CITY OF REDONDO BEACH
HARBOR COMMISSION AGENDA
Monday, October 13, 2025

415 DIAMOND STREET, REDONDO BEACH

CITY COUNCIL CHAMBER

REGULAR MEETING OF THE HARBOR COMMISSION - 6:30 PM

ALL PUBLIC MEETINGS HAVE RESUMED IN THE COUNCIL CHAMBER. MEMBERS OF THE PUBLIC MAY PARTICIPATE IN-PERSON, BY ZOOM, EMAIL OR eCOMMENT.

Harbor Commission meetings are broadcast live through Spectrum Cable, Channel 8, and Frontier Communications, Channel 41. Live streams and indexed archives of meetings are available via internet. Visit the City's office website at www.Redondo.org/rbtv.

TO WATCH MEETING LIVE ON CITY'S WEBSITE:
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After registering, you will receive a confirmation email containing information about joining the meeting.
If you are participating by phone, be sure to provide your phone # when registering. You will be provided a Toll Free number and a Meeting ID to access the meeting. Note; press # to bypass Participant ID. Attendees will be muted until the public participation period is opened. When you are called on to speak, press *6 to unmute your line. Note, comments from the public are limited to 3 minutes per speaker.

eCOMMENT: COMMENTS MAY BE ENTERED DIRECTLY ON WEBSITE AGENDA PAGE:
https://redondo.granicusideas.com/meetings
1) Public comments can be entered before and during the meeting.
2) Select a SPECIFIC AGENDA ITEM to enter your comment;
3) Public will be prompted to Sign-Up to create a free personal account (one-time) and then comments may be added to each Agenda item of interest.
4) Public comments entered into eComment (up to 2200 characters; equal to approximately 3 minutes of oral comments) will become part of the official meeting record. Comments may be read out loud during the meeting.

EMAIL: TO PARTICIPATE BY WRITTEN COMMUNICATION WITH ATTACHED DOCUMENTS BEFORE 3PM DAY OF MEETING:
Written materials that include attachments pertaining to matters listed on the posted agenda received after the agenda has been published will be added as supplemental materials under

the relevant agenda item. Mio.Iwasaki@redondo.org

REGULAR MEETING OF THE HARBOR COMMISSION - 6:30 PM

A. CALL TO ORDER

B. ROLL CALL

C. SALUTE TO THE FLAG

D. APPROVE ORDER OF AGENDA

E. BLUE FOLDER ITEMS - ADDITIONAL BACK UP MATERIALS

Blue folder items are additional back up material to administrative reports and/or public comments received after the printing and distribution of the agenda packet for receive and file.

E.1. For Blue Folder Documents Approved at the Harbor Commission Meeting

F. CONSENT CALENDAR

Business items, except those formally noticed for public hearing, or those pulled for discussion are assigned to the Consent Calendar. The Commission Members may request that any Consent Calendar item(s) be removed, discussed, and acted upon separately. Items removed from the Consent Calendar will be taken up under the "Excluded Consent Calendar" section below. Those items remaining on the Consent Calendar will be approved in one motion. The Chair will call on anyone wishing to address the Commission on any Consent Calendar item on the agenda, which has not been pulled by the Commission for discussion. Each speaker will be permitted to speak only once and comments will be limited to a total of three minutes.

F.1. APPROVAL OF AFFIDAVIT OF POSTING FOR THE HARBOR COMMISSION MEETING OF OCTOBER 13, 2025

F.2. APPROVAL OF THE FOLLOWING MINUTES: SEPTEMBER 8, 2025

G. EXCLUDED CONSENT CALENDAR ITEMS

H. PUBLIC PARTICIPATION ON NON-AGENDA ITEMS

This section is intended to provide members of the public with the opportunity to comment on any subject that does not appear on this agenda for action. This section is limited to 30 minutes. Each speaker will be afforded three minutes to address the Commission. Each speaker will be permitted to speak only once. Written requests, if any, will be considered first under this section.

H.1. For eComments and Emails Received from the Public

I. EX PARTE COMMUNICATION

This section is intended to allow all officials the opportunity to reveal any disclosure or ex parte communication about the following public hearings.

J. PUBLIC HEARINGS

K. ITEMS CONTINUED FROM PREVIOUS AGENDAS

L. ITEMS FOR DISCUSSION PRIOR TO ACTION

L.1. HARBOR COMMISSION NOMINATIONS AND ELECTION OF CHAIRPERSON AND VICE CHAIR

L.2. DISCUSSION AND POSSIBLE ACTION ON A RECOMMENDATION TO CITY COUNCIL TO AUTHORIZE STAFF TO APPLY FOR A GRANT FROM THE CALIFORNIA DIVISION OF BOATING & WATERWAYS TO FUND A NEW PUBLIC BOAT LAUNCH AND TO IDENTIFY A RECOMMENDED PREFERRED LOCATION FOR THE NEW PUBLIC BOAT LAUNCH ON MOLE D AS A PART OF THE GRANT APPLICATION SUBMITTAL

M. ITEMS FROM STAFF

M.1. LIAISON'S REPORT

N. COMMISSION MEMBER ITEMS AND FUTURE COMMISSION AGENDA TOPICS

O. ADJOURNMENT

The next meeting of the Redondo Beach Harbor Commission will be a regular meeting to be held at 6:30 p.m. on November 10, 2025, in the Redondo Beach Council Chambers, at 415 Diamond Street, Redondo Beach.

It is the intention of the City of Redondo Beach to comply with the Americans with Disabilities Act (ADA) in all respects. If, as an attendee or a participant at this meeting you will need special assistance beyond what is normally provided, the City will attempt to accommodate you in every reasonable manner. Please contact the City Clerk's Office at (310) 318-0656 at least forty-eight (48) hours prior to the meeting to inform us of your particular needs and to determine if accommodation is feasible. Please advise us at that time if you will need accommodations to attend or participate in meetings on a regular basis.

An agenda packet is available 24 hours at www.redondo.org under the City Clerk.

Administrative Report

E.1., **File #** HC25-1413 **Meeting Date:** 10/13/2025

TITLE

For Blue Folder Documents Approved at the Harbor Commission Meeting

Administrative Report

F.1., **File #** HC25-1414 **Meeting Date:** 10/13/2025

TO: HARBOR COMMISSION

FROM: GREG KAPOVICH, WATERFRONT & ECONOMIC DEVELOPMENT DIRECTOR

TITLE

APPROVAL OF AFFIDAVIT OF POSTING FOR THE HARBOR COMMISSION MEETING OF OCTOBER 13, 2025

ATTACHMENTS

- AFFIDAVIT OF POSTING - OCTOBER 13, 2025

REDONDO BEACH

Waterfront & Economic Development Department
415 Diamond Street
Redondo Beach CA90277

Tel: 310.697.4631

Redondo.org

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) SS
CITY OF REDONDO BEACH)

AFFIDAVIT OF POSTING

In compliance with the Brown Act, the following materials have been posted at the locations indicated below.

Legislative Body	Harbor Commission
Posting Type	Regular Meeting Agenda
Posting Locations	415 Diamond Street, Redondo Beach, CA 90277 ✓ Adjacent to Council Chambers
Meeting Date & Time	October 13, 2025, 6:30 pm

As the W.E.D. representative at the City of Redondo Beach, I declare, under penalty of perjury, the document noted above was posted at the date displayed below.

Mio Iwasaki, Administrative Analyst, Waterfront & Economic Development

Date: October 9, 2025

Administrative Report

F.2., **File #** HC25-1415 **Meeting Date:** 10/13/2025

TO: HARBOR COMMISSION

FROM: GREG KAPOVICH, WATERFRONT & ECONOMIC DEVELOPMENT DIRECTOR

TITLE

APPROVAL OF THE FOLLOWING MINUTES: SEPTEMBER 8, 2025

ATTACHMENT

- MEETING MINUTES - SEPTEMBER 8, 2025

CITY OF REDONDO BEACH
HARBOR COMMISSION MINUTES
Monday, September 8, 2025

REGULAR MEETING OF THE HARBOR COMMISSION – 6:30 PM

A. CALL TO ORDER

A meeting of the Harbor Commission was held at the City of Redondo Beach City Council Chambers and was called to order by Chair Callahan at 6:30 p.m.

B. ROLL CALL

Commissioners Present: Abelman, Bauer, Carlson, Chrzan, Coller, Falk, Chair Callahan

Officials Present: Greg Kapovich, W.E.D. Director
Katherine Buck, W.E.D. Manager
Dave Charobee, Senior Management Analyst
Mio Iwasaki, Administrative Analyst

C. SALUTE TO THE FLAG

Commissioner Chrzan led in the salute to the flag.

D. APPROVAL OF ORDER OF AGENDA

Motion by Commissioner Coller, seconded by Commissioner Bauer, to approve the order of the agenda, as presented. Hearing no objections, Chair Callahan so ordered.

E. BLUE FOLDER ITEMS – ADDITIONAL BACK UP MATERIALS

E.1. For Blue Folder Documents Approved at the Harbor Commission Meeting

W.E.D. Director Kapovich reported two items under Blue Folder Items related to presentations from the Police Department and Harbor Patrol and stated they will be emailed to the Commission after the meeting.

The Commission concurred to receive and file Blue Folder Items.

F. CONSENT CALENDAR

F.1. APPROVAL OF AFFIDAVIT OF POSTING FOR THE HARBOR COMMISSION MEETING OF SEPTEMBER 8, 2025

F.2. APPROVAL OF THE FOLLOWING MINUTES: AUGUST 11, 2025

There were no public comments on the Consent Calendar.

Motion by Commissioner Chrzan, seconded by Commissioner Falk, to approve the Consent Calendar, as presented. Hearing no objections, Chair Callahan so ordered.

G. EXCLUDED CONSENT CALENDAR ITEMS - None

H. PUBLIC PARTICIPATION ON NON-AGENDA ITEMS - None

H.1. For eComments and Emails Received from the Public

Chair Callahan invited public comments.

There were no public comments.

I. EX PARTE COMMUNICATION - None

J. PUBLIC HEARINGS - None

K. ITEMS CONTINUED FROM PREVIOUS AGENDAS - None

L. ITEMS FOR DISCUSSION PRIOR TO ACTION

L.1. PUBLIC SAFETY REPORT

W.E.D. Director Kapovich introduced Sergeant Brian Weiss from RBPD; mentioned a new Redondo Pier Sergeant who will be giving reports to the Commission at future meetings, but he was unable to attend tonight and deferred to Sergeant Weiss for a presentation.

RBPD Sergeant Weiss presented details of June, July and August crime statistics.

Discussion followed regarding eBike enforcement, bike rodeos and certification, continued outreach, coordination with other police agencies, schools and clubs, rewarding positive behavior, reduction in Part 1 crimes, theft on boats, calls for service on the pier, increasing educational events about allowed fishing areas and safety, graffiti enforcement, increasing camera surveillance, assaults and trends on the docks in the harbor area, and transient outreach and enforcement.

Harbor Master Mahoney narrated a PowerPoint presentation with details of Redondo Beach Harbor Patrol operations for January through June 2025.

Discussion followed regarding the effect on personal services (i.e., boat tow) responses as a result of implementing fees, boat fires involving gasoline, reduction in incidents of

parties/swimmers in the harbor, the use of hydrofoils in the harbor, the newsletter, and the possibility of implementing a “flare day” in Redondo Beach Harbor or LA County.

Motion by Commissioner Chrzan, seconded by Commissioner Coller, to receive and file the Public Safety Reports. Hearing no objections, Chair Callahan so ordered.

M. ITEMS FROM STAFF

M.1. LIAISON’S REPORT

W.E.D. Director Kapovich addressed an upcoming Water Polo event at the waterfront, the community workshop for the public boat launch, new leases, and announced the next meeting of the Harbor Commission.

Additionally, he commented on this being Chair Callahan’s last meeting and on her ten years of service.

N. COMMISSION MEMBER ITEMS AND FUTURE COMMISSION AGENDA TOPICS

Chair Callahan expressed her enjoyment at working on the many issues and projects through the years; voiced her appreciation to prior Mayors and colleagues and felt confidence in the Commission’s work to carry on the rich tradition of serving the interests of the City.

Commissioner Carlson reported that early planning has begun for the Holiday Boat Parade and talked about involving the south end of the harbor.

Commissioner Chrzan mentioned the International Outrigger Distance Championships and the participation of several Redondo Beach residents.

O. ADJOURNMENT – 7:30 p.m.

Motion by Commissioner Abelman, seconded by Commissioner Chrzan, to adjourn the Harbor Commission meeting at 7:30 p.m. Hearing no objections, Chair Callahan so ordered.

Chair Callahan adjourned the meeting noting the next meeting of the Redondo Beach Harbor Commission is scheduled for 6:30 p.m. on October 13, 2025, in the Redondo Beach Council Chambers at 415 Diamond Street, Redondo Beach, California.

All written comments submitted via eComment are included in the record and available for public review on the City website.

Respectfully submitted:

_____

Greg Kapovich
W.E.D. Director

Administrative Report

H.1., **File #** HC25-1416 **Meeting Date:** 10/13/2025

TITLE

For eComments and Emails Received from the Public

Administrative Report

L.1., **File #** HC25-1417 **Meeting Date:** 10/13/2025

TO: HARBOR COMMISSION

FROM: GREG KAPOVICH, WATERFRONT & ECONOMIC DEVELOPMENT DIRECTOR

TITLE

HARBOR COMMISSION NOMINATIONS AND ELECTION OF CHAIRPERSON AND VICE CHAIR

Administrative Report

L.2., **File #** HC25-1390 **Meeting Date:** 10/13/2025

TO: HARBOR COMMISSION

FROM: GREG KAPOVICH, WATERFRONT & ECONOMIC DEVELOPMENT DIRECTOR

TITLE

DISCUSSION AND POSSIBLE ACTION ON A RECOMMENDATION TO CITY COUNCIL TO AUTHORIZE STAFF TO APPLY FOR A GRANT FROM THE CALIFORNIA DIVISION OF BOATING & WATERWAYS TO FUND A NEW PUBLIC BOAT LAUNCH AND TO IDENTIFY A RECOMMENDED PREFERRED LOCATION FOR THE NEW PUBLIC BOAT LAUNCH ON MOLE D AS A PART OF THE GRANT APPLICATION SUBMITTAL

EXECUTIVE SUMMARY

City Staff seeks authorization from City Council to apply for a grant from the State of California's Division of Boating and Waterways (DBW) to cover the costs of constructing a public boat launch on Mole D. Staff is seeking a recommendation from the Harbor Commission advising City Council to authorize staff to apply for the grant. The application is due to DBW by February 2, 2026 and the submittal package requires an identified preferred location. City Staff is also seeking a recommendation from the Harbor Commission on a preferred location for the boat launch, which will be included as a part of the grant application.

In 2024, the City entered into a contract with Moffatt & Nichol, an Engineering firm with experience in designing boat launches nationwide. The first phase of the contract is underway and requires the consultant to conduct necessary technical studies such as traffic, parking, wave attenuation, and overall demand, identify location options along Mole D that adhere to the completed studies and are large enough to conceptually accommodate minimum boat launch design standards, and assist with the submittal of a grant application to DBW. If the City is awarded funding for the boat launch project, the consultant would further refine designs within the preferred location to accommodate exact sizing and placement of other elements of the boat launch such as a boat wash-down area, pay station, open space, relocated commercial structures, etc. For purposes of the grant application, the preferred location need only be detailed enough to illustrate that the area can meet minimum standards.

The consultants have identified several locations on Mole D for the placement of the boat launch. Supporting studies completed to date indicate that a two-lane ramp meets regional demand. The identified locations for a two-lane boat launch can be accommodated within the Mole D area and adhere to minimum parking/circulation requirements. On September 23, 2025, the City hosted a public workshop to review the three locations and to gather the public's feedback. Staff is now

approaching Harbor Commission to discuss and consider making a recommendation to proceed with the grant application to DBW and identify a preferred location to accompany the grant application submittal.

BACKGROUND

Unlike many regional harbors, King Harbor has historically been without a public boat launch, instead relying on boat hoists. Since 1959 the City has examined over 20 potential locations across Moles A, B, C, and D to build a public boat launch in accordance with direction from the Coastal Commission and to satisfy the requirements of Measure C. Measure C was a voter initiative that places emphasis on improvements to the King Harbor Marina that are recreational in nature, inclusive of a public boat launch. Measure C not only requires that a boat launch be constructed but it stipulates that the ramp must include two lanes, 60 trailer parking spaces, be located a safe distance from the hand launch, not reduce the number of boat slips in the marina, operate in normal surge conditions, avoid locations where waves overtop the break wall, and is designed to meet minimum DBW design standards for boat launch ramps.

The most recent locations considered were along Mole C in 2015 and on Mole B in 2017. The Mole C location was not of sufficient size to meet minimum Measure C parking requirements. In addition, the general public cited concerns with ingress/egress to the site. There were two options considered for Mole B. Neither option could accommodate the parking requirements outlined by Measure C. In addition, option 1 along Mole B resulted in a net loss of slips as well as a narrow channel between the end of the boat ramp and existing slips to the north. Option 2 on Mole B required the proposed boat launch to extend west from Mole B and due to the elevation change between Mole B and the water required the boat launch to over-extend into the main channel, which was not supported by the public.

In 2022, City Council approved the Public Amenities Plan which identified Mole D as the location for the public boat launch ramp within King Harbor. Mole D was favored by the general public, Harbor Commission, and City Council citing its proximity to the open water, as well as its size which can accommodate necessary parking and circulation.

The next step in the boat launch schedule is applying for a Boat Launching Facilities (BLF) grant from the State of California's Division of Boating & Waterways (DBW) which would fund the permitting and construction of the public boat launch. The grant will not fund "pre-planning" phases, which includes preparation of a grant application, entitlement approval, or CEQA review. City Council appropriated approximately $650,000 in the FY 2025-26 budget to cover the pre-planning phases. City staff and the consultant are currently working on the grant application. Should the City receive a grant funding award from DBW, staff would advance the City funded portion of the project to the entitlement phase, which includes more community outreach to design the specific preferred location, perform a CEQA environmental analysis, and obtain Harbor Commission and Coastal Commission approvals. Once complete, the awarded grant funding from DBW would cover preparation of plans and specifications for building permit submittal, building permits, and construction.

The consultant created six location alternatives along Mole D that could be designed to accommodate the results of the technical studies, meet minimum DBW design standards, and

minimum Measure C requirements. Staff and the consultant narrowed the alternatives down to three, referred to as alternative A, B, and C. The three other designs that were eliminated from consideration were variations of Option C whereby the boat ramp faced west and had similar advantages/disadvantages; including the need for a 10-15-foot-tall sheet pile wall to eliminate wave uprush into the Mole D parking lot (more details to follow).

Grant Program Considerations

The Division of Boating & Waterways Boat Launching Facilities grant program provides 100% funding for the building permit process and construction of public launch infrastructure. City funding will cover conceptual plans, grant application submittal process, environmental (CEQA) review, and entitlements. The grant program would cap the boat launch usage and parking fee to $13 per launch for the first year with subsequent annual adjustments tied to the consumer price index. To qualify for the 2026/2027 application cycle for this grant, City Council must choose a preferred option and prepare a resolution to be included with the application package due by February 2, 2026. The City's work to date, including the demand study, conceptual layouts, environmental and coastal hazard reconnaissance, traffic and parking analysis, and public outreach aligns with submittal expectations. DBW emphasizes equitable access, limited impact on the environment, and year-round ramp functionality as desirable criteria in selecting which boat launch applications to fund.

Technical Study Findings

The Boat Launch Demand Study is a required study for the DBW grant. It assists in identifying how many boaters are expected to utilize the new boat launch, which in turn helps designers determine the appropriate number of lanes to accommodate demand. Through this study, the consultants calculated that approximately 54 new vehicle trips would occur on Mole D with the construction of a boat launch. The consultant and study determined that a two-lane ramp would cover the demand. Each of the location alternatives under consideration by the Harbor Commission and City Council include two-lanes.

The Transportation Impact and Parking Study evaluated whether or not the proposed boat launch would have adverse impacts to traffic or parking on Mole D. As concluded in the demand study, the boat launch ramp on Mole D is anticipated to add 54 vehicle trips to Mole D. The Transportation Study evaluated the level of service at the existing intersections along Harbor Drive at Herondo Street, Yacht Club Way, and Beryl Street. It also evaluated the intersections at Herondo Street & Francisca and Catalina Avenue & Beryl Street. The study concluded that the addition of 57 vehicle trips per day does not reduce the levels of service at any of the aforementioned intersections.

The City Traffic Engineer recommends slight modifications to the existing ingress/egress driveway accessed off of Harbor Drive. Currently, the driveway is wide enough to accommodate three lanes of vehicles (one inbound and two outbound). The City Traffic Engineer recommends a slight reduction in driveway width to eliminate the third lane while maintaining adequate width for the turning radius of large vehicles with trailers. Existing medians within the driveway would be removed and the sidewalk would be reconfigured to the adequate width. The new design could also accommodate additional pedestrian/bicycle alert signals or ground material changes to further reduce conflict between

pedestrians and users of the bike lane. Design criteria to be considered after the City is awarded grant money during the entitlement process, which will include additional community input. In addition to the physical driveway improvements, the City Traffic Engineer will also prohibit vehicles with trailers from turning right (south) onto Harbor Drive when leaving the Mole D surface parking lot. The intersection at Pacific Avenue and Catalina Avenue does not accommodate the necessary turning radius of a vehicle with a trailer. All vehicles with trailers will be required to turn left (north) onto Harbor Drive and can utilize either Beryl Street or Herondo Street to leave the area.

The Parking Study found that the two existing surface lots on Mole D provide 719 spaces in total; 382 in the north lot (Seaside Lagoon and CA Surf Club side) and 337 in the south lot (Cantina, R10 side). The placement of a new boat launch on Mole D will result in a net loss of existing parking stalls to accommodate circulation, the boat launch itself, and the inclusion of trailer parking as required by Measure C.

Reconfiguration of the north and south lots yields a compliant supply of regular, ADA, vehicle-plus-trailer, and RV-plus-trailer spaces to serve all existing tenants and the new proposed ramp. This would allow for the boat launch to accommodate the required parking indicated by the Demand & Parking study in addition to what is required under Measure C.

With the boat launch, both lots are reconfigured to a combined 525 spaces: 465 regular (including ADA), 54 vehicle-plus-trailer (including ADA), and 6 RV-plus-trailer. This results in a net reduction of 194 regular spaces but an increase of 6 trailer spaces plus 6 new RV-plus-trailer spaces. The 525 total parking spaces are sufficient to meet the parking requirements for all existing buildings and uses on Mole D, inclusive of the new proposed boat launch.

The Coastal Criteria and Hazards Analysis is a required report to apply for a Coastal Development Permit from the California Coastal Commission. The study demonstrates that the City is addressing future sea level rise to explore the impact on the locations. Modeling and short-term wave measurements inside the harbor show that operational wave heights at proposed sites are generally low under typical conditions, with storm periods generating more significant swells. The studies also looked at a worst-case-scenario in the form of the impact of a once-in-100-year storm surge. Sea-level rise should be accommodated over the service life of the boat launch and can be planned for via freeboard, grading, and adaptable features in design. The technical data indicated that the wave attenuation would have the most impact on Option C, thus requiring a 10-15-foot-tall sheet pile wall situated 50 feet from the toe of the boat launch to mitigate wave attenuation run-up and parking lot flooding. The study identified the least amount of sea level rise impact on Option A with more of an impact on Option B, but not enough to require a sheet pile wall.

Location Options

Attachment 1 includes each of the three proposed location options presented to the community during the community workshop and are under consideration for the grant application.

Option A - Option A locates the ramp near the southern tip of Mole D and provides the most efficient land side design for queuing and circulation of vehicles. It provides minimal disruption of the

pedestrian promenade and does not present a scenario in which vehicles with trailers are reversing across a pedestrian walkway. The ramp itself is the shortest of the three options due to the existing grade of this particular area of Mole D and it has the lowest expected wave run-up due to its protected location closest to the Basin III marina. For these reasons it is also likely to be the least expensive option. A portion of the existing dock infrastructure would need to be removed to accommodate the ramp opening but the option includes construction of new dock area to the west of the ramp to accommodate a vessel queuing area on the water.

The drawback of option A is that the ramp reduces the channel width to 130 feet. Pursuant to DBW requirements, at least 50 feet of channel width measured from the toe of the ramp is required to accommodate boats utilizing the ramp. In addition to boats utilizing the new boat launch, there are existing commercial and recreational boats located within 58 slips and 4 dock areas in Basin III. Therefore, additional channel width must be accommodated for two-way vessel traffic. According to DBW standards, the required width for each vessel lane is 30 feet, or 60 feet for two-way traffic. In total, DBW requirements stipulate a channel width of 110 feet is required to accommodate boat launch users and Basin III vessel traffic where Option A provides 130 feet. It is also important to note that Basin III contains commercial vessel operators that rent stand up paddleboards, pedal boats, and duffy boats for use by the general public. All three examples are small, slow-moving and are often utilized by inexperienced operators. DBW standards base channel lane width requirements on the slip that can accommodate the largest vessel operating within Basin III. A stand-up paddleboard, pedal boat, and duffy boat are all smaller than said largest vessel and as such the DBW requirement that 30-foot-wide vessel lanes be provided will accommodate those users. However, there is concern that the inexperienced user of pedal boats/paddleboards/duffy boats will attempt to traverse the narrow channel width while two larger vessels already occupy the travel lanes.

Option B - Option B is similar to Option A in that the ramp faces south. However, the ramp has been moved further west, within the footprint of the existing Cantina restaurant. Vehicle circulation and queuing on landside must also shift west reducing the landside vehicle efficiency and causing vehicles with trailers to make sharper turns when approaching or leaving the launch ramp. The overall grade at the top of the ramp would increase two feet in height when compared to Option A to accommodate slightly higher grade elevations at this point on Mole D as well as slightly higher wave uprush. Wave uprush is expected to be higher in Option B due to its location closer west where wave attenuation is higher. That said, a sheet pile wall to protect against wave uprush is not needed. Due to the higher overall grade at the top of ramp, the ramp itself has a greater overall length than Option A and is therefore projected to be more expensive. Where landside vehicle circulation efficiency is reduced, waterside navigability is gained. By shifting the south facing ramp further west the design takes advantage of the angle of the existing south breakwater wall, which results in a widened channel. Option B results in a channel width of approximately 170 feet, or 40 feet wider than Option A.

Option C - Option C completely changes the angle of the proposed boat ramp to face west. It is in close proximity to the hand launch and is located adjacent to the primary parking lot drive aisle connecting to Harbor Drive. It would also result in the most waterside navigability clearance and is not limited in width by the south breakwater wall.

Drawbacks of option C include a major wave uprush concern. As shown in Attachment 2, there were several other west facing ramps explored for Mole D and all west facing options resulted in significant wave uprush issues in which the marina parking lot would be subject to periodic flooding. To mitigate against the wave uprush issue the west facing option would require the construction of a 10-15-foot-tall sheet pile wall. In addition to the sheet pile wall, the overall grade at the top of ramp would need to be four feet higher than Option B grade and six feet higher than Option A, resulting in the lengthiest ramp of all the options. Due to the overall length, the fact that the ramp projects further west and into the ocean floor and the need for a sheet pile wall, Option C represents the largest footprint, highest cost, and most environmental impact to the ocean floor. It is important to note that when Coastal Commission reviews our final entitlement plans at a future phase of the project, options with minimal environmental impact will be favored. For this reason, staff and the consultant have identified Option C as the most difficult to receive permits. Other drawbacks include a severed pedestrian promenade in which vehicles with trailers will be required to reverse across a pedestrian heavy environment, and minimal vehicle queuing on the landside.

Public Outreach

On September 23, 2025, SWA moderated an in-person community workshop to present the technical studies, three location options, answer questions, and gather public input. The workshop was held at the Redondo Beach Public Library from 5:30 to 7:00 pm, with nearly 40 community members in attendance. The meeting was live-streamed on YouTube via the City's official channel for remote participants. During the meeting, the City and project consultant team (SWA and Moffatt & Nichol) introduced the project goals and reviewed past studies and planning efforts related to the boat launch. The project team discussed the analysis of existing conditions at the Mole D site, followed by a presentation of three boat launch location options currently under consideration. An in-depth analysis was provided for each option, outlining the benefits and drawbacks. A live interactive survey was incorporated into the presentation to encourage public participation. The workshop concluded with a Q&A session, during which participants submitted written comments and questions on cards for the project team to address.

SWA moderated and conducted an interactive live survey during the meeting to collect community input and feedback. Seven survey questions were developed in collaboration with the project consultant team and the City. The first three questions focused on getting to know who was in the audience. attendee demographics, frequency of visits to King Harbor, and primary reasons for those visits. When asked about which group best described you, nearly 33% of the audience identified as local residents, 27% were boat owners with slips, 15% were yacht club members, and 12% were business owners. Approximately 34% of respondents reported visiting the harbor daily, while 36% visit multiple times per week. Of the seven response categories, the primary reasons for visiting King Harbor were identified as: boating (27%), dining (19%), walking the pier/biking (15%), visiting a yacht club (13%), attending harbor/pier events (11%), paddle boarding/kayaking (11%), and going to work (4%).

The remaining questions addressed the importance of various elements of the boat launch, the likelihood of participants using the facility, and their preferred option among those presented. *Boater traffic safety* was considered the most important factor by the majority of respondents (average score

4.5). The second and third most important factors were *wave protection* (3.0) and *minimizing conflicts between pedestrians/bikes and vehicles* (2.8). Nearly half of the respondents indicated they are likely (from "likely" to "very likely") to use the boat launch. About 31% reported that the question was not applicable because they do not launch boats, while 25% indicated they are unlikely to use the facility. Among the three boat launch locations, Option C was the most favored by respondents (42%), followed by Option A (35%). Option B was the least favored (23%).

A Q&A session was held after the presentation. Participants wrote their questions and comments on cards for the project team and the City to address. A total of 14 comment cards were collected, covering a range of questions. Several addressed operational aspects of the boat launch, such as hours of operation and regulated parking times. Boat traffic considerations were raised multiple times, and questions related to the sheet pile wall in Option C were also highlighted and discussed. One card provided a new location for the boat launch, an "Option D", which located the launch near the existing boat hoist and R10. Option D has been included as Attachment 3 and the consultant team looked at this location, before the Harbor Commission meeting. However, the option would require removing existing Basin III slips, which is prohibited by Measure C, so this site was not looked at in further detail. The final question on the preferred boat launch option was asked again after the Q&A session with the project team; Option C remained the most popular choice (46%), while Options A and B received similar levels of support, each at approximately 27%.

