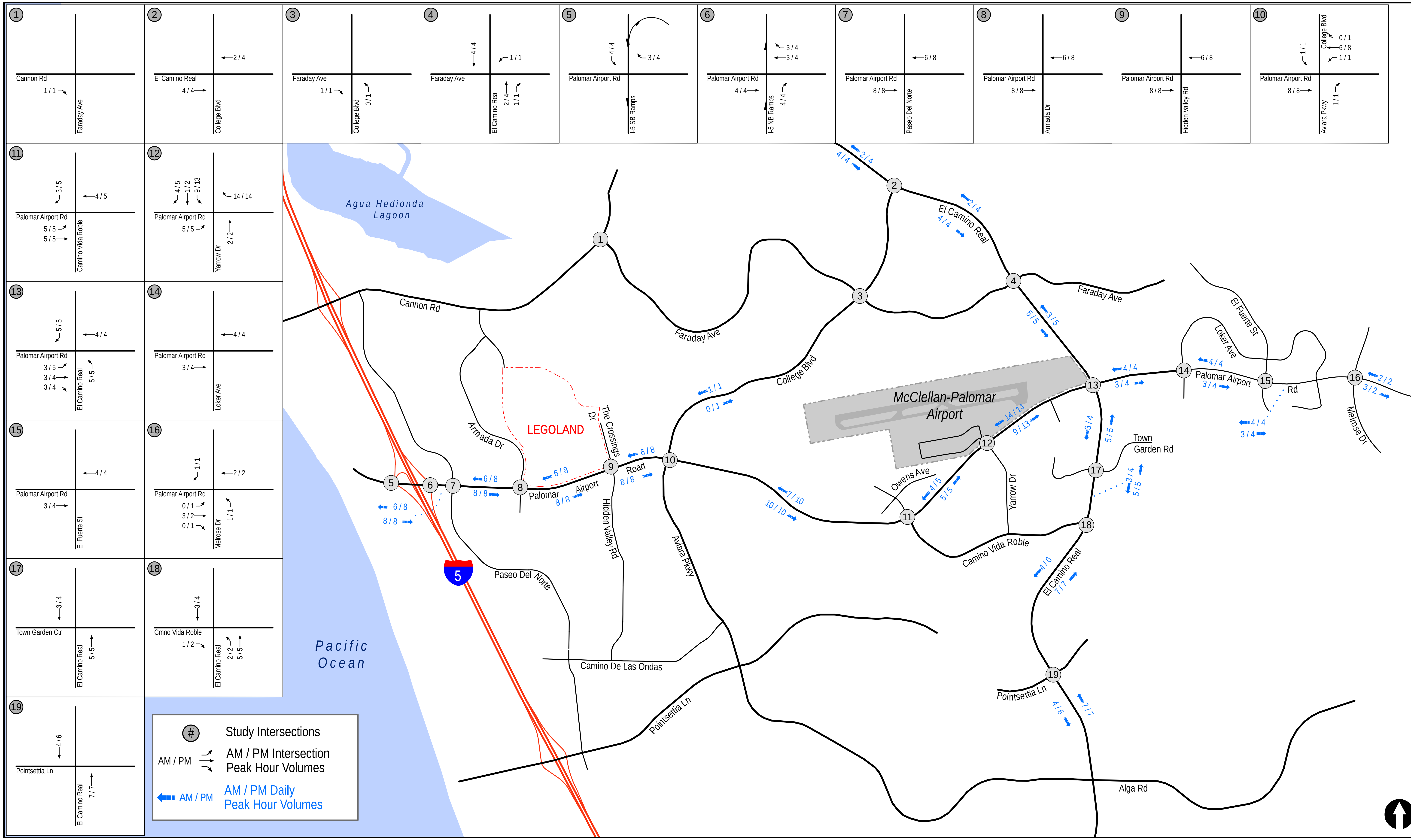

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Figure 7-3

Near-Term (PAL 2) Project Traffic Volumes

McClellan-Palomar Airport Master Plan

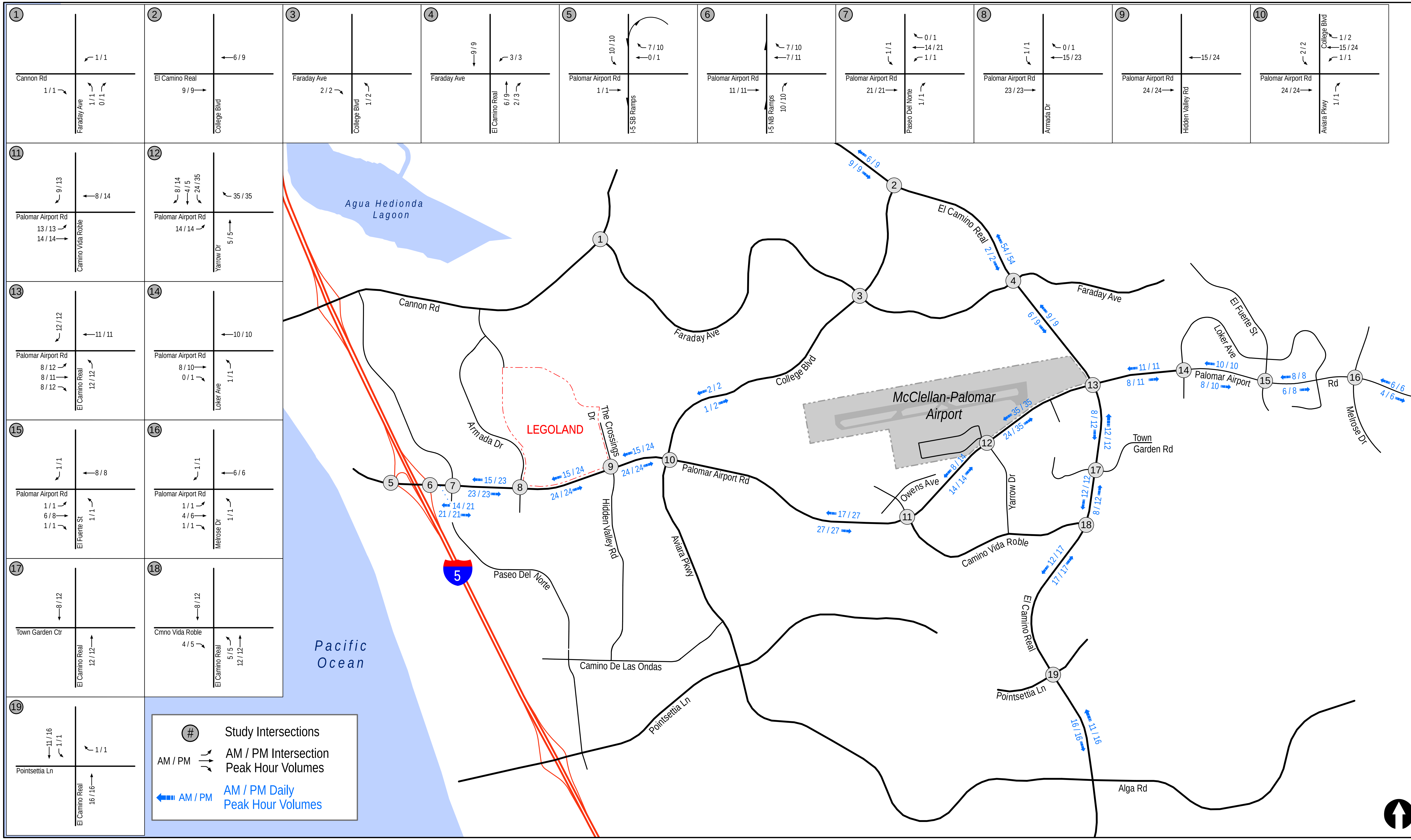

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Figure 7-4

Long-Term (PAL1) Project Traffic Volumes

McClellan-Palomar Airport Master Plan

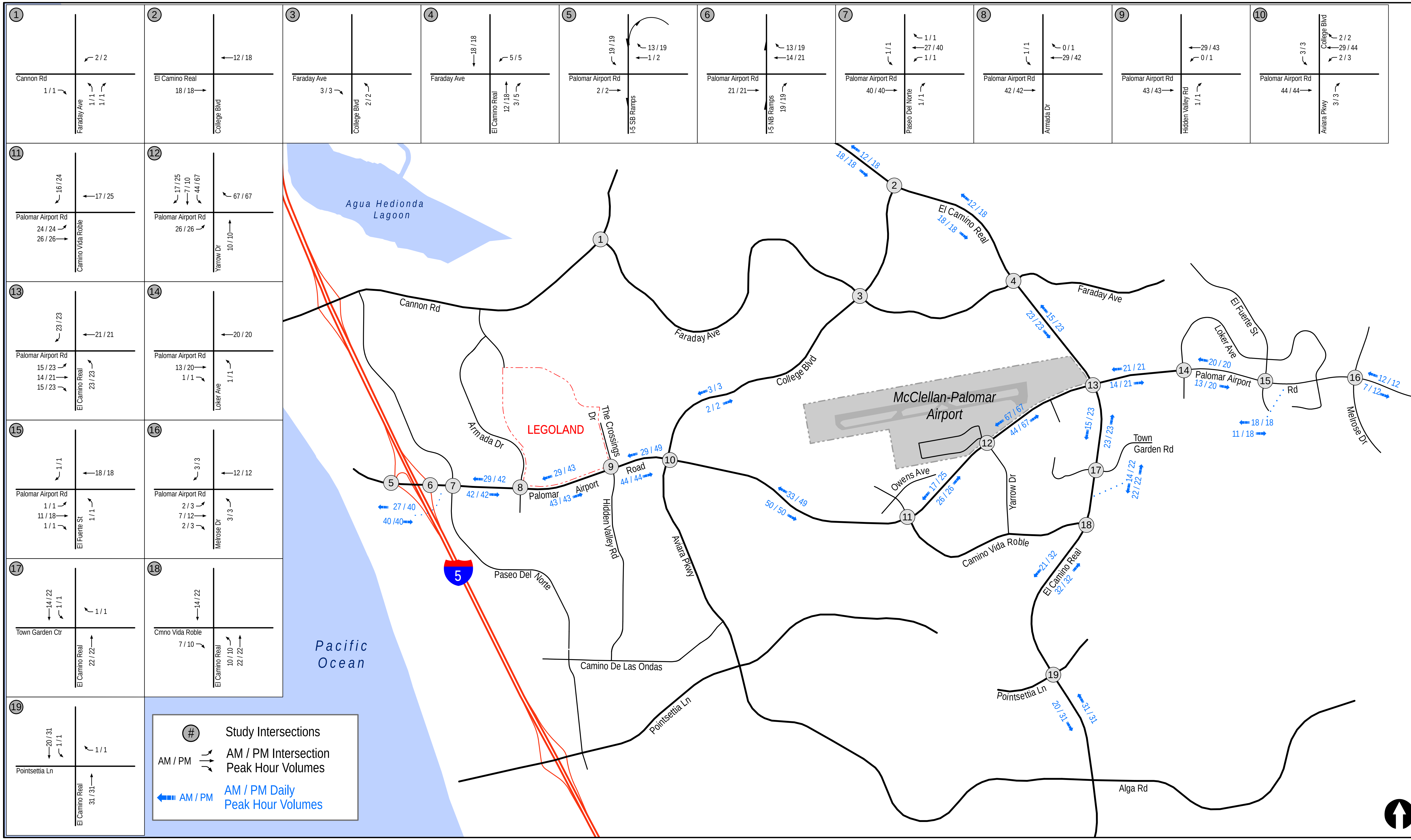

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Figure 7-5

Long-Term (PAL 2) Project Traffic Volumes

McClellan-Palomar Airport Master Plan

8.0 ANALYSIS OF EXISTING + PROJECT SCENARIOS

8.1 Existing + Project (PAL1)

Figure 8–1 depicts the Existing + Near-Term (PAL1) Project traffic volumes.

8.1.1 *Intersection Analysis*

Intersection capacity analyses were conducted for the study intersections under Existing + Project conditions. ***Table 8–1*** reports the Existing + Project (PAL1) intersection operations during the AM and PM peak hours. As shown in *Table 8–1*, all of the study area intersections are calculated to continue operate at LOS D or better with the addition of Project (PAL1) traffic.

Based on the significance criteria, no intersection impacts are calculated since the Project (PAL1) contribution does not exceed a 0.02 ICU increase.

Appendix D contains the intersection analysis worksheets for the Existing + Project (PAL1) scenario.

8.1.2 *Segment Operations*

Table 8–2 summarizes the street segment operations under Existing + Project (PAL1) conditions. As shown in *Table 8–2*, the study area segments are calculated to continue to operate acceptably at LOS B or better.

Based on the significance criteria, no street segment impact is calculated since the study area street segments are all calculated to operate at acceptable LOS.

8.2 Existing + Project (PAL2)

Figure 8–2 depicts the Existing + Near-Term (PAL2) Project traffic volumes.

8.2.1 *Intersection Analysis*

Table 8–1 reports the Existing + Project (PAL2) intersection operations during the AM and PM peak hours. As shown in *Table 8–1*, all of the study area intersections are calculated to continue operate at LOS D or better with the addition of Project (PAL2).

Based on the significance criteria, no intersection impacts are calculated since the Project (PAL2) contribution does not exceed a 0.02 ICU increase.

Appendix D contains the intersection analysis worksheets for the Existing + Project (PAL2) scenario.

8.2.2 *Segment Operations*

Table 8–2 summarizes the street segment operations under Existing + Project (PAL2) conditions. As shown in *Table 8–2*, the study area segments are calculated to continue to operate acceptably at LOS B or better.

Based on the significance criteria, no street segment impacts are calculated since the study area street segments are all calculated to operate at acceptable LOS.