Option E - At the conclusion of the community outreach workshop, staff and the consultant explored another option with the premise of improving upon the drawbacks of Option A (narrow channel) and Option B (tight landside vehicle turns). The consultant began by taking a south facing ramp as shown in Option A and B as a starting point and rotated the angle of the ramp to the west. The proposal has been included as Attachment 4. The idea is to rotate the ramp as far west as possible before wave uprush becomes a concern. By rotating the ramp west, we can maximize a wider channel width by taking advantage of the south breakwater wall angle but stop the rotation when a sheet pile wall would be necessary to avoid wave uprush. In this case, the channel width in Option E is approximately 160 feet, or 30 feet wider than Option A, but ten feet narrower than Option B. In addition, if the ramp is rotating west towards the expanded channel width, then the vehicle turn-around circle located atop the boat ramp would rotate east thus improving the vehicle circulation challenges in Option B by eliminating the sharp turns as vehicles traverse the surface parking lot and approach the turn-around circle.

Staff Recommendation

Preserving navigable waters and ensuring clearances and predictable traffic patterns for Basin III tenants, visiting boaters, and human-powered craft is an important consideration. Moffatt & Nichol took the minimum clearances required from the DBW boat launch guidelines and ensured that locations A, B, C, and E all meet and exceed the minimum requirements for safety. They accounted for the size and quantity of the vessels that have slips in Basin 3 and measured for the largest-sized boats, so two of the large boats could pass next to each other and someone could be launching a boat simultaneously. Option A has the least clearance space with 130 feet, while Option E provides more navigable width at 160 feet, and Option B has an even greater width at 170 feet. The sheet pile wall for Option C would extend the required 50 feet beyond the bottom of the ramp to give the

minimum clearance for ramp ingress/egress. Beyond the 50-foot requirement, Option C provides the most navigable waters beyond the sheet pile wall with no other limitations.

While Option C provides the most navigable water, minimizing new over-water shading and soft-bottom impacts reduces the impact of the boat launch on the existing harbor ecosystem and lowers mitigation costs and streamlines approvals during the permitting process. Locations that avoid the construction of new offshore wave protection structures, including sheet pile walls, are generally less complex to permit. Where in-water work is necessary, eelgrass and benthic surveys and a mitigation strategy may be required to secure approval from relevant permitting agencies. The additional sheet pile breakwater, possible rock mound, and length of ramp would impact more soft bottom habitat as opposed to Option A, B, or E where most of the ramp is being constructed on land side and only the bottom of the ramp is protruding into the existing coastline. Options A, B, and E would therefore be viewed as more favorable by the CCC and other regulatory agencies because they are less impactful. The CCC and other regulatory agencies will require the submittal of an alternatives analysis. If Option C is submitted as the City's preferred option to the CCC for approval, they will see the other alternatives as less impactful to the coastline, and reject Option C and direct the City to pursue one of the other options.

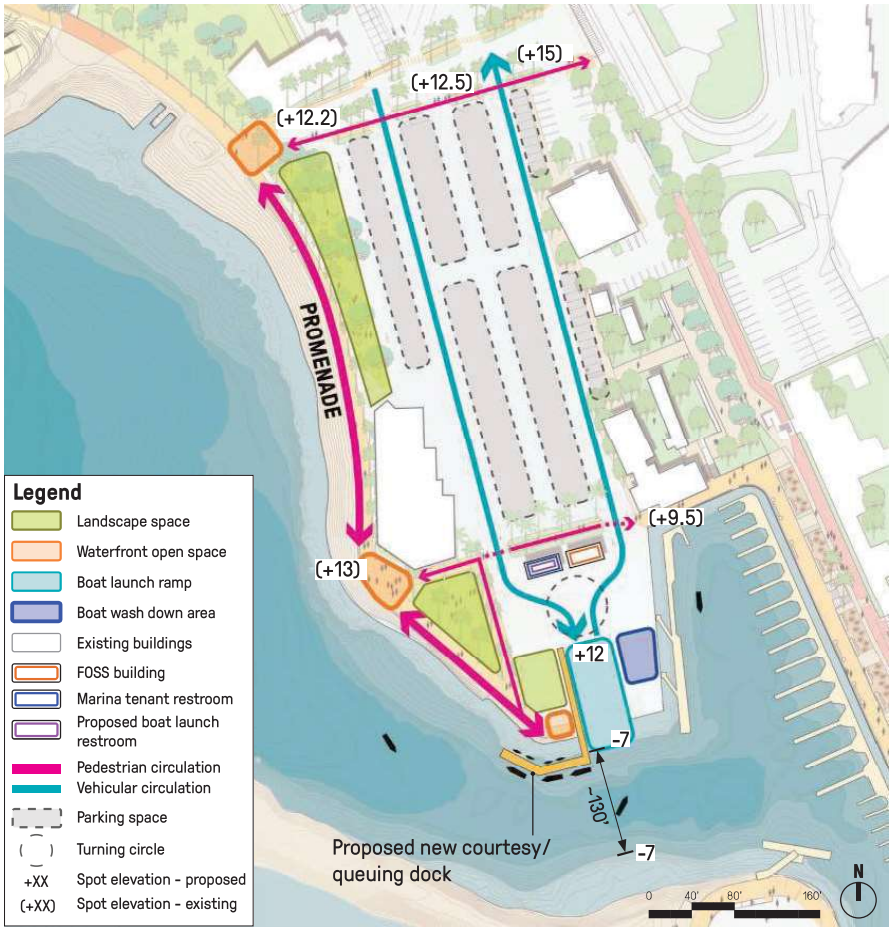
Staff recommends Option E, which improves upon the deficiencies of both Options A and B. The channel width of Option E is approximately 30 feet wider than Option A, thus providing more channel width to accommodate human powered vessels and other slow-moving vessels. Option E also results in a vehicle turn around circle further east and more in-line with the existing parking lot drive-aisles thus eliminating the need for sharp turns before vehicles with trailers approach the turn-around circle. The channel width of Option B remains approximately 10 feet wider than Option E, however the landside circulation for both vehicles and pedestrians is significantly improved over Option B.

Staff seeks a recommendation from the Harbor Commission to the City Council directing staff to apply for the grant and to identify a preferred location alternative for preparation of the grant application. Staff is preparing a City Council agenda item for November 4, 2025 for City Council to authorize Staff to submit the DBW BLF application based on the preferred location selection.

ATTACHMENTS

Conceptual plans: Alternatives A, B, C
Additional Conceptual Plans
Community Member Option D
New Option E
Boat Launch Demand Study
Coastal Criteria and Hazards Analysis
Transportation Impact and Parking Study

BOAT LAUNCH RAMP CONCEPTUAL PLACEMENT - OPTION A



Key Facts

- Two lane launch ramp
- Total trailer parking spaces:
  - *60 on-site*
  - *20 overflow*
- Total pedestrian parking spaces:
  - *40-60 on-site*

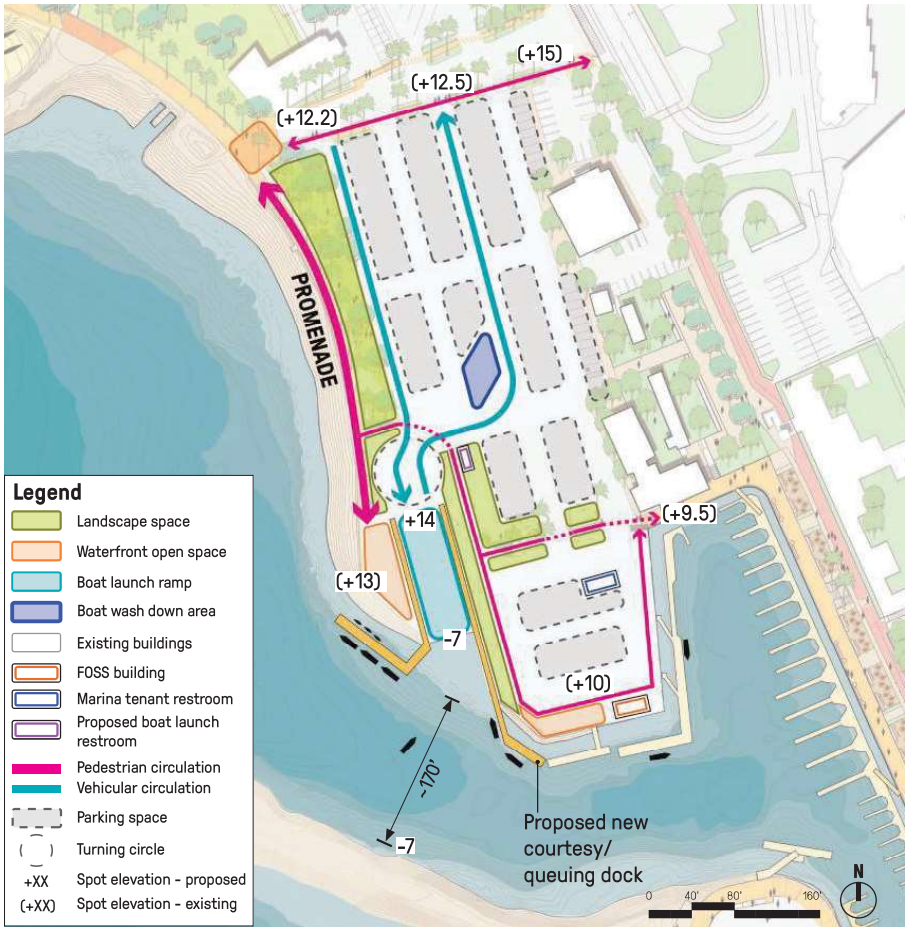
Benefits

- Best option in terms of circulation due to space for turning and ample space for queuing lanes
- Minimal disruption to waterfront pedestrian promenade
- Lowest expected wave run-up, most protected area from waves
- Smallest ramp footprint
- Cost effective
- Ability to protect existing Mole D restaurant tenant building in place

Drawbacks

- Ramp is further away from access of Harbor Dr
- Demolition and/or relocation of existing Basin 3 tenant restroom and FOSS buildings and parking
- Reduced channel width for vessel navigation, but still meeting, and exceeding, minimum requirements

BOAT LAUNCH RAMP CONCEPTUAL PLACEMENT - OPTION B



Key Facts

- Two lane launch ramp
- Total trailer parking spaces:
  - *60 on-site*
  - *20 overflow*
- Total pedestrian parking spaces:
  - *40-60 on-site*

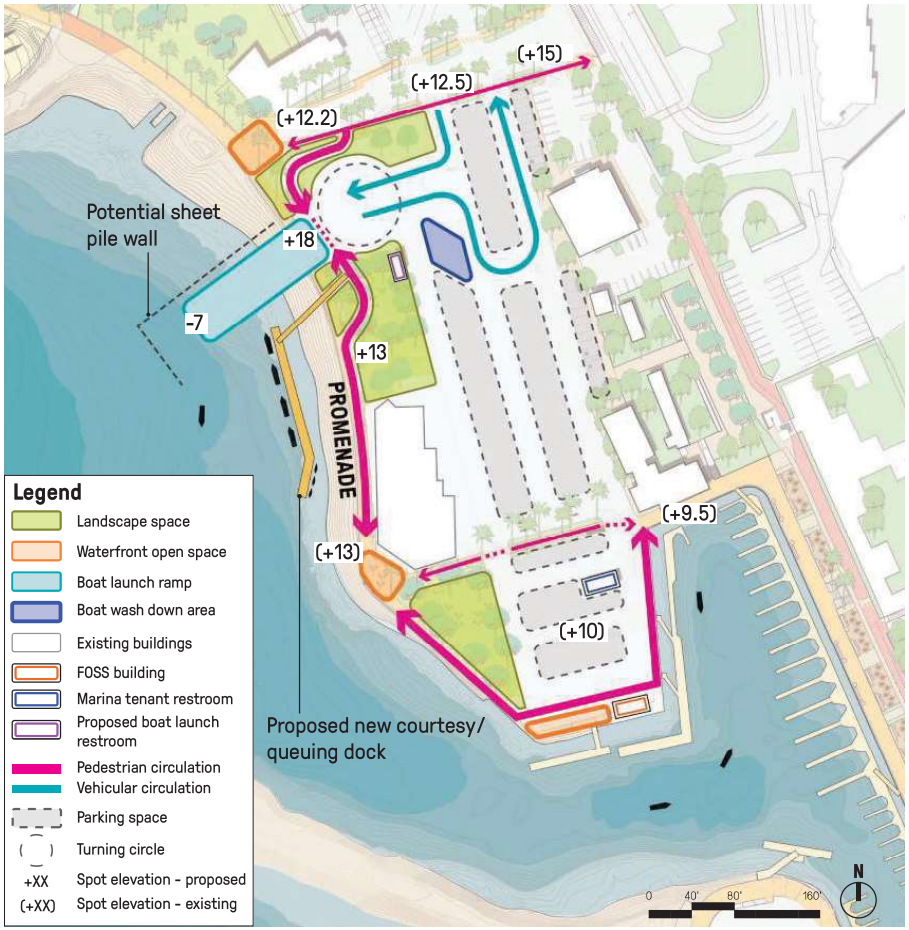
Benefits

- Allow existing basin 3 tenant restroom and FOSS building to be protected in place
- Vehicle queuing can begin in the parking lot
- Maintains channel width for vessel navigation

Drawbacks

- Location of ramp requires separation from parking and boat wash down areas
- Shorter vehicle queuing in parking lot
- Increased conflicts between pedestrian circulation & boat launch activity
- Limited green space and reduced waterfront promenade
- Demolition of existing Mole D restaurant tenant building

BOAT LAUNCH RAMP CONCEPTUAL PLACEMENT - OPTION C



Key Facts

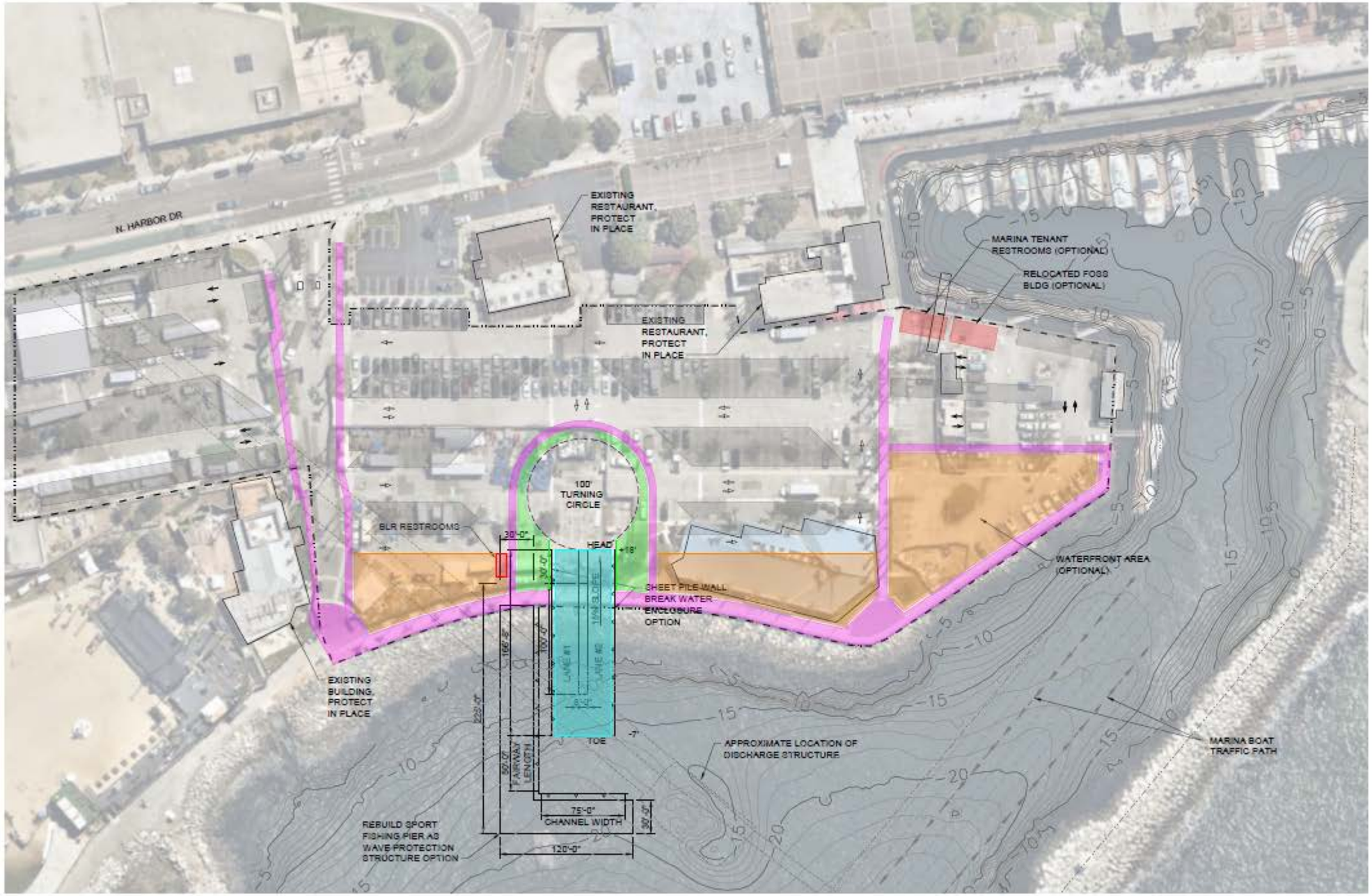
- Two lane launch ramp
- Total trailer parking spaces:
  - *60 on-site*
  - *20 overflow*
- Total pedestrian parking spaces:
  - *40-60 on-site*

Benefits

- Closest to Harbor Dr. Access
- Widest navigational clearance
- Ability to protect existing Mole D restaurant tenant building and FOSS building in place

Drawbacks

- Severed pedestrian promenade
- Potential conflict with kayak drop off area
- Minimum queue/stacking length
- Turning circle difficult to navigate from main entrance off Harbor Dr
- High potential wave run-up, least protected from waves and requires significant grading and/ or sheet pile protection
- Significant regulatory permitting hurdle
- Largest ramp footprint
- Highest cost



LEGEND

- VEHICULAR TRAFFIC
- PEDESTRIAN CIRCULATION
- GREEN SPACE
- WATERFRONT OPEN SPACE
- PARKING
- BOAT LAUNCH RAMP
- BUILDING/STRUCTURE

N

50' 0' 50' 100'

SCALE: 1"=50'

CITY OF REDONDO BEACH
REDONDO BEACH, CA

REDONDO BEACH MOLE D
BOAT LAUNCH RAMP
REDONDO BEACH, CA

ALTERNATIVE 4 PLAN

425 EAST CONANT STREET
LONG BEACH, CA 90805
562-426-6691

Sheet Reference No.
G-105

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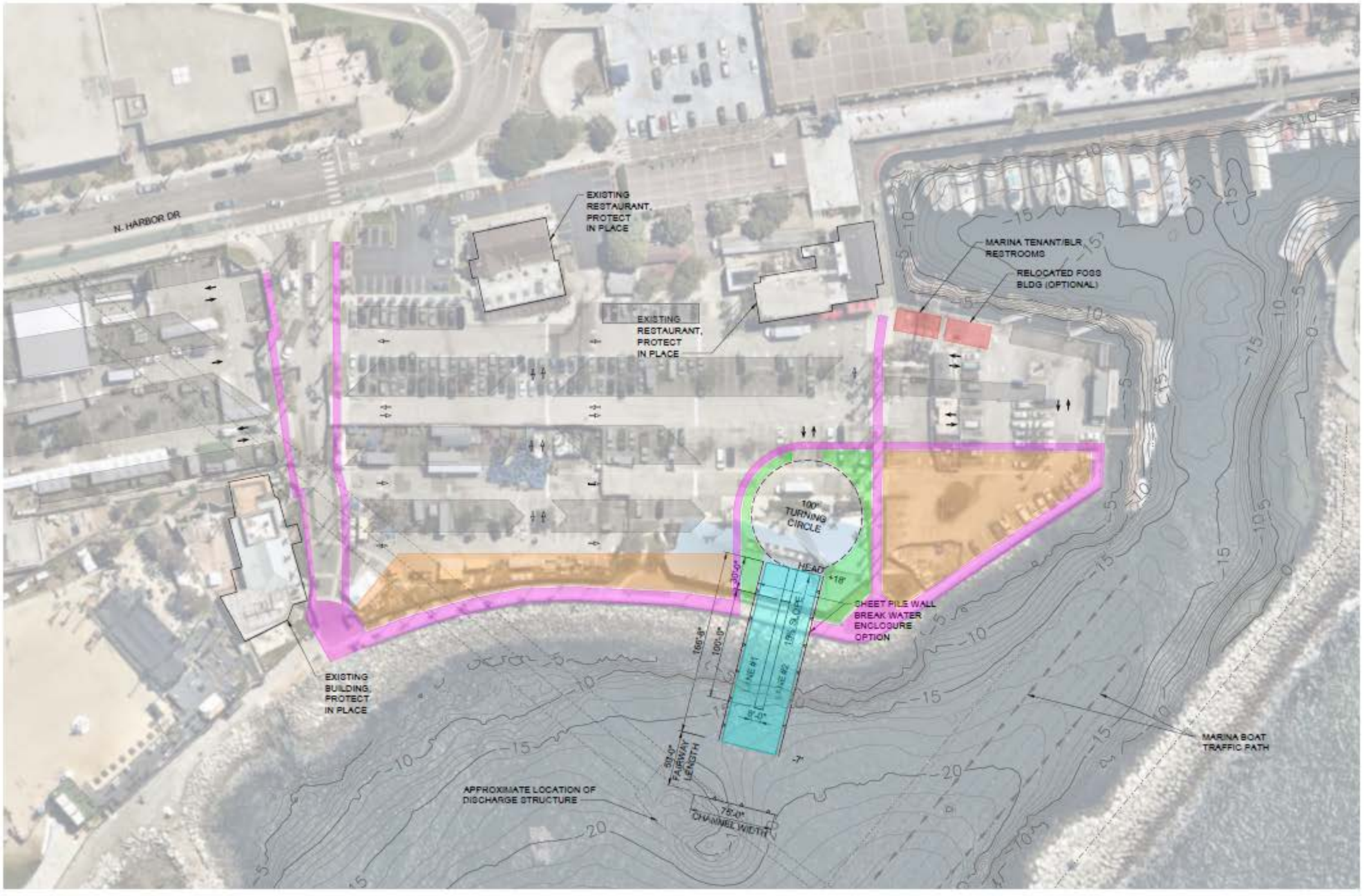
DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



LEGEND

- VEHICULAR TRAFFIC
- PEDESTRIAN CIRCULATION
- GREEN SPACE
- WATERFRONT OPEN SPACE
- PARKING
- BOAT LAUNCH RAMP
- BUILDING/STRUCTURE

N

50' 0' 50' 100'

SCALE: 1"=50'

CITY OF REDONDO BEACH
REDONDO BEACH, CA

REDONDO BEACH MOLE D
BOAT LAUNCH RAMP
REDONDO BEACH, CA

ALTERNATIVE 3 PLAN

4225 EAST CONANT STREET
LONG BEACH, CA 90808
562-429-9551

moffatt & nichol

Sheet Reference No.
G-104

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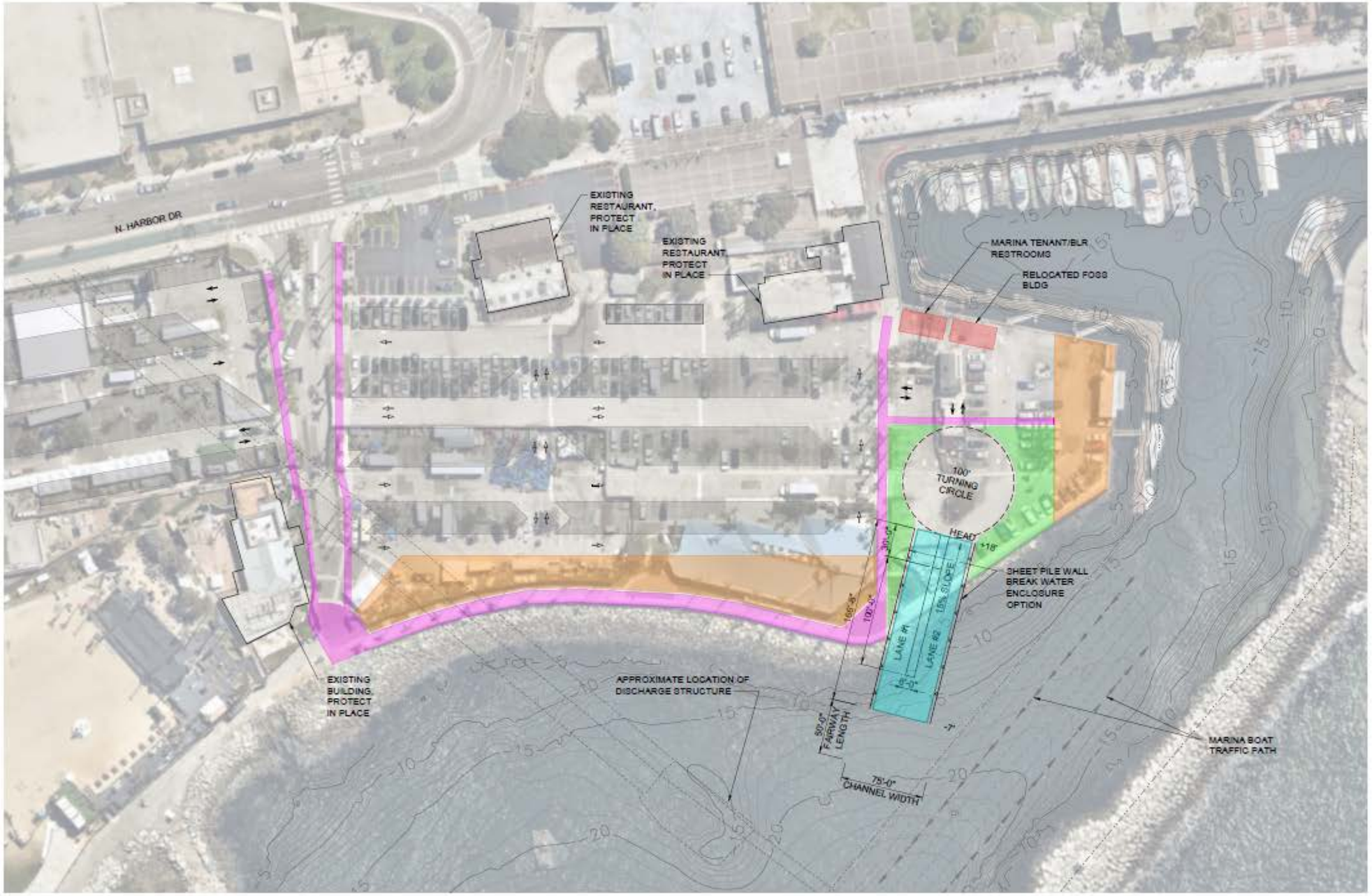
DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



LEGEND

- VEHICULAR TRAFFIC
- PEDESTRIAN CIRCULATION
- GREEN SPACE
- WATERFRONT OPEN SPACE
- PARKING
- BOAT LAUNCH RAMP
- BUILDING/STRUCTURE

N

50' 0' 50' 100'

SCALE: 1"=50'

CITY OF REDONDO BEACH
REDONDO BEACH, CA

REDONDO BEACH MOLE D
BOAT LAUNCH RAMP
REDONDO BEACH, CA

ALTERNATIVE 2 PLAN

425 EAST OCEAN STREET
LONG BEACH, CA 90802
562-435-6651
moffatt & nichol

Sheet Reference No.
G-103
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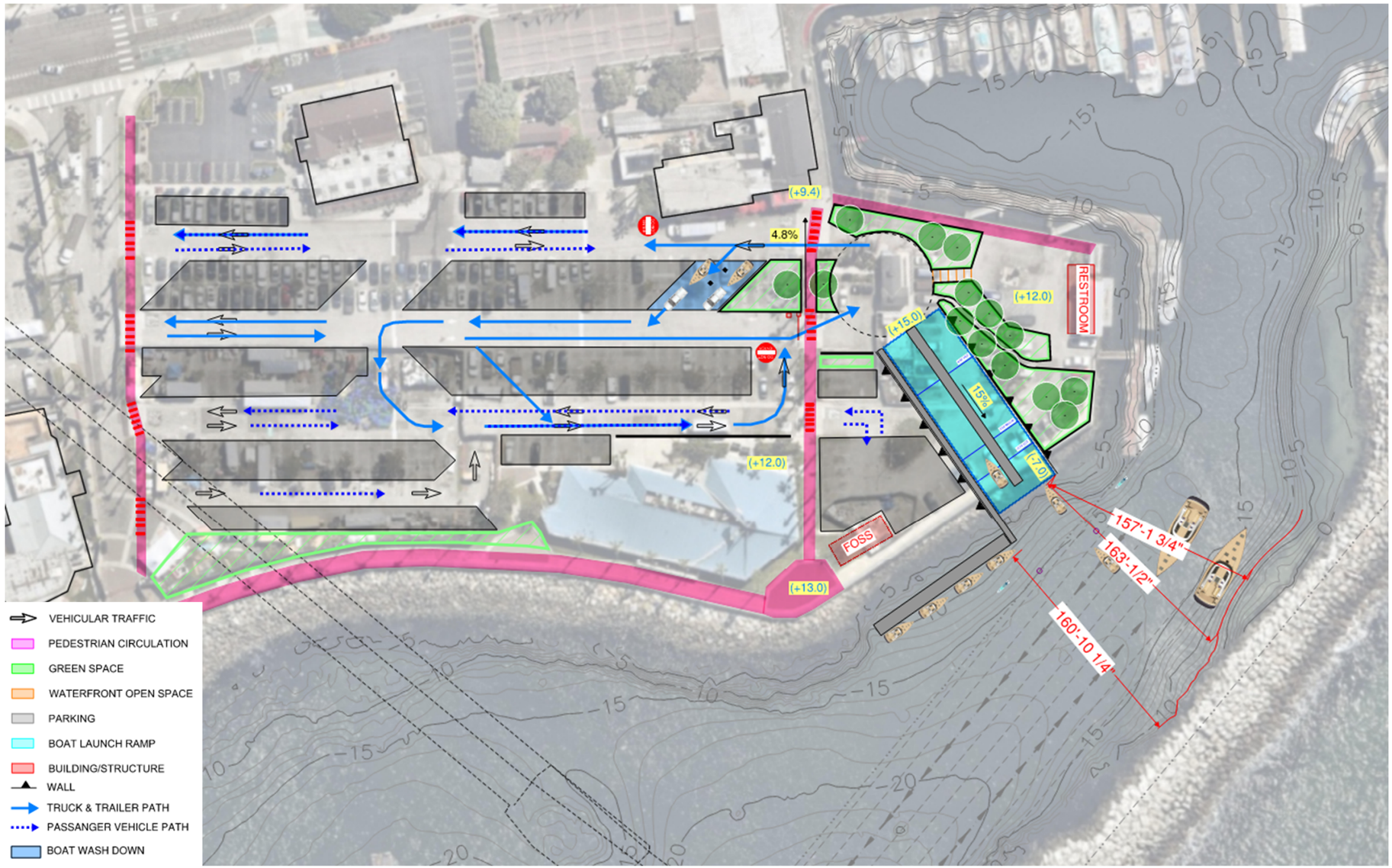
DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

M&N OPTION D REVIEW & ASSESEMENT

BOAT LAUNCH CONCEPTUAL PLACEMENT – OPTION E (A-B HYBRID)



KEY FACTS

- Two lane launch ramp
- Total trailer parking spaces:
  - 60 on-site
  - 20 overflow
- Total pedestrian parking spaces:
  - 40-60 on-sites

Benefits

- Good vehicle circulation and parking layout like Option A
- Minimal disruption to waterfront pedestrian promenade
- Improved Channel Navigation width over Option A
- Ability to protect existing Mole D restaurant building in place

Drawbacks

- Bisects Mole D south of the promenade walkway
- Increased grading challenges to meet requirements for parking, ADA, and sea level rise.
- Larger ramp footprint and top of ramp elevation compared to Option A and B
- Higher wave run-up
- Demolition and/or relocation of existing Basin 3 tenant restroom and FOSS buildings and parking.

FINAL Submittal

Prepared For:
City of Redondo Beach
Waterfront & Economic Development Department
May 5, 2025

moffatt & nichol

REDONDO BEACH BOAT LAUNCH RAMP DEMAND STUDY

M&N PROJECT #: 232677

Redondo Beach Boat Launch Ramp Demand Study

May 5, 2025

Prepared by:

moffatt & nichol

4225 E Conant St
Long Beach, CA 90808

Table of Contents

1. Existing Regional Boat Launch Market

Cataloguing the existing regional boat launch market provides an insight into market capacity and local boating trends. The existing market analysis is used to evaluate the current demand for boat launches and to project future demand in the market region by identifying the types of existing boat launches in the market.

1.1 Market Area

The proposed Redondo Beach Boat Launch Ramp resides in King Harbor. Regionally, King Harbor lies on the California coast, 20 miles from downtown Los Angeles, in Los Angeles County. The harbor is south of Marina del Rey, Los Angeles International Airport and Manhattan Beach and north of the Palos Verdes Peninsula, and within the limits of the City of Redondo Beach and Los Angeles County. The Redondo Beach regional market consists of five counties: Ventura, Los Angeles, San Bernardino, Riverside and Orange.

Market area geographic boundaries are generally defined by the distance that local boaters are willing to travel to use a facility. The geographic area helps identify the competing and comparable boat launches within that area.

Studies suggest typical day boaters are willing to travel by car for up to one hour (~30 miles) from home to use their boat. Weekend boaters will travel much farther – up to 5 or 6 hours – spending the night on their boat. Surveys support these limits, confirming the geographic market region centered on Redondo Beach encompasses boaters within Ventura, Los Angeles, San Bernardino, Riverside and Orange County. Boat launches within this geographic area compete for the regional boating population.

Figure 1-1: Redondo Beach Market Area

1.2 Market Characteristics

Boating season in the Redondo Beach Boat Launch Ramp market is year-round but peaks in the summer months – June, July, and August. Redondo Beach is a prime geographic location in Southern California, with some of the best weather and water conditions in the country and is in close proximity to fishing grounds.

Sailing/cruising and recreational fishing are among the most popular activities in California marine markets. The region also attracts transient boaters from outside the market for sailing races, sportfishing, and general tourism. To better identify boater demographics within the regional market and subsequently define the drivers that generate demand, the market is divided into boat classes defined by length; vessels under 40 ft. are trailerable vessels and generally stored on land, resulting in the need for a boat launch or hoist to get into the water. Vessels above 40 ft. are generally stored in water.

1.3 Market Size

There is currently a Redondo Beach Small Boat Launch Facility with a boat hoist that provides access to the water for the local market, however, this is proposed to be demolished and replaced with the proposed Redondo Beach Boat Launch Ramp. Additionally, the regional market is comprised of 16 other boat launch facilities (BLF) for coastal water access, as shown in Table 1-1. Of these 16 boat launch facilities, 9 are located within 30 miles of the proposed boat launch site.

Table 1-1: Redondo Beach Market Boat Launch Facilities

Facility	Distance from Redondo Beach	City	County
Marina Del Rey Boat Launch Facility	9.3	Marina Del Rey	Los Angeles
Cabrillo Beach Launch Ramp	11.5	Los Angeles	Los Angeles
South Shore Boat Ramp	13	Long Beach	Los Angeles
Claremont Boat Launch Ramp	18	Long Beach	Los Angeles
Davies Boat Ramp	18	Long Beach	Los Angeles
Granada Boat Launch Ramp	18	Long Beach	Los Angeles
Marine Stadium Ramp	18	Long Beach	Los Angeles
Sunset Aquatic Marina	20.2	Huntington Beach	Orange
Huntington Harbor Yacht Club	21	Huntington Beach	Orange
Newport Dunes Waterfront Resort & Marina	33.7	Newport Beach	Orange
Dana Point Boat Launch Ramp / Embarcadero Marina	49	Dana Point	Orange
Channel Islands Harbor	51	Oxnard	Santa Barbara
Ventura Harbor	58	Ventura Beach	Ventura
Santa Barbara Launch Ramp	83	Santa Barbara	Santa Barbara
Goleta Beach County Park	91	Goleta	Santa Barbara
Gaviota State Park	112	Goleta	Santa Barbara

1.4 Facility Type & Size

A summary of the BLFs in the market broken down by facility name, type, and number of lanes is shown in Table 1-2. Of the 16 facilities in the market area, 12 are boat launch ramps, with number of launch lanes ranging from 1 to 8.

Table 1-2: Market Area Boat Launch Facility Type & Size

Facility	Number of Launch Lanes
Marina Del Rey Boat Launch Facility	8
Cabrillo Beach Launch Ramp	4
South Shore Boat Ramp	2
Claremont Boat Launch Ramp	Sand
Davies Boat Ramp	7
Granada Boat Launch Ramp	Sand
Marine Stadium Ramp	4
Sunset Aquatic Marina	4
Huntington Harbor Yacht Club	1
Newport Dunes Waterfront Resort & Marina	6
Dana Point Boat Launch Ramp / Embarcadero Marina	6
Channel Islands Harbor	3
Ventura Harbor	6
Santa Barbara Launch Ramp	8
Goleta Beach County Park	
Gaviota State Park	Hoist

1.5 Pricing

Usage rates for boat launch facilities in the regional market vary and are influenced somewhat by location and amenities provided. Table 1-3 shows information on published rates for the different facilities in the market. Most facilities do not charge for the use of the boat launch itself, but rather charge a “per day” parking fee for vehicle and/or trailers. The per day rate for facilities in the market area varies from $7 to $20, with the average being $14 for the market area and $13 for facilities within 30 miles of the proposed project site.

Table 1-3: Market Area Boat Launch Facility Pricing

Facility	Fee to Launch
Marina Del Rey Boat Launch Facility	$15 with trailer, $10 vehicles only
Cabrillo Beach Launch Ramp	$15/day
South Shore Boat Ramp	$12/day
Claremont Boat Launch Ramp	$12/day
Davies Boat Ramp	$12/day
Granada Boat Launch Ramp	$12/day
Marine Stadium Ramp	$12/day
Sunset Aquatic Marina	$20/day
Huntington Harbor Yacht Club	$7/day
Newport Dunes Waterfront Resort & Marina	$15/winter, $20/summer
Dana Point Boat Launch Ramp / Embarcadero Marina	$15/day
Channel Islands Harbor	$13 day use, $19 8pm-4am, $60 overnight occupied
Ventura Harbor	$10/day
Santa Barbara Launch Ramp	$20 vehicle per day, $8 trailer per day
Goleta Beach County Park	$15/day
Gaviota State Park	Annual Hoist Fee $150

2. Boating Market and Industry Trends

Trends in the U.S. boating market as well as correlations between boat ownership and major economic indicators provide guidance on potential marina and boat launch market growth. Trends include:

- National and State Boat Registration Trends
- Population Trends

These trends are further analyzed in the following sections.

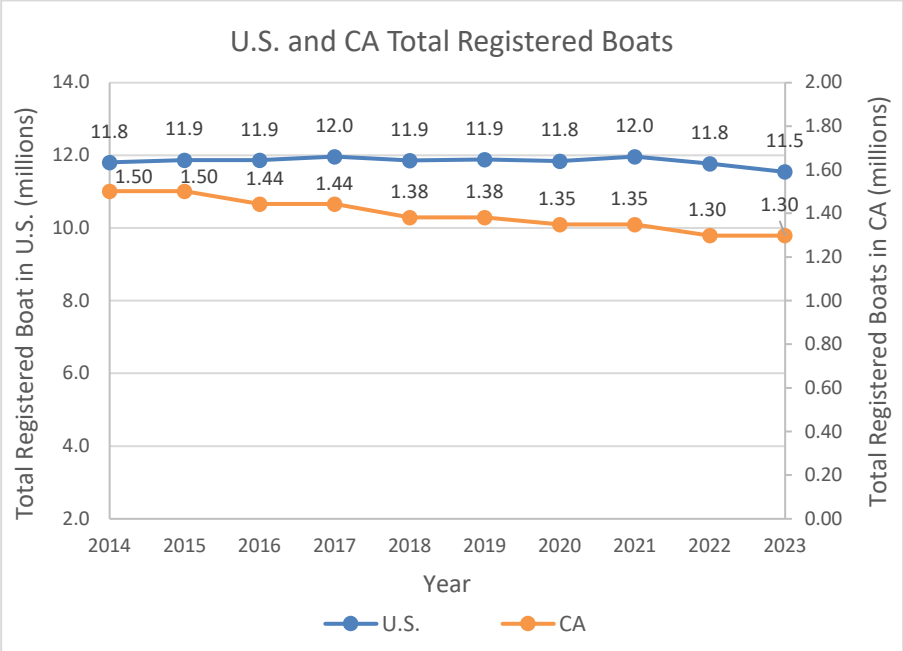
2.1 Boat Registration Trends

Boats in the U.S. are registered and licensed by the U.S. Coast Guard or the state of residence. The number of registered boats directly relates to boat ownership and boat use which affects boat launch facility demand.

Analysis of U.S. boat registration statistics from 2014 to 2023 (Figure 2-1) shows that the total number of registered boats in the U.S. has stayed relatively steady. Figure 2-1 also shows that there has been a slight decrease in registered boats in California but overall has also remained relatively steady.

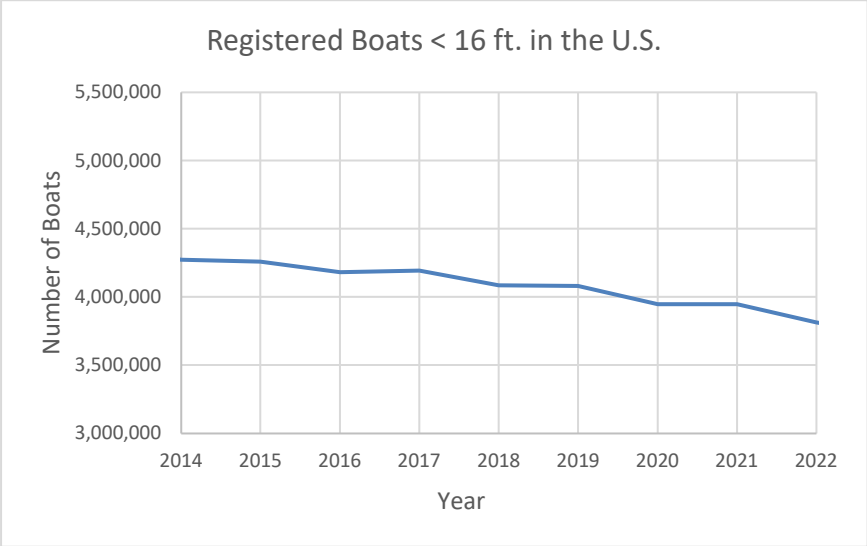
The U.S. boat registration statistics can be further broken down to observed trends in specific boat sizes. For boats under 40 ft., the United States Coast Guard (USCG) breaks down the sizing as registered boats less than 16 ft., registered boats greater than 16 ft. and less than 26 ft., and registered boats greater than 26 ft. and less than 40 ft. The registration trends for each of these sizing categories for the U.S. can be seen in Figure 2-2, Figure 2-3, and Figure 2-4, respectively.

While there has been a steady decrease in vessels less than 16 ft. in length, there has been a steady increase in vessels greater than 16 ft. but less than 26 ft., and in vessels greater than 26 ft. but less than 40 ft. The vessels in these 16 ft. to 40 ft. categories are the target audience for a boat launch ramp facility compared to vessels less than 16 ft., as the smaller vessels could use other means for getting into the water like a boat hoist facility that may not have enough tonnage capacity for the larger vessels being trailered.



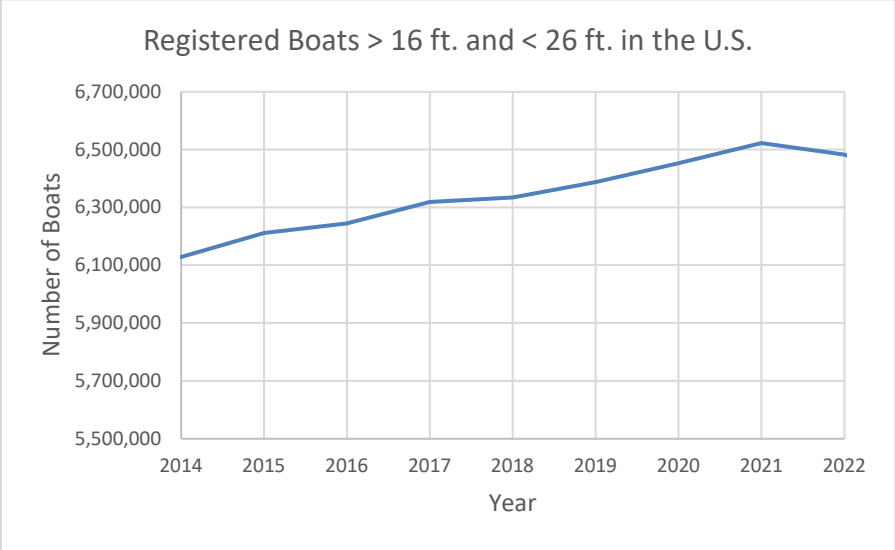
(Source: USCG)

Figure 2-1: U.S. and CA Total Registered Boats by Year



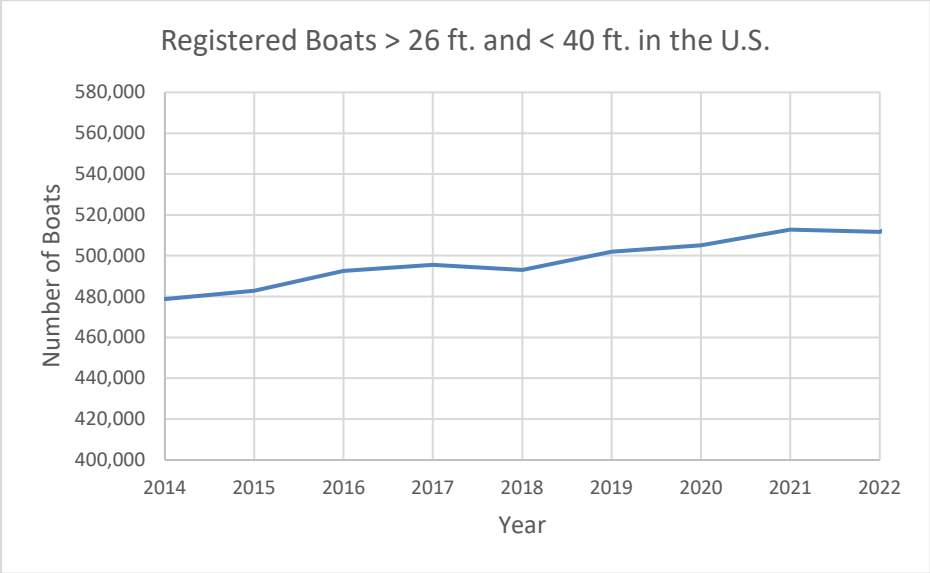
(Source: USCG)

Figure 2-2: U.S. Registered Boats < 16 ft. by Year



(Source: USCG)

Figure 2-3: U.S. Registered Boats > 16 ft. and < 26 ft. by Year

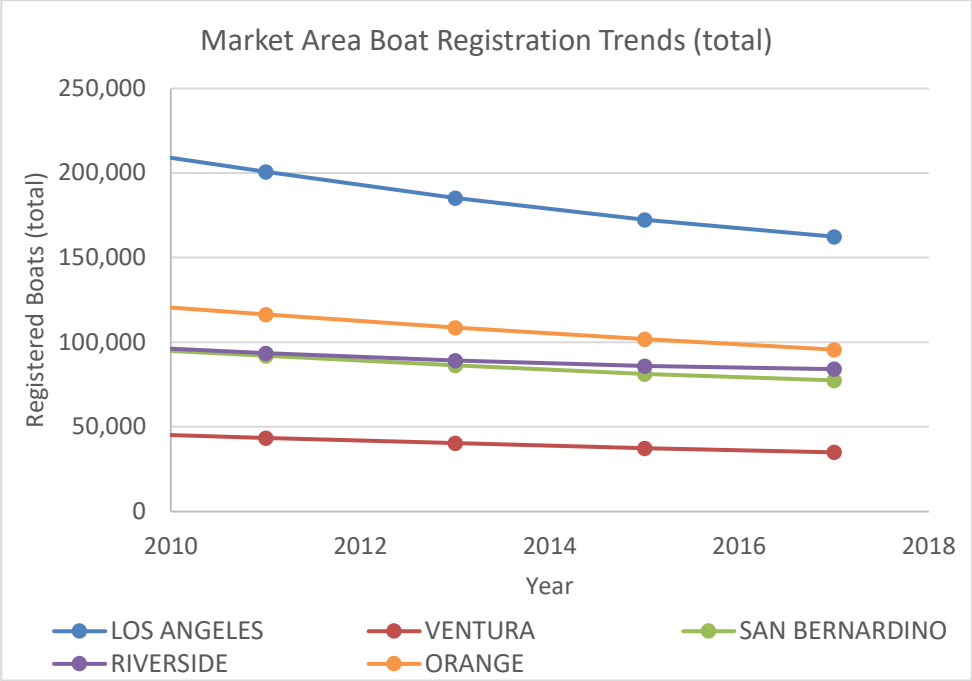


(Source: USCG)

Figure 2-4: U.S. Registered Boats > 26 ft. and < 40 ft. by Year

Trends for registered boats within the market area from 2010 to 2017 can be seen in Figure 2-5. While boat registrations within the market area have had a slight decrease overtime, Los Angeles County, where the proposed boat launch facility is located, continues to hold the largest number of boat registrations within the market area. It is assumed that the boat owners within Los Angeles County will be the typical day boaters using the facility, while boat owners from other counties may travel to the area less frequently or on weekends.

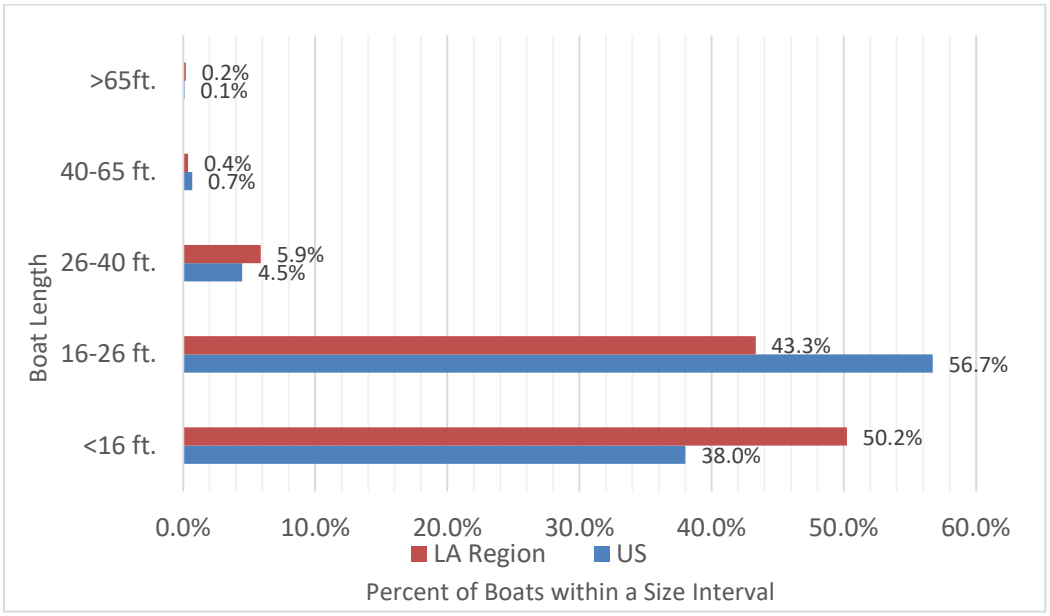
The California Department of Motor Vehicles (CA DMV) has not published the total vessel registrations by county since 2017, but vessel registrations for more recent years for the entirety of California can be seen in Figure 2-1. Comparing Figure 2-1 and Figure 2-5, the California, United States, and market area boat registrations all trend similarly. Due to the similar trend lines, it is assumed that the market area boat registration trend has continued to have a slight decrease in recent years, but likely due to a decrease in vessels below 16 ft. in length as seen in the U.S. registration trends.



(Source: CA DMV, CA DBW)

Figure 2-5: Market Area Boat Registration by Year

Figure 2-6 shows a breakdown of boat sizes in both the Los Angeles Region and the U.S. These percentages confirm that trailerable boat sizes, or those less than 40 ft., account for more than 99% of the registered boats in the market area and the country.



(Source: CA DMV, CA DBW, USCG)

Figure 2-6: Percentage of Boats by Size in Los Angeles Region and U.S.

2.2 Population Trends

Figure 2-7 through Figure 2-10 below shows population growth trends from 2010 to 2022 for the market area, Los Angeles County, the South Bay area, and Redondo Beach, respectively. The "market area" refers to the 5 counties previously mentioned surrounding the project location. The "South Bay" refers to the local market in the Southern portion of Los Angeles County that is anticipated to benefit greatly from the addition of the proposed boat launch ramp; this area includes the following cities: Redondo Beach, El Segundo, Hermosa Beach, Manhattan Beach, Palos Verdes Peninsula, Carson, Gardena, Hawthorne, Inglewood, Lawndale, Lomita, Torrance, San Pedro, Westchester, Wilmington, and Harbor City.

Population growth in the market area, Los Angeles County, and the South Bay show an overall steady increase in population from 2010 to 2022. Population growth in Redondo Beach had a steady increase from 2010 to 2015, and then increased quicker between 2018 and 2020, showing that the population has the potential to grow at a higher rate in years to follow.

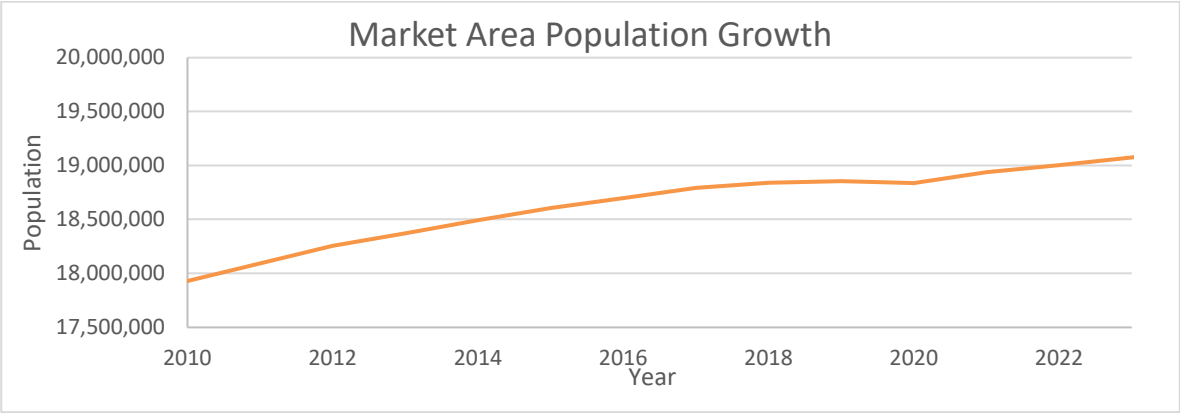


Figure 2-7: Market Area Population Growth by Year

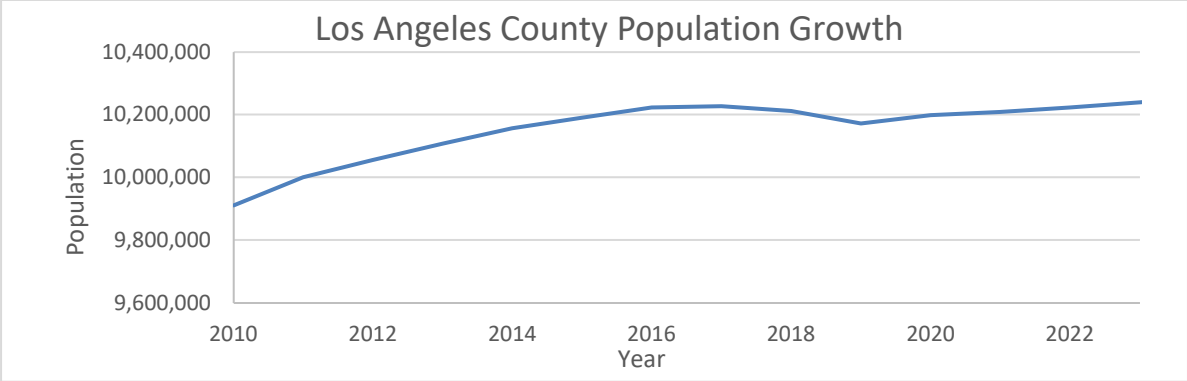


Figure 2-8: Los Angeles County Population by Year

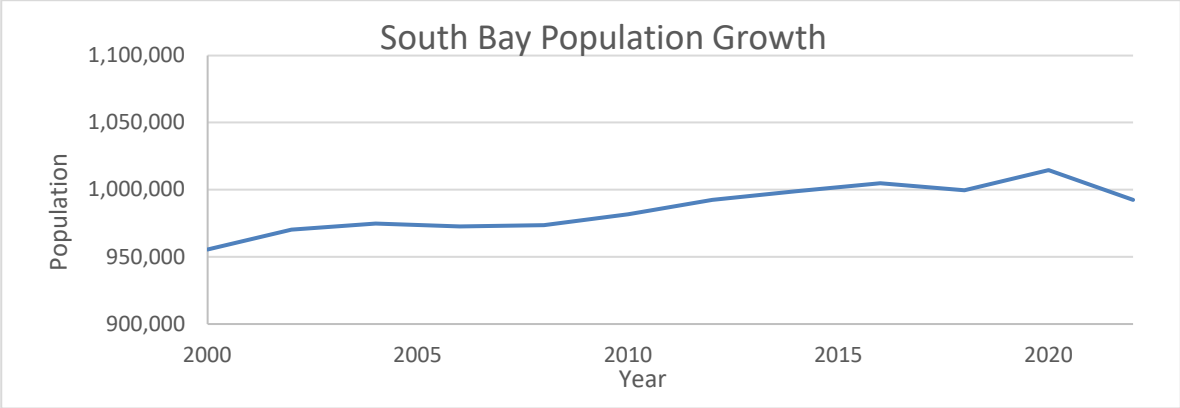


Figure 2-9: South Bay Population Growth by Year

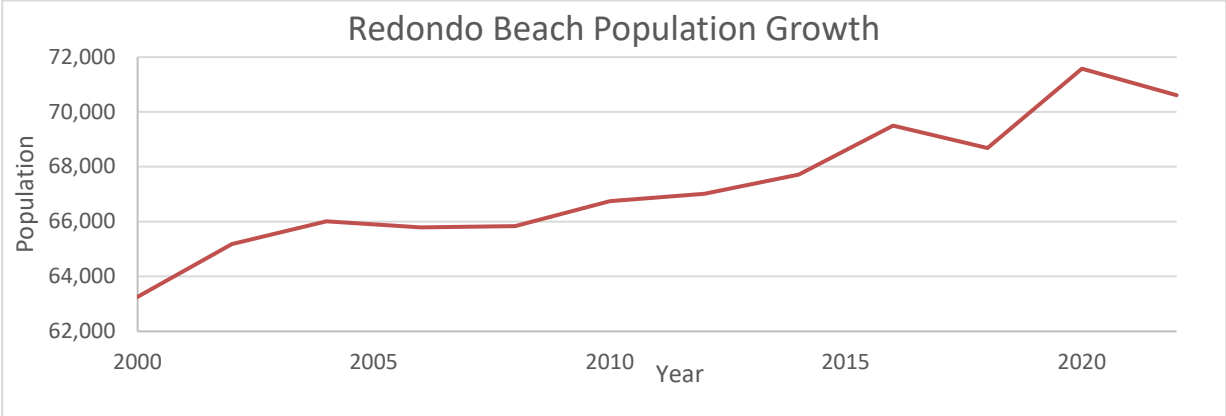


Figure 2-10: Redondo Beach Population Growth by Year

3. Market Usage and Demand

The market capacity is determined by identifying typical boaters projected to use a boat launch facility within the market and associated trends in the populations of boaters. Boat launch facility users in the regional market area include:

- Recreational boaters from the surrounding community who store their boats on land
- Transient recreational boaters visiting the region

3.1 Usage

3.1.1. Redondo Beach Boat Hoist

Usage data for the existing Redondo Beach boat hoist can be seen in Table 3-1; note that usage data is unknown from 2000-2011 and 2015-2022. Usage for this boat launch facility has decreased over time, likely due to several causes including: limitations on boat size/weight that can use the hoist, limited hours of operation, reduction in number of hoists at facility, and more expensive launching rates. The current boat hoist is a five-ton hoist and is capable of hoisting boats up to 10,000 lb. and 30 ft. long and is open between 6am and 7pm, depending on the day and time of year. When the hoist facility first opened in the

1960's, two boat hoists were available for public use. However, nearly 50 years later, between 2012 and 2014 the hoists were displaying operating deficiencies and were in need of repairs. In 2014, the City only repaired one of the two hoists, leaving only one operable hoist at the facility; in recent years, the second hoist was completely demolished from the site. The reduction to one hoist in 2014, and the operational deficiencies leading up to then, is likely a major cause to the decrease in yearly launches between 1999 and 2012.