TABLE 8–1
EXISTING + PROJECT INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing		Existing+ Project (PAL1)			Existing + Project (PAL2)		
			ICU[a]	LOS[b]	ICU	LOS	Δ[c]	ICU	LOS	Δ
1. Canon Road / Faraday Avenue	Signal	AM PM	0.47 0.51	A A	0.47 0.51	A A	0.00 0.00	0.47 0.51	A A	0.00 0.00
2. El Camino Real / College Boulevard	Signal	AM PM	0.52 0.61	A B	0.52 0.61	A B	0.00 0.00	0.52 0.61	A B	0.00 0.00
3. College Boulevard / Faraday Avenue	Signal	AM PM	0.54 0.44	A A	0.54 0.44	A A	0.00 0.00	0.54 0.44	A A	0.00 0.00
4. El Camino Real / Faraday Avenue	Signal	AM PM	0.70 0.77	B C	0.70 0.77	B C	0.00 0.00	0.70 0.77	B C	0.00 0.00
5. I-5 SB Ramps / Palomar Airport Road	Signal	AM PM	0.57 0.44	A A	0.57 0.44	A A	0.00 0.00	0.57 0.44	A A	0.00 0.00
6. I-5 NB Ramps / Palomar Airport Road	Signal	AM PM	0.68 0.63	B B	0.68 0.64	B B	0.00 0.01	0.68 0.63	B B	0.00 0.00
7. Palomar Airport Road / Paseo Del Norte	Signal	AM PM	0.65 0.69	B B	0.65 0.69	B B	0.00 0.00	0.65 0.69	B B	0.00 0.00
8. Palomar Airport Road / Armada Drive	Signal	AM PM	0.61 0.70	B B	0.61 0.70	B B	0.00 0.00	0.61 0.70	B B	0.00 0.00
9. Palomar Airport Road / Hidden Valley Road	Signal	AM PM	0.62 0.75	B C	0.62 0.75	B C	0.00 0.00	0.62 0.75	B C	0.00 0.00
10. Palomar Airport Road / College Boulevard	Signal	AM PM	0.59 0.72	A C	0.59 0.72	A C	0.00 0.00	0.59 0.72	A C	0.00 0.00
11. Palomar Airport Road / Camino Vida Roble	Signal	AM PM	0.59 0.77	A C	0.59 0.77	A C	0.00 0.00	0.59 0.77	A C	0.00 0.00
12. Palomar Airport Road / Yarrow Drive	Signal	AM PM	0.49 0.67	A B	0.50 0.67	A B	0.01 0.00	0.50 0.68	A B	0.01 0.01
13. Palomar Airport Road / El Camino Real	Signal	AM PM	0.64 0.82	B D	0.64 0.82	B D	0.00 0.00	0.64 0.83	B D	0.00 0.01
14. Palomar Airport Road / Loker Avenue	Signal	AM PM	0.78 0.74	C C	0.78 0.74	C C	0.00 0.00	0.78 0.74	C C	0.00 0.00
15. Palomar Airport Road / El Fuerte Street	Signal	AM PM	0.69 0.84	B D	0.69 0.84	B D	0.00 0.00	0.69 0.84	B D	0.00 0.00

TABLE 8–1
EXISTING + PROJECT INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing		Existing+ Project (PAL1)			Existing + Project (PAL2)		
			ICU[a]	LOS[b]	ICU	LOS	Δ[c]	ICU	LOS	Δ
16. Palomar Airport Road / Melrose Drive	Signal	AM PM	0.90 0.70	D B	0.90 0.70	D B	0.00 0.00	0.90 0.70	D B	0.00 0.00
17. El Camino Real / Town Garden Road	Signal	AM PM	0.51 0.64	A B	0.51 0.65	A B	0.00 0.01	0.51 0.65	A B	0.00 0.01
18. El Camino Real / Camino Vida Roble	Signal	AM PM	0.51 0.58	A A	0.51 0.58	A A	0.00 0.00	0.51 0.58	A A	0.00 0.00
19. El Camino Real / Poinsettia Lane	Signal	AM PM	0.44 0.50	A A	0.44 0.50	A A	0.00 0.00	0.44 0.50	A A	0.00 0.00

Footnotes:

a. Intersection Capacity Utilization
b. Level of Service
c. Δ denotes a Project induced increase in ICU

ICU	LOS
0.0 ≤ 0.60	A
0.61 to 0.70	B
0.71 to 0.80	C
0.81 to 0.90	D
0.91 to 1.00	E
> 1.00	F

TABLE 8–2
EXISTING + PROJECT STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Direction	Peak Hour	Capacity (LOS E) [a]	Existing			Existing + PAL1				Existing + PAL2			
				Volumes	LOS [b]	V/C [c]	Volumes	LOS	V/C	Δ [d]	Volumes	LOS	V/C	Δ
Palomar Airport Road														
I-5 Ramps to Paseo Del Norte	EB	AM	5,400	2,689	A	0.498	2,694	A	0.499	0.001	2,697	A	0.499	0.001
		PM	5,400	1,684	A	0.312	1,689	A	0.313	0.001	1,692	A	0.313	0.001
	WB	AM	5,400	1,213	A	0.225	1,217	A	0.225	0.001	1,219	A	0.226	0.001
		PM	5,400	2,488	A	0.461	2,493	A	0.462	0.001	2,496	A	0.462	0.001
Paseo Del Norte to Armada Drive	EB	AM	5,400	2,619	A	0.485	2,624	A	0.486	0.001	2,627	A	0.486	0.001
		PM	5,400	1,593	A	0.295	1,598	A	0.296	0.001	1,601	A	0.296	0.001
	WB	AM	5,400	1,194	A	0.221	1,198	A	0.222	0.001	1,200	A	0.222	0.001
		PM	5,400	2,634	A	0.488	2,639	A	0.489	0.001	2,642	A	0.489	0.001
Armada Drive to Hidden Valley Ranch	EB	AM	5,400	2,503	A	0.464	2,508	A	0.464	0.000	2,511	A	0.465	0.001
		PM	5,400	1,729	A	0.320	1,734	A	0.321	0.001	1,737	A	0.322	0.002
	WB	AM	5,400	1,351	A	0.250	1,355	A	0.251	0.001	1,357	A	0.251	0.001
		PM	5,400	2,789	A	0.516	2,794	A	0.517	0.001	2,797	A	0.518	0.002
Hidden Valley Ranch to College Boulevard	EB	AM	5,400	2,455	A	0.455	2,460	A	0.456	0.001	2,463	A	0.456	0.001
		PM	5,400	2,149	A	0.398	2,154	A	0.399	0.001	2,157	A	0.399	0.001
	WB	AM	5,400	1,301	A	0.241	1,305	A	0.242	0.001	1,307	A	0.242	0.001
		PM	5,400	2,294	A	0.425	2,299	A	0.426	0.001	2,302	A	0.426	0.001
College Boulevard to Camino Vida Roble	EB	AM	5,400	1,851	A	0.343	1,856	A	0.344	0.001	1,861	A	0.345	0.002
		PM	5,400	1,406	A	0.260	1,411	A	0.261	0.001	1,416	A	0.262	0.002
	WB	AM	5,400	1,183	A	0.219	1,187	A	0.220	0.001	1,190	A	0.220	0.001
		PM	5,400	1,911	A	0.354	1,916	A	0.355	0.001	1,921	A	0.356	0.002
Camino Vida Roble to Yarrow Drive	EB	AM	5,400	1,521	A	0.282	1,524	A	0.282	0.000	1,526	A	0.283	0.001
		PM	5,400	2,088	A	0.387	2,091	A	0.387	0.000	2,093	A	0.388	0.001
	WB	AM	5,400	1,347	A	0.249	1,349	A	0.250	0.001	1,351	A	0.250	0.001
		PM	5,400	1,338	A	0.248	1,341	A	0.248	0.000	1,343	A	0.249	0.001
Yarrow Drive to El Camino Real	EB	AM	5,400	1,153	A	0.214	1,158	A	0.214	0.000	1,162	A	0.215	0.001
		PM	5,400	2,064	A	0.382	2,071	A	0.384	0.002	2,077	A	0.385	0.003
	WB	AM	5,400	1,941	A	0.359	1,949	A	0.361	0.002	1,955	A	0.362	0.003
		PM	5,400	1,333	A	0.247	1,341	A	0.248	0.001	1,347	A	0.249	0.002
El Camino Real to Loker Avenue	EB	AM	5,400	1,640	A	0.304	1,641	A	0.304	0.000	1,643	A	0.304	0.000
		PM	5,400	2,700	A	0.500	2,702	A	0.500	0.000	2,704	A	0.501	0.001
	WB	AM	5,400	2,654	A	0.491	2,656	A	0.492	0.001	2,658	A	0.492	0.001
		PM	5,400	1,927	A	0.357	1,929	A	0.357	0.000	1,931	A	0.358	0.001
Loker Avenue to El Fuerte Street	EB	AM	5,400	1,271	A	0.235	1,272	A	0.236	0.001	1,274	A	0.236	0.001
		PM	5,400	2,635	A	0.488	2,637	A	0.488	0.000	2,639	A	0.489	0.001
	WB	AM	5,400	2,924	A	0.541	2,926	A	0.542	0.001	2,928	A	0.542	0.001
		PM	5,400	1,603	A	0.297	1,605	A	0.297	0.000	1,607	A	0.298	0.001
El Fuerte Street to Melrose Drive	EB	AM	5,400	1,180	A	0.219	1,181	A	0.219	0.000	1,183	A	0.219	0.000
		PM	5,400	2,846	A	0.527	2,848	A	0.527	0.000	2,850	A	0.528	0.001
	WB	AM	5,400	3,350	B	0.620	3,352	B	0.621	0.001	3,354	B	0.621	0.001
		PM	5,400	1,656	A	0.307	1,658	A	0.307	0.000	1,660	A	0.307	0.000
East of Melrose Drive	EB	AM	5,400	1,090	A	0.202	1,091	A	0.202	0.000	1,093	A	0.202	0.000
		PM	5,400	2,270	A	0.420	2,272	A	0.421	0.001	2,272	A	0.421	0.001
	WB	AM	5,400	1,761	A	0.326	1,763	A	0.326	0.000	1,763	A	0..326	0.000
		PM	5,400	1,157	A	0.214	1,159	A	0.215	0.001	1,159	A	0.215	0.001
El Camino Real														
North of College Boulevard	EB	AM	3,600	2,479	B	0.689	2,481	B	0.689	0.000	2,483	B	0.690	0.001
		PM	3,600	1,158	A	0.322	1,160	A	0.322	0.000	1,162	A	0.323	0.001
	WB	AM	5,400	671	A	0.124	673	A	0.125	0.001	673	A	0.125	0.001
		PM	5,400	2,522	A	0.467	2,524	A	0.467	0.000	2,526	A	0.468	0.001
College Boulevard to Faraday Avenue	NB	AM	5,400	592	A	0.110	594	A	0.110	0.000	594	A	0.110	0.000
		PM	5,400	1,848	A	0.342	1,850	A	0.343	0.001	1,852	A	0.343	0.001
	SB	AM	5,400	2,034	A	0.377	2,036	A	0.377	0.000	2,038	A	0.377	0.000
		PM	5,400	1,167	A	0.216	1,169	A	0.216	0.000	1,171	A	0.217	0.001
Faraday Avenue to Palomar Airport Road	NB	AM	5,400	1,092	A	0.202	1,094	A	0.203	0.001	1,095	A	0.203	0.001
		PM	5,400	1,642	A	0.304	1,645	A	0.305	0.001	1,647	A	0.305	0.001
	SB	AM	5,400	1,699	A	0.315	1,702	A	0.315	0.000	1,704	A	0.316	0.001
		PM	5,400	1,729	A	0.320	1,732	A	0.321	0.001	1,734	A	0.321	0.001
Palomar Airport Road to Town Garden Road	NB	AM	5,400	1,160	A	0.215	1,163	A	0.215	0.000	1,165	A	0.216	0.001
		PM	5,400	1,462	A	0.271	1,465	A	0.271	0.000	1,467	A	0.272	0.001
	SB	AM	5,400	1,735	A	0.321	1,737	A	0.322	0.001	1,738	A	0.322	0.001
		PM	5,400	1,507	A	0.279	1,509	A	0.279	0.000	1,511	A	0.280	0.001
Town Garden Road to Camino Vida Roble	NB	AM	5,400	1,423	A	0.264	1,426	A	0.264	0.000	1,428	A	0.264	0.001
		PM	5,400	1,523	A	0.282	1,526	A	0.283	0.001	1,528	A	0.283	0.001
	SB	AM	5,400	1,497	A	0.277	1,499	A	0.278	0.001	1,500	A	0.278	0.001
		PM	5,400	1,859	A	0.344	1,861	A	0.345	0.001	1,863	A	0.345	0.001

TABLE 8–2
EXISTING + PROJECT STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Direction	Peak Hour	Capacity (LOS E) [a]	Existing			Existing + PAL1				Existing + PAL2			
				Volumes	LOS [b]	V/C [c]	Volumes	LOS	V/C	Δ [d]	Volumes	LOS	V/C	Δ
Camino Vida Roble to Poinsettia Lane	NB	AM	3,600	1,416	A	0.393	1,420	A	0.394	0.001	1,423	A	0.395	0.002
		PM	3,600	1,334	A	0.371	1,338	A	0.372	0.001	1,341	A	0.373	0.001
	SB	AM	5,400	1,392	A	0.258	1,394	A	0.258	0.000	1,396	A	0.259	0.001
		PM	5,400	2,055	A	0.381	2,058	A	0.381	0.000	2,061	A	0.382	0.001
South of Poinsettia Lane	NB	AM	5,400	1,510	A	0.280	1,514	A	0.280	0.000	1,517	A	0.281	0.001
		PM	5,400	1,682	A	0.311	1,686	A	0.312	0.001	1,689	A	0.313	0.002
	SB	AM	5,400	1,501	A	0.278	1,503	A	0.278	0.000	1,505	A	0.279	0.001
		PM	5,400	2,067	A	0.383	2,070	A	0.383	0.000	2,073	A	0.384	0.001
College Road														
Aston Avenue to Palomar Airport Road	NB	AM	3,600	1,117	A	0.310	1,117	A	0.310	0.000	1,117	A	0.310	0.000
		PM	3,600	473	A	0.131	473	A	0.131	0.000	474	A	0.132	0.001
	SB	AM	3,600	388	A	0.108	388	A	0.108	0.000	389	A	0.108	0.000
		PM	3,600	969	A	0.269	969	A	0.269	0.000	970	A	0.269	0.000

Footnotes:

a. Capacities based on 1,800 vehicles per lane per hour
b. Level of Service.
c. Volume to Capacity.
d. Δ denotes a project-induced increase in the Volume to Capacity Ratio

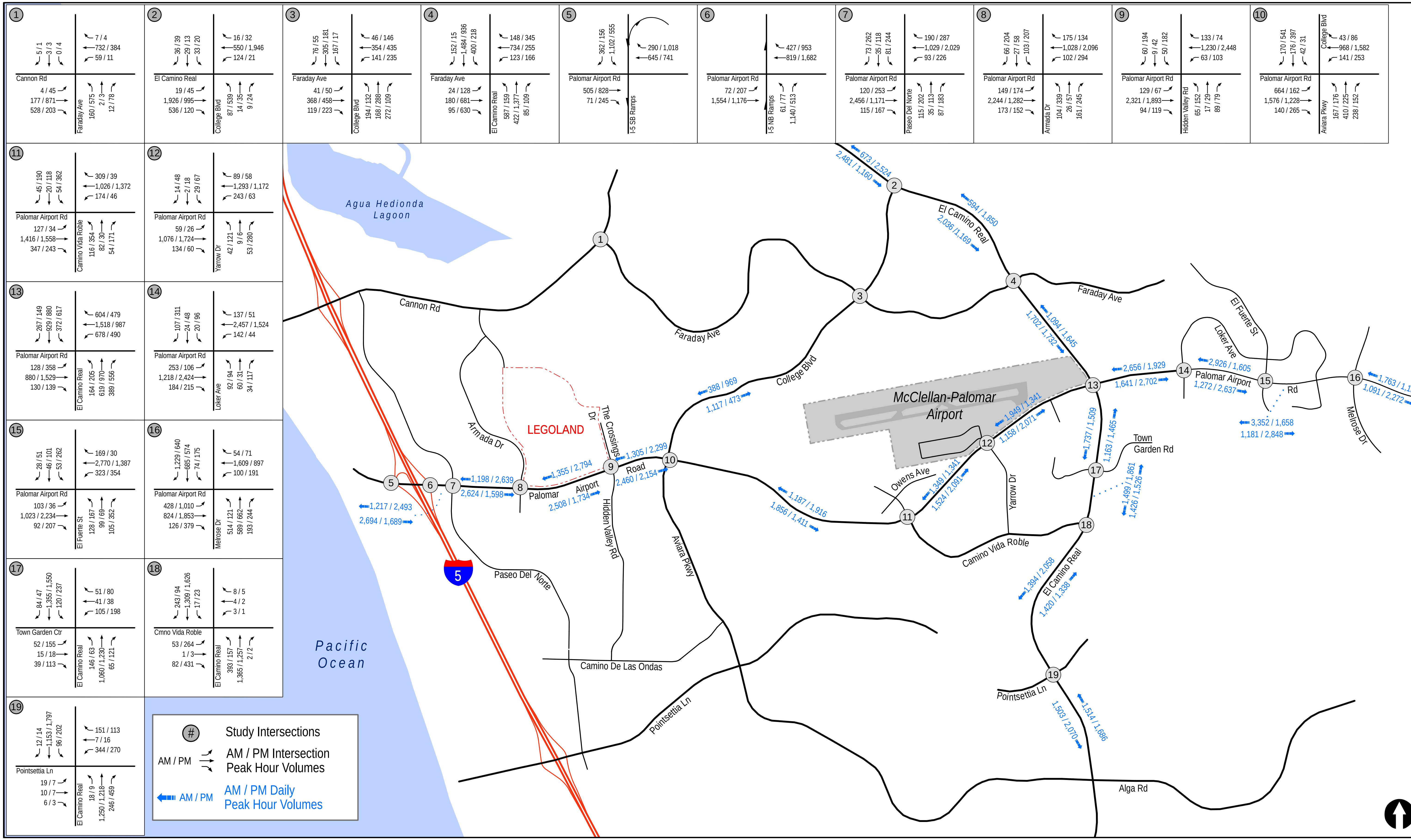

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Figure 8-1

Exisitng +Near Term Project (PAL1) Traffic Volumes McClellan-Palomar Airport Master Plan