Table 3-1: Redondo Beach Boat Hoist Launch Data

Year	# of Launches
1997	4800
1998	4800
1999	4500
2012	1193
2013	1225
2014	1134
2023	1166
2024	1233

Current rates for the Redondo Beach Boat Hoist, based on boat length, are shown in Table 3-2. Compared to the boat ramp launch rates for the market area shown in Table 1-3, the boat hoist rates are significantly higher. Boats over 18 ft. in length would be paying over double the average boat launch rate ($14) in the area, likely resulting in boaters travelling to a facility that may be further away to save money on launch rates.

Table 3-2: Redondo Beach Boat Hoist Rates

Boat Length	Hoist Rate
Under 12'	$18.00
12' to 17'11"	$23.00
18' to 21'11"	$30.00
22' to 24'11"	$35.00
25' & over	$40.00

Usage data for the existing Redondo Beach boat hoist in 2024 can be used to estimate an average number of launches per day for the boat hoist. Per daily usage data provided by the City, during peak usage days, which is estimated to be 90 days of the year, 462 launches were accounted for using the boat hoist, equating to approximately 5.13 launches per day. On the remaining sub-peak usage days, or remaining 275 days of the year, a total of 771 launches were accounted for using the boat hoist, which equates to approximately 2.80 launches per day. Taking both the peak usage days (462 launches) and sub-peak usage days (771 launches) into account, **an average of approximately 3.38 launches per day** occurred using the boat hoist in 2024.

3.1.2. Market Area Usage

Per the California Department of Boating and Waterways (DBW) 2019 "California Boating Facilities Needs Assessment" (2019 CBFNA) the Long Beach Harbor area is the most frequently visited waterway by

motorized boats in the Los Angeles region (15% of boaters). Ten percent of boaters reported that they visit Alamitos Bay most frequently. These percentages correlate to the fact that Long Beach provides the most boat launch ramps of any city in the market area, with 5 of the 12 boat launch ramps.

It was reported that Davies Boat Launch Ramp, the largest boat launching facility in Long Beach, has approximately 40,000 trailered boats launched annually; this number does not account for the additional boats being launched at the other four boat launch sites located in the Long Beach Harbor/Alamitos Bay areas. It is anticipated that by providing a new boat launch ramp outside of the local Long Beach area, demand from those boat ramps will disperse to the new boat launch ramp as well. Additionally, at the north end of the market area, there are approximately 100,000 trailered boats launched annually at the Marina Del Rey boat launching facility. There are likely more launches at Marina Del Rey compared to Davies boat launch ramp due to it being the only launch facility in Marina Del Rey and the surrounding area, compared to Davies being 1 of 5 facilities in Long Beach.

Per a survey conducted in the 2019 CBFNA, 25% of motorized boat owners and said that King Harbor is in need of a launch ramp facility; this reiterates the idea that there is demand for a boat launch facility within the local Redondo Beach waterways. Furthermore, it is anticipated that the proposed boat launch ramp will have much greater demand than the existing boat hoist due to ease of use, larger vessel size capacity, and updated facility conditions.

3.1.3. Market Area Boat and Population Growth

Per the boat registration data in Section 2.1, there has been a steady number of registered boats in the United States between 2014 and 2021, with a steady increase in boats in the 16 ft. to 40 ft. size range. An increase in these size vessels likely indicates that there is also a growth in number of boats being trailered to a boat launch facility for day use.

Per the 2019 CBFNA, there were a total of 79,415 motorized vessels less than 40 ft. registered with the California Department of Motor Vehicles (CA DMV) between Los Angeles and Ventura Counties in 2016. Per data in Section 2.2, the approximate population of these two counties is 11 million, with 1 million (9%) of those residing in the South Bay region. It can then be assumed that 9%, or approximately 7,150, of those registered vessels less than 40 ft., will be in close proximity to the proposed boat launch ramp and become the target user. The remaining 72,265 registered vessels less than 40 ft. are still anticipated to use the proposed boat launch ramp, but likely at a less frequent rate. Non-motorized vessels are not considered in this study as a separate hand launch facility is assumed to be located in King Harbor.

It is anticipated that many of these boats in the South Bay region do not currently use the boat hoist located in Redondo Beach due to a combination of the capacity limits of the boat hoist (30 ft. length and 10,000 lb max), the high fees, and the ease of using a newer launch ramp facility versus the hoist. Though, as mentioned in Section 3.1.2, many boat owners have expressed interest in utilizing a launch ramp facility located in King Harbor/Redondo Beach.

The City of Redondo Beach has recognized the increase in boaters in the South Bay region in and local demand for the addition of a boat launch ramp in recent years through an amendment to the Redondo Beach Local Coastal Program (LCP). Among other things, the amendment requires the development of a public boat launch in King Harbor prior to or in conjunction with future development; this requirement has been heavily supported by local boaters for an expansion of public access on the water.

3.2 Recreational Demand Analysis

3.2.1. Anticipated Demand

Using data on the number of registered boats under 40 ft., and population of Redondo Beach and the surrounding market area, an anticipated demand for the proposed boat launch facility was developed.

Per Section 3.1.3, approximately 7,150 registered boats are assumed to be located within the South Bay area and an additional 72,265 in the market area. Per the USCG 2020 "National Recreational Boating Safety Survey" (2020 NRBSS), an average of 63.3% of boats in California are transported/trailered for launch purposes; using this statistic, it can be assumed that 4,525 boats in the South Bay region and an additional 45,745 boats in the market area are transported/trailered to launch each year. Furthermore, the 2020 NRBSS states that, on average, boats are transported/trailered for launch purposes 12 times a year in California; this would equate to 54,300 launches per year for boats in the South Bay area. It is anticipated that boats located outside the South Bay are more likely to visit the proposed boat launch facility on weekends or holidays, or approximately 33% of the time compared to those boats located within the South Bay. With that in mind, it can be assumed that these boats will be transported/trailered for launch purposes 4 times a year, creating an additional 182,980 launches per year.

It is anticipated that the proposed launch ramp facility will attract many of these boat owners due to closer proximity and newer facilities. However, it is also assumed some boat owners will continue to use their current boat launch facility. To be conservative, it is assumed that 25% of boat owners in the South Bay area would transition to using the proposed boat launch facility, which would equate to 13,575 launches per year; this assumption is based on the 25% of motorized boat owners who said that King Harbor needs a launch ramp facility as mentioned in the DBW Facility Needs assessment referenced in Section 3.1.2. In the overall market area outside of the South Bay, it is assumed 3% (approximately 1/8 of the 25% assumed for South Bay region) of boat owners transition to using the proposed boat launch facility, there would be an additional 14,640 launches per year. Taking both the anticipated South Bay boaters (13,575 launches) and remaining Los Angeles/Ventura County (5,718 launches) boat launches per year into account, **19,293 launches per year can be anticipated**. This number is likely conservative for the total demand as it does not include boats that may come from the other, further counties in the market area.

Comparing the anticipated demand for the proposed BLF in Redondo Beach to the current demand for facilities in Long Beach Harbor and Marina Del Rey, which capture the boat launch demand to both the south and north of the proposed launch ramp, further justifies that there is a high level of demand in the market area. With 40,000 trailered boats launched annually at Davies seven-lane launch ramp, that equates to approximately 5,714 launches per lane, per year. With Marina Del Rey boat launch ramp having 100,000 trailered boats launched annually for approximately eight launch lanes, that equates to 12,500 launches per lane, per year. The Davies launch ramp facility is likely not used to full capacity due to there being four other boat launch facilities in the Long Beach area and thus boaters dispersing throughout those facilities during the busy season. However, the proposed Redondo Beach facility would be the only boat launch ramp located in the South Bay, with the next closest launching location being the one in Marina Del Rey, which is approximately 9 miles away. Based on boat registration data analyzed above, the proposed BLF is anticipated to have approximately 9,646 launches per lane, per year, with a large portion of users coming directly from the South Bay area; this anticipated demand is comparable to current demand per lane at the neighboring facilities.

3.2.2. Anticipated Capacity

The proposed new Redondo Beach Boat Launch Facility is located in the South Coast region of California in a densely populated urban area in close proximity to prime fishing grounds, which include Catalina Island and Santa Monica Bay. Per DBW's 2021 "Layout and Design Guidelines for Boat Launching Facilities," 50 launches per day, per lane is assumed for the proposed boat ramp. During peak usage days, which is estimated to be 90 days of the year, a two-lane launch ramp would account for 9,000 launches per year.

On the remaining sub-peak usage days, less than half of peak usage, or only about 20 launches per day, per lane is estimated for the remaining 275 calendar days. This accounts for an additional 11,000 launches per year given a two-lane launch ramp. Taking both the peak usage days (9,000 launches) and sub-peak usage days (11,000 launches) into account, **total capacity for launches per year is estimated at up to 20,000.**

Taking the peak and sub-peak usage days and the respective anticipated number of launches per day, per lane into consideration, an **average of approximately 27 launches per day, per lane** can be anticipated for the proposed boat launch facility. For a two-lane boat launch ramp, this would equate to a cumulative average of approximately 54 launches per day for the facility. This average is found by taking the total capacity for launches per year, which is estimated to be 20,000, and dividing by 365 days in a year to get a per day count of approximately 54 launches; dividing by the number of anticipated lanes, two for the proposed facility, then equates to 27 launches per day, per lane.

3.2.3. Proposed Fees

Per the DBW "Boating Facilities Development and Financing Local Assistance Grant and Loan Application," there is a $13 fee limitation for Boat Launch Facilities for grantees. This $13 limit is for the combination of entrance, parking, launching, and any day use fees. Per Table 1-3 in Section 1.5, the range of fees for nearby BLF is from $7-$20 for day use of the facilities. The average maximum day use charge for the nearby facilities is $14 per day, and the average maximum day use charge for facilities within 30 miles of the proposed project site is $13 per day.

It is assumed that any boat using the BLF will only be launched once per day, and thus the $13 per day usage fee can be considered for each boat launch anticipated. For the anticipated capacity of 20,000 total launches per year for a two-lane boat launch ramp, $260,000 of revenue from facility usage fees per year would result. It is also likely that additional usage fee income would come from visitors parking at the facility but not launching a boat, whether they are using the facility for other reasons or joining another group on their boat. An assessment of the additional revenue generated from these sources is not included at this time.

3.2.4. Demand vs. Capacity and Recommendations

Given that the anticipated demand of 19,293 launches per year is just slightly lower than the anticipated capacity of 20,000 launches per year for a two-lane boat launch ramp, it is recommended this size and type of launch ramp is adequate for the market serviced, and would be beneficial to boat owners in the local Redondo Beach area as well as the overall market area surrounding the project site. While it is still anticipated that boat users will continue to go to other launch ramps in the area, the addition of a boat launch facility in Redondo Beach can help alleviate overall demand across the market and allow more boat owners to get out on the water.

Furthermore, historical data trends show that boater registrations are fairly consistent or even slightly lower within the market over the last 10 to 15 years. This would suggest that providing the two-lane launch ramp as recommended will still provide adequate user capacity into the future.

3.2.5. Layout Recommendations

A proposed layout for the recommended two-lane Redondo Beach Boat Launch Ramp can be seen in Figure 3-1. Using DBW's 2021 "Layout and Design Guidelines for Boat Launching Facilities," and local Measure C guidelines for a two-lane launch ramp it is anticipated a total of 60 vehicle/trailer parking stalls be provided to accommodate anticipated parking at the project site. An attempt has been made to indicate approximate locations of vehicle/trailer parking stalls. Refer to the "Mole D Public Boat Launch Transportation Impact and Parking Study" prepared by STC Traffic, Inc. for further parking discussions.

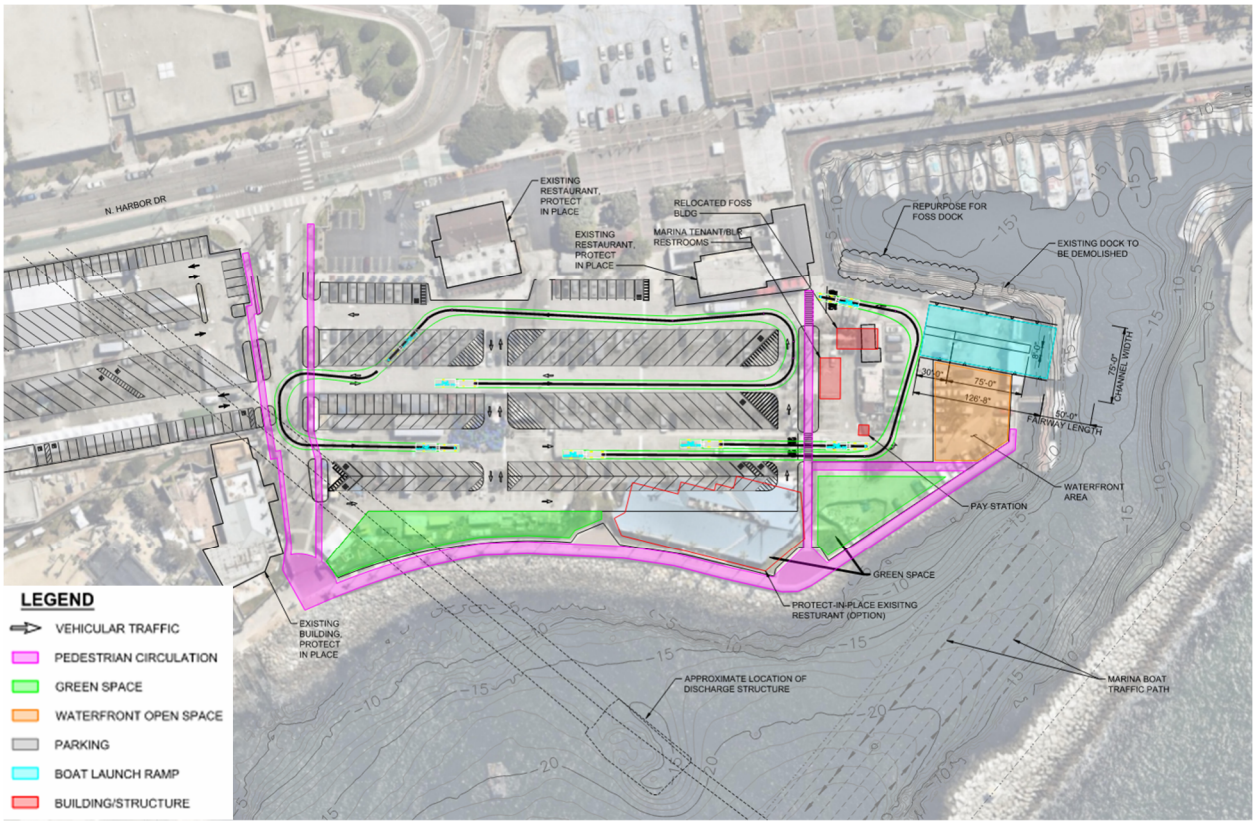


Figure 3-1: Proposed Alternative Layout for Redondo Beach Boat Launch Ramp (ALT 1)

4. Summary

Based on the findings conveyed in this report, there is demand in the market area for the addition of a two-lane launch ramp in King Harbor/Redondo Beach and by providing this proposed facility, more local boaters would be able to have easy access to the open ocean and nearby fishing waters on a regular basis. Boat registrations in the South Bay and overall market area show an increase in trailerable boats (those 40 ft and under) in recent years, and those registration numbers are expected to continue to rise. Based on analysis of those boat registration numbers, it is anticipated that South Bay boaters, or those in close proximity to Redondo Beach, would account for +/- 13,500 launches per year at the proposed launch

ramp, and an additional +/- 5,500 launches per year would likely come from boaters across Los Angeles and Ventura counties. Though, this anticipated demand is thought to be conservative for multiple reasons; one being it only assumes 25% of trailerable boats in the South Bay would use the proposed facility, assuming some may still prefer to go to their current launch facility, but it is anticipated that many boaters in the South Bay would actually prefer a closer launch ramp to avoid traveling through Southern California traffic. Another reason this demand number is thought to be conservative is that boaters regularly traveling from inland counties (San Bernadino and Riverside) to launch their boats out on the ocean are not accounted for.

While the anticipated demand is significantly higher than the current demand for the Redondo Beach Boat Hoist, there are several reasons why it is believed a new boat launch ramp facility in the same location would produce higher demand. The current launch facility is older and in poor condition and only allows for one boat to be launched at a time, already reducing the efficiency of the existing facility in half from the newly proposed facility. Furthermore, the weight/length limitations of the hoist result in a portion of trailerable vessels being unable to use the facility, which would not be a concern with a launch ramp. The boat hoist also requires an operator to be on site for use of the boat hoist and is not open outside the hours of 6am-7pm, and these hours could likely be expanded for a launch ramp since an onsite operator would not be a requirement. Lastly, the boat hoist launch fees are generally over double the fee that is anticipated for the boat ramp ($30 to $40 for boat hoist and $13 max for boat ramp), resulting in many local boaters currently traveling further away to save money. The City of Redondo Beach's amendment to their LCP further justifies that there is a need for a boat launch ramp in King Harbor and that it is supported by local boat owners and the City of Redondo Beach to allow for greater public access to the water and help alleviate demand at crowded launch ramps elsewhere in the market area.

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MEMORANDUM

To:	Dave Charobee; Katherine Buck – (City of Redondo Beach)
From:	Jerry Holcomb, PE – (Moffatt & Nichol)
Date:	May 8, 2025
Subject:	Redondo Harbor Boat Launch Ramp – Coastal Criteria and Hazards Analysis
M&N Job No.:	232677

1 Introduction

Local residents and community leaders have agreed upon the development of a public boat launch within King Harbor. King Harbor is in the City of Redondo Beach, CA, approximately 10 miles northwest of the Port of Los Angeles and Port of Long Beach (Figure 1). King Harbor accommodates three marina basins, named Basin 1, Basin 2 and Basin 3 from north to south. The proposed public boat launch locations (three alternative locations) are within the red box (shown in Figure 1) between the Seaside Lagoon rock groin and the entrance of Basin 3. The new public boat launch will allow access to the open ocean and provide recreational and commercial opportunities for community members.

This memorandum uses publicly available data, field collected data, and modelling results to: 1) provide coastal design criteria and environmental conditions within the Project site, 2) summarize coastal hazards at the Project site including future sea level rise (SLR), and recommend SLR adaptation measures.

Figure 1. Project Location and Features.

2 Metocean Conditions

2.1 Water Levels

2.1.1 Tides and tidal datum

The tides in Redondo Beach are semi-diurnal with pronounced diurnal inequalities (i.e., two high and low tides each within a 24.6-hour period with varying elevations); otherwise known as mixed tides. Water levels were taken from NOAA station 9410840 which is located off Santa Monica Pier, 13 miles north of the project site. This tide gauge has been recording tidal elevations since 1974. The tidal datums have been developed by the National Oceanic and Atmospheric Administration (NOAA) based on the 1983-2001 tidal epoch. The tidal datums at the Santa Monica Station are recommended to be used in this project and are presented in Table 1 below.

Table 1. Tidal Datums at NOAA Tide Station 9410840, Santa Monica, CA.

Abbreviation	Description	Water Elevation (ft, MLLW)	Water Elevation (ft, NAVD88)
HOWL	Highest Observed Water Level	+8.50	+8.31
HAT	Highest Astronomical Tide	+7.27	+7.08
MHHW	Mean Higher High Water	+5.43	+5.24
MHW	Mean High Water	+4.69	+4.50
MSL	Mean Sea Level	+2.79	+2.60
MLW	Mean Low Water	+0.93	+0.74
NAVD88	North American Vertical Datum of 1988	+0.19	+0.00
MLLW	Mean Lower Low Water	+0.00	-0.19
LAT	Lowest Astronomical Tide	-1.97	-2.16
LOWL	Lowest Observed Water Level	-2.84	-3.03

2.1.2 SLR Probability & Timing

Sea level rise (SLR) science has evolved with a better understanding of both global and local physical processes. Future SLR projections are developed based on the current best scientific understanding of these processes using advanced global, regional, and local modeling techniques. The Ocean Protection Council (OPC) and California Coastal Commission (CCC) both published updated SLR guidance documents in 2024. Each report provides SLR scenarios and values for various coastal regions in California. The regional SLR projections for Santa Monica in CCC's *Sea Level Rise Policy Guidance: Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs and Coastal Development Permits* report (California Coastal Commission, 2024) was chosen to be used. The OPC's *State of California Sea Level Rise Guidance: 2024 Science & Policy Update* report provided SLR projections for the greater Los Angeles area (OPC, 2024). The difference in values for the selected SLR scenarios between the Santa Monica and Los Angeles Stations is 0.1 ft.

Sea level scenarios are offered in five different categories: Low, Intermediate-Low, Intermediate, Intermediate-High, and High. The selection of SLR scenario is dependent on the level of risk the community is willing to accept. Both OPC and CCC recommend evaluating Intermediate, Intermediate-High, and High scenarios for infrastructure projects.

2.1.2.1 Selected SLR Scenarios

A 50- and 75-year service life was considered when selecting the SLR scenario to be used for analysis within this study. The projected timing of evaluated SLR scenarios is presented in Table 2. As seen in the table, a range of time horizons is projected for each SLR value depending on the level of risk aversion. Projections are summarized according to the possible timelines of their occurrence as follows based on the 2024 CCC Guidance:

1. SLR of 1.7 ft (0.52 m) is representative of a time horizon range from 2050-2080.
2. SLR of 2.9 ft (0.88 m) is representative of a time horizon range from 2070-2100.

The 75-year service life was chosen for the analysis; 2.9 ft of SLR is predicted to occur by 2100 based on the Intermediate scenario.

Table 2. Probability and Potential Timing Associated with Selected SLR Scenarios in Santa Monica (California Coastal Commission, 2024).

SLR Scenario Probability*	Intermediate 5 percent	Intermediate – High 0.1 percent	High <0.1 percent
1.7 ft	2080	2060 - 2070	2050 - 2060
2.9 ft	2100	2080	2070 - 2080

Note: *Probability assuming 3°C of warming in 2100.

2.1.3 Extreme Water Levels

Extreme water levels for a range of return periods were published by NOAA on the Santa Monica tide gauge (Station 9410840). Table 3 Presents the extreme water levels based on Santa Monica tide gauge results to be used for the project. The values for the 1-year, 2-year, 10-year, and 100-year return periods were provided by NOAA while the remaining were interpreted from the annual exceedance probability curves shown in Figure 2 and Table 3.

Table 3. Extreme Water Levels at Project Site.

Return Period	Stillwater Elevation (ft, MLLW)
100-Year	8.0
50-Year	7.8
25-Year	7.7
10-Year	7.6
5-Year	7.4
2-Year	7.3
1-Year	7.0

Note: The extreme water levels are based on NOAA Tide Gauge at Santa Monica.

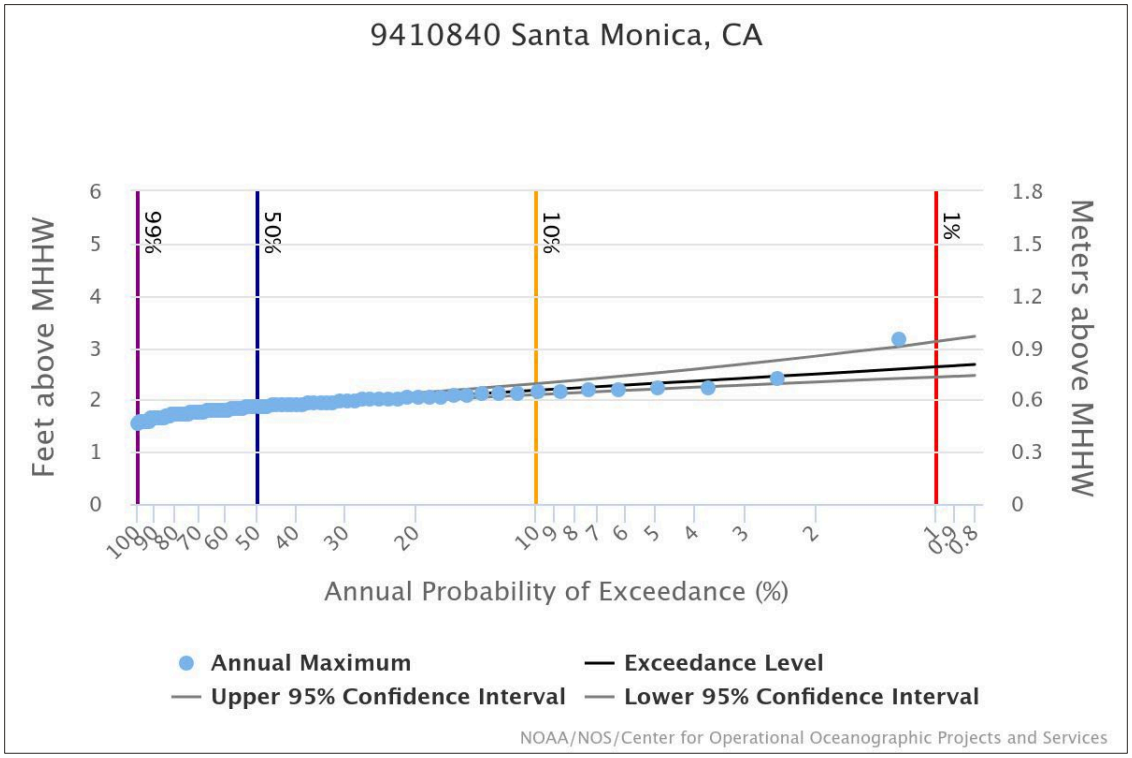


Figure 2. Annual Exceedance Probability Curves - High Water Levels.

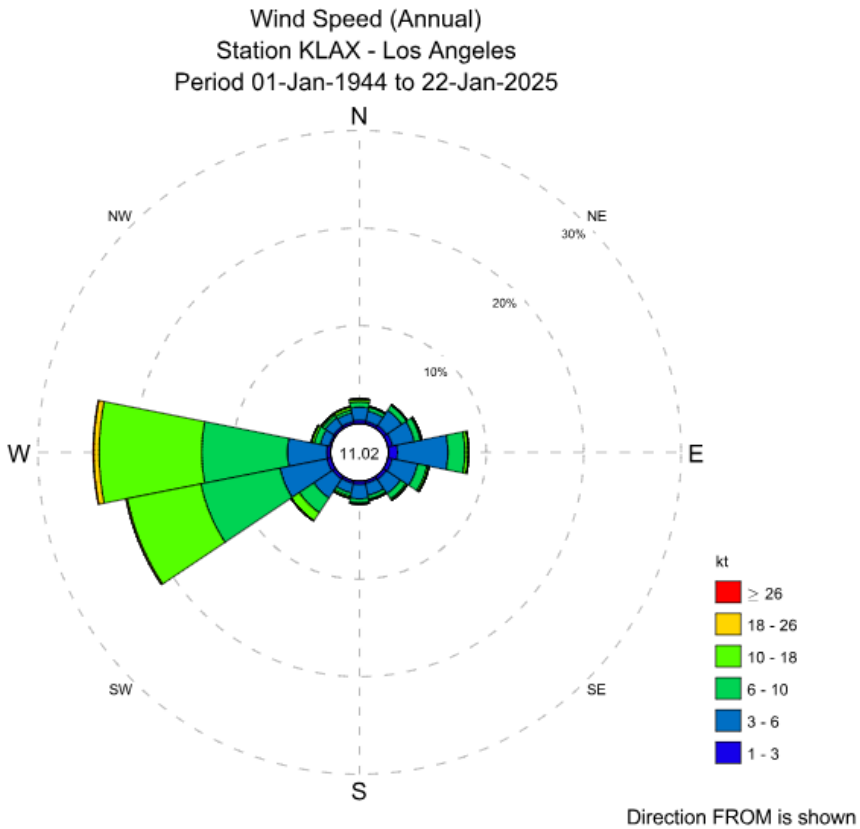
2.2 Currents

The currents during operational conditions are mainly driven by tidal flows. With the rise and fall of tides, the currents within the harbor change directions and are called flood and ebb currents. Wave-induced currents contribute to the currents at the boat launch ramps too. Extreme currents are likely to occur during tsunamis when long-period waves are caused by underwater disturbances such as earthquakes across deep ocean and inundating the coast.

2.3 Wind

2.3.1 Operational Wind Condition

Wind data was summarized from 80-year measurements (1944-2025) at Los Angeles International Airport which is located approximately 7 miles north of Kings Harbor. Los Angeles International Airport is the nearest airport that has wind measurements available for public use. Daily wind speeds were recorded as hourly, 2-minute wind speeds at a location 33 feet (10 meters) above the ground. The data was used to create a wind rose shown in Figure 3. Winds are dominant from the west to west-southwest direction and 60 percent of them are below 10 knots. The strong winds between 18 to 26 knots are coming from the west. Figure 3 also shows the percentage of occurrence for different wind directions and speeds.



Percentage of Occurrence

Wind Speed, kt	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
Total	2.50	1.81	2.88	3.50	8.19	4.28	2.92	1.99	2.30	1.79	5.45	21.43	24.33	2.05	1.76	1.79	88.98
26												0.12	0.55				0.82
18	0.28			0.12	0.37	0.21	0.17	0.11	0.11	0.18	1.01	7.72	10.53	0.28	0.15	0.30	21.67
10	0.55	0.40	0.62	0.65	1.74	0.99	0.66	0.40	0.42	0.37	1.80	8.27	8.80	0.65	0.35	0.33	27.00
6	1.31	1.06	1.85	2.27	5.17	2.66	1.75	1.23	1.45	1.00	2.32	4.92	4.02	0.94	1.03	0.89	33.88
3	0.33	0.25	0.34	0.45	0.90	0.42	0.33	0.25	0.33	0.24	0.31	0.40	0.38	0.17	0.22	0.23	5.55
1																	

Figure 3. Annual Wind Rose and Joint Probability Table From Los Angeles International Airport (1944-2025).

2.3.2 Extreme Wind Condition

A statistical analysis was performed on the wind measurements taken from the Los Angeles International Airport to determine extreme wind conditions. The return period wind speeds were recorded within an 'all direction' category. The extreme wind return period distribution plot is shown in Figure 4 with a summary presented in Table 4.

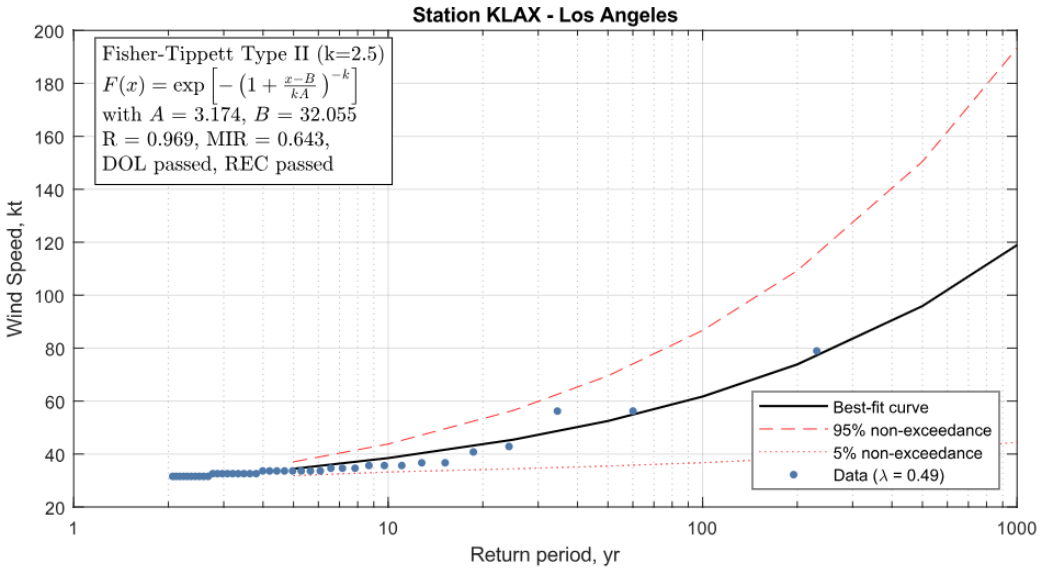


Figure 4. Extreme Wind Return Period Distribution Plot at Los Angeles International Airport (1944-2025).

Table 4. Extreme Wind Speeds at Los Angeles International Airport (1944-2025).

Return Period	2-min Wind Speed (knots)	30-sec Wind Speed (knots)
100-Year	61.7	69.9
50-Year	52.5	59.5
25-Year	45.4	51.4
10-Year	38.5	43.6
5-Year	34.4	39.0
1-Year	31.2	35.3

2.4 Offshore Waves

2.4.1 NDBC Buoy

NOAA's National Data Buoy Center (NDBC) deploys moored buoys that are used to collect meteorological and oceanic data. Buoy Station 46221 has collected offshore wave data from 2008 to the present day and is located approximately 14 miles offshore from the project site as seen in Figure 5. Figure 6 includes the wave rose at NDBC Station 46221. Waves are predominantly seen from the west and south-southwest directions. The significant wave heights of 1 percent, 10percent, and 50 percent exceedance are 8.4 ft, 4.9 ft and 3.1 ft, respectively. The joint probability table for significant wave height and peak wave period is presented in Figure 7. More than 44 percent of the waves have a peak wave period between 13 to 16 seconds. 6.3 percent of the waves have a peak wave period longer than 18 seconds. The longer the wave period, the more energetic the wave is.

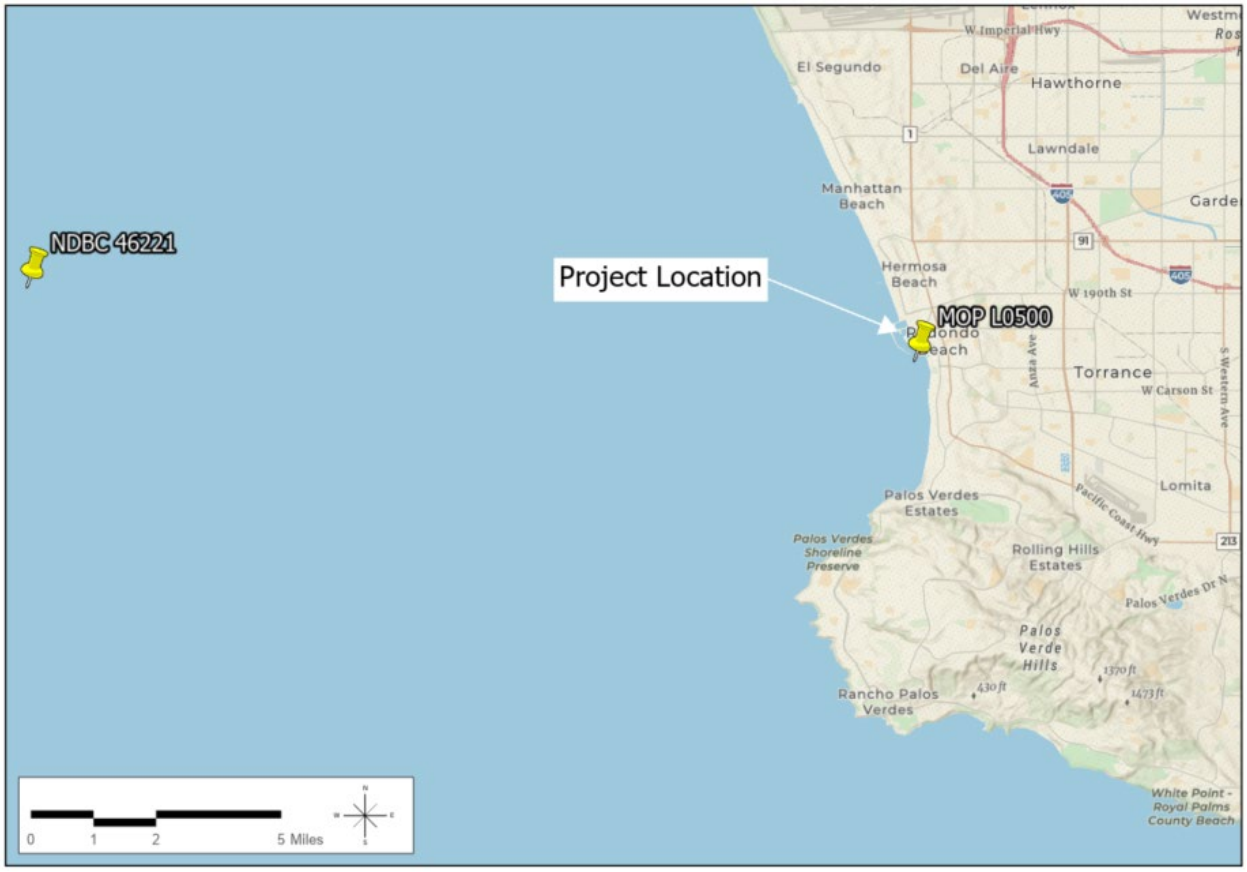


Figure 5. Location of NDBC and L0500 Buoys Relative to Project.

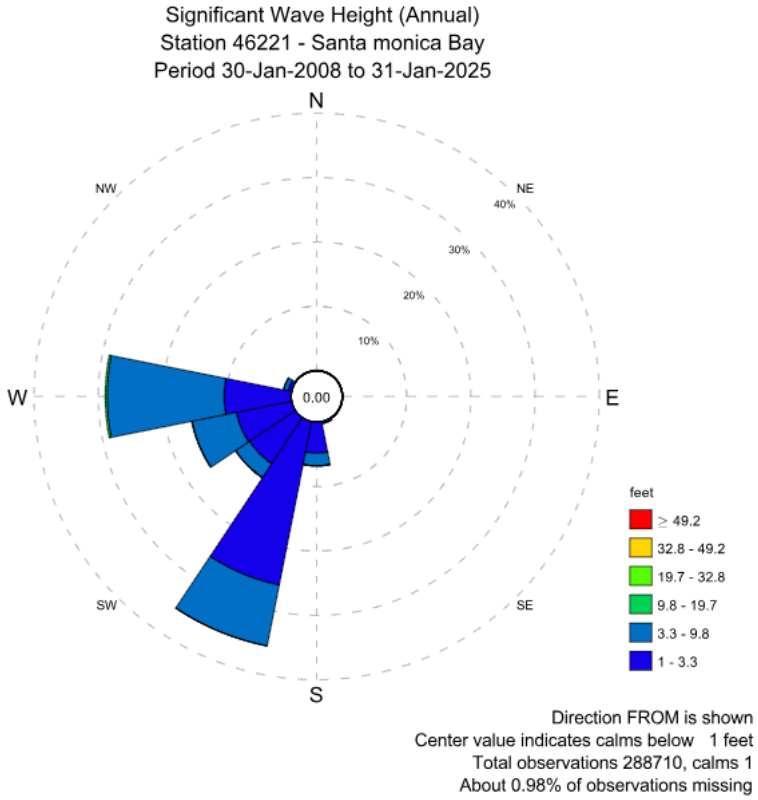


Figure 6.Wave Rose Plot at NDBC Station 46221.

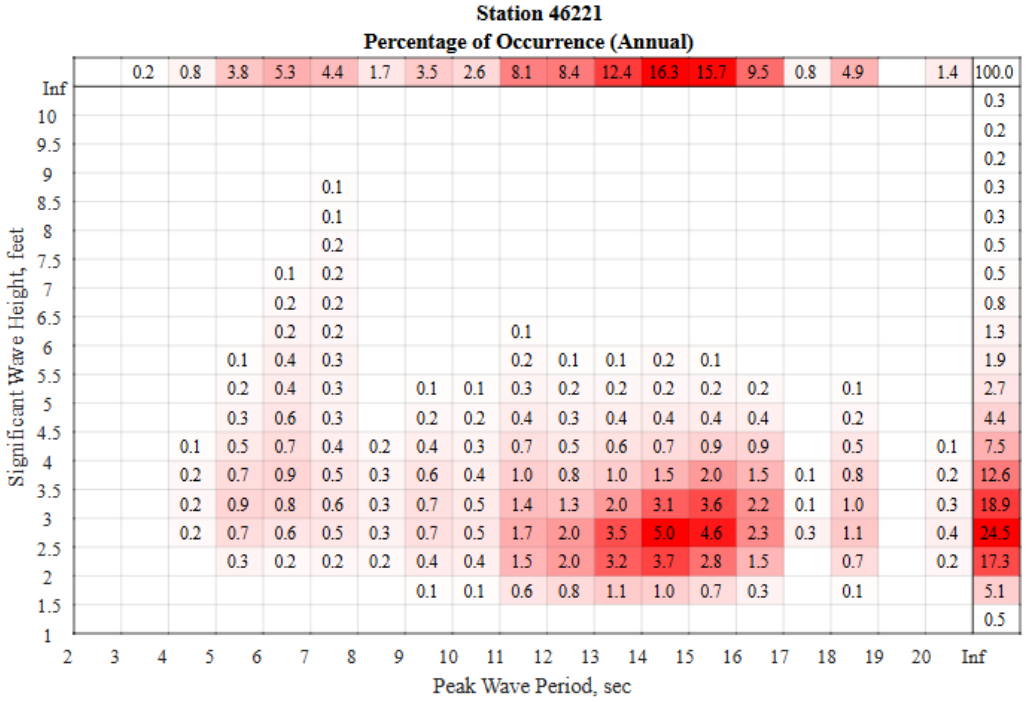
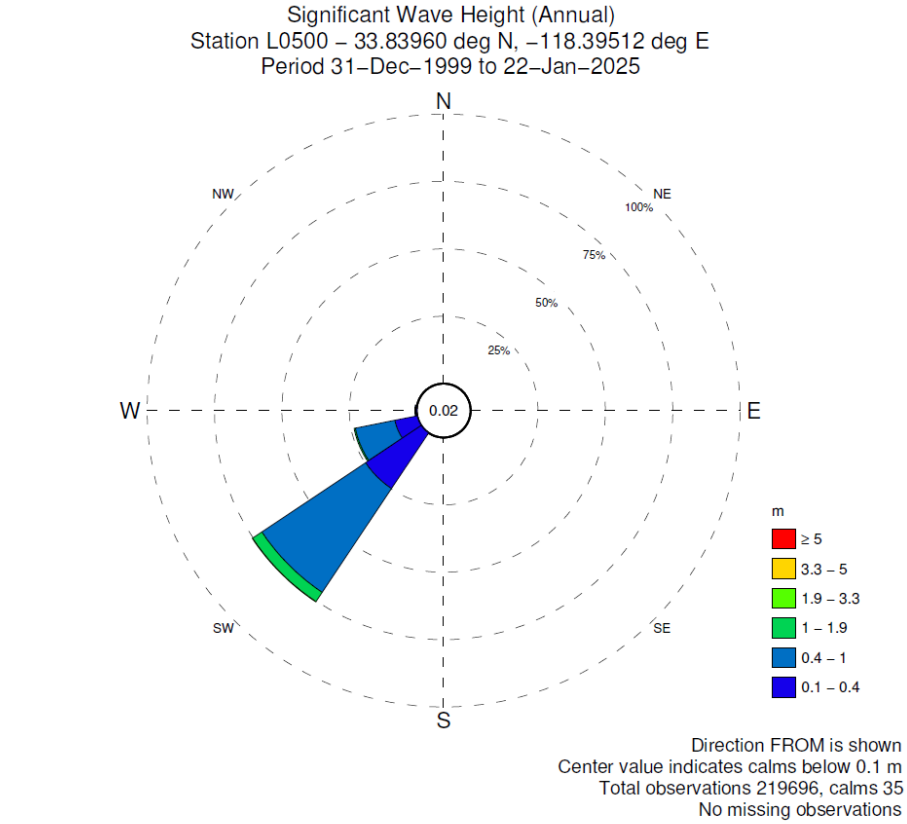


Figure 7. Joint Probability of Wave Hight and Period at NDBC Station 46221.

2.4.2 CDIP MOP L0500

The Coastal Data Information Program (CDIP) provides monitor-based wave hindcast and nowcast along the California coast, called the Monitoring and Prediction (MOP) system. The offshore wave conditions for modeling were developed based on wave data at Station L0500 from MOP from January 2000 to January 2025. Figure 5 presents the location of the MOP station, which is at the entrance of King Harbor with a depth of 33 feet (10 meters). Figure 8 includes the wave rose plot and joint probability table at Station L0500. The dominant waves at the entrance come from the southwest, perpendicular to the orientation of King Harbor's breakwater. More than 60 percent of the waves since 2000 at L0500 are less than 3.3 ft.



Percentage of Occurrence

Significant Wave Height, m	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
Total											75.40	23.89	0.70				99.98
5																	
3.3											0.12						0.12
1.9											4.15	0.47					4.62
1											46.30	14.97	0.33				61.60
0.4											24.83	8.44	0.37				33.65
0.1																	

Figure 8. Wave Rose and Joint Probability Table at MOP Station L0500.

Historically, El Nino years in the 1980s had large wave events with elevated water levels and caused damage along the California coast. Therefore, additional wave events and high water level events obtained from FEMA's FIRM IDS studies[1] at the harbor entrance were added to the MOP data. An extreme value analysis of waves at the King Harbor entrance was conducted. The resulting extreme wave conditions by return periods are listed in Table 5. The associated peak wave periods are recommended as 16 to 18 seconds based on the measurements at the offshore NDBC buoy and gauges inside the harbor (see Section 2.4.1 and Section 3). These wave conditions were applied in the wave model as boundary conditions and discussed in Section 4.3.

Table 5: Extreme Offshore Wave Conditions – at King Harbor Entrance.

Return Period (year)	Significant Wave Height (ft)	Peak Wave Period[1] (s)
1	6.7	16
2	7.1	16
5	7.8	16
10	8.4	16
25	9.3	16
50	10.3	18
100	11.4	18

Note: [1] The peak wave periods were conservatively determined based on measurements at NDBC buoys and wave gauges in the harbor.

3 Wave Data Collection

Two RBR pressure gauges with wave measurement capabilities (RBR solo^3 D | wave16) were deployed on November 7th, 2024 within King Harbor to capture the wave climate. The gauge locations can be seen in Figure 9. The gauges were attached to the center bar of PVC frames filled with sand that were gently lowered to rest on the seafloor. A picture of the PVC frame can be seen in Figure 10. Locations were selected to be representative of wave information across the area, based on their proximity to design alternatives.

[1] BakerAECOM (2015). FEMA Region IX California Coastal Analysis and Mapping Project Intermediate Data Submittal #3, Nearshore Hydraulics, LA County, California, Appendix 4.

Figure 9. Locations of RBR Wave Gauges within King Harbor.

Figure 10. PVC Frame Used to Mount the RBR Wave Gauges.

The wave gauges were set to collect burst measurements at a speed of 2 Hz for 512 samples, every 10 minutes. Data from the gauges were analyzed and presented below for the 2-month period (November 7th 2024 to January 10th, 2025) that they were deployed. Figure 11 and Figure 12 show significant wave height (feet) and peak wave period (seconds) plotted over time for Locations 1 & 2.

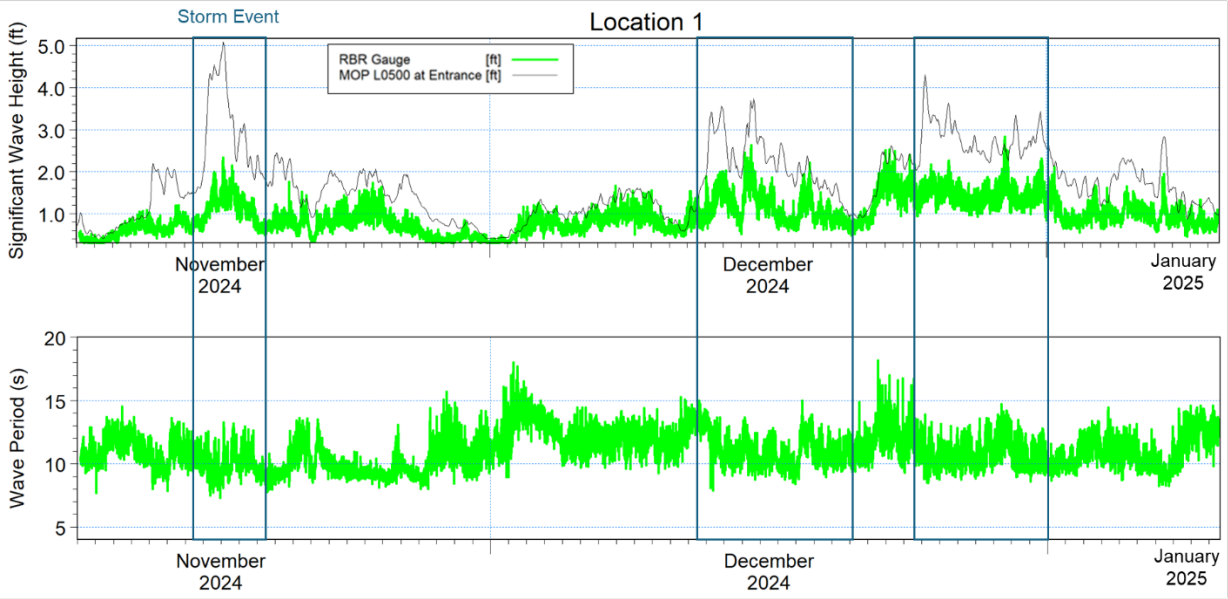


Figure 11. Timeseries of Significant Wave Height and Significant Wave Period for Location 1.

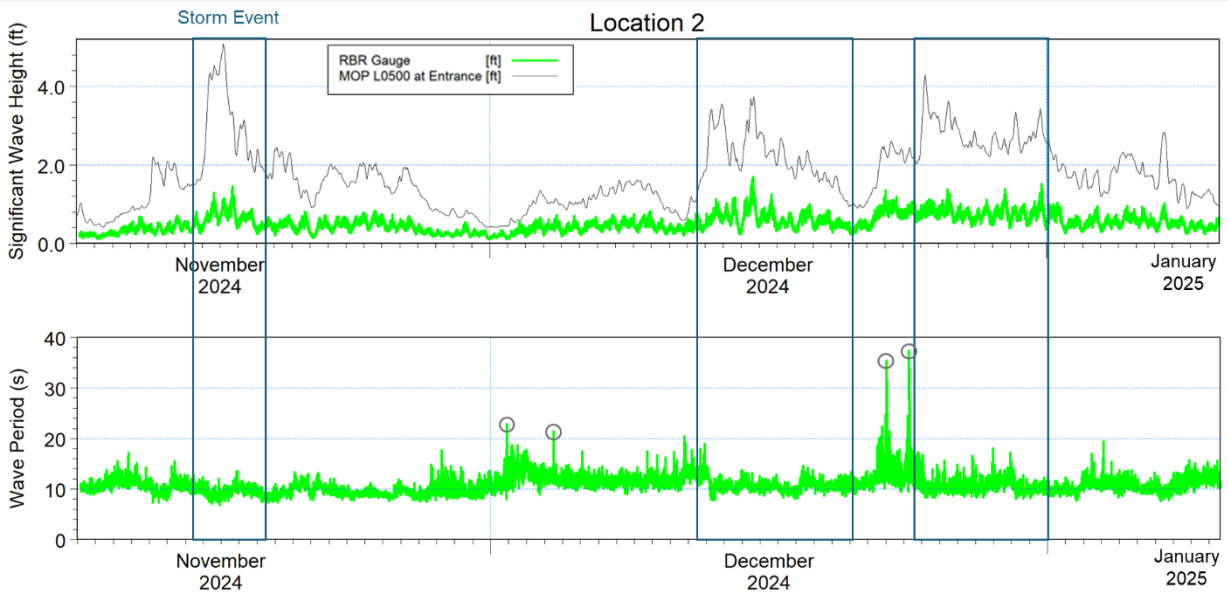


Figure 12. Timeseries of Significant Wave Height and Significant Wave Period for Location 2.

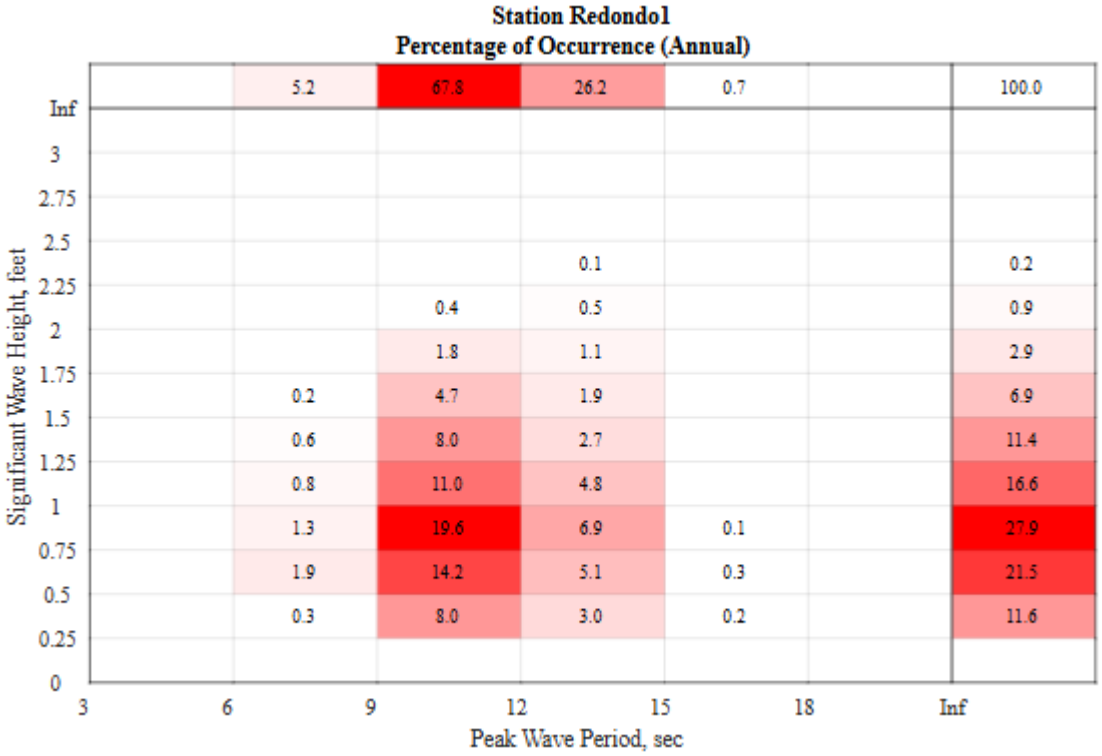


Figure 13. Joint Probability Table for Location 1.

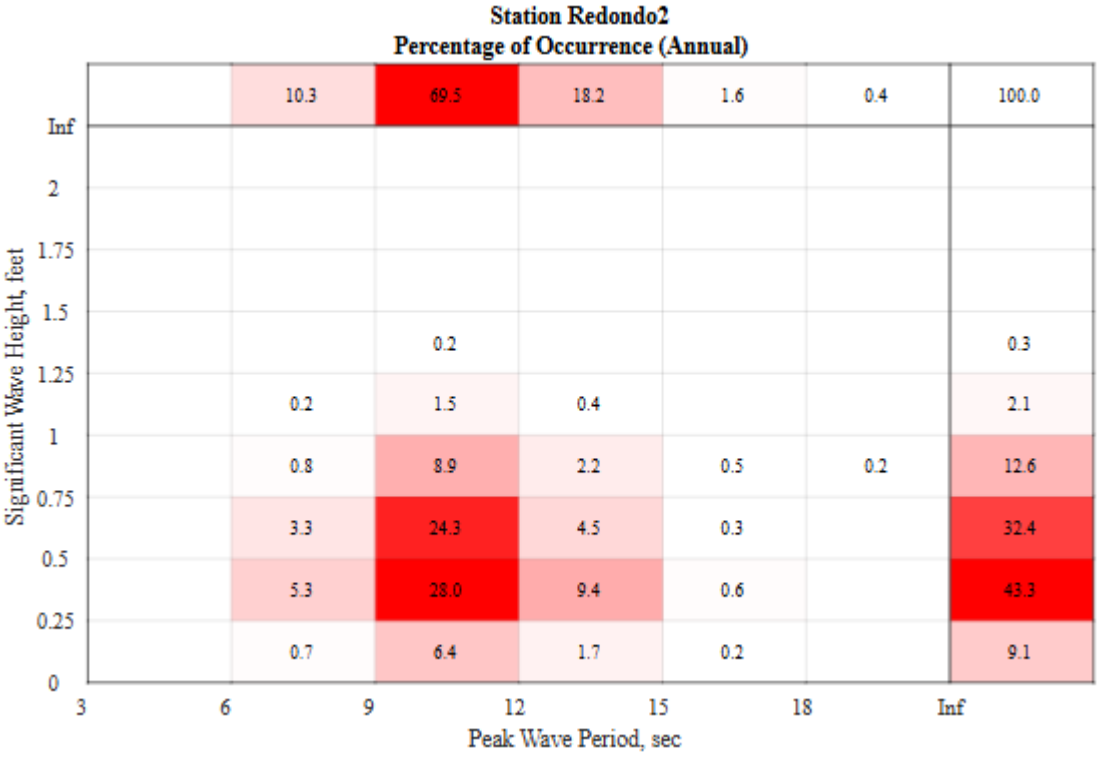


Figure 14. Joint Probability Table for Location 2.

The measured approximate 2-month data show that significant wave heights do not exceed 3 ft at Location 1 and 1.7 ft at Location 2. The significant wave period at Location 1 ranges from 7 seconds to 18 seconds, consistent with what has been seen at the offshore NDBC buoy. However, there are occurrences of wave periods longer than 20 seconds observed at Location 2, marked in grey circles in Figure 12. These long periods could be an indication of seiche problems within the harbor or data noise from instruments. Additional modeling in the future final design once a preferred alternative is chosen could help to identify whether potential seiche problems exist or not. Storm events captured by both gages are highlighted in blue boxes in Figure 11 and Figure 12. The MOP wave time series at the harbor entrance (L0500) are also plotted in these two figures. A good correlation between the MOP and RBR measurements is observed, especially during storm events. Figure 13 and Figure 14 summarize the joint probability of wave height and period for Locations 1 & 2. The most frequent wave period for both locations is between 9 to 12 seconds, with 68 percent to 70 percent of the waves, corresponding to the wind waves. The frequent swell wave periods are from 12 to 15 seconds, with 18 percent to 26 percent occurrence.

The data show that the wave heights at Location 1 were consistently higher than that recorded at Location 2. This is likely due to the gauges' proximity to the breakwater. The breakwater provides protection from offshore waves for Location 2. Small waves less than 1 ft are not of operational concern but waves greater than 2 ft will disrupt the operation.

4 Site-specific Wave Modeling

MIKE21 Wave model Flexible Mesh (FM) from Danmark Hydraulics Institute (DHI) was used to develop the wave conditions at the proposed boat launch sites. MIKE21 Wave FM is a newly released phase-resolving wave model formulated in the time domain. It replaces the traditional MIKE21 Boussinesq Wave (BW) model and can accurately model wave diffraction and refraction. MIKE21 Wave FM model solves the same governing equations as the MIKE21 BW model but uses unstructured flexible meshes that require less computational time.

The modeling approach of wave conditions at the boat launch sites can be summarized as the following:

- Develop operational and extreme wave conditions at the entrance of the harbor using as model input data
- Develop 2D MIKE21 Wave FM model for the Redondo King Harbor
- Calibrate the MIKE21 Wave FM model with measured waves
- Simulate the design and operational wave conditions with the calibrated wave model and provide waves at the boat ramps.

4.1 Model Mesh and Bathymetry

A flexible mesh with varied element sizes was developed for Redondo King Harbor. Figure 15 illustrates the model domain that covers the entire harbor. Bathymetry contours from the previous 2016 main channel dredging study were used to develop model bathymetry. The vertical datum is set to MLLW. The deepest point within the domain is at the harbor entrance, at an elevation of -42 ft MLLW. The three marina basins have depths between 10 to 20 ft below MLLW.

The flexible mesh has a resolution of 10 to 15 ft over the entire domain. Finer elements are applied in shallow areas with steep slopes.