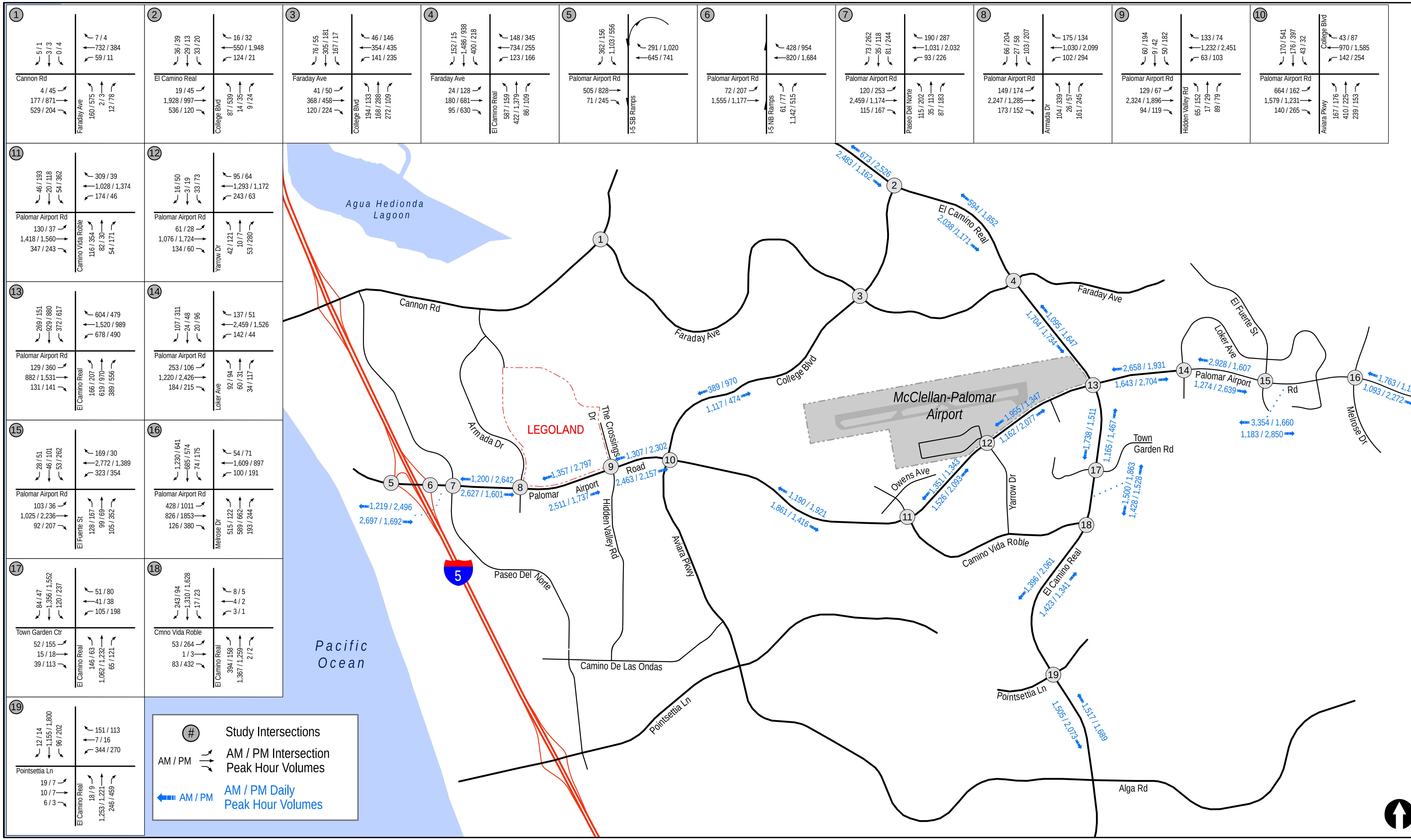

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Figure 8-2

Exisitng +Near Term Project (PAL2) Traffic Volumes

McClellan-Palomar Airport Master Plan

9.0 CUMULATIVE PROJECTS

To determine the Near-Term pre-Project (Existing + Cumulative) conditions in the Project study area, the forecasted traffic associated with several approved or pending projects was added to Existing traffic volumes. LLG coordinated with City staff to compile a list of relevant cumulative projects for inclusion in the analysis. Cumulative project traffic data through the study area is based on information from traffic impact studies prepared for the cumulative projects where available.

Table 9–1 lists the relevant cumulative projects that may add traffic to the study area locations. ***Figure 9–1*** shows the location of each cumulative project.

TABLE 9–1
CUMULATIVE PROJECTS LIST

Project Name	Project Description
Dos Colinas	A 47-acre site with a 309-unit continuing care facility plus 29 affordable housing units.
Rancho Milagro	22 estate single family units. The project is near College Boulevard, El Camino Real, and adjacent to Dos Colinas.
Robertson Ranch PA22/ Cannon Road Senior Housing	98 multi-family housing units. This project is located near El Camino Real and Cannon Road.
La Costa Town Square	A 284,400 square foot community shopping center with 128 condominium units, 64 single family units, and an additional 55,000 square feet designated for further residential use.
Viasat Campus	A 25 acre industrial project within the Bressi Ranch area. The project would be located east of El Camino Real between Gateway Road on the north and Town Garden Road to the south.
Quarry Creek Master Plan	This project includes 636 dwelling units, community facilities and a park and ride lot.
Poinsettia 61	140 single family dwelling units located on Poinsettia Lane just west of El Camino Real.
Uptown Bressi	This project consists of 17.7 acres of land proposed to be developed for mixed residential units and retail/commercial use.

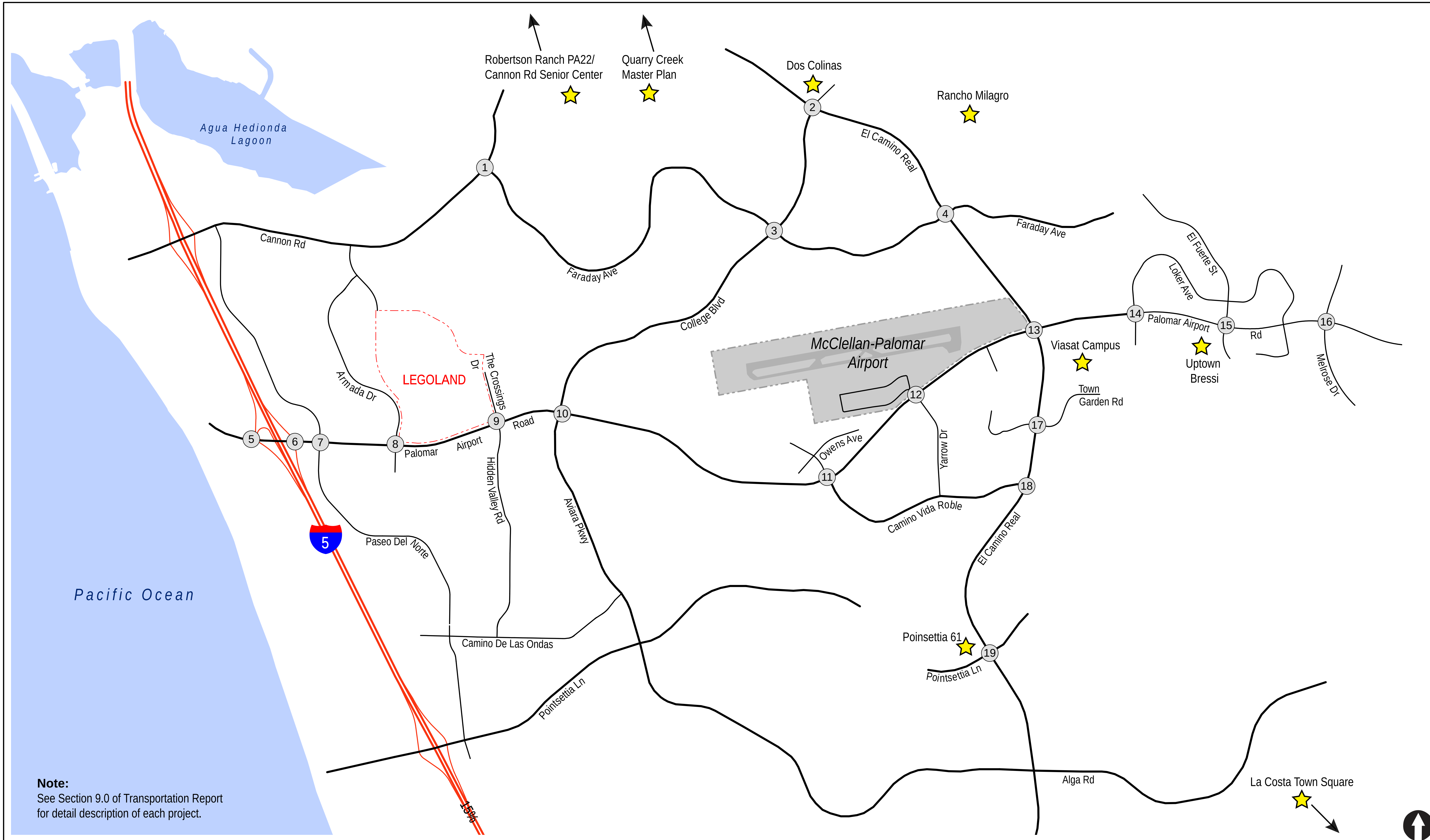

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Figure 9-1

Cumulative Projects Location Map

McClellan-Palomar Airport Master Plan

10.0 ANALYSIS OF NEAR-TERM SCENARIOS

This section discusses the Near-Term operations of the intersections and street segments in the Project study area.

10.1 Existing + Cumulative Projects

Based on the City of Carlsbad Mobility Element, scenarios including Cumulative trips were analyzed under HCM Methodology. Therefore, it should be noted that ***Table 10–1*** contains delays reported using HCM Methodology. ***Figure 10–1*** depicts the traffic volumes for the Existing + Cumulative Projects scenario.

10.1.1 *Intersection Analysis*

Table 10–1 reports the Existing + Cumulative Project intersection operations during the AM and PM peak hours. As shown in *Table 10–1*, all of the study area intersections are calculated to operate at LOS D or better except for the following intersections:

- El Camino Real / College Boulevard (LOS E during both the AM and PM peak hours)
- El Camino Real / Faraday Avenue (LOS E/F during the AM/PM peak hours)
- Palomar Airport Road / Camino Vida Roble (LOS E during the PM peak hour)
- Palomar Airport Road / El Camino Real (LOS F during both the AM and PM peak hours)
- Palomar Airport Road / Loker Avenue (LOS F/E during the AM/PM peak hours)
- Palomar Airport Road / El Fuerte Street (LOS F during the PM peak hour)
- Palomar Airport Road / Melrose Drive (LOS F/E during the AM/PM peak hours)
- El Camino Real / Town Garden Center (LOS E during both the AM and PM peak hours)
- El Camino Real / Camino Vida Roble (LOS F during the AM peak hour)

Appendix E contains the intersection analysis worksheets for the Existing + Cumulative Projects scenario.

10.1.2 *Segment Operations*

Table 10–2 summarizes the street segment operations under Existing + Cumulative Projects conditions during AM/PM peak hours in each direction. As shown in *Table 10–2*, the study are segments are calculated to operate acceptably at LOS C or better.

10.2 Existing + Cumulative Projects + Project (PAL1)

Figure 10–2 depicts the traffic volumes for the Existing + Cumulative Projects + Project (PAL1) scenario.

10.2.1 *Intersection Analysis*

Table 10–1 reports the Existing + Cumulative Projects + Project (PAL1) intersection operations during the AM and PM peak hours. As shown in *Table 10–1*, all of the study area intersections are calculated to continue operate at LOS D or better except for the following intersections:

- El Camino Real / College Boulevard (LOS E during both the AM and PM peak hours)
- El Camino Real / Faraday Avenue (LOS E/F during the AM/PM peak hours)
- Palomar Airport Road / Camino Vida Roble (LOS E during the PM peak hour)
- Palomar Airport Road / El Camino Real (LOS F during both the AM and PM peak hours)
- Palomar Airport Road / Loker Avenue (LOS F/E during the AM/PM peak hours)
- Palomar Airport Road / El Fuerte Street (LOS F during the PM peak hour)
- Palomar Airport Road / Melrose Drive (LOS F/E during the AM/PM peak hours)
- El Camino Real / Town Garden Center (LOS E during both the AM and PM peak hours)
- El Camino Real / Camino Vida Roble (LOS F during the AM peak hour)

Appendix E contains the intersection analysis worksheets for the Existing + Cumulative Projects + Project (PAL1) scenario.

Based on the significance criteria, no intersection impacts are calculated since the Project (PAL1) contribution does not exceed 2.0 seconds.

10.2.2 *Segment Operations*

Table 10–2 summarizes the street segment operations under Existing + Cumulative Projects + Project (PAL1) conditions. As shown in *Table 10–2*, the study area segments are calculated to continue to operate acceptably at LOS C or better.

Based on the significance criteria, no street segment impacts are calculated since the study area street segments are all calculated to operate at acceptable LOS.

10.3 Existing + Cumulative Projects + Project (PAL2)

Figure 10–3 depicts the traffic volumes for the Existing + Cumulative Projects + Project (PAL2) scenario.