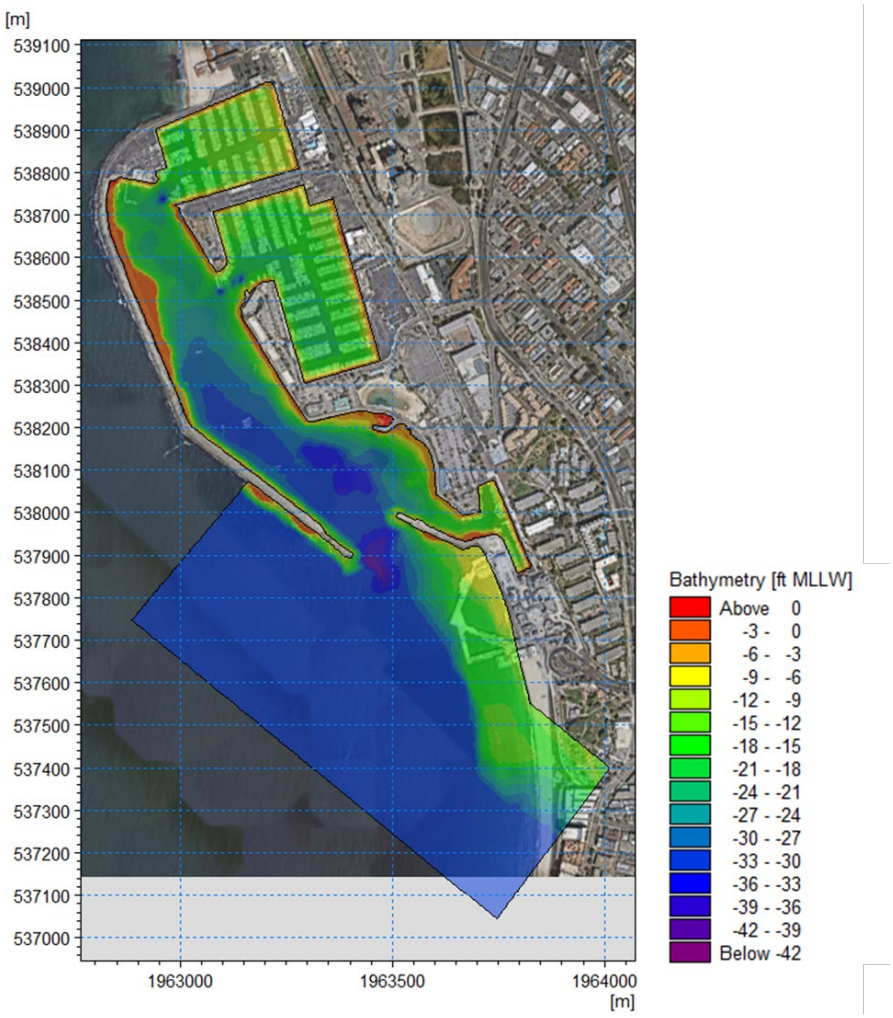


Figure 15. Model Domain and Bathnymetry of the Existing Harbor.

4.2 Model Calibration

Two RBR wave gauges were deployed inside the harbor measuring waves in the winter season. The measured waves discussed in Section 3 are used to calibrate and verify the MIKE21 wave FM model. The model calibration focused on three events captured during the deployment period, covering a wave period from 13.3 seconds to 7.1 seconds. These three events are within the three highlighted with blue box storm periods illustrated in Figure 11 and Figure 12. Such a range of wave periods covers both swell and wind wave events. However, this wave study is focused on swell waves with longer wave periods as it will control the boat ramp design. The wave direction at the entrance is from the southwest with very small variations.

During the model calibration, the porosity layers in the model were initially determined by the types of shoreline and then adjusted to achieve the best fit with the measured waves during these events. The porosity values within the harbor were set between 0.2 to 0.45 after model calibration. Table 6 summarizes the measured and modeled significant wave heights at the two wave gauges, named Location 1 and Location 2, respectively. The modeled wave heights in Event 1 and Event 2 match very well with the measured wave heights, showing less than 0.1 ft difference. The modeled waves are slightly higher than measured, indicating relatively conservative estimates. In Event 3, the model over-estimates

the wave height at Location 1 (Gauge “Pier”), and underestimates it at Location 2 (Gauge “Channel”). This is related to the missing winds in the model, as this is a wind-induced wave event with a 7-second period. Overall, the MIKE21 Wave FM model is deemed sufficiently accurate for computing swell waves within King Harbor.

Table 6. Model Calibration Results at RBR Wave Gauges.

Parameter	Event 1	Event 2	Event 3
Event Time (GMT)	12/28/2024 11:00 AM	11/17/2024 8:00 AM	11/15/2024 6:00 PM
Offshore Sign. Wave Height [1]	2.5 ft	3.1 ft	4.4 ft
Offshore Peak Wave Period	13.3 s	10 s	7.1 s
Offshore Incoming Wave Direction (from)	228°N	227°N	235°N
Stillwater Level	3.6 ft MLLW	5.7 ft MLLW	4.4 ft MLLW
Measured Sign. Wave Height at RBR Location 1	1.08 ft	1.33 ft	1.25 ft
Modeled Sign. Wave Height at RBR Location 1	1.15 ft	1.43 ft	1.38 ft
Measured Sign. Wave Height at RBR Location 2	0.78 ft	0.64 ft	0.86 ft
Modeled Sign. Wave Height at RBR Location 2	0.85 ft	0.67 ft	0.46 ft

Note: [1] Offshore wave conditions at the harbor entrance where MOP L0500 is located.

The model was also verified with USACE’s model study for Redondo Beach King Harbor improvements in 1990[2]. With an entrance wave of 11.5 ft, 15 seconds and Stillwater level at 7.0 ft MLLW, the study reported a maximum wave height of 4.3 ft at Gage 12. Figure 16 depicts the location of Gage 12 from USACE’s 1990 study. The MIKE21 Wave FM model simulated the same entrance wave conditions from the model boundary and compared the maximum wave height obtained at the RBR Location 2 (Gauge “Channel”) with that at Gage 12. The current MIKE21 model predicts a maximum wave height of 4.2ft at “Channel”, close to 4.3ft estimated at Gage 12 by USACE.

[2] Robert R. Bottin, Jr. and Rochard E. Kent. (1990) Redondo Beach King Harbor, California Development of Design Data for Harbor Improvements, Coastal Model Investigation, Final Report, USACE Technical Report CERC-90-6, May 1990.

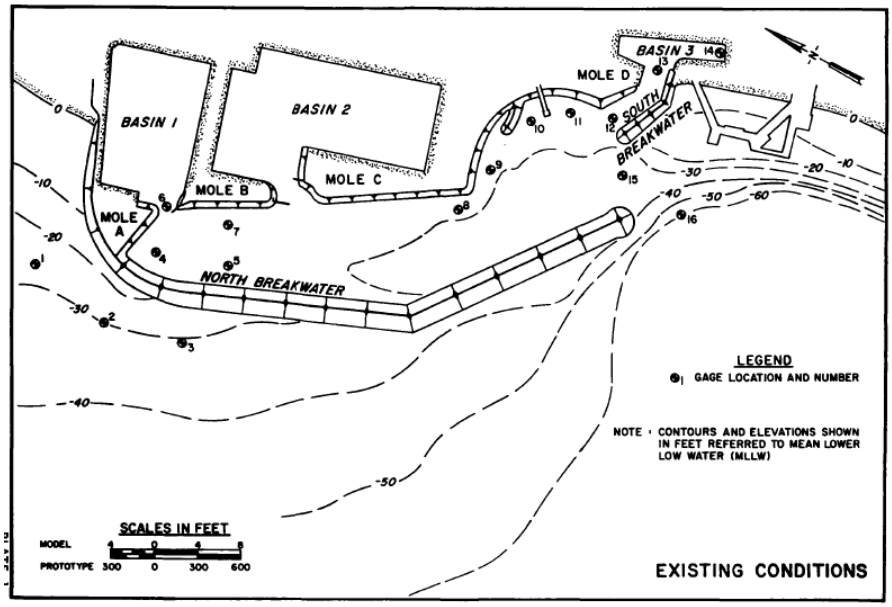


Figure 16. Gage Location in USACE 1990 Study.

4.3 Modeled Scenarios and Boundary Conditions

Three proposed alternatives named Alternative 1, Alternative 2 and Alternative 5 were studied. Figure 17 through Figure 19 present the boat launch ramp locations of these three alternatives. Alternative 1 has the boat launch ramp at the entrance of Basin 3 marina. Its location is the one furthest from the King Harbor entrance among the three, meaning the least wave disturbance. Alternative 2 is located in the harbor turning basin. Alternative 5 is close to the previously demolished sport fishing pier, south of the Seaside Lagoon rock groin. An L-shape sheet pile wall is proposed next to the boat launch in Alternative 5 to provide extra wave protection. This sheet pile wall was not included in the 2D wave model for this concept level modeling study.

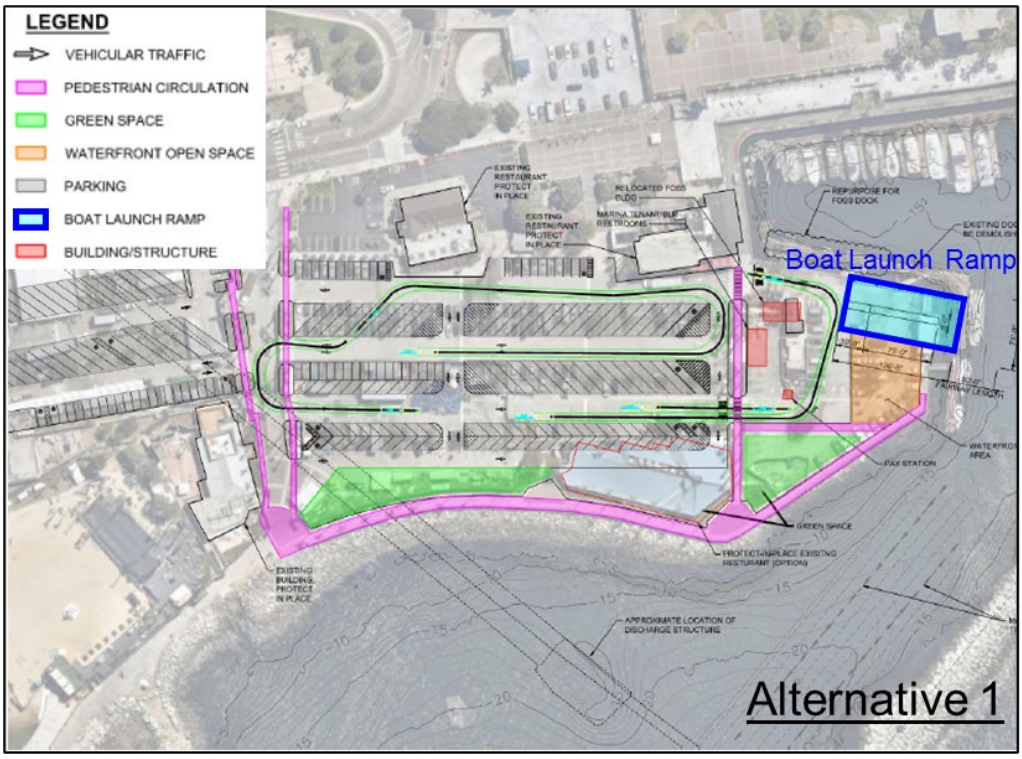


Figure 17. Boat Launch Ramp Placement – Alternative 1 (dated December 18, 2024).

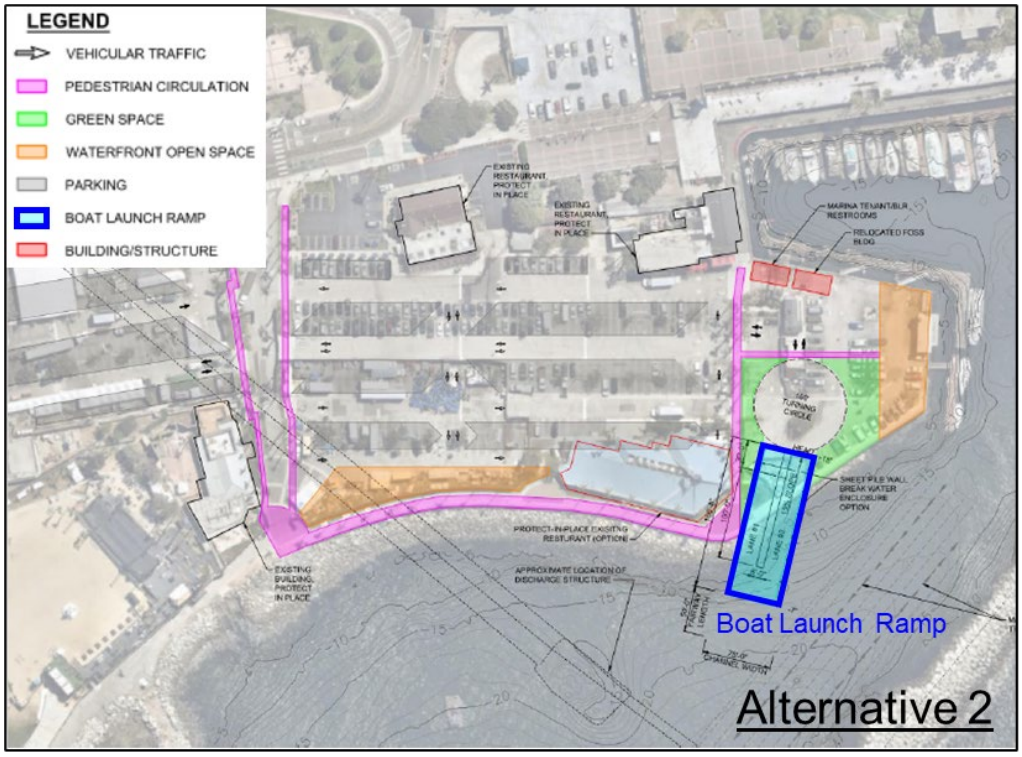


Figure 18. Boat Launch Ramp Placement – Alternative 2 (dated December 18, 2024).

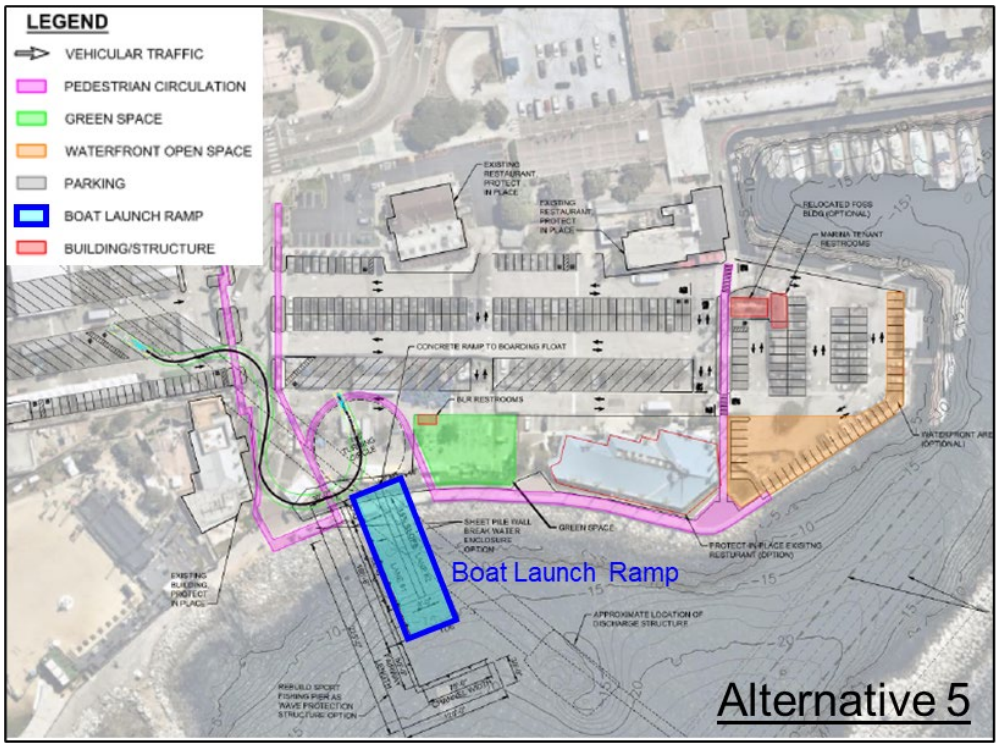


Figure 19. Boat Launch Ramp Placement – Alternative 5 (Note: The graphic shows a rebuilt pier and potential sheet pile wall wave attenuator, but the wave modeling assumed no pier or wave attenuator) (dated December 18, 2024).

To provide design waves and understand boat ramp operational limits, a series of model scenarios were conducted and listed in Table 7. The wave conditions applied at the boundary were developed based on Scripps' CDIP MOP database at Station L0500 at the King Harbor entrance. Peak wave periods of 16 and 18 seconds were used. Details on the offshore waves are discussed in Section 2.4. The 1-year extreme water level at the Santa Monica tide gauge was applied with the extreme waves under various return periods. A SLR condition was also modeled to address future coastal hazards. More discussions on coastal hazards are included in Section 5.

Table 7. Model Scenarios and Boundary Conditions.

Purpose	Return periods	Stillwater Level	Wave Condition at Boundary[3]	
			Sign. Wave Height (ft)	Peak Wave Period (s)
Operation Conditions	1-year	7.0 ft MLLW[1]	6.7 ft	16 s
	2-year	7.0 ft MLLW	7.1 ft	16 s
	5-year	7.0 ft MLLW	7.8 ft	16 s
	10-year	7.0 ft MLLW	8.4 ft	16 s
	25-year	7.0 ft MLLW	9.3 ft	16 s
	50-year	7.0 ft MLLW	10.3 ft	18 s
Design Wave Conditions; Coastal Hazard Analysis	100-year	7.0 ft MLLW	11.4 ft	18 s
	100-year	9.9 ft MLLW[2]	11.4 ft	18 s

Note:

[1] 1-year extreme Stillwater level based on NOAA tide gauge at Santa Monica (ID 9410840).

[2] 1-year Stillwater level with +2.9 ft SLR by 2080 (see discussion in Section 2.1.2).

[3] The mean wave direction at the boundary for all scenarios was set to 230°N, based on MOP L0500 data.

4.4 Model Results

As shown in Figure 20, four output locations were selected to extract modeled waves at the proposed boat launch ramps. Their associated depths are also included in Figure 20. Note that two locations are selected for Alternative 5. Alt5-1 is at the boat launch ramp and assumes no sheet pile wall. Alt5-2 is at the seaward side of the potential sheet pile wall.

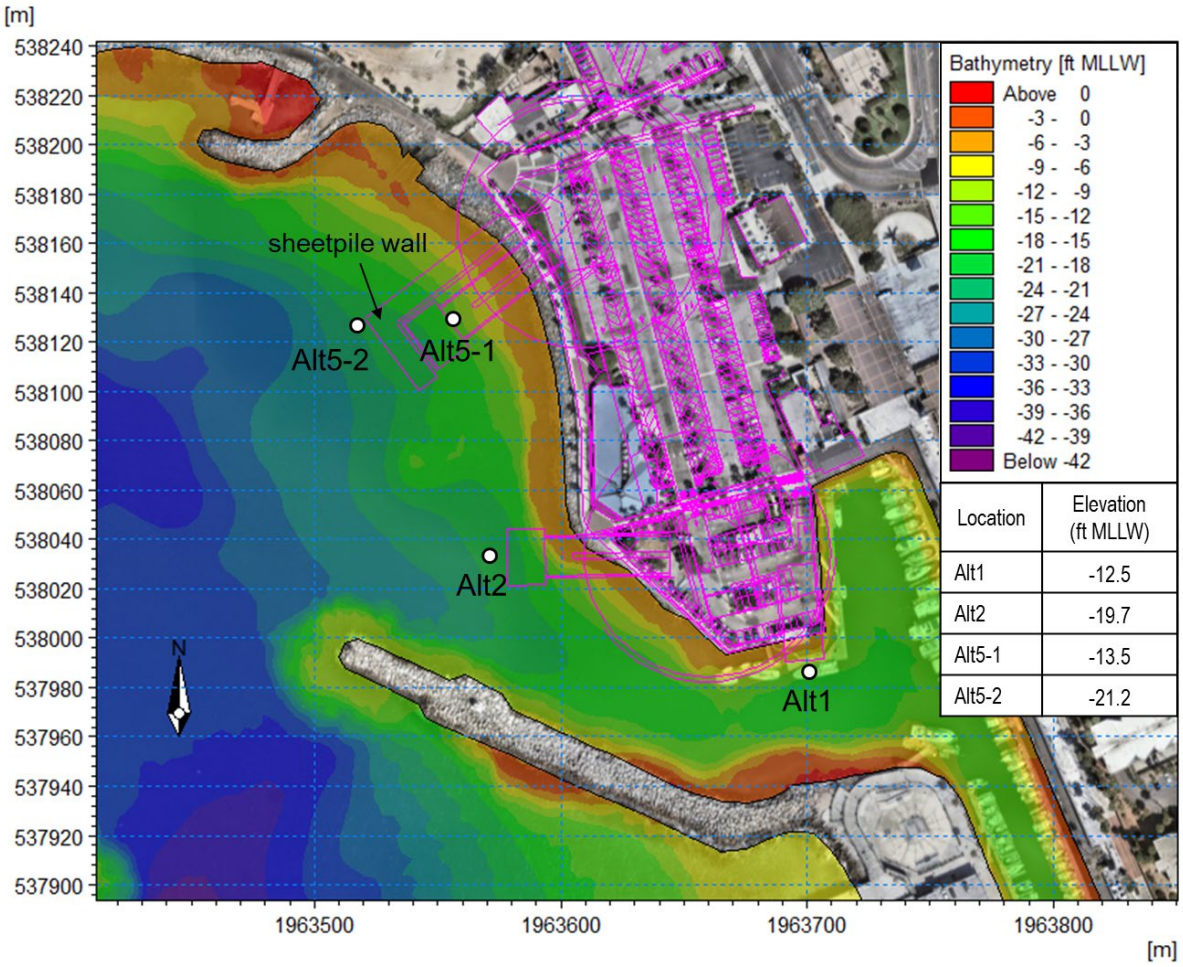


Figure 20. Extraction Locations for Three Alternatives (Note: Although rebuilt pier and sheet pile wall are shown in this graphic at the Alternative 5 location, the pier and wave attenuator were not included in the wave modeling).

4.4.1 100-year Design Waves

The modeled 100-year wave conditions at the four output locations are listed in Table 8. With 2.9 ft SLR, the predicted 100-year significant wave heights at these locations are generally 0.1 to 0.3 ft higher than the ones without SLR. Alternative 1 has the smallest waves among the three alternatives as it is most sheltered from the harbor entrance. The 100-year significant wave height at Alt1 is 2.3 ft with current sea level and reaches 2.5 ft with 2.9 ft SLR. Alt5-2 shows the highest waves among the four locations, reaching 4 ft without SLR and 4.3 ft with 2.9 ft SLR. Waves at Alt5-1 will be much lower than modeled if the location is protected by the proposed sheet pile.

Table 8: 100-year Waves at Boat Launch Ramp.

Scenario	Significant Wave Height [1] (ft)				Peak Wave Period (s)
	Alt1	Alt2	Alt5-1	Alt5-2	
100-year Wave, 1-year Water Level	2.3	2.7	3.5	4.0	18
100yr Waves, 1-year Water Level with SLR by 2080	2.5	3.0	3.6	4.3	18

Note: [1] The wave height locations are shown in Figure 20.

4.4.2 Operational Wave Conditions

Wave events with shorter return periods were simulated to understand the potential limits for boat ramp operations. Table 9 tabulates the modeled wave conditions at the four boat ramp extraction locations under wave height of 1-year, 2-year, 5-year, 10-year, 25-year, 50-year and 100-year return periods. All modeling runs assumed a 16 second wave period. Note that the results listed in Table 9 do not include SLR impact.

Using a 2-ft significant wave height as an operation criterion at the boat launch ramp, Alternative 1 will experience unfavorable wave heights exceeding 2 ft under a return period of 50 years or longer. Alternative 2 will exceed this operational criterion under a return period of 25 years or longer. Alternative 5 will have more frequent downtime, as the 1-year wave height is already 1.9 ft at Alt5-1 and 2.3 ft at Alt5-2. The results of Alternative 5 also support the recommendation of adding a sheet pile wall structure at the boat ramp to provide wave protection.

Table 9. Wave Conditions at Boat Launch Ramp by Return Periods.

Return Period (yr)	Significant Wave Height (ft)			
	Alt1	Alt2	Alt5-1	Alt5-2
1	1.2	1.5	1.9	2.3
2	1.3	1.6	2.0	2.4
5	1.4	1.7	2.2	2.6
10	1.5	1.8	2.4	2.9
25	1.9	2.2	2.9	3.4
50	2.1	2.5	3.2	3.8
100	2.3	2.7	3.5	4.0

5 Coastal Hazards Analysis

5.1 Shoreline Erosion Hazards

The existing shoreline at the project site, as shown in Figure 21, has engineered shore protection structures such as a seawall, bulkhead and rock revetment along the majority of its perimeter. There is no existing sandy shoreline that can experience erosion; therefore, shoreline erosion is not applicable and is not considered a hazard in this analysis.

Figure 21. Project site seawall (A and B) and bulkhead (C) from different views (photos taken in fall of 2024)

5.2 Flood Hazards

Flood hazards at the site (flooding of the areas surrounding the launch ramp) may be caused by high still water levels (SWL) and/or wave runup (Figure 22). SWLs fluctuate with tidal variability, storm surge, and changes in mean sea level. Elevated SWLs typically cause inundation over the course of hours or longer. Wave runup, on the other hand, is generated by waves above the SWL acting on the shoreline or coastal structures and typically causes intermittent flooding over the course of minutes. Note that wave runup typically reaches much higher elevations than the SWL, as the forward momentum associated with the wave propels water up and onshore into the project site, i.e. up the launch ramp.

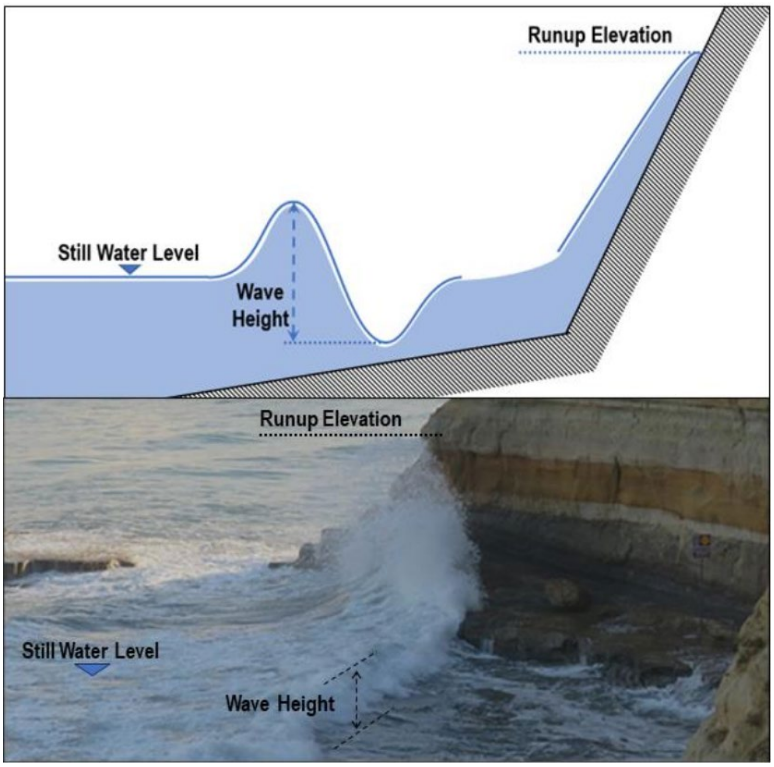


Figure 22. Flood Hazard Definitions.

5.2.1 Still Water Flooding

SWL can be defined as the water surface elevation in the absence of local variation due to waves, at present and projected SLR conditions. For the latter, we used a SLR of 2.9 ft, which is associated with the intermediate-high scenario, with a 0.1 percent exceedance probability, in 2080 (see section 2.1.2.1). Table 3 shows the range of present SWLs at the project site for different return periods.

The 100-year return period SWL, anomalous high-water conditions caused by atmospheric patterns (such as El Niño) and/or astronomical components, i.e., the present SWL of 8.0 ft MLLW compares relatively well to the historical highest observed water level at 8.5 ft MLLW. Extreme 100-yr SWLs at the project site are +8.0 and +10.9 ft MLLW under Present and 2080 SLR conditions, respectively.

Based on the 2016 USGS LiDAR (Dewberry, 2016) shown in Figure 23 (no other current topographic survey data was available for this analysis), the ground elevations within the project shoreline range from approximately +9 to +13 ft MLLW. Based on the Mole D Splash Wall record drawings (DMJM, 1990), the top of seawall (TOSW) is at +17 ft MLLW, and its top of footing (TOF) is at +12.5 ft MLLW. Therefore, under the Present and 2080 sea levels, the seawall footing does not flood under the 100-year SWL. The

backlands of Alternatives 2 and 5, with top of ramp elevations of +18 ft MLLW, and Alternative 1, with top of ramp of +12 ft MLLW, would also not flood with these extreme 100-yr SWLs for Present or 2080 SWLs. However, it is worth noting there is an opening in the existing seawall at the location of Alternative 5, and the seawall does not extend to the Alternative 1 location where the ground elevation is at approximately +9.5 ft MLLW.

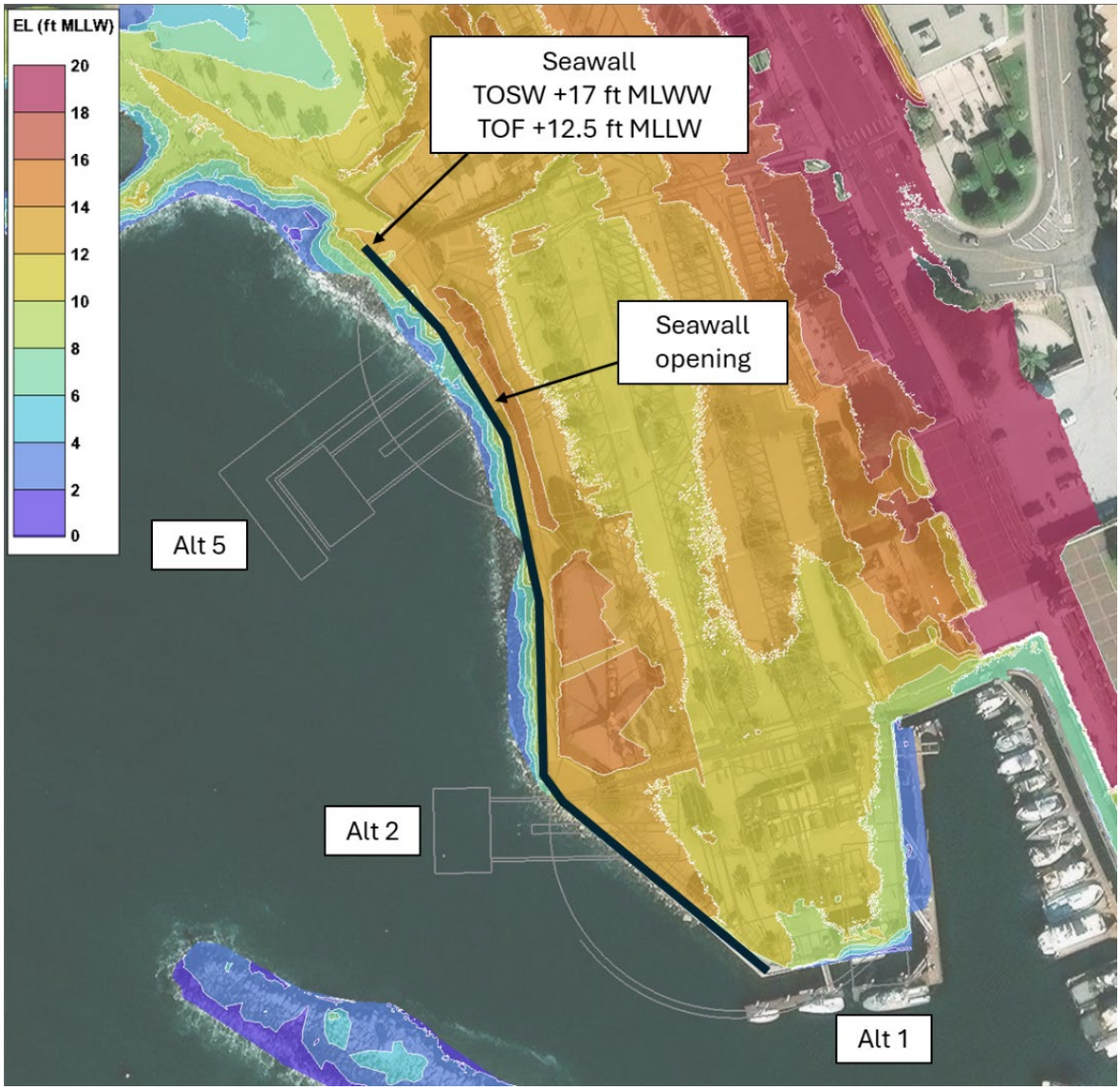


Figure 23. Existing Surface Elevation at the Project Site. Based on USGS LiDAR (2016), alternatives 1, 2, and 5 shown in grey, and approximate seawall extents shown in black.

5.2.2 Total Water Level Flooding

Total Water Level (TWL) is defined as the water elevation that results from the combination of the SWL, wave setup, and wave-induced runup. This section analyzes the results of present and future TWL flooding predictions from three separate sources: (1) USGS CoSMoS, (2) FEMA FIRM, and (3) Moffatt & Nichol (M&N) wave runup analysis.

5.2.2.1 USGS CoSMoS

CoSMoS (USGS, 2021) has the capability to map detailed predictions of coastal flooding based on existing and future climate scenarios for Southern California (Barnard, 2018). The modeling system incorporates state-of-the-art physical process models to enable the prediction of currents, wave height, wave runup, and total water levels. Coastal flooding predictions simulate the effects of erosion, wave runup, and overtopping during storm events. Flooding extents are calculated and mapped at profiles spaced about 330 ft apart along the shoreline.

The projected water levels used in the flood mapping consider future shoreline changes, tides, sea level anomalies such as El Niño, storm surge, and SLR. Future wave conditions used in the model are based on forecasted conditions out to the year 2100. Future storm event scenarios for typical conditions, 1-, 20-, and 100-year return periods are available for SLR scenarios from 0 to 6.6 ft. The CoSMoS SLR scenario closest to the 2.9 ft previously described in sections 5.2.1 and 2.1.2.1 is 3.3 ft; see Figure 24.

The CoSMoS data shows the TWL not reaching the project site under the present SLR, and in agreement with the 100-year SWL no flood condition, because it can be inferred that the present 100-year wave runup does not reach the existing ground elevations. However, a significant portion of the parking lot in the southern end of the project by Alternative 1 is projected to be affected in 2080 by wave runup since the seawall does not extend this location; Alternatives 2 and 5 are protected from 2080 runup because of the existing seawall.

5.2.2.2 FEMA FIRMs

The National Flood Hazard Layer (NFHL) is a geospatial database that contains current effective flood hazard data. The FEMA Flood Insurance Rate Maps (FIRM) provide the 100-yr Base Flood Elevations (BFE), which include 100-year wave runup elevations for present-day (only) sea levels at coastal locations based on calculations at discrete analysis transects.

The FIRM at the project site is shown in Figure 25. Two separate flood zones, delimited by the jetty, can be observed at the project site:

- Zone VE at EL +21 NAVD88: No flooding of the project area (including Alternative 5 location) because the existing seawall and its curvature may prevent wave uprush from reaching the area.
- Zone AE EL +8 NAVD88: No flooding of the project area because waves are presumed to not penetrate into this zone, including Alternatives 2 and 5 locations, i.e. no wave uprush is included in the FEMA analysis. However, M&N wave monitoring and modeling results do indicate wave presence in this zone.

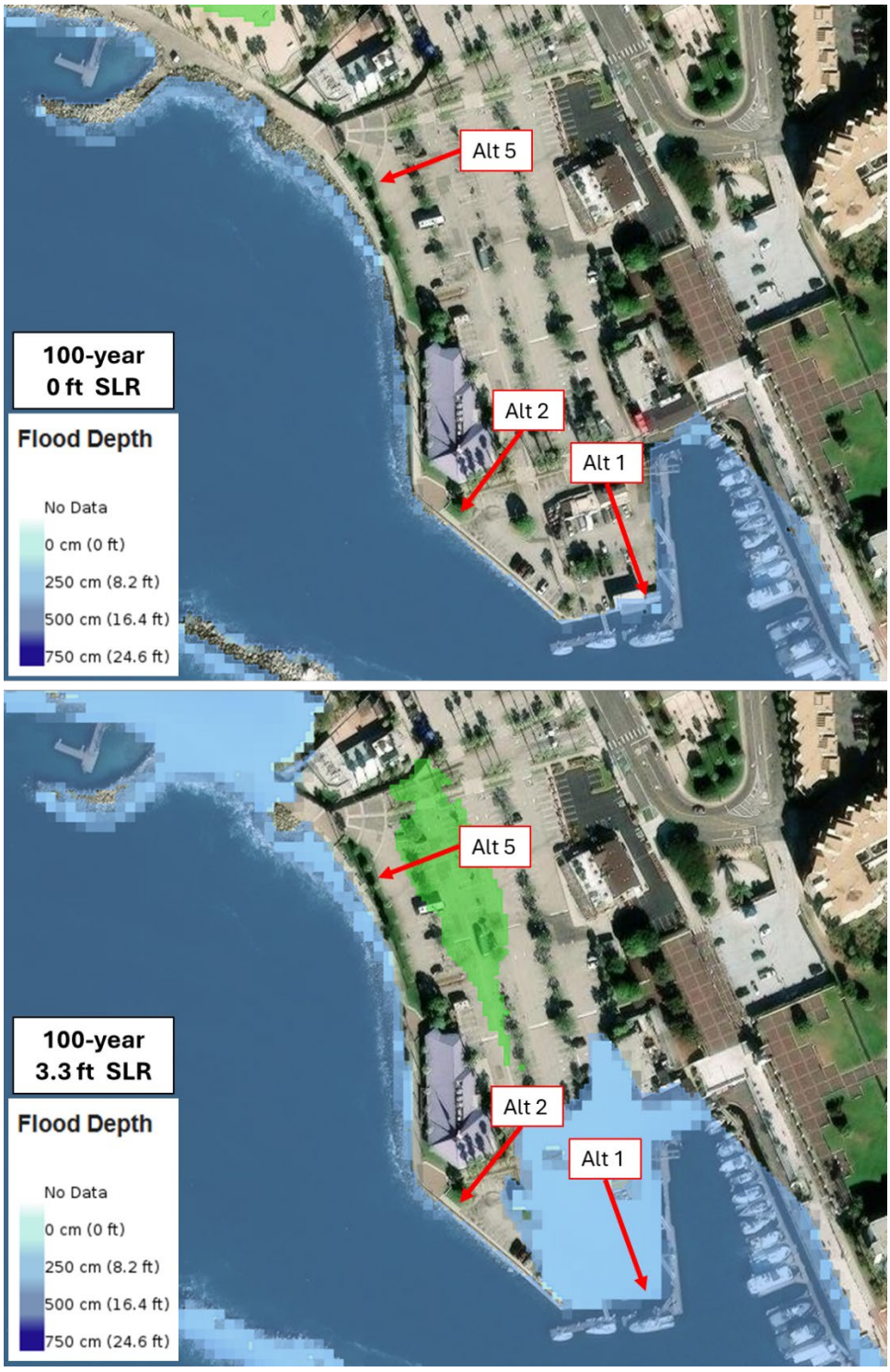


Figure 24. CoSMoS 100-yr-event Flooding Extents Under Existing Conditions (no SLR) (top) and 3.3 ft of SLR (bottom).

Figure 25. FEMA FIRM at Project Site (City of Redondo Beach).

5.2.2.3 M&N Wave Runup Analysis

M&N conducted a wave runup analysis following the methods described by (FEMA, 2005) where the TWL was calculated using the Technical Advisory Committee for Water Retaining Structures approach, known as TAW.

To determine a conservative estimate of the maximum extent of present and future flood hazards from SLR and storm-related flooding, the extreme storm criteria employed in this M&N analysis consisted of the following environmental conditions:

- 100-year-return waves (wave height and wave period)
- 1-year SWL and present-day sea level conditions
- 1-year SWL and 2.9 ft of future SLR

The geometry assumed for each alternative is shown in Table 10 and the runup results are shown in Table 11. The wave runup results for Alternatives 1, 2, and 5, under future SLR exceed the proposed top of ramp elevations, i.e. water will run up to the top (landward) edge of the ramp under the 100-year-return wave conditions. For present sea level, wave runup for Alternatives 1 and 2 does not exceed the top of ramp elevations, but does for Alternative 5 .

Table 10. Boat Launch Ramp Design Geometry Used in Wave Runup Calculations.

Design Parameter	Alt 1	Alt 2	Alt 5
Top of Ramp Elevation (ft MLLW)	+12	+18	+18
Bottom of Ramp Elevation (ft MLLW)	-7*	-7*	-7*
Existing Bottom Elevation (ft MLLW)	-9.5*	-16*	-16*
Ramp Slope (percent)	15	15	15
Notes	Wave direction is at an angle to the ramp	Wave direction is at an angle to the ramp	Wave direction is parallel to the ramp
*** For both alternatives, the existing harbor bottom is deeper than the proposed bottom of ramp, indicating the need for a transition structure at the bottom of the ramp.**			

Table 11. Wave Runup Results under 100-year waves and 1-year SWL, with and without SLR.

	Alt 1, 0 ft SLR	Alt 1, 2.9 ft SLR	Alt 2, 0 ft SLR	Alt 2, 2.9 ft SLR	Alt 5, 0 ft SLR	Alt 5, 2.9 ft SLR
SWL (ft MLLW)	7	9.9	7	9.9	7	9.9
Hs (ft)	2.3	2.5	2.7	3.0	3.5	3.6
Tp (sec)	18	18	18	18	18	18
TWL, Runup Elevation (ft MLLW)	11.8	15.1	16.1	20.0	19.0	22.2
Top of Ramp	12	12	18	18	18	18
Overtopping occurs?	No	Yes	No	Yes	Yes	Yes

When comparing the wave runup results for the different alternatives, given the same SLR and wave period, the bigger wave height and parallel alignment of the wave direction and boat ramp lead to a larger runup for Alternative 5. To illustrate the results with the proposed geometry, cross-sections have been plotted in Figure 26, Figure 27, and Figure 28, leading to the following observations:

- Alternative 1:
    - More sheltered to waves, resulting in no overtopping of the ramp under the present 100-year wave event;
    - Need for operational restrictions for both current and future SLR under extreme wave conditions but less frequently than for Alternatives 2 and 5; and
    - Under 2080 SLR (+2.9 ft), wave runup exceeds the top of ramp indicating the need for adaptation measures such as raising the top of the ramp in the future.

- Alternative 2:
    - More exposed to waves coming through the harbor entrance than for Alternative 1, but lower waves than at the Alternative 5 location, with no overtopping of the ramp under the present 100-year-return wave event;
    - Need for operational restrictions for both current and future SLR under extreme wave conditions but less frequently than for Alternative 5; and
    - Under both present and 2080 (+2.9 ft) SLR conditions, the wave runup exceeds the top of ramp which results in the need for measures such as:
        - Installing an in-water sheet pile wall seaward of the ramp to reduce the wave size/wave penetration. A sheet pile has not been included in the numerical model, but it is assumed that it will minimize wave penetration and therefore significantly lower wave runup. With future SWL of 9.9 ft MLLW; the top of ramp could be lowered from +18 to +12 ft MLLW to accommodate future SLR SWL flooding and a small amount of wave runup. However, the Alternative 2 location with a top ramp at +12 ft MLLW would make an opening in the seawall making the backland area more vulnerable to flooding.
- Alternative 5:
    - Need for operational restrictions for both current and future SLR under specific wave conditions; and
    - Under both present and 2080 SLR conditions, the wave runup exceeds the top of ramp which results in the need for measures similar to Alternative 2.

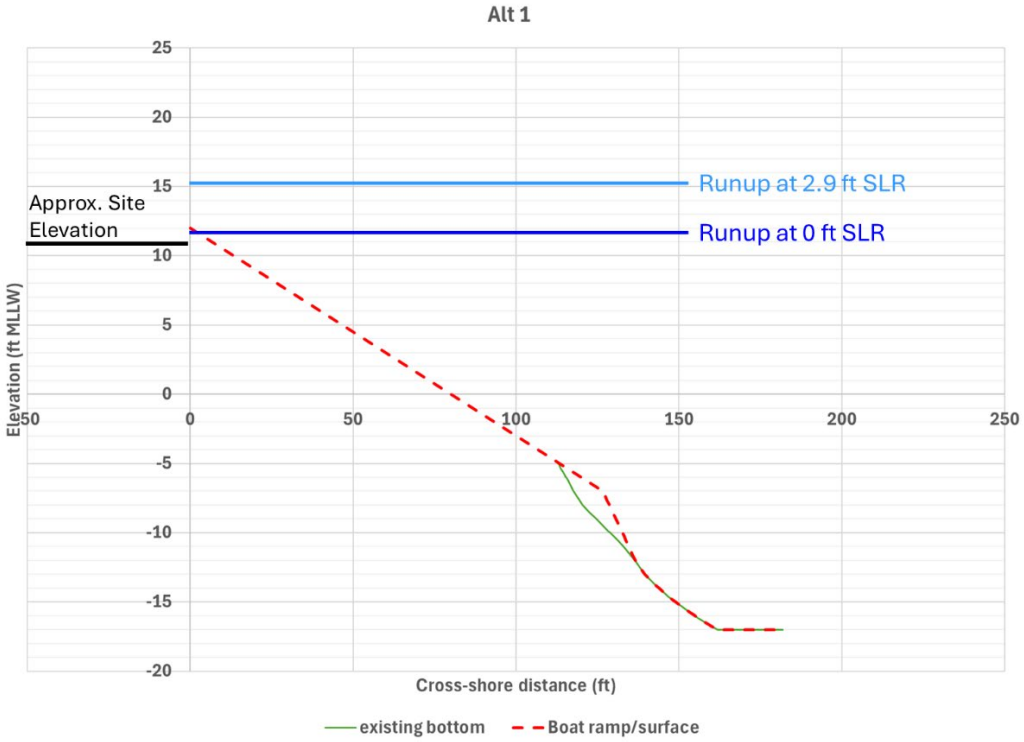


Figure 26. Alternative 1 Preliminary Boat Ramp Design Cross-section with Wave Runup Results.

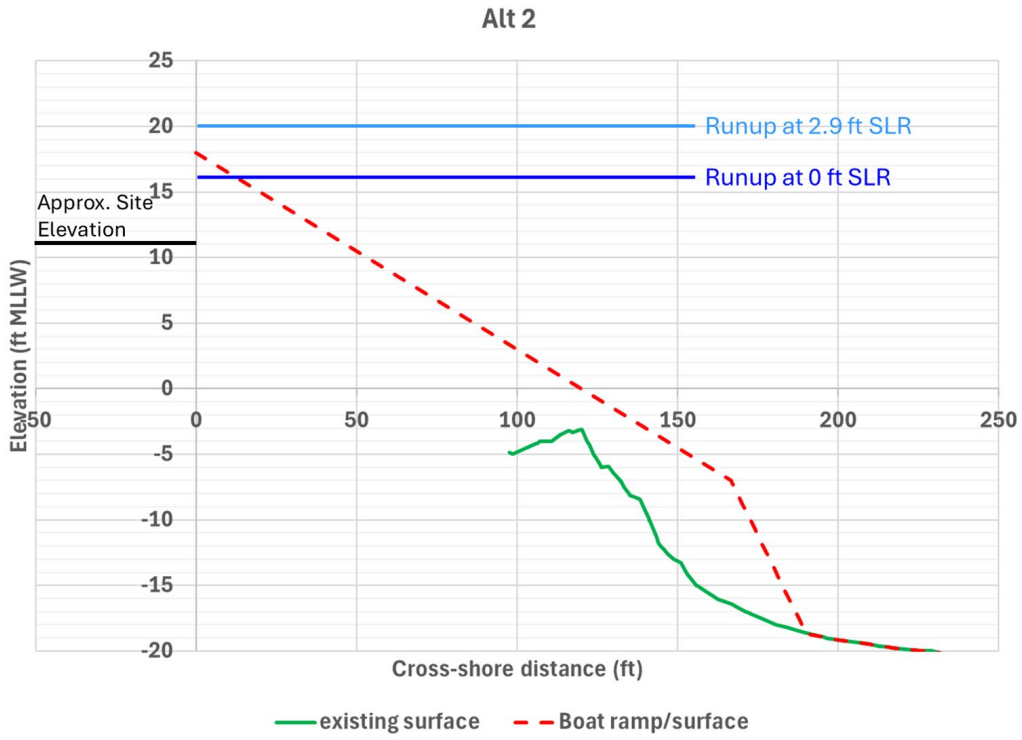


Figure 27. Alternative 2 Preliminary Boat Ramp Design Cross-section with Wave Runup Results.

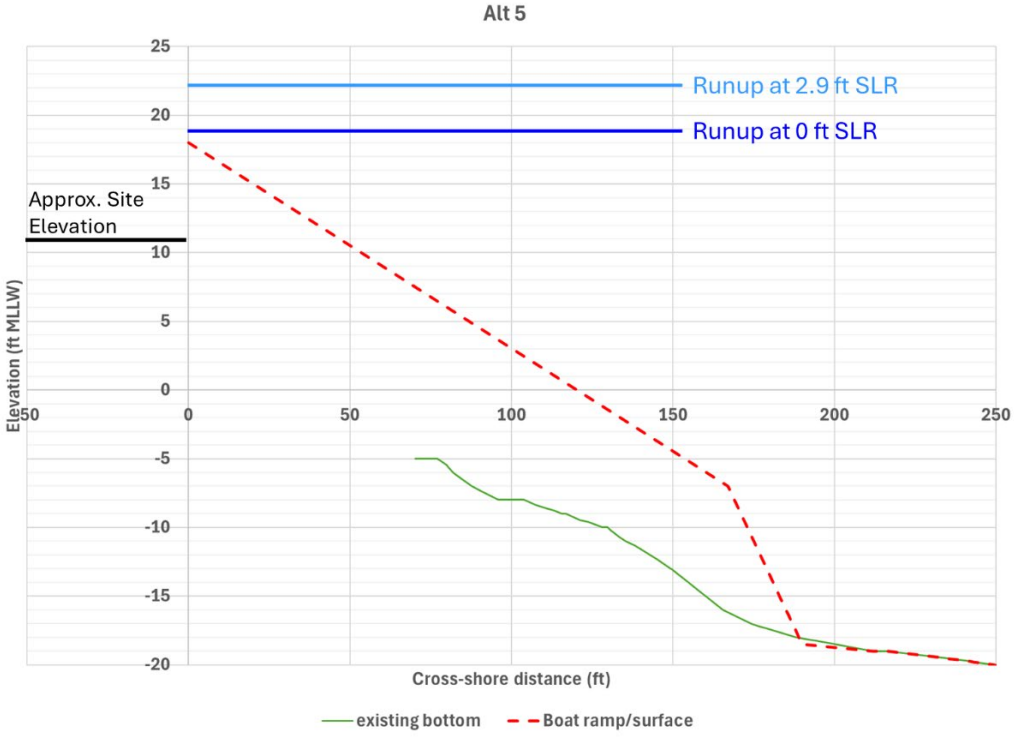


Figure 28. Alternative 5 Preliminary Boat Ramp Design Cross-section with Wave Runup Results.

It is worth noting that the M&N wave runup calculations include the proposed boat ramp geometry, while the FEMA and CoSMoS models are based on existing site conditions. Therefore, the FEMA and CoSMoS data can be used to assess the flooding extent of the current project site (parking lot, existing structures, etc.) but not with the proposed boat ramp. In addition, the wave model results indicate that an 18 second wave penetrates the marina and reaches the Alternative 1 location, while FEMA does not consider the wave impact at the Alternative 1 location. Thus, for the present and future wave runup associated with the proposed boat ramp, the M&N calculations are considered more applicable and accurate.

In addition, the California Department of Boating and Waterways (DBAW) grant requires a 20-year-SLR (2050) design condition, which is 0.9 ft for the intermediate-high condition. As shown in Table 8, only a 0.2 ft wave height difference is observed between the present and 2080 SLR wave results; therefore, the 2080 SLR results presented in this report are comparable to the DBAW 2050 requirements.

5.3 Limitations

Both FEMA and CoSMoS models were developed on a coarse model grid on a regional scale that do not consider shoreline complexities at a local level. Coastal flooding maps presented in this section should be interpreted to generally identify the potential extent of present and future coastal flooding and highlight areas that are most susceptible to flooding at the project site.

6 Coastal Hazards Adaptation Measures

Based on the results of the wave runup analyses, adaptation measures to address coastal hazards are needed for all alternatives. Three potential measures are discussed below.

6.1 Boat Ramp Operational Restrictions

Using a 2-ft significant wave height limit as the boat ramp operation criterion as described in section 4.4.2, for the present sea level, this 2-ft wave height has the following exceedance probabilities:

- Alternative 1: 2 percent probability of annual exceedance (50-year event);
- Alternative 2: 4 percent probability of annual exceedance (25-year event), and
- Alternative 5: 50 percent probability of annual exceedance (1-year event).

Launch ramp closure would be necessary during these exceedance periods, and the analysis indicates Alternative 5 would have a higher frequency of these closure periods. It should be noted that these operational restrictions are based on the premise that wave runup can occur on the ramp during boat launch operations.

6.2 Raising Top of Ramp to Accommodate Wave Runup

In order to avoid overtopping and flooding of the backland areas, the tops of the ramps would need to be raised to accommodate the wave runup levels shown in Table 11:

- Alternative 1: an additional 3.1 ft to accommodate 2.9 ft of SLR (from +12 ft to +15.1 ft MLLW).
- Alternative 2: an additional 2.0 ft to accommodate 2.9 ft of SLR (from +18 ft to +20 ft MLLW).
- Alternative 5: an additional 1 ft for the present sea level and 4.2 ft to accommodate 2.9 ft of SLR (from +18 ft to +19 and +22.2 ft MLLW, respectively), which is likely not practical.

These top of ramp elevations assume that the neighboring shoreline perimeter will also be raised to avoid wave overtopping. Because the proposed top of ramp elevations are higher than the existing ground, grading to match the existing ground elevations would be needed in the present and for future SLR.

6.3 Sheet Pile Wall Installation

The results of the Alternatives 2 and 5 wave runup analysis indicate the need for installing a sheet pile wall at these boat ramp locations to provide wave protection. It is assumed that the sheet pile wall would block incoming waves, resulting in minimal wave penetration, with mainly SWL flood hazard to be considered. The sheet pile would need to be designed to facilitate navigation in and out of the ramp. The installation of the sheet pile would likely allow for lowering of the top of ramp elevation for Alternatives 2 and 5; a 12 ft MLLW top of ramp elevation would accommodate the Present and 2080 sea levels with a small amount of wave runup.

7 Discussion, Summary, and Conclusions

Redondo Beach residents and community leaders have agreed upon the development of a public boat launch within King Harbor. The new public boat launch will allow access to the open ocean and provide recreational and commercial opportunities for community members.

Wave gauges were deployed in the harbor during a 2-month period; the collected data was used to evaluate the waves at the site and to calibrate the wave model. The numerical wave model provided operational and design wave conditions. The design wave was the 100-year-return wave with a 1-year-return SWL. The wave model results were used to determine wave runup flood hazards, for present and future SLR of up to 2.9 ft. The most critical factors in the analysis were found to be:

- Proposed top of ramp elevations of +12 and +18 ft MLLW.
- Significant wave height of 2 ft as the operational criterion.
- Wave runup above the top of the ramp.

A comparison of Alternatives 1, 2, and 5 is presented in Table 12.

Based on the results and analysis presented herein, Alternative 1 is the preferred alternative because it:

- has the least amount of wave runup
- would not require installation of a sheet pile wall
- requires the smallest amount of backland fill to match the top of ramp elevation
- has the lowest frequency of operational restrictions based on wave height.

Alternatives 2 and 5 would require installation of an in-water sheet pile wall to reduce wave runup and regulatory agencies approval of the wall is likely to be challenging. Therefore, Alternatives 2 and 5 are not recommended.

Table 12. Comparison of Design Alternatives.

	No Project	Alternative 1	Alternative 2	Alternative 5
Description	No boat ramp	• New boat ramp at south-end of harbor • Top of ramp +12 ft MLLW • Ramp slope 15 percent • Bottom of ramp -7 ft MLLW • Existing bottom elevation -9.5 ft MLLW	• New boat ramp near restaurant • Top of ramp +18 ft MLLW • Ramp slope 15 percent • Bottom of ramp -7 ft MLLW • Existing bottom elevation -16 ft MLLW	• New boat ramp near old Sport fishing Pier • Top of ramp +18 ft MLLW • Ramp slope 15 percent • Bottom of ramp -7 ft MLLW • Existing bottom elevation -16 ft MLLW
Key Pros	No negative effects on existing structures	• Runup does not reach top of ramp for present-day conditions • Location more sheltered from waves • Top of ramp elevation closer to existing ground elevation	• Runup does not reach top of ramp for present-day conditions • Shorter navigation route from ocean to ramp location	• Shorter navigation route from ocean to ramp location
Key Cons	No new or enhanced access to boating	• 1 ft of fill may be required to match the proposed +12 ft MLLW top of ramp elevation • Operational limits are required	• Without wave protection with a sheet pile wall, approx. 7 ft of fill of the backlands would be required to match the +18 ft MLLW top of ramp elevation. • Installation of in-water sheet pile wall likely required, which would impact boater navigation and may not be permittable • Operational limits are required	• Without wave protection with a sheet pile wall, approx. 7 ft of fill of the backlands would be required to match the +18 ft MLLW top of ramp elevation. • Installation of in-water sheet pile wall likely required, which would impact boater navigation and may not be permittable • Operational limits are required
Coastal Hazards	• No impact to shoreline erosion • No impact to flooding	• Project does not impact shoreline erosion • Wave runup elevation exceeds top of ramp with future SLR	• Project does not impact shoreline erosion • Wave runup elevation exceeds top of ramp with future SLR	• Project does not impact shoreline erosion • Wave runup elevation exceeds top of ramp for present day and future SLR
Operational Restrictions	Not applicable	• 2 percent probability of annual exceedance of 2 ft wave limitation	• 4 percent probability of annual exceedance of 2 ft wave limitation	• 50 percent probability of annual exceedance of 2 ft wave limitation

	No Project	Alternative 1	Alternative 2	Alternative 5
Adaptation Measures	Not applicable	• For 2080 SLR, raising top of ramp to accommodate for total water levels would be needed.	• For present and 2080 SLR, +20 ft top of ramp elevation is needed to accommodate total water levels • Or installing sheet pile wall in front of boat ramp to reduce wave size/penetration	• For present and 2080 SLR, +20 ft top of ramp elevation is needed to accommodate total water levels • Or installing sheet pile wall in front of boat ramp to reduce wave size/penetration.
Preferred Alternative	No	**Yes**	No	No

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Mole D Public Boat Launch Transportation Impact and Parking Study

Final Report

City of Redondo Beach | September 12, 2025

Submitted By:

STC Traffic, Inc

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moffatt & nichol

REDONDO BEACH

City of Redondo Beach

Mole D Public Boat Launch

Transportation Impact and Parking Study

Final Report

September 2025

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APPENDICES

1 INTRODUCTION

The City of Redondo Beach is proposing to construct a new public boat launch ramp ("Project") on Mole D of the City of Redondo Beach King Harbor. The project location is shown in **Figure 1-1** This report has been prepared to evaluate the following:

- Operating condition of the surrounding intersections, that will likely be affected by the project, with the addition of the project.
- Parking adequacy of the proposed project site design layout.
- Project access and on-site circulation.
- Pedestrian connectivity and pedestrian-vehicle conflict areas.

This report was prepared in consultation with the project development team including the City of Redondo Beach and Moffatt & Nichol.

1.1 PROJECT DESCRIPTION

Project Site Location: The project site is located south of Herondo Street, north of Torrance Boulevard and west of Pacific Coast Highway (State Route 1) and Catalina Avenue. The Seaside Lagoon is located north, and the Redondo Beach Pier is located south of the project site.

Project Site: The project site consists of the parking lot (Mole D) located south of the Redondo Beach Marina entrance. The site consists of a 10,000 square-feet restaurant, 5,000 square-feet restaurant and event building, 3,000 square-feet of office space and a boat hoist. All land uses share the parking lot within the project site. In addition, the project proposes reconfiguration of the parking lot (north parking lot) located between Portofino Way and the Redondo Beach Marina entrance.

Proposed Project Description: The project proposes the following:

- Construct two lane boat launch ramp on Mole D and include necessary vehicle + trailer parking, boat launch queueing area, turn-around area and new tenant restrooms.
- Reconfigure the south parking lot (Mole D) and the north parking lot to accommodate the new boat launch facility, vehicle + trailer parking and to provide an optimum number of parking spaces.
- The access to the project site will be retained, which is from the Redondo Beach Marina entrance on Harbor Drive. The project proposes to reduce the number of outbound lanes from the current two lanes to one lane. This should reduce the conflict zone between vehicles, bicyclists and pedestrians at the driveway access/ egress. The existing one inbound lane will be retained
- The existing pedestrian promenade shall be retained.
- The existing boat hoist facility will be removed.

It should be noted that during the preparation of this report, the site design was in the planning and development stages and several alternative site design concepts were developed by Moffat and Nichol. This report evaluates the design preferred at the time of preparation of this report. The preferred alternative site design concept is shown in **Figure 1-2**.

1.2 BACKGROUND

As part of the "Public Amenities Plan" approved by the City Council in 2022, the boat launch ramp was proposed along with vehicle + trailer parking stalls, wash down area, launching queue area, turn-around circle, employee office, restroom/shower, security cameras, striped pedestrian crossings and emergency call boxes. The King Harbor Coastal Access, Revitalization, and Enhancement Act (Measure C), passed in 2015 is meant to preserve and expand public access to King Harbor and to ensure safety and maintain aquatic recreational activity. To achieve its objectives, Measure C established specific design requirements for boat launches. These include provisions for the number of launch lanes and vehicle-plus-trailer parking spaces and ensuring safety. Additionally, the measure mandates the strategic placement of launch lanes to support safe operations and protect against high waves.