10.3.1 *Intersection Analysis*

Table 10–1 reports the Existing + Cumulative Projects + Project (PAL2) intersection operations during the AM and PM peak hours. As shown in *Table 10–1*, all of the study area intersections are calculated to continue operate at LOS D or better except for the following intersections:

- El Camino Real / College Boulevard (LOS E during both the AM and PM peak hours)
- El Camino Real / Faraday Avenue (LOS E/F during the AM/PM peak hours)
- Palomar Airport Road / Camino Vida Roble (LOS E during the PM peak hour)

- Palomar Airport Road / El Camino Real (LOS F during both the AM and PM peak hours)
- Palomar Airport Road / Loker Avenue (LOS F/E during the AM/PM peak hours)
- Palomar Airport Road / El Fuerte Street (LOS F during the PM peak hour)
- Palomar Airport Road / Melrose Drive (LOS F/E during the AM/PM peak hours)
- El Camino Real / Town Garden Center (LOS E during both the AM and PM peak hours)
- El Camino Real / Camino Vida Roble (LOS F during the AM peak hour)

Appendix E contains the intersection analysis worksheets for the Existing + Cumulative Projects + Project (PAL2) scenario.

Based on the significance criteria, no intersection impacts are calculated since the Project (PAL2) contribution does not exceed 2.0 seconds.

10.3.2 *Segment Operations*

Table 10–2 summarizes the street segment operations under Existing + Cumulative Projects + Project (PAL2) conditions. As shown in *Table 10–2*, the study area segments are calculated to continue to operate acceptably at LOS C or better.

Based on the significance criteria, no street segment impacts are calculated since the study area street segments are all calculated to operate at acceptable LOS.

TABLE 10–1
NEAR-TERM INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing + Cumulative Projects		Existing + Cumulative Projects + (Project) PAL1			Existing + Cumulative Projects + Project (PAL2)		
			Delay[a]	LOS[b]	Delay	LOS	Δ[c]	Delay	LOS	Δ
1. Canon Road / Faraday Avenue	Signal	AM PM	34.5 32.7	C C	34.5 32.7	C C	0.0 0.0	34.5 32.8	C C	0.0 0.1
2. El Camino Real / College Boulevard	Signal	AM PM	65.1 78.0	E E	65.3 78.0	E E	0.2 0.0	65.5 78.0	E E	0.4 0.0
3. College Boulevard / Faraday Avenue	Signal	AM PM	34.6 35.8	C D	34.6 35.8	C D	0.0 0.0	34.6 35.9	C D	0.0 0.1
4. El Camino Real / Faraday Avenue	Signal	AM PM	67.9 105.9	E F	68.2 105.9	E F	0.3 0.0	68.4 106.0	E F	0.5 0.1
5. I-5 SB Ramps / Palomar Airport Road	Signal	AM PM	11.3 8.0	B A	11.3 8.0	B A	0.0 0.0	11.3 8.0	B A	0.0 0.0
6. I-5 NB Ramps / Palomar Airport Road	Signal	AM PM	44.4 39.0	D D	44.5 39.2	D D	0.1 0.2	44.6 39.4	D D	0.2 0.4
7. Palomar Airport Road / Paseo Del Norte	Signal	AM PM	47.8 36.3	D D	47.9 36.3	D D	0.1 0.0	47.9 36.3	D D	0.1 0.0
8. Palomar Airport Road / Armada Drive	Signal	AM PM	28.8 38.6	C D	28.8 39.0	C D	0.0 0.4	28.8 39.2	C D	0.0 0.6
9. Palomar Airport Road / Hidden Valley Road	Signal	AM PM	27.9 48.0	C D	28.3 48.1	C D	0.4 0.1	28.6 48.1	C D	0.7 0.1
10. Palomar Airport Road / College Boulevard	Signal	AM PM	31.8 51.5	C D	31.9 51.7	C D	0.1 0.2	31.9 51.8	C D	0.1 0.3
11. Palomar Airport Road / Camino Vida Roble	Signal	AM PM	48.5 70.1	D E	48.5 70.1	D E	0.0 0.0	48.5 70.2	D E	0.0 0.1

TABLE 10–1
NEAR-TERM INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing + Cumulative Projects		Existing + Cumulative Projects + (Project) PAL1			Existing + Cumulative Projects + Project (PAL2)		
			Delay[a]	LOS[b]	Delay	LOS	Δ[c]	Delay	LOS	Δ
12. Palomar Airport Road / Yarrow Drive	Signal	AM PM	37.7 40.2	D D	38.0 40.4	D D	0.3 0.2	38.2 40.7	D D	0.5 0.5
13. Palomar Airport Road / El Camino Real	Signal	AM PM	139.3 106.1	F F	139.6 106.3	F F	0.3 0.2	139.9 106.6	F F	0.6 0.5
14. Palomar Airport Road / Loker Avenue	Signal	AM PM	82.1 65.1	F E	82.3 65.2	F E	0.2 0.1	82.6 65.3	F E	0.5 0.2
15. Palomar Airport Road / El Fuerte Street	Signal	AM PM	50.8 125.2	D F	51.0 125.4	D F	0.2 0.2	51.2 125.6	D F	0.4 0.4
16. Palomar Airport Road / Melrose Drive	Signal	AM PM	91.6 63.2	F E	91.7 63.2	F E	0.1 0.0	91.9 63.4	F E	0.3 0.2
17. El Camino Real / Town Garden Road	Signal	AM PM	70.8 70.2	E E	71.2 70.6	E E	0.4 0.4	71.4 70.8	E E	0.6 0.6
18. El Camino Real / Camino Vida Roble	Signal	AM PM	139.1 48.5	F D	139.8 48.8	F D	0.7 0.3	140.4 49.1	F D	1.3 0.6
19. El Camino Real / Poinsettia Lane	Signal	AM PM	39.9 41.7	D D	39.9 41.7	D D	0.0 0.0	39.9 41.7	D D	0.0 0.0

Footnotes:

a. Average delay expressed in seconds per vehicle.
b. Level of Service
c. Δ denotes an increase in delay due to Project.

SIGNALIZED		UNSIGNALIZED	
DELAY/LOS THRESHOLDS		DELAY/LOS THRESHOLDS	
Delay	LOS	Delay	LOS
0.0 ≤ 10.0	A	0.0 ≤ 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
≥ 80.1	F	≥ 50.1	F

TABLE 10–2
NEAR-TERM STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Direction	Peak Hour	Capacity (LOS E)[a]	Existing + Cumulative Projects			Existing + Cumulative Projects + Project (PAL1)				Existing + Cumulative Projects + Project (PAL2)			
				Volume	LOS[b]	V/C	Volume	LOS	V/C	Δ[d]	Volume	LOS	V/C	Δ
Palomar Airport Road														
I-5 Ramps to Paseo Del Norte	EB	AM	5,400	2,830	A	0.524	2,835	A	0.525	0.001	2,838	A	0.526	0.001
		PM	5,400	1,790	A	0.331	1,795	A	0.332	0.001	1,798	A	0.333	0.001
	WB	AM	5,400	1,290	A	0.239	1,294	A	0.240	0.001	1,296	A	0.240	0.001
		PM	5,400	2,630	A	0.487	2,635	A	0.488	0.001	2,638	A	0.489	0.001
Paseo Del Norte to Armada Drive	EB	AM	5,400	2,770	A	0.513	2,775	A	0.514	0.001	2,778	A	0.514	0.001
		PM	5,400	1,710	A	0.317	1,715	A	0.318	0.001	1,718	A	0.318	0.001
	WB	AM	5,400	1,260	A	0.233	1,264	A	0.234	0.001	1,266	A	0.234	0.001
		PM	5,400	2,790	A	0.517	2,795	A	0.518	0.001	2,798	A	0.518	0.001
Armada Drive to Hidden Valley Ranch	EB	AM	5,400	2,640	A	0.489	2,645	A	0.490	0.001	2,648	A	0.490	0.001
		PM	5,400	1,850	A	0.343	1,855	A	0.344	0.001	1,858	A	0.344	0.001
	WB	AM	5,400	1,430	A	0.265	1,434	A	0.266	0.001	1,436	A	0.266	0.001
		PM	5,400	2,940	A	0.544	2,945	A	0.545	0.001	2,948	A	0.546	0.001
Hidden Valley Ranch to College Boulevard	EB	AM	5,400	2,600	A	0.481	2,605	A	0.482	0.001	2,608	A	0.483	0.001
		PM	5,400	2,280	A	0.422	2,285	A	0.423	0.001	2,288	A	0.424	0.001
	WB	AM	5,400	1,380	A	0.256	1,384	A	0.256	0.001	1,386	A	0.257	0.001
		PM	5,400	2,430	A	0.450	2,435	A	0.451	0.001	2,438	A	0.451	0.001
College Boulevard to Camino Vida Roble	EB	AM	5,400	1,970	A	0.365	1,975	A	0.366	0.001	1,980	A	0.367	0.002
		PM	5,400	1,520	A	0.281	1,525	A	0.282	0.001	1,530	A	0.283	0.002
	WB	AM	5,400	1,260	A	0.233	1,264	A	0.234	0.001	1,267	A	0.235	0.001
		PM	5,400	2,020	A	0.374	2,025	A	0.375	0.001	2,030	A	0.376	0.002
Camino Vida Roble to Yarrow Drive	EB	AM	5,400	1,610	A	0.298	1,613	A	0.299	0.001	1,615	A	0.299	0.001
		PM	5,400	2,210	A	0.409	2,213	A	0.410	0.001	2,215	A	0.410	0.001
	WB	AM	5,400	1,490	A	0.276	1,492	A	0.276	0.000	1,494	A	0.277	0.001
		PM	5,400	1,590	A	0.294	1,593	A	0.295	0.001	1,595	A	0.295	0.001

TABLE 10–2
NEAR-TERM STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Direction	Peak Hour	Capacity (LOS E) [a]	Existing + Cumulative Projects			Existing + Cumulative Projects + Project (PAL1)				Existing + Cumulative Projects + Project (PAL2)			
				Volume	LOS [b]	V/C	Volume	LOS	V/C	Δ[d]	Volume	LOS	V/C	Δ
Yarrow Drive to El Camino Real	EB	AM	5,400	1,400	A	0.259	1,405	A	0.260	0.001	1,409	A	0.261	0.002
		PM	5,400	2,230	A	0.413	2,237	A	0.414	0.001	2,243	A	0.415	0.002
	WB	AM	5,400	2,110	A	0.391	2,118	A	0.392	0.001	2,124	A	0.393	0.003
		PM	5,400	1,600	A	0.296	1,608	A	0.298	0.001	1,614	A	0.299	0.003
El Camino Real to Loker Avenue	EB	AM	5,400	1,930	A	0.357	1,931	A	0.358	0.000	1,933	A	0.358	0.001
		PM	5,400	2,970	A	0.550	2,972	A	0.550	0.000	2,974	A	0.551	0.001
	WB	AM	5,400	2,850	A	0.528	2,852	A	0.528	0.000	2,854	A	0.529	0.001
		PM	5,400	2,130	A	0.394	2,132	A	0.395	0.000	2,134	A	0.395	0.001
Loker Avenue to El Fuerte Street	EB	AM	5,400	1,370	A	0.254	1,371	A	0.254	0.000	1,373	A	0.254	0.001
		PM	5,400	2,830	A	0.524	2,832	A	0.524	0.000	2,834	A	0.525	0.001
	WB	AM	5,400	3,090	A	0.572	3,092	A	0.573	0.000	3,094	A	0.573	0.001
		PM	5,400	1,700	A	0.315	1,702	A	0.315	0.000	1,704	A	0.316	0.001
El Fuerte Street to Melrose Drive	EB	AM	5,400	1,340	A	0.248	1,341	A	0.248	0.000	1,343	A	0.249	0.001
		PM	5,400	3,170	A	0.587	3,172	A	0.587	0.000	3,174	A	0.588	0.001
	WB	AM	5,400	3,610	B	0.669	3,612	B	0.669	0.000	3,614	B	0.669	0.001
		PM	5,400	2,140	A	0.396	2,142	A	0.397	0.000	2,144	A	0.397	0.001
East of Melrose Drive	EB	AM	5,400	1,160	A	0.215	1,161	A	0.215	0.000	1,163	A	0.215	0.001
		PM	5,400	2,400	A	0.444	2,402	A	0.445	0.000	2,402	A	0.445	0.000
	WB	AM	5,400	1,860	A	0.344	1,862	A	0.345	0.001	1,862	A	0.345	0.001
		PM	5,400	1,370	A	0.254	1,372	A	0.254	0.000	1,372	A	0.254	0.000
El Camino Real														
North of College Boulevard	EB	AM	3,600	2,640	C	0.733	2,642	C	0.734	0.001	2,644	C	0.734	0.001
		PM	3,600	1,280	A	0.356	1,282	A	0.356	0.001	1,284	A	0.357	0.001
	WB	AM	5,400	760	A	0.141	762	A	0.141	0.000	762	A	0.141	0.000
		PM	5,400	2,720	A	0.504	2,722	A	0.504	0.000	2,724	A	0.504	0.001

TABLE 10–2
NEAR-TERM STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Direction	Peak Hour	Capacity (LOS E) [a]	Existing + Cumulative Projects			Existing + Cumulative Projects + Project (PAL1)				Existing + Cumulative Projects + Project (PAL2)			
				Volume	LOS [b]	V/C	Volume	LOS	V/C	Δ[d]	Volume	LOS	V/C	Δ
College Avenue to Faraday Avenue	NB	AM	5,400	930	A	0.172	932	A	0.173	0.000	932	A	0.173	0.000
		PM	5,400	2,070	A	0.383	2,072	A	0.384	0.000	2,074	A	0.384	0.001
	SB	AM	5,400	2,220	A	0.411	2,222	A	0.411	0.000	2,224	A	0.412	0.001
		PM	5,400	1,240	A	0.230	1,242	A	0.230	0.000	1,244	A	0.230	0.001
Faraday Avenue to Palomar Airport Road	NB	AM	5,400	1,550	A	0.287	1,552	A	0.287	0.000	1,553	A	0.288	0.001
		PM	5,400	1,760	A	0.326	1,763	A	0.326	0.001	1,765	A	0.327	0.001
	SB	AM	5,400	1,790	A	0.331	1,793	A	0.332	0.001	1,795	A	0.332	0.001
		PM	5,400	2,070	A	0.383	2,073	A	0.384	0.001	2,075	A	0.384	0.001
Palomar Airport Road to Town Garden Road	NB	AM	5,400	1,490	A	0.276	1,493	A	0.276	0.001	1,495	A	0.277	0.001
		PM	5,400	1,660	A	0.307	1,663	A	0.308	0.001	1,665	A	0.308	0.001
	SB	AM	5,400	2,090	A	0.387	2,092	A	0.387	0.000	2,093	A	0.388	0.001
		PM	5,400	1,690	A	0.313	1,692	A	0.313	0.000	1,694	A	0.314	0.001
Town Garden Road to Camino Vida Roble	NB	AM	5,400	1,510	A	0.280	1,513	A	0.280	0.001	1,515	A	0.281	0.001
		PM	5,400	1,610	A	0.298	1,613	A	0.299	0.001	1,615	A	0.299	0.001
	SB	AM	5,400	1,620	A	0.300	1,622	A	0.300	0.000	1,623	A	0.301	0.001
		PM	5,400	1,980	A	0.367	1,982	A	0.367	0.000	1,984	A	0.367	0.001
Camino Vida Roble to Poinsettia Lane	NB	AM	3,600	1,500	A	0.417	1,504	A	0.418	0.001	1,507	A	0.419	0.002
		PM	3,600	1,410	A	0.392	1,414	A	0.393	0.001	1,417	A	0.394	0.002
	SB	AM	5,400	1,480	A	0.274	1,482	A	0.274	0.000	1,484	A	0.275	0.001
		PM	5,400	2,180	A	0.404	2,183	A	0.404	0.001	2,186	A	0.405	0.001
South of Poinsettia Lane	NB	AM	5,400	1,600	A	0.296	1,604	A	0.297	0.001	1,607	A	0.298	0.001
		PM	5,400	1,790	A	0.331	1,794	A	0.332	0.001	1,797	A	0.333	0.001
	SB	AM	5,400	1,590	A	0.294	1,592	A	0.295	0.000	1,594	A	0.295	0.001
		PM	5,400	2,190	A	0.406	2,193	A	0.406	0.001	2,196	A	0.407	0.001

TABLE 10–2
NEAR-TERM STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Direction	Peak Hour	Capacity (LOS E)[a]	Existing + Cumulative Projects			Existing + Cumulative Projects + Project (PAL1)				Existing + Cumulative Projects + Project (PAL2)			
				Volume	LOS[b]	V/C	Volume	LOS	V/C	Δ[d]	Volume	LOS	V/C	Δ
College Boulevard														
Aston Avenue to Palomar Airport Road	NB	AM	3,600	1,190	A	0.331	1,190	A	0.331	0.000	1,190	A	0.331	0.000
		PM	3,600	520	A	0.144	520	A	0.144	0.000	521	A	0.145	0.000
	SB	AM	3,600	420	A	0.117	420	A	0.117	0.000	421	A	0.117	0.000
		PM	3,600	1,030	A	0.286	1,030	A	0.286	0.000	1,031	A	0.286	0.000

Footnotes:

a. Capacities based on 1,800 vehicles per lane per hour

b. Level of Service.

c. Volume to Capacity.

d. Δ denotes a Project-induced increase in the Volume to Capacity Ratio

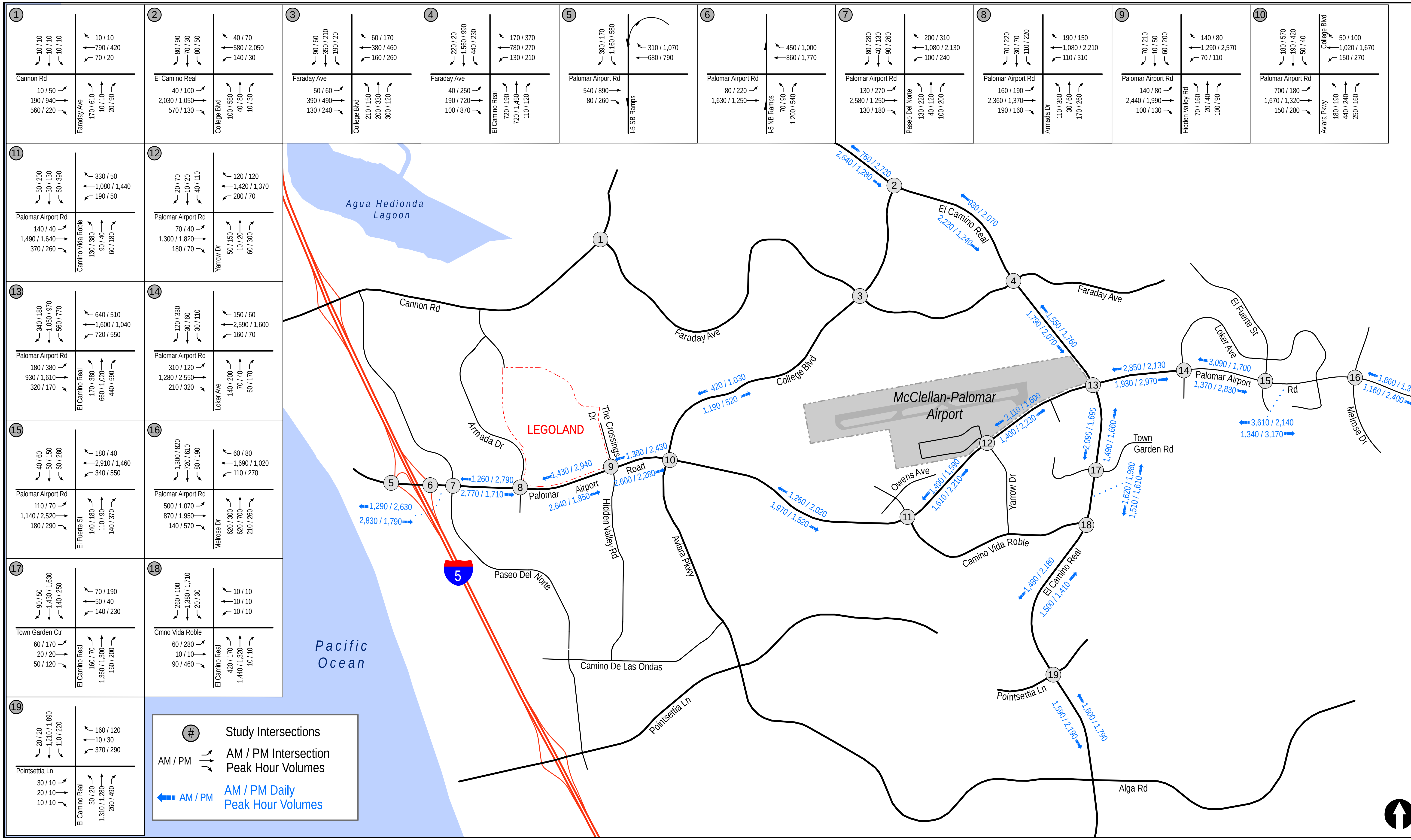

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Figure 10-1

Exisitng + Cumulative Projects Traffic Volumes

McClellan-Palomar Airport Master Plan

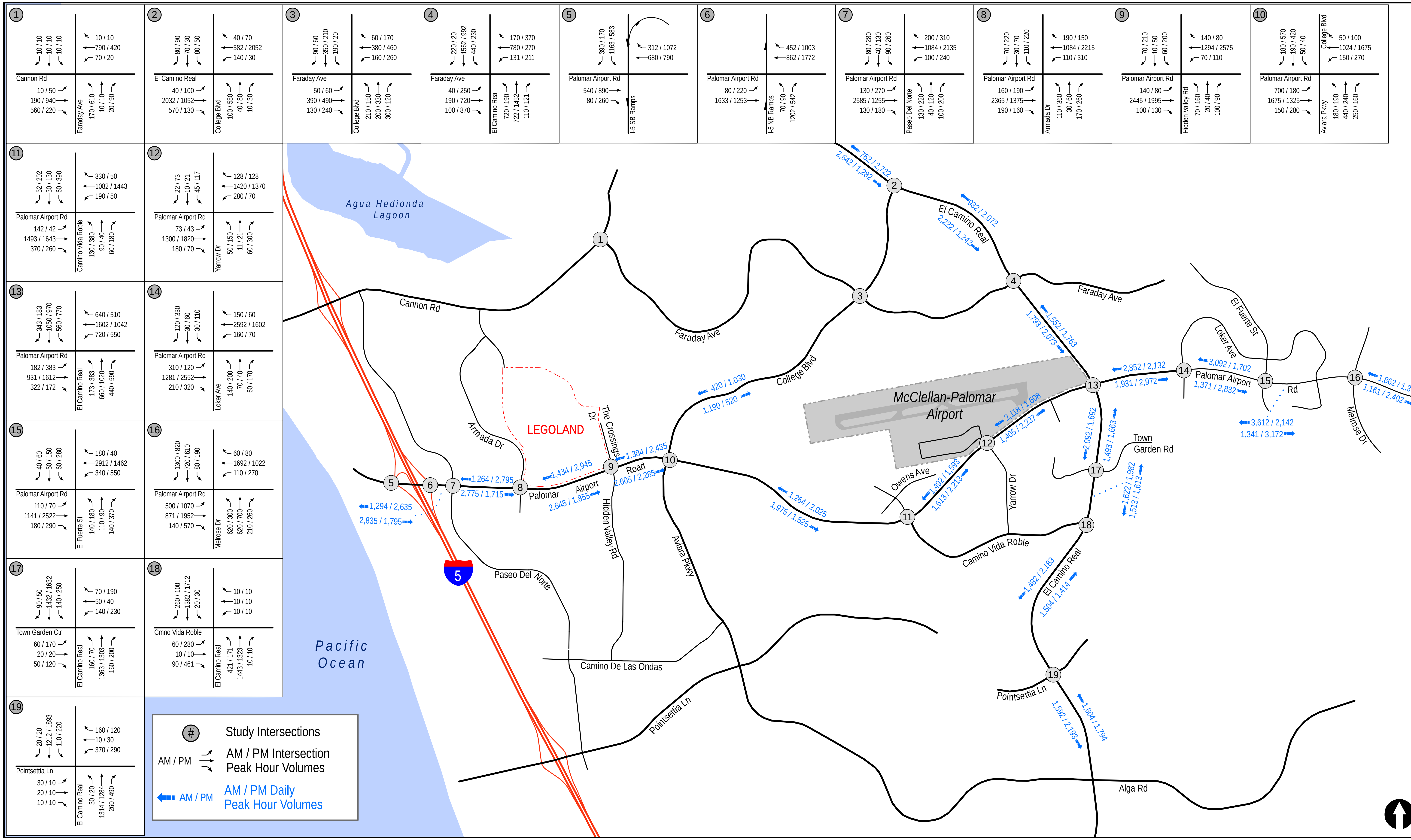

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Figure 10-2

Exisitng + Cumulative Projects + Near Term Project (PAL1) Traffic Volumes

McClellan-Palomar Airport Master Plan

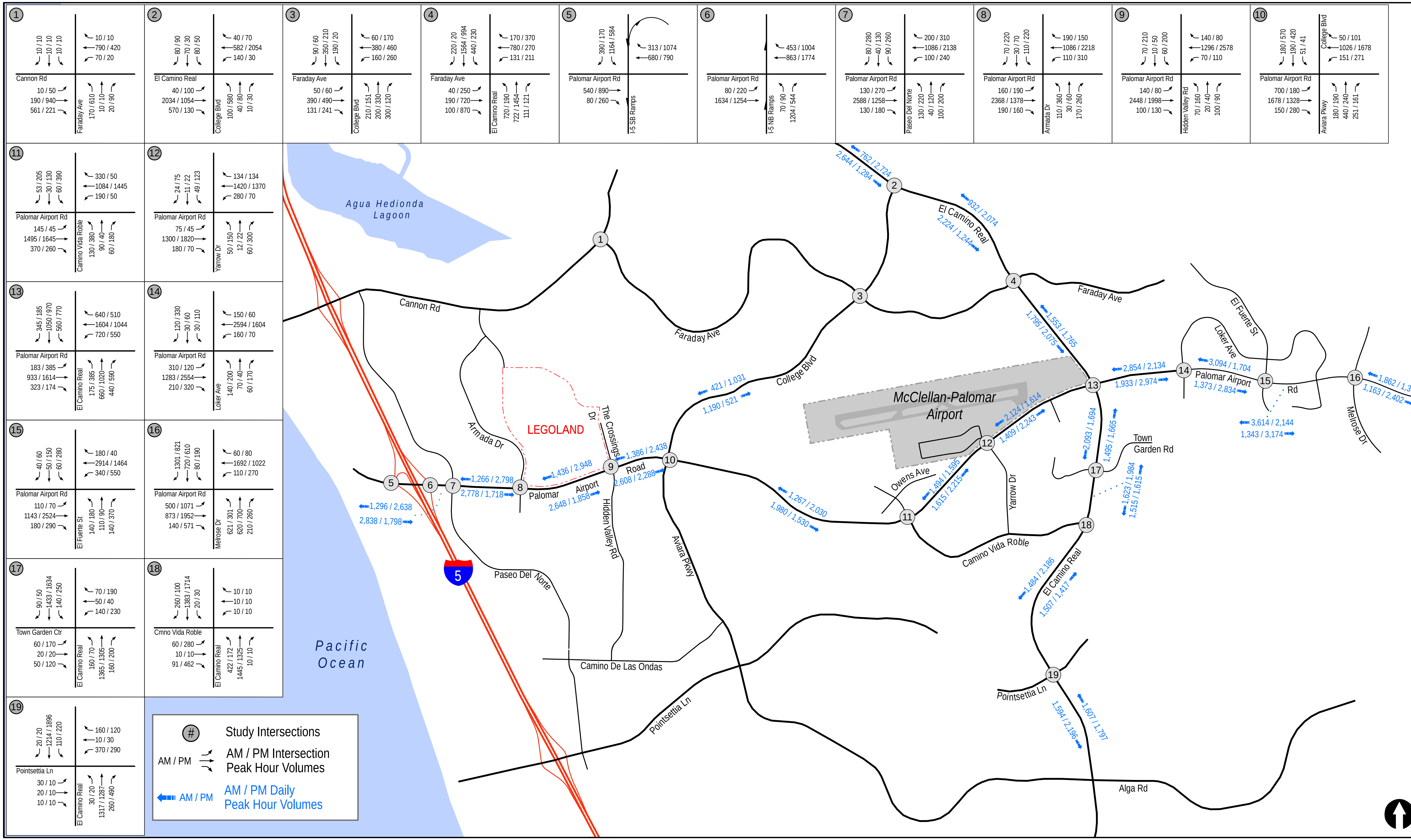

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Figure 10-3

Exisitng + Cumulative Projects + Near Term Project (PAL 2) Traffic Volumes

McClellan-Palomar Airport Master Plan

11.0 Analysis of Long-Term Scenarios

This section discusses the Long-Term (2036) operations of the intersections and street segments in the Project study area as required by the City of Carlsbad's *Growth Management Plan*.

11.1 Volumes Development

The SANDAG Series 13 Model forecast was used as the source to obtain long-term volumes for the study area locations. SANDAG forecasts volumes in 5-year increments and the Year 2035 volumes were chosen as the baseline to assess the Long-Term (Year 2036) potential impacts since it represents the closest forecast to the Project's long-term year. Peak hour volumes were estimated based on the model and partially on the existing relationship between ADT and peak hour volumes.

Several other traffic engineering principles and factors such as the K-factor (the proportion of daily volume that occurs during the peak period) and D-factor (the directional split of the traffic volumes) were also considered in the forecast analysis. The forecast volumes were also checked for consistency between intersections, where no driveways or roadways exist between intersections, and were compared to existing volumes for accuracy.

Figure 11–1 shows the Long-Term without Project traffic volumes. ***Figure 11–2*** shows the Long-Term with Project (PAL1) traffic volumes. ***Figure 11–3*** shows the Long-Term with Project (PAL2) traffic volumes.

11.2 Long-Term without Project

11.2.1 *Intersection Analysis*

Intersection capacity analyses were conducted for the study intersections under Long-Term conditions. ***Table 11–1*** reports the Long-Term intersection operations during the AM and PM peak hours. As shown in *Table 11–1*, the following intersections are calculated to operate at LOS D or better. All other locations are calculated to operate at LOS E or F.

- Cannon Rd / Faraday Avenue (LOS D during the AM peak hour)
- I-5 SB Ramps / Palomar Airport Road (LOS B/A during the AM/PM peak hours)
- I-5 NB Ramps / Palomar Airport Road (LOS D during both the AM and PM peak hours)
- Palomar Airport Road / Paseo Del Norte (LOS D during the PM peak hour)
- Palomar Airport Road / Armada Drive (LOS C during the AM peak hour)
- Palomar Airport Road / College Boulevard (LOS D during the AM peak hour)
- Palomar Airport Road / Camino Vida Roble (LOS D during the AM peak hour)
- Palomar Airport Road / Yarrow Drive (LOS D during both the AM and PM peak hours)
- Palomar Airport Road / Poinsettia Lane (LOS D during both the AM and PM peak hours)

Appendix F contains the intersection analysis worksheets for the Long-Term scenario.

11.2.2 *Segment Operations*

Long-Term street segment analyses were conducted for the study roadways. ***Table 11–2*** summarizes the street segment operations under Long-Term conditions. As shown in *Table 11–2,* the study area segments are calculated to operate at an acceptable LOS.

11.3 Long-Term + Project (PAL1)

11.3.1 *Intersection Analysis*

Table 11–1 reports the Long-Term + Project (PAL1) intersection operations during the AM and PM peak hours. As shown in *Table 11–1,* the following intersections are calculated to operate at LOS D or better:

- Cannon Rd / Faraday Avenue (LOS D during the AM peak hour)
- I-5 SB Ramps / Palomar Airport Road (LOS B/A during the AM/PM peak hours)
- I-5 NB Ramps / Palomar Airport Road (LOS D during both the AM and PM peak hours)
- Palomar Airport Road / Paseo Del Norte (LOS D during the PM peak hour)
- Palomar Airport Road / Armada Drive (LOS C during the AM peak hour)
- Palomar Airport Road / College Boulevard (LOS D during the AM peak hour)
- Palomar Airport Road / Camino Vida Roble (LOS D during the AM peak hour)
- Palomar Airport Road / Yarrow Drive (LOS D during both the AM and PM peak hours)
- Palomar Airport Road / Poinsettia Lane (LOS D during both the AM and PM peak hours)

Appendix F contains the intersection analysis worksheets for the Long-Term + Project (PAL1) scenario.

Based on the significance criteria, no intersection impacts are calculated since the Project (PAL1) contribution does not exceed 2.0 seconds.

11.3.2 *Segment Operations*

Long-Term street segments analyses were conducted for the study roadways. *Table 11-2* summarizes the street segment operations under Long-Term conditions. As shown in *Table 11-2,* the study area segments are calculated to operate at an acceptable LOS.

Based on the significance criteria, no street segment impacts are calculated since the study area street segments are all calculated to operate at acceptable LOS.

11.4 Long-Term + Project (PAL2)

11.4.1 *Intersection Analysis*

Table 11–1 reports the Long-Term + Project (PAL2) intersection operations during the AM and PM peak hours. As shown in *Table 11–1,* the following intersections are calculated to operate at LOS D or better:

- Cannon Rd / Faraday Avenue (LOS D during the AM peak hour)
- I-5 SB Ramps / Palomar Airport Road (LOS B/A during the AM/PM peak hours)
- I-5 NB Ramps / Palomar Airport Road (LOS D during both the AM and PM peak hours)
- Palomar Airport Road / Paseo Del Norte (LOS D during the PM peak hour)
- Palomar Airport Road / Armada Drive (LOS C during the AM peak hour)
- Palomar Airport Road / College Boulevard (LOS D during the AM peak hour)
- Palomar Airport Road / Camino Vida Roble (LOS D during the AM peak hour)
- Palomar Airport Road / Yarrow Drive (LOS D during both the AM and PM peak hours)
- Palomar Airport Road / Poinsettia Lane (LOS D during both the AM and PM peak hours)

Appendix F contains the intersection analysis worksheets for the Long-Term + Project (PAL2) scenario.

Based on the significance criteria, cumulative impacts are calculated at the following intersections because the Project's (PAL2) contribution would cause an increased delay of more than 2.0 seconds:

- **Palomar Airport Road / Camino Vida Roble**
- **Palomar Airport Road / El Camino Real**

11.4.2 *Segment Operations*

Long-Term street segments analyses were conducted for the study roadways. *Table 11-2* summarizes the street segment operations under Long-Term conditions. As shown in *Table 11-2*, the study area segments are calculated to operate at an acceptable LOS.

Based on the significance criteria, no street segment impacts are calculated since the study area street segments are all calculated to operate at acceptable LOS.

TABLE 11–1
LONG-TERM INTERSECTION OPERATIONS

Intersection	Peak Hour	Long-Term without Project		Long-Term + Project (PAL1)				Long-Term + Project (PAL2)			
		Delay[a]	LOS[b]	Delay[a]	LOS[b]	Delay Increase	Sig?[c]	Delay[a]	LOS[b]	Delay Increase	Sig?[c]
1. Canon Road / Faraday Avenue	AM PM	43.1 63.1	D E	43.2 63.5	D E	0.1 0.4	No No	43.3 63.5	D E	0.2 0.4	No No
2. El Camino Real / College Boulevard	AM PM	255.2 457.2	F F	255.6 457.3	F F	0.4 0.1	No No	255.9 457.3	F F	0.7 0.1	No No
3. College Boulevard / Faraday Avenue	AM PM	65.7 77.2	E E	66.0 77.6	E E	0.3 0.4	No No	66.2 77.7	E E	0.5 0.5	No No
4. El Camino Real / Faraday Avenue	AM PM	108.6 116.0	F F	108.8 116.0	F F	0.2 0.0	No No	109.4 116.0	F F	0.8 0.0	No No
5. I-5 SB Ramps / Palomar Airport Road	AM PM	15.5 8.7	B A	15.7 8.8	B A	0.2 0.1	No No	15.9 8.8	B A	0.4 0.1	No No
6. I-5 NB Ramps / Palomar Airport Road	AM PM	50.4 46.0	D D	51.1 47.0	D D	0.7 1.0	No No	51.8 48.0	D D	1.4 2.0	No No
7. Palomar Airport Road / Paseo Del Norte	AM PM	63.4 40.5	E D	64.2 40.6	E D	0.8 0.1	No No	64.8 40.6	E D	1.4 0.1	No No
8. Palomar Airport Road / Armada Drive	AM PM	32.6 72.5	C E	32.9 72.7	C E	0.3 0.2	No No	32.9 74.3	C E	0.3 1.8	No No
9. Palomar Airport Road / Hidden Valley Road	AM PM	62.0 69.8	E E	62.1 70.0	E E	0.1 0.2	No No	62.6 71.3	E E	0.6 1.5	No No

TABLE 11–1
LONG-TERM INTERSECTION OPERATIONS

Intersection	Peak Hour	Long-Term without Project		Long-Term + Project (PAL1)				Long-Term + Project (PAL2)			
		Delay[a]	LOS[b]	Delay[a]	LOS[b]	Delay Increase	Sig?[c]	Delay[a]	LOS[b]	Delay Increase	Sig?[c]
10. Palomar Airport Road / College Boulevard	AM PM	37.2 74.0	D E	38.0 74.0	D E	0.8 0.0	No No	38.8 75.5	D E	1.6 1.5	No No
11. Palomar Airport Road / Camino Vida Roble	AM PM	53.9 **92.9**	D **F**	54.0 94.2	D F	0.1 1.3	No No	54.2 **95.4**	D **F**	0.3 **2.5**	No **Impact**
12. Palomar Airport Road / Yarrow Drive	AM PM	38.8 41.7	D D	40.3 43.0	D D	1.5 1.3	No No	42.1 46.0	D D	3.3 4.3	No No
13. Palomar Airport Road / El Camino Real	AM PM	**168.4** **126.2**	**F** **F**	169.8 127.9	F F	1.4 1.7	No No	**171.1** **130.9**	**F** **F**	**2.7** **4.7**	**Impact** **Impact**
14. Palomar Airport Road / Loker Avenue	AM PM	114.9 91.7	F F	115.9 92.7	F F	1.0 1.0	No No	116.8 93.3	F F	1.9 1.6	No No
15. Palomar Airport Road / El Fuerte Street	AM PM	85.6 138.1	F F	86.4 138.8	F F	0.8 0.7	No No	87.3 139.7	F F	1.7 1.6	No No
16. Palomar Airport Road / Melrose Drive	AM PM	118.5 82.3	F F	118.7 82.6	F F	0.2 0.3	No No	118.8 82.7	F F	0.3 0.4	No No
17. El Camino Real / Town Garden Road	AM PM	112.2 88.0	F F	112.8 88.5	F F	0.6 0.5	No No	113.4 88.9	F F	1.2 0.9	No No
18. El Camino Real / Camino Vida Roble	AM PM	173.5 59.6	F E	174.0 60.0	F E	0.5 0.4	No No	174.1 60.9	F E	0.6 1.3	No No

TABLE 11–1
LONG-TERM INTERSECTION OPERATIONS

Intersection	Peak Hour	Long-Term without Project		Long-Term + Project (PAL1)				Long-Term + Project (PAL2)			
		Delay[a]	LOS[b]	Delay[a]	LOS[b]	Delay Increase	Sig?[c]	Delay[a]	LOS[b]	Delay Increase	Sig?[c]
19. El Camino Real / Poinsettia Lane	AM	44.5	D	44.7	D	0.2	No	44.9	D	0.4	No
	PM	51.4	D	52.4	D	1.0	No	53.2	D	1.8	No

Footnotes:

a. Average delay expressed in seconds per vehicle.
b. Level of Service
c. Δ denotes an increase in delay due to Project.

SIGNALIZED		UNSIGNALIZED	
DELAY/LOS THRESHOLDS		DELAY/LOS THRESHOLDS	
Delay	LOS	Delay	LOS
0.0 ≤ 10.0	A	0.0 ≤ 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
≥ 80.1	F	≥ 50.1	F

TABLE 11–2
LONG-TERM STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Direction	Peak Hour	Capacity (LOS E) [a]	Long-Term without Project			Long-Term + Project (PAL1)				Long-Term + Project (PAL2)			
				Volume	LOS [b]	V/C	Volume	LOS	V/C	Δ [d]	Volume	LOS	V/C	Δ [d]
Palomar Airport Road														
I-5 Ramps to Paseo Del Norte	EB	AM	5,400	3,160	A	0.585	3,181	A	0.589	0.004	3,200	A	0.593	0.008
		PM	5,400	2,020	A	0.374	2,041	A	0.378	0.004	2,060	A	0.381	0.007
	WB	AM	5,400	1,460	A	0.270	1,474	A	0.273	0.003	1,487	A	0.275	0.005
		PM	5,400	2,910	A	0.539	2,931	A	0.543	0.004	2,950	A	0.546	0.007
Paseo Del Norte to Armada Drive	EB	AM	5,400	3,080	A	0.570	3,103	A	0.575	0.005	3,122	A	0.578	0.008
		PM	5,400	1,890	A	0.350	1,913	A	0.354	0.004	1,932	A	0.358	0.008
	WB	AM	5,400	1,430	A	0.265	1,445	A	0.268	0.003	1,459	A	0.270	0.005
		PM	5,400	3,110	A	0.576	3,133	A	0.580	0.004	3,152	A	0.584	0.008
Armada Drive to Hidden Valley Ranch	EB	AM	5,400	2,940	A	0.544	2,964	A	0.549	0.005	2,983	A	0.552	0.008
		PM	5,400	2,080	A	0.385	2,104	A	0.390	0.005	2,123	A	0.393	0.008
	WB	AM	5,400	1,620	A	0.300	1,635	A	0.303	0.003	1,649	A	0.305	0.005
		PM	5,400	3,250	B	0.602	3,274	B	0.606	0.004	3,293	B	0.610	0.008
Hidden Valley Ranch to College Boulevard	EB	AM	5,400	2,890	A	0.535	2,914	A	0.540	0.005	2,934	A	0.543	0.008
		PM	5,400	2,510	A	0.465	2,534	A	0.469	0.004	2,554	A	0.473	0.008
	WB	AM	5,400	1,580	A	0.293	1,595	A	0.295	0.002	1,609	A	0.298	0.005
		PM	5,400	2,720	A	0.504	2,744	A	0.508	0.004	2,764	A	0.512	0.008
College Boulevard to Camino Vida Roble	EB	AM	5,400	2,210	A	0.409	2,237	A	0.414	0.005	2,260	A	0.419	0.010
		PM	5,400	1,710	A	0.317	1,737	A	0.322	0.005	1,760	A	0.326	0.009
	WB	AM	5,400	1,400	A	0.259	1,417	A	0.262	0.003	1,433	A	0.265	0.006
		PM	5,400	2,230	A	0.413	2,257	A	0.418	0.005	2,279	A	0.422	0.009
Camino Vida Roble to Yarrow Drive	EB	AM	5,400	1,780	A	0.330	1,794	A	0.332	0.002	1,806	A	0.334	0.004
		PM	5,400	2,440	A	0.452	2,454	A	0.454	0.002	2,466	A	0.456	0.004
	WB	AM	5,400	1,660	A	0.307	1,668	A	0.309	0.002	1,677	A	0.311	0.004
		PM	5,400	1,750	A	0.324	1,764	A	0.327	0.003	1,775	A	0.329	0.005

TABLE 11–2
LONG-TERM STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Direction	Peak Hour	Capacity (LOS E) [a]	Long-Term without Project			Long-Term + Project (PAL1)				Long-Term + Project (PAL2)			
				Volume	LOS [b]	V/C	Volume	LOS	V/C	Δ[d]	Volume	LOS	V/C	Δ[d]
Yarrow Drive to El Camino Real	EB	AM	5,400	1,490	A	0.276	1,514	A	0.280	0.004	1,534	A	0.284	0.008
		PM	5,400	2,450	A	0.454	2,485	A	0.460	0.006	2,517	A	0.466	0.012
	WB	AM	5,400	2,440	A	0.452	2,475	A	0.458	0.006	2,507	A	0.464	0.012
		PM	5,400	1,780	A	0.330	1,815	A	0.336	0.006	1,847	A	0.342	0.012
El Camino Real to Loker Avenue	EB	AM	5,400	2,030	A	0.376	2,038	A	0.377	0.001	2,044	A	0.379	0.003
		PM	5,400	3,200	A	0.593	3,211	A	0.595	0.002	3,221	A	0.596	0.003
	WB	AM	5,400	3,180	A	0.589	3,191	A	0.591	0.003	3,201	A	0.593	0.004
		PM	5,400	2,430	A	0.450	2,441	A	0.452	0.002	2,451	A	0.454	0.004
Loker Avenue to El Fuerte Street	EB	AM	5,400	1,580	A	0.293	1,588	A	0.294	0.001	1,593	A	0.295	0.002
		PM	5,400	3,240	B	0.600	3,250	B	0.602	0.002	3,260	B	0.604	0.004
	WB	AM	5,400	3,470	B	0.643	3,480	B	0.644	0.001	3,490	B	0.646	0.003
		PM	5,400	1,940	A	0.359	1,950	A	0.361	0.002	1,960	A	0.363	0.004
El Fuerte Street to Melrose Drive	EB	AM	5,400	1,470	A	0.272	1,476	A	0.273	0.001	1,481	A	0.274	0.002
		PM	5,400	3,330	B	0.617	3,338	B	0.618	0.001	3,348	B	0.620	0.003
	WB	AM	5,400	3,890	C	0.720	3,898	C	0.722	0.002	3,908	C	0.724	0.004
		PM	5,400	2,120	A	0.393	2,128	A	0.394	0.001	2,138	A	0.396	0.003
East of Melrose Drive	EB	AM	5,400	1,290	A	0.239	1,294	A	0.240	0.001	1,297	A	0.240	0.001
		PM	5,400	2,650	A	0.491	2,656	A	0.492	0.001	2,662	A	0.493	0.002
	WB	AM	5,400	2,090	A	0.387	2,096	A	0.388	0.001	2,102	A	0.389	0.002
		PM	5,400	1,400	A	0.259	1,406	A	0.260	0.001	1,412	A	0.261	0.002
El Camino Real														
North of College Boulevard	EB	AM	3,600	3,150	D	0.875	3,159	D	0.878	0.003	3,168	D	0.880	0.005
		PM	3,600	1,830	A	0.508	1,839	A	0.511	0.003	1,848	A	0.513	0.005
	WB	AM	5,400	1,180	A	0.219	1,186	A	0.220	0.001	1,192	A	0.221	0.002
		PM	5,400	3,430	B	0.635	3,439	B	0.637	0.002	3,448	B	0.639	0.004
College Boulevard to Faraday Avenue	NB	AM	5,400	970	A	0.180	976	A	0.181	0.001	982	D	0.182	0.002
		PM	5,400	2,510	A	0.465	2,519	A	0.466	0.002	2,528	A	0.468	0.003

TABLE 11–2
LONG-TERM STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Direction	Peak Hour	Capacity (LOS E) [a]	Long-Term without Project			Long-Term + Project (PAL1)				Long-Term + Project (PAL2)			
				Volume	LOS [b]	V/C	Volume	LOS	V/C	Δ[d]	Volume	LOS	V/C	Δ[d]
	SB	AM	5,400	2,520	A	0.467	2,529	A	0.468	0.002	2,538	A	0.470	0.003
		PM	5,400	1,480	A	0.274	1,489	A	0.276	0.002	1,498	B	0.277	0.003
Faraday Avenue to Palomar Airport Road	NB	AM	5,400	1,660	A	0.307	1,668	A	0.309	0.002	1,675	A	0.310	0.003
		PM	5,400	2,080	A	0.385	2,092	A	0.387	0.002	2,103	A	0.389	0.004
	SB	AM	5,400	2,180	A	0.404	2,192	A	0.406	0.002	2,203	A	0.408	0.004
		PM	5,400	2,240	A	0.415	2,252	A	0.417	0.002	2,263	A	0.419	0.004
Palomar Airport Road to Town Garden Road	NB	AM	5,400	1,800	A	0.333	1,812	A	0.336	0.003	1,823	A	0.338	0.005
		PM	5,400	1,800	A	0.333	1,812	A	0.336	0.003	1,823	A	0.338	0.005
	SB	AM	5,400	2,290	A	0.424	2,298	A	0.426	0.002	2,305	A	0.427	0.003
		PM	5,400	1,880	A	0.348	1,892	A	0.350	0.002	1,903	A	0.352	0.004
Town Garden Road to Camino Vida Roble	NB	AM	5,400	1,680	A	0.311	1,692	A	0.313	0.002	1,702	A	0.315	0.004
		PM	5,400	1,790	A	0.331	1,802	A	0.334	0.003	1,812	A	0.336	0.005
	SB	AM	5,400	1,790	A	0.331	1,798	A	0.333	0.002	1,804	A	0.334	0.003
		PM	5,400	2,260	A	0.419	2,272	A	0.421	0.002	2,282	A	0.423	0.004
Camino Vida Roble to Poinsettia Lane	NB	AM	3,600	1,760	A	0.489	1,777	A	0.494	0.005	1,792	A	0.498	0.009
		PM	3,600	1,640	A	0.456	1,657	A	0.460	0.004	1,672	A	0.464	0.008
	SB	AM	5,400	1,640	A	0.304	1,652	A	0.306	0.002	1,661	A	0.308	0.004
		PM	5,400	2,420	A	0.448	2,437	A	0.451	0.003	2,452	A	0.454	0.006
South of Poinsettia Lane	NB	AM	5,400	1,870	A	0.346	1,886	A	0.349	0.003	1,901	A	0.352	0.006
		PM	5,400	2,060	A	0.381	2,076	A	0.384	0.003	2,091	A	0.387	0.006
	SB	AM	5,400	1,830	A	0.339	1,841	A	0.341	0.002	1,850	A	0.343	0.004
		PM	5,400	2,520	A	0.467	2,536	A	0.470	0.003	2,551	A	0.472	0.005

TABLE 11–2
LONG-TERM STREET SEGMENT OPERATIONS DURING PEAK HOURS

Street Segment	Direction	Peak Hour	Capacity (LOS E) [a]	Long-Term without Project			Long-Term + Project (PAL1)				Long-Term + Project (PAL2)			
				Volume	LOS [b]	V/C	Volume	LOS	V/C	Δ[d]	Volume	LOS	V/C	Δ[d]
College Boulevard														
Faraday Avenue to Palomar Airport Road	NB	AM	3,600	1,350	A	0.375	1,351	A	0.375	0.000	1,352	A	0.376	0.001
		PM	3,600	600	A	0.167	602	A	0.167	0.000	602	A	0.167	0.000
	SB	AM	3,600	490	A	0.136	492	A	0.137	0.001	493	A	0.137	0.001
		PM	3,600	1,180	A	0.328	1,182	A	0.328	0.000	1,183	A	0.329	0.001

Footnotes:

a. Capacities based on 1,800 vehicles per lane per hour

b. Level of Service.

c. Volume to Capacity

d. Δ denotes a Project-induced increase in the Volume to Capacity Ratio

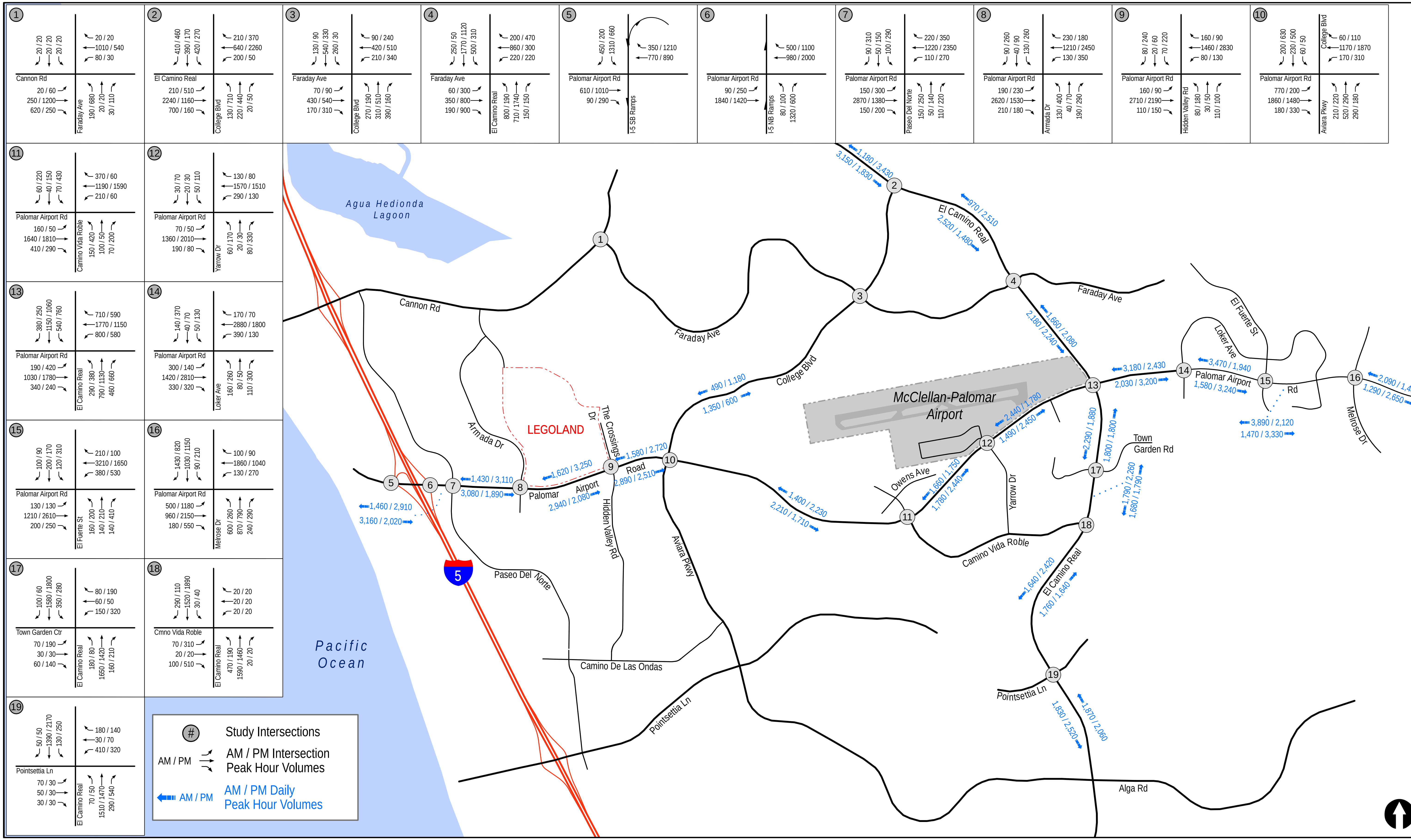

Figure 11-1

Horizon Year Traffic Volumes

McClellan-Palomar Airport Master Plan

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Date: 8/28/17

Linscott Law & Greenspan engineers

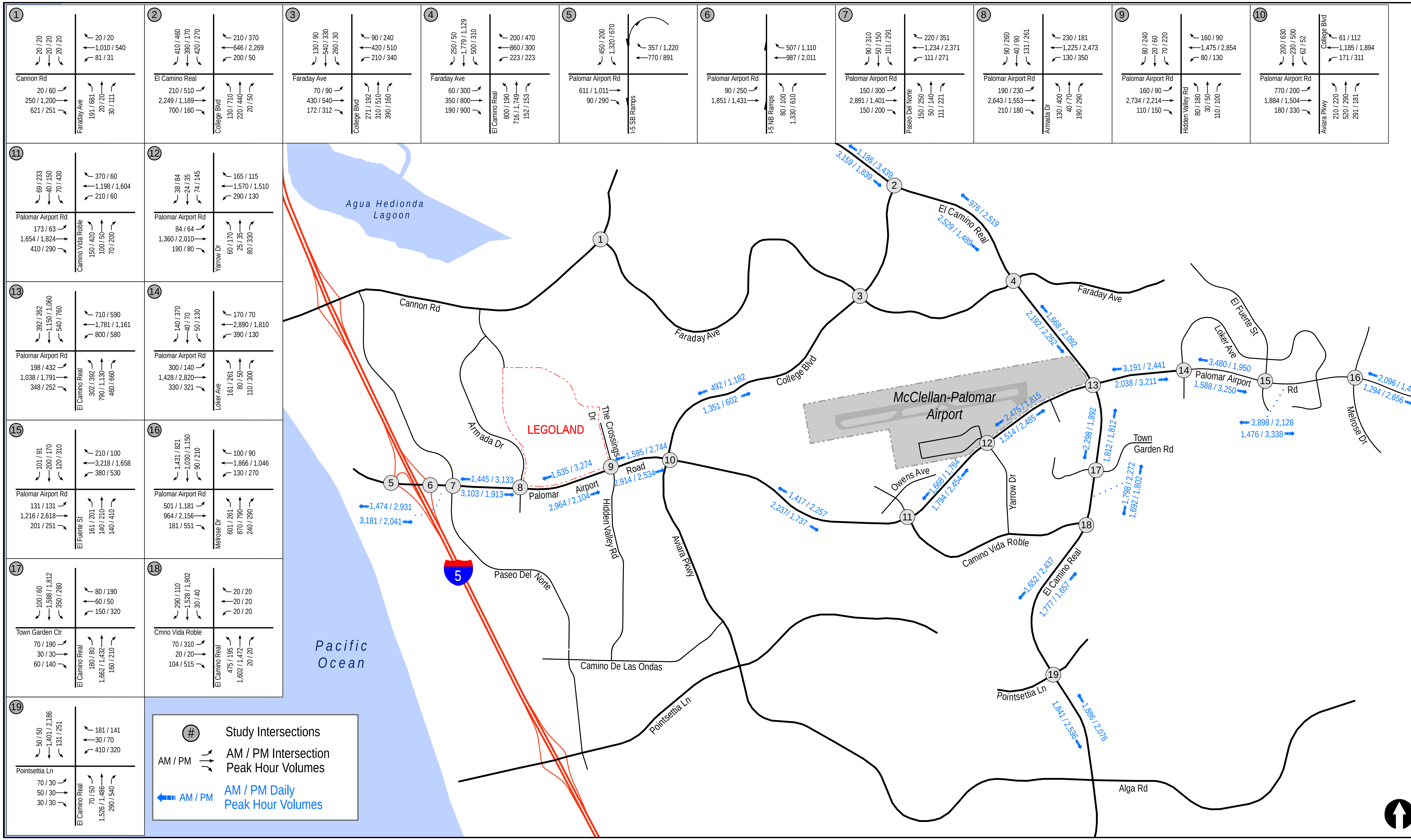

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Figure 11-2

Horizon Year + Long-Term Project (PAL 1) Traffic Volumes

McClellan-Palomar Airport Master Plan

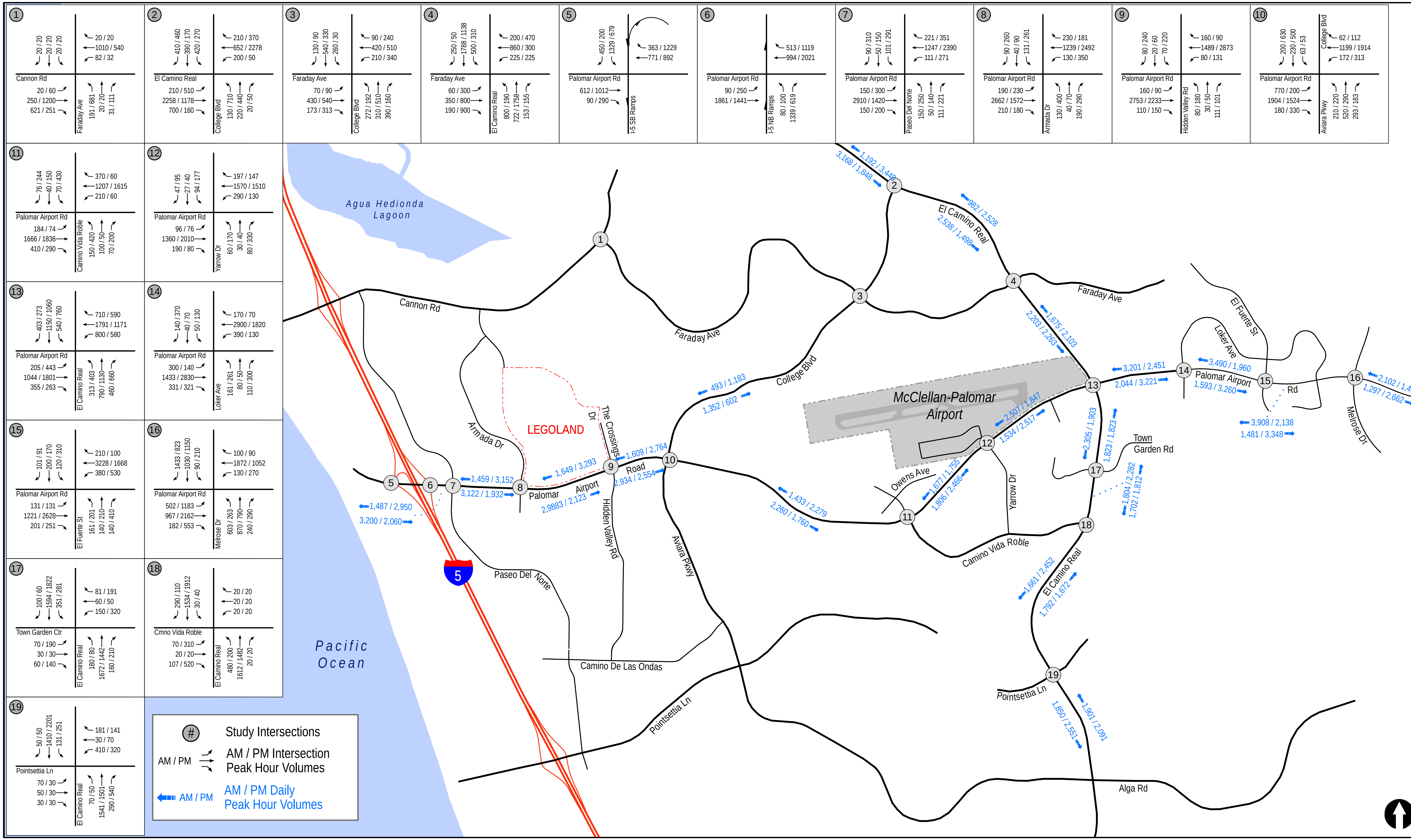

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Figure 11-3

Horizon Year + Long-Term Project (PAL 2) Traffic Volumes

McClellan-Palomar Airport Master Plan

12.0 PEDESTRIAN / BICYCLE / TRANSIT ANALYSIS

12.1 Overview

The City of Carlsbad requires multimodal level of service (MMLOS) evaluation for pedestrian, bicycle and transit/rideshare users of the public roadway system. The city organizes the street network by a system of "typologies," as defined by the City of Carlsbad Mobility Element. As seen in Table 3-1 of the City of Carlsbad Mobility Element, depending on the typology, different streets may require different MMLOS evaluations. For each roadway user set (pedestrian, bicycle, transit), general criteria groups have been identified. ***Table 12–1*** shows a summary of the criteria for each roadway user set based on the City of Carlsbad's MMLOS methodology.

TABLE 12–1
MULTIMODAL LEVEL OF SERVICE CRITERIA

Roadway Users		
Pedestrian	***Bicycle***	***Transit/Ridesharing***
Accessibility & Functionality	Street Characteristics	Access
Street Characteristics	Facility (each side of street)	Connectivity
Crossing Characteristics	Bikeway Design	Transit Priority
Other Elements	Connectivity/Contiguity	Service
–	Adjacent Vehicle Parking	Amenities
–	Other Elements.	Bicycle Accommodations
–	–	Ridesharing Potential

Source: Extracted from the City of Carlsbad MMLOS Scoring Criteria

Each roadway typography is evaluated for the particular set of roadway users based on sub-criteria, which is assigned "typology points". For example, within the *"Pedestrian-Accessibility and Functionality"* general criteria group, the following sub-criteria (with corresponding points) are considered:

- *Sidewalk meets ADA unobstructed width requirements (25 points)*
- *Ramps and landings within segment meet ADA requirements (20 points)*
- *Sidewalk segments meet ADA requirements (cross slopes and trip hazards) (15 points)*
- *Meets recommended sidewalk width for typology and adjacent land uses along frontage according to Mobility Element (10 points)*

The MMLOS analysis evaluates each of the sub-criteria, totals the points for the subject street typology, and compares the points to the City's MMLOS Point System and LOS Rating, shown in ***Table 12–2***. This table assigns a qualitative LOS to several ranges of points, similar to the application of LOS to ranges in delay for intersection operations.

TABLE 12–2
MMLOS POINT SYSTEM & LOS RATING

Point Score	*LOS*
90-100	A
80-90	B
70-80	C
60-70	D
50-60	E
0-50	F

Source: City of Carlsbad General Plan: Mobility Element

The City's Mobility Element calls for each street typology to achieve LOS D (equivalent to 60 points) or better operations for each general criteria group. It should be noted that scores in excess of 100 points can be achieved.

12.2 Project Roadway Evaluation

The City of Carlsbad identified the following roadways in the study area for MMLOS evaluation:

Palomar Airport Road is identified in the Mobility Element as an "Arterial Street". Based on the City's criteria for MMLOS evaluation, arterial streets are not subject to pedestrian or bicycle MMLOS standards. Therefore, only the following MMLOS "LOS D Standard" and corresponding analysis is required:

- Transit & Ridesharing MMLOS Criteria

Thus, Palomar Airport Road is to be evaluated <u>between the northwest corner of the Project frontage intersection</u> and the <u>eastbound transit stop located 200 feet east of Yarrow Drive</u>.

Yarrow Drive is identified in the Mobility Element as an "Industrial Street". Based on the City's criteria for MMLOS evaluation, industrial streets are not subject to pedestrian or bicycle MMLOS standards. Therefore, only the following MMLOS "LOS D Standard" and corresponding analysis is required:

- Transit & Ridesharing MMLOS Criteria

Thus, Yarrow Drive is to be evaluated <u>between the northwest corner of the Project frontage intersection</u> and the <u>westbound transit stop located 200 feet south of Palomar Airport Drive</u>.

12.3 MMLOS Results

12.3.1 *Palomar Airport Road – Transit and Ridesharing results*

Table 12–3 shows the Transit and Ridesharing MMLOS scoring criteria provided by the City of Carlsbad. As seen in *Table 12–3*, the existing transit amenities are identified based on street segment classification and proximate to the site as highlighted in yellow. When combined, these amenities achieve 100 points' worth of criteria in five (5) of the six (6) broad Transit and Ridesharing categories. This is sufficient to meet the minimum standard of 60 points.

12.3.2 *Yarrow Drive – Transit and Ridesharing results*

Table 12–3 shows that the existing transit amenities proximate to the site achieve 95 points' worth of criteria in five (5) of the six (6) broad Transit and Ridesharing categories. This is sufficient to meet the minimum standard of 60 points.

12.4 Conclusion

As discussed above, the City of Carlsbad requires MMLOS evaluation for pedestrian, bicycle, and transit/rideshare users of the public roadway system. Based on the City of Carlsbad Mobility Element and in consultation with City staff, a MMLOS study area was identified for the Project. Based on the significance criteria, analysis of pedestrian and bicycle MMLOS was not required. Upon evaluating the Project under the transit and ridesharing criteria, no MMLOS street segment impacts are calculated since the study area street segments are all calculated to operate at acceptable LOS.

Table 12–3
Transit and Ridesharing MMLOS Criteria

			"MMLOS = D" Standard Applies			"MMLOS = D" Standard Does Not Apply						
		Typology	Arterial Streets	Employment/ Transit Connector Street	Industrial Streets	Identity Streets	Village Streets	Arterial Connector Streets	Neighborhood Connector Street	Coastal Streets	School Streets	Local/ Neighborhood Street
	Criteria	Points										
Existing Transit Route Located within 1/4 Mile Walk from Roadway Section												
Access	No greater than 1/4 mile walk to the nearest transit stop	40	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	No greater than 1/2 mile walk to the nearest transit stop	20	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	No greater than 1 mile bicycle ride to the nearest transit stop	10	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	ADA compliant connections to transit stops	20	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
Connectivity	Multiple transit routes stop on segment	10	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	Route provides a direct link to a COASTER station or mobility hub	30	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	Route provides for a single transfer to reach a COASTER station or mobility hub	15	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
Transit priority	Dedicated right of way	5	◊	◊	◊	*	*	*	*	*	*	*
	Transit priority during peak hours	5	*	*	*	*	*	*	*	*	*	*
Service	Headways of- 15 minutes between 6:30-8:30 am and 4-6 pm on weekdays	20	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	Headways of 30 minutes between 6:30-8:30 am and 4-6 pm on weekdays	10	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	Headways of 1 hour between 6:30-8:30 am and 4-6 pm on weekdays	5	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	No more than 2 hour headways between 6 am and 7 pm on weekdays	5	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	No more than 2 hour headways between 9 am and 5 pm on weekends	5	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
Amenities	Covered bus stops	20	◊	◊	◊	◊	◊	◊	◊	◊	◊	*
	Bench	20	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	Well-lit stop that provides a sense of security	20	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	Trash cans	5	◊	◊	◊	◊	◊	◊	◊	◊	◊	*
	Bus stop located within a block of commercial services	5	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
Bicycle Accommodations	Bike parking available at the bus stop	10	◊	◊	◊	◊	◊	◊	◊	◊	◊	*
	Buses that provide on-board bike racks	5	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
No Existing Transit Route Located within 1/4 Mile Walk from Roadway Section (or by approval of the City Traffic Engineer)												
Ridesharing Potential	Documented TDM measures are in place that promote ridesharing	60	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	On demand service is subsidized for trips to transit service	60	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
	Segment within FLEX service area	60	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊

Source: City of Carlsbad

13.0 VEHICLE MILES TRAVELED (VMT) ANALYSIS

In 2013, California Governor Jerry Brown signed into law Senate Bill 743 (SB 743), which created a new statewide approach to transportation and land use planning. A key aspect of this new approach looks at the relationship between new development and the number of "vehicle miles traveled" (VMT) generated by a development. Since SB 743 was passed, the state Office of Planning & Research (OPR) has been working to prepare draft revisions to the State's CEQA Guidelines. At the time of this writing, evaluation of transportation impacts using the VMT metric is not required by the State or County CEQA Guidelines, and LOS is the official metric for identifying impacts and mitigation. However, for informational purposes only, this section presents a voluntary evaluation of the potential VMT that could be generated by the Project.

In an effort to provide an evaluation of VMT, an analysis was conducted to document the Project's potential VMT and Average Vehicle Trip Length (ATL) per assigned vehicle trip. SANDAG's April 2002 *(Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region* reports an ATL of 12.5 miles for any airport and states "trip lengths are average weighted for all trips to and from the land use site." The SANDAG trip length is for any given airport, which could range from large commercial hub (e.g., international) airports to nonprimary reliever or general aviation airports. Based on the fact that the Project will not provide as many services as a large commercial hub airport but is still in relative proximity to other airports, and the fact that McClellan-Palomar Airport will generate most of its trips from cities and communities located in northern San Diego County, an ATL of 6.25 miles was estimated for the Project. In addition, the availability of other general aviation airports such as Montgomery-Gibbs and Gillespie Field will shorten the distance patrons need to drive to the McClellan-Palomar Airport.

Table 13–1 shows the VMT calculations for both Project alternatives (PAL1 and PAL2). Using the estimated ATL, the total daily VMT generated by the Project was calculated by multiplying the Project ATL by the Project trip generation.

TABLE 13–1
PROJECT-GENERATED VEHICLE MILES TRAVELED

Project Scenario	Average Trip Length (miles)**	Average Daily Vehicle Trips	Daily Vehicle Miles Traveled (miles)*
Near-Term Project (PAL1)	6.25	449	2,807
Near-Term Project (PAL2)	6.25	844	5,275
Long-Term Project (PAL1)	6.25	2,230	13,938
Long-Term Project (PAL2)	6.25	4,206	26,288

*Rounded up to whole number.

** Trip length is the average of all trips generated by the airport, including employees, patrons, deliveries, etc.

14.0 SIGNIFICANCE OF IMPACTS AND MITIGATION MEASURES

Per City of Carlsbad significance thresholds and the analysis methodology presented in this report, no significant direct impacts are calculated. Two (2) significant cumulative impacts are calculated. The following section lists the significant impacts and provides recommendations for mitigation measures to address operating deficiencies. Also included is the results of a phasing analysis to determine the amount of enplanements that could occur before the impacts would occur.

14.1 Significance of Impacts

Based on the applied significance criteria, the following significant cumulative impacts were calculated at the following locations:

Intersections

a. Palomar Airport Road / Camino Vida Roble (cumulative impact)
b. Palomar Airport Road / El Camino Real (cumulative impact)

Segments

Based on the applied significance criteria, the Project was calculated to have no significant impacts at any of the study area street segments in the near-term or long-term conditions.

14.2 Phasing Analysis

An analysis was conducted to determine the amount of traffic which can be added to each intersection before the significant impact would be triggered using City criteria. Those volumes were then correlated to the amount of enplanements that would produce that volume. Based on the City of Carlsbad's significance criteria, the Project would have a significant impact once the Project increases the intersection delay by more than 2.0 seconds.

Using the Project trip generation and trip distribution, the amount of peak hour traffic that would cause a 2.0 second delay increase was calculated. This amount of peak hour traffic was then correlated to the daily and peak hour enplanements using the trip generation factors. ***Appendix G*** contains the calculation sheets. The significant impact at the Palomar Airport Road / Camino Vida Roble intersection would occur at 1,260 daily enplanements and the impact at the Palomar Airport Road / El Camino Real intersection would occur at 670 daily enplanements.

14.3 Mitigation

The following mitigation measures are recommended to mitigate the significant impacts. Both mitigation measures recommend the payment of a fair share amount. Using the standard fair share formula of [Project traffic/(Long-Term – Existing traffic)], fair share percentages were calculated. ***Appendix H*** shows the fair share calculations:

Per the City of Carlsbad's Mobility Element, Palomar Airport Road from Interstate-5 to College Boulevard and from El Camino Real to Melrose Drive are exempt from City LOS standards. Therefore, the City plans to implement transportation demand management, transportation system management, and livable streets techniques to better manage the transportation system as a whole.

Transportation System Management (TSM) strategies can include implementation of advanced signal timing procedures that use real-time traffic data to adjust signals to events that cannot be anticipated by traditional time-of-day plans, such as accidents and road construction. TSM strategies include enhanced multimodal traffic signal operations, enhanced traffic incident management, and transit signal priority.

It is recommended that the Project contribute a fair share towards the implementation of TSM strategies along Palomar Airport Road. The following are the specific mitigation measures.

a. Palomar Airport Road / Camino Vida Roble

Paying a fair share (10.7%) towards the installation of TSM strategies that improve signal operations along Palomar Airport Road that would include this intersection would mitigate the significant cumulative impact.

b. Palomar Airport Road / El Camino Real

Paying a fair share (7.5%) towards the installation of TSM strategies that improve signal operations along Palomar Airport Road that would include this intersection would mitigate the significant cumulative impact.

McClellan-Palomar AIRPORT

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http://www.sandiegocounty.gov/dpw/airports/palomar.html

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Expect More. Experience Better.