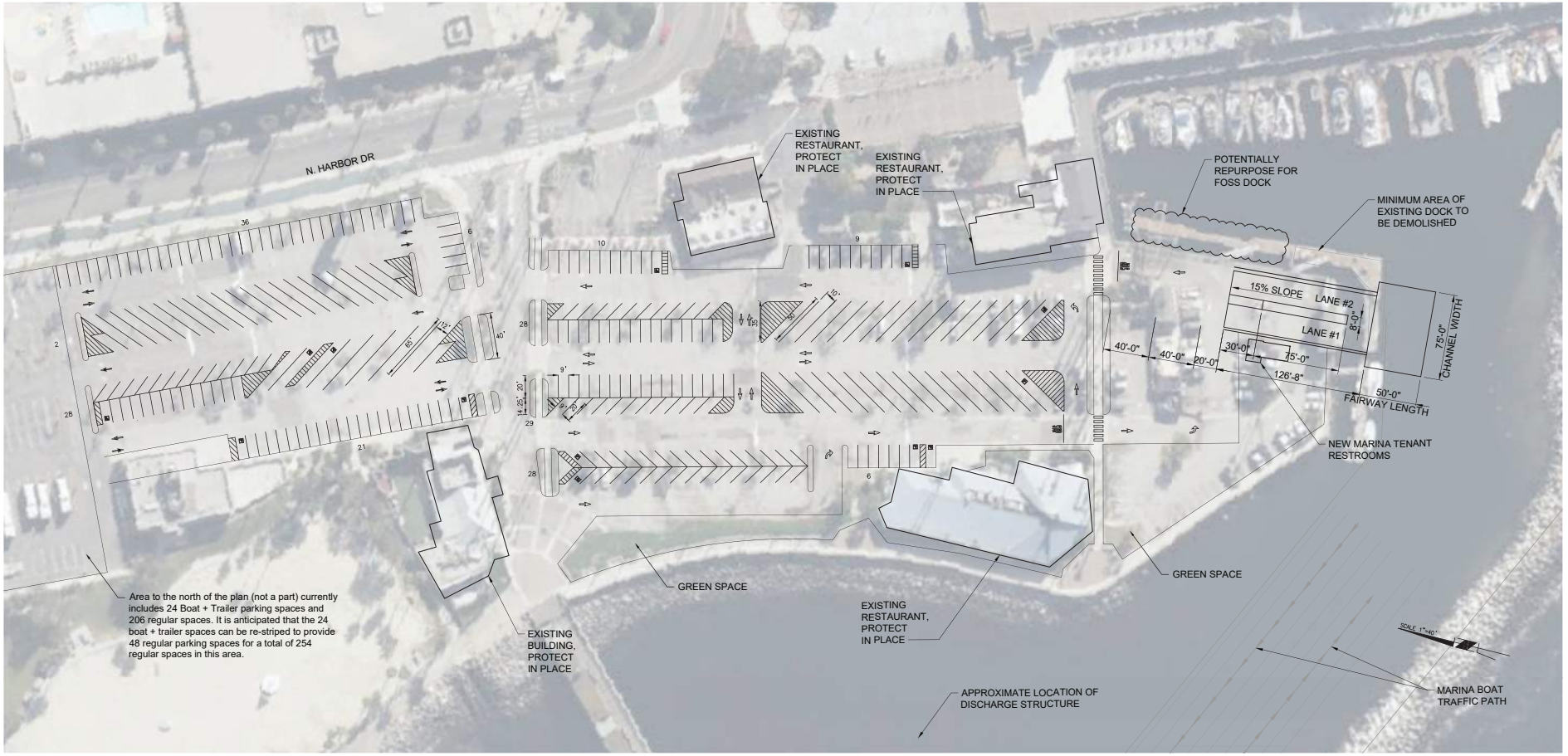
1.3 DOCUMENT ORGANIZATION

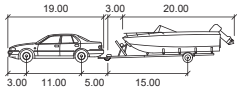
The report is organized into the following sections described below:

- **Local Transportation Assessment:** Presents the operating condition of the study intersections with the project. The subsections present a description of the study area, study scenarios, existing roadway conditions, existing traffic data, traffic volume forecast, project trip generation, trip distribution and, intersection analysis methodology and results.
- **Parking Evaluation**: Presents an evaluation of the parking adequacy of the proposed site design layout. The subsections present the existing parking assessment, proposed parking evaluation and City Parking Requirements.
- **City Parking Requirements:** Compares City parking requirements with proposed parking supply.
- **Project Access, On-Site and Pedestrian Circulation Assessment:** Presents an evaluation of the project access and on-site circulation of the proposed site design layout.

Mole D Public Boat Launch Project

Figure 1-1
Project Location

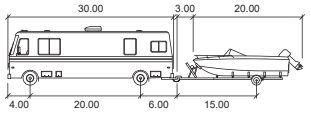




P-B

feet

Car Width	: 7.00		
Trailer Width	: 8.00		
Car Track	: 6.00		
Trailer Track	: 8.00		
Lock to Lock Time	: 6.0		
Steering Angle	: 31.6		
Articulating Angle	: 70.0		



MH-B

feet

MH Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.00	Steering Angle	: 25.8
MH Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.00		

NORTH PARKING LOT	
REGULAR SPACES	346
ADA SPACES	3
VEHICLE/TRAILER	21
ADA/VEH/TRAILER	2
RV/TRAILER	5

SOUTH PARKING LOT	
REGULAR SPACES	110
ADA SPACES	6
VEHICLE/TRAILER	30
ADA/VEH/TRAILER	2
RV/TRAILER	0

TOTAL(NORTH+SOUTH)	
REGULAR SPACES	456
ADA SPACES	9
VEHICLE/TRAILER	51
ADA/VEH/TRAILER	4
RV/TRAILER	5

Not for construction. Further design required.

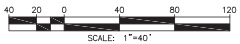


Figure 1-2
Proposed Site Design Concept

2 LOCAL TRANSPORTATION ASSESSMENT

This section presents the operating conditions of the study intersections with the project.

2.1 STUDY AREA

The study intersections evaluated in this traffic study are listed below and shown in **Figure 2-1**:

1. Harbor Drive/ Hermosa Avenue and Herondo Street (Signal).
2. Harbor Drive and Yacht Club Way (Signal).
3. Harbor Drive and Marina Way (Signal).
4. Harbor Drive and Beryl Street/ Portofino Way (Signal).
5. Harbor Drive and Redondo Beach Marina Entrance (All-Way Stop).
6. Harbor Drive and N Pacific Avenue (All-Way Stop).

2.2 STUDY SCENARIOS

The intersection conditions were evaluated for the following scenarios:

- **Existing Conditions (Year 2024)**: This scenario evaluates the intersection conditions for the year 2024 with the existing roadway geometry and the peak season traffic volumes.

- **Opening Year 2027 Without Project Conditions:** This scenario forecasts the intersection conditions in the project opening year 2027, with existing roadway geometry and projected year 2027 traffic volumes.

- **Opening Year 2027 With Project Conditions:** This scenario forecasts the roadway conditions in the project opening Year 2027 with the project constructed and operational. The project trips was added to the Opening Year 2027 Without Project traffic volumes to derive the traffic volumes for this scenario.

Figure 2-1
Project Study Area

2.3 EXISTING ROADWAY CONDITIONS

The existing roadway conditions are summarized in this section. The existing intersection geometry is shown in **Figure 2-2**.

Harbor Drive, within the project study area is oriented in the north-south direction. In the City's General Plan, the roadway is classified as a Collector north of Beryl Street/ Portofino Way and unclassified to the south. This unclassified section provides access to the project site. The roadway between Herondo Street and Pacific Avenue has two travel lanes with a center two-way-left-turn-lane. The posted speed limit is 30 MPH. On-street parallel parking exists on the west side of the roadway north of Beryl Street/ Portofino Way and on the east side of the roadway south of Beryl Street/ Portofino Way. A two-way Class IV cycle track exists along the west side of the roadway. Sidewalks exist on both sides of the roadway.

Herondo Street, within the project study area is oriented in the east-west direction. In the City's General Plan, the roadway is classified as a Secondary Arterial between Harbor Drive and Pacific Coast Highway and as a Major Arterial east of Pacific Coast Highway. The section of Herondo Street closest to the project, west of Pacific Coast Highway, the posted speed limit is 30 MPH. Here the roadway has two travel lanes separated by a raised median and back-in-only, angled on-street parking is provided on both sides of the roadway. Class II bike lanes and sidewalks exist on both sides of the roadway.

Beryl Street, within the project study area is oriented in the east-west direction. In the City's General Plan, the roadway is classified as a Secondary Arterial. West of Catalina Avenue, the roadway has two travel lanes in each direction with a center two-way-left-turn-lane. East of Catalina there is one travel lane in each direction, on-street parallel parking, Class II bike lanes and sidewalks on both sides of the roadway. West of Pacific Coast Highway the posted speed limit is 25 MPH.

Mole D Public Boat Launch Project

Figure 2-2
Existing Intersection Geometry

2.4 TRAFFIC VOLUMES

This section provides a description of the existing traffic volume data and the Opening Year 2027 traffic volume forecast.

2.4.1 Existing Traffic Volume Data

The peak hour count data was collected on Saturday, October 5, 2024, at the study intersections. The count data consists of vehicle and bicycle turning movement count and pedestrian counts on each leg of the intersection. The counts were collected during the following peak periods:

- Morning (7:00 AM – 9:00 AM)
- Midday (11:00 AM – 1:00 PM)
- Evening (4:00 PM – 6:00 PM)

Peak Season Adjustment: To evaluate the intersection condition during peak season, Placer.ai data was provided by the City and utilized to determine the peak season of the year. The data, provided in **Appendix A**, shows an 80% increase in visitors to the Waterfront area in the month of July when compared to October. For a conservative estimate, the October peak hour intersection vehicle turning movement volumes were increased by a factor of 80% to reflect peak season volumes.

The adjusted peak hour intersection turning movement volumes for AM and mid-day (MD) peak hours are shown in **Figure 2-3** and the volume for PM peak hour is shown in **Figure 2-4**. The count data and the Placer.ai data are included in Appendix A.

Mole D Public Boat Launch Project

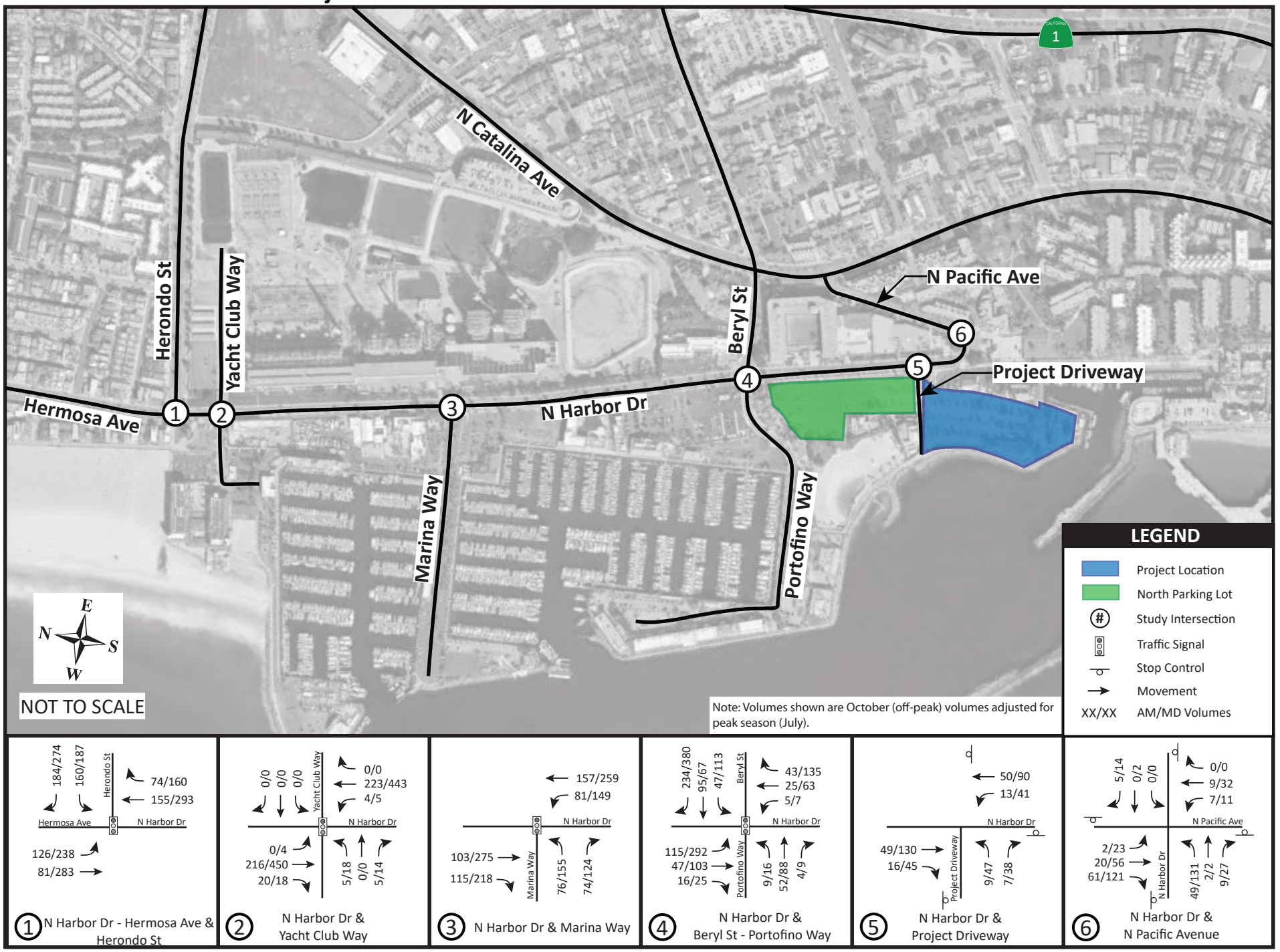


Figure 2-3
Existing AM and MD Peak Hour Intersection Volumes

Mole D Public Boat Launch Project

Figure 2-4
Existing PM Peak Hour Intersection Volumes

2.4.2 Opening Year 2027 Without Project Traffic Volume

The Opening Year 2027 Without Project traffic volumes were forecasted by applying an annual growth to the existing peak season traffic volumes (adjusted volumes). The growth factor was calculated using the employment data from the Southern California Association of Governments (SCAG) Demographics and Growth Forecast Technical Report (September 3, 2020) and confirmed as appropriate during scoping discussions with the City on Wednesday November 13, 2024. Based on the comparison of the year 2016 and year 2045 employment data for the City of Redondo Beach, the employment is forecast to grow 0.39% per year. A total growth factor of 1.17% was applied to the existing traffic volume to forecast the Opening Year 2027 Without Project traffic volumes. The AM and MD peak hour intersection turning movement volumes are shown in **Figure 2-5** and the volumes for the PM peak hour are shown in **Figure 2-6**. The SCAG data is included in **Appendix B**.

Mole D Public Boat Launch Project

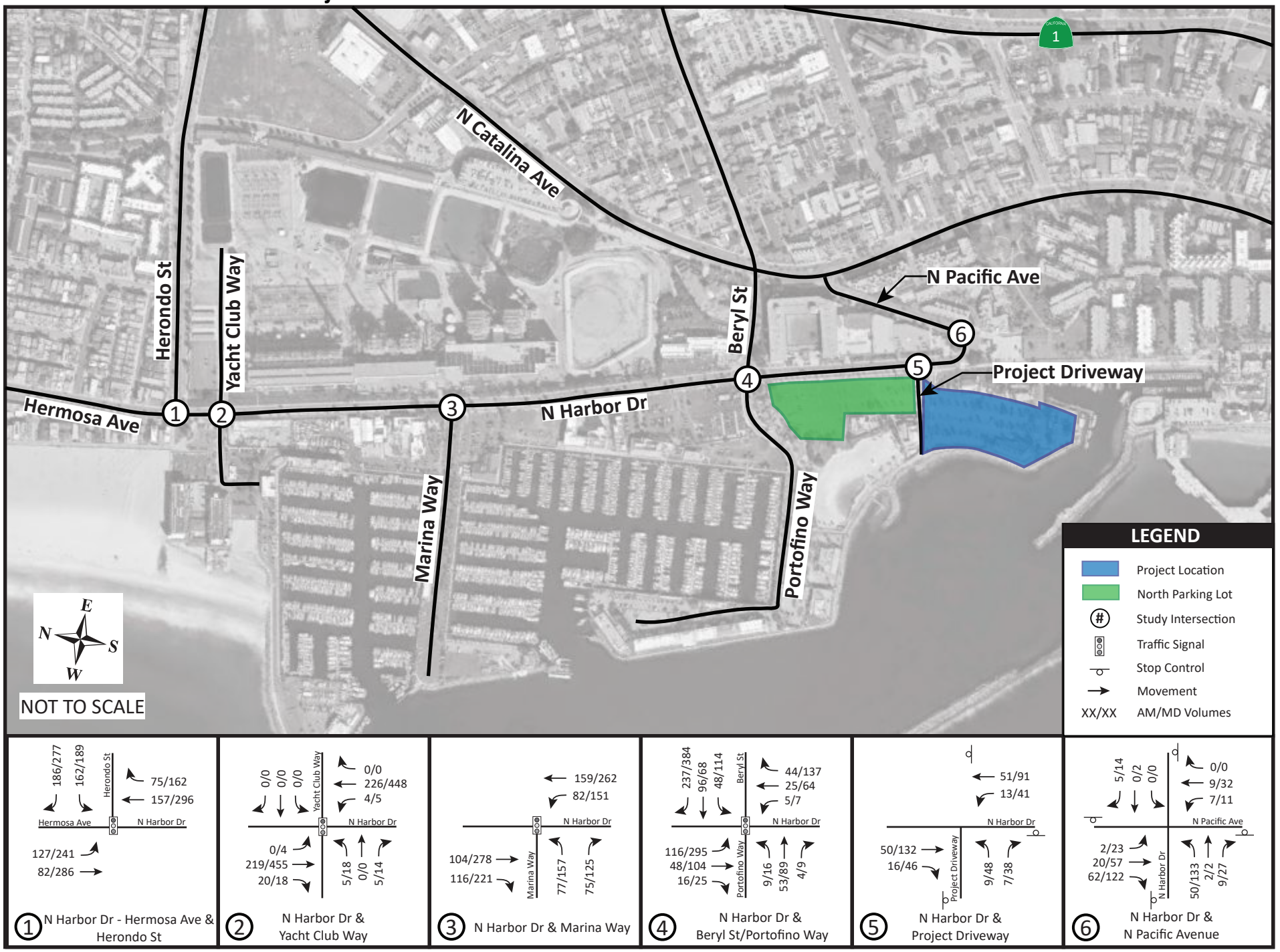


Figure 2-5
Opening Year 2027 Without Project AM and MD Peak Hour Intersection Volumes

Mole D Public Boat Launch Project

Figure 2-6
Opening Year 2027 Without Project PM Peak Hour Intersection Volumes

2.4.3 Opening Year 2027 With Project Traffic Volume

The Opening Year 2027 With Project traffic volumes were derived by adding the project trips to the Opening Year 2027 Without Project traffic volumes. The project trips at the study intersections were estimated based on the peak hour project trip generation estimate and the anticipated distribution of trips through the roadway network.

Project Trip Generation: Since there is no trip generation manual that provides trip estimates for a boat launch facility, the following are the assumptions were made to derive project trips as shown in **Table 2-1**:

- The Boat Ramp Demand Study (Moffatt & Nichol, 2025) anticipates a normal peak day average of 27 boat launches and 27 boat retrievals per launch lane per day. This trip generation was derived from California Department of Parks and Recreation Division of Boating and Waterways Layout & Design Guidelines for Boat Launching Facilities (2021) and equates to 54 trips per launch lane per day.
- The normal peak day was assumed to be a Saturday.
- The actual trip generation as seen in the table below is higher than the trip generation in the VMT Screening Evaluation (STC Traffic, 2025) which uses updated information. This provides a conservative approach for the level of service (LOS) analysis.
- For a worse-case scenario all trips were assumed to occur during the peak hour, with maximum inbound trips occurring during the AM and MD peak hours and the maximum outbound trips occurring during the PM peak hour.

Table 2-1: Project Trip Generation

Land Use	Daily Trips	Time Period	Trip Rates		Trip Generation	
			IN	Out	IN	OUT
Boat Launch Ramp (2 lanes)	120	AM	50%	0%	30	0
		MD	45%	10%	27	6
		PM	5%	90%	3	54
		Total	100%	100%	60	60[1]

[1]LOS Analysis Trip Generation is conservative as it is higher than the VMT Screening Evaluation which used updated information.

Project Trip Distribution and Assignment: Project trip distribution is the anticipated travel pattern of the project trips based on the existing traffic pattern and the surrounding roadway network. The project trip distribution is shown in **Figure 2-7**.

The project trip assignment for the AM and MD peak hour are shown in **Figure 2-8** and for the PM peak hour in **Figure 2-9**. The Opening Year 2027 With Project traffic volumes for the AM and MD peak hour are shown in **Figure 2-10** and for the PM peak hour in **Figure 2-11**.

Mole D Public Boat Launch Project

1 N Harbor Dr - Hermosa Ave & Herondo St

2 N Harbor Dr & Yacht Club Way

3 N Harbor Dr & Marina Way

4 N Harbor Dr & Beryl St/Portofino Way

5 N Harbor Dr & Project Driveway

6 N Harbor Dr & N Pacific Avenue

Figure 2-7
Project Trip Distribution

Figure 2-8
AM and MD Peak Hour Project Trip Assignment

Mole D Public Boat Launch Project

Figure 2-9
PM Peak Hour Project Trip Assignment

Mole D Public Boat Launch Project

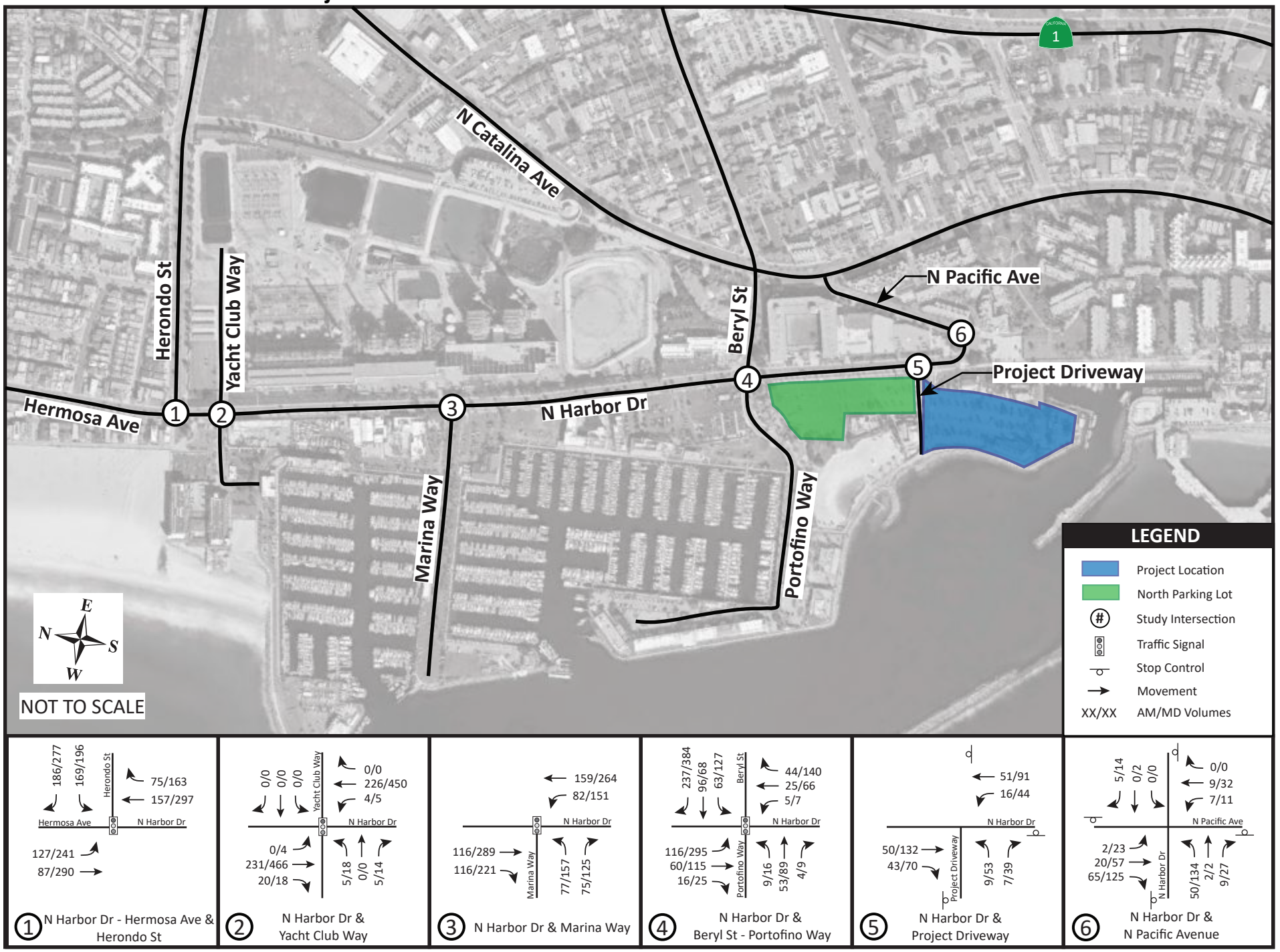


Figure 2-10
Opening Year 2027 With Project AM and MD Peak Hour Intersection Volumes

Mole D Public Boat Launch Project

Figure 2-11
Opening Year 2027 With Project PM Peak Hour Intersection Volumes

2.5 TRAFFIC ANALYSIS

This section presents the LOS traffic analysis methodology and the analysis results for the study intersections. The analysis was conducted for the AM, MD, and PM peak hours on a Saturday (busiest day of the week) during the peak season (July). The analysis methodology was established in reference to the City of Redondo Beach Transportation Impact Study (TIS) Guidelines (May 5, 2021) and in consultation with the City of Redondo Beach staff.

Project Changes: At the project access, the project proposes to reduce the number of outbound lanes from the current two lanes to one lane. Hence, at the Harbor Drive and Redondo Beach Marina entrance intersection the eastbound approach was analyzed with one shared left turn/right turn lane.

2.5.1 Analysis Methodology

Intersection LOS analysis was conducted using the Synchro 11 analysis software. Existing roadway geometry was obtained from Google Earth aerial imagery and verified in the field. Existing traffic signal timing sheets were used for signal timing inputs. Traffic volume (vehicle, pedestrian and bicycle) and peak hour factor (PHF) data inputs were based on count data.

Highway Capacity Manual (HCM) 6th Edition methodology was used to report intersection conditions for unsignalized intersections. Due to HCM 6th Edition methodology not supporting non – standard NEMA phasing and clustered intersections on one common traffic signal controller, HCM 2000 methodology was used to report intersection condition for all signalized intersections. Delay (in seconds) and corresponding LOS are reported for intersection conditions. The LOS thresholds are shown in **Table 2-2**.

Table 2-2: HCM LOS Threshold

LOS	Control Delay (sec/veh)		Description
	Signalized Intersection	Unsignalized Intersection	
A	≤10	≤10	Operations with very low delay and most vehicles do not stop.
B	>10 and ≤20	>10 and ≤15	Operations with good progression but with some restricted movements.
C	>20 and ≤35	>15 and ≤25	Operations where a significant number of vehicles are stopping with some backup and light congestion.
D	>35 and ≤55	>25 and ≤35	Operations where congestion is noticeable, longer delays occur, and many vehicles stop. The proportion of vehicles not stopping declines.
E	>55 and <80	>35 and <50	Operations where there is significant delay, extensive queuing, and poor progression.
F	>80	>50	Operations that are unacceptable to most drivers, when the arrival rates exceed the capacity of the intersection.

Source: *Highway Capacity Manual (HCM).*

2.5.2 Performance Criteria

The City of Redondo Beach has identified significant degradation criteria for intersection conditions, which is shown in **Table 2-3**. If the project results in degradation of the intersection conditions, improvements should be identified to offset degraded roadway operations.

Table 2-3: City of Redondo Beach Significant Degradation Criteria

LOS	Project-Related Increase in Seconds of Average Total Delay	
	Signalized Intersection	Unsignalized (All-Way Stop) Intersection
D	Equal to or greater than 10.0 seconds	Equal to or greater than 4.0 seconds
E or F	Equal to or greater than 5.0 seconds	Equal to or greater than 3.0 seconds

2.5.3 General Plan Consistency

Section 1.2, Page 12 of the Redondo Beach Circulation Element (Adopted July 2021) states that the City of Redondo Beach has expressed a goal for City intersections not to degrade beyond LOS D. Where intersections currently exceed LOS D, the City will pursue mitigation measures to achieve LOS D.

2.5.4 Analysis Results

The existing intersection conditions are summarized in **Table 2-4**. The Opening Year 2027 Without Project and the Opening Year 2027 With Project conditions are summarized in **Table 2-5** and **Table 2-6** respectively. The analysis worksheets are included in **Appendix C**.

Table 2-4: Existing Intersection LOS Analysis Summary

Study Intersection		Control	AM		MD		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
1	Harbor Dr/ Hermosa Ave and Herondo St [1]	Signal	17.6	B	21.1	C	27.9	C
2	Harbor Dr and Yacht Club Way[1]	Signal	11.3	B	15.6	B	20.3	C
3	Harbor Dr and Marina Way [1]	Signal	13.2	B	15.1	B	15.4	B
4	Harbor Dr and Beryl St - Portofino Way [1]	Signal	21.8	C	31.3	C	45.1	D
5	Harbor Dr and RB Marina Entrance	AWS	7.9	A	8.9	A	9.8	A
6	Harbor Dr and N Pacific Ave	AWS	7.9	A	9.3	A	10.0	A

Delay reported in seconds. LOS – Level of Service. AWS – All-Way Stop Control

[1]Reported HCM 2000 methodology results.

Table 2-5: Opening Year 2027 Without Project Intersection LOS Analysis Summary

Study Intersection		Control	AM		MD		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
1	Harbor Dr/ Hermosa Ave and Herondo St [1]	Signal	17.6	B	21.3	C	28.8	C
2	Harbor Dr and Yacht Club Way[1]	Signal	11.3	B	15.8	B	20.7	C
3	Harbor Dr and Marina Way [1]	Signal	13.3	B	15.2	B	15.7	B
4	Harbor Dr and Beryl St - Portofino Way [1]	Signal	21.8	C	31.6	C	46.4	D
5	Harbor Dr and RB Marina Entrance	AWS	7.9	A	8.9	A	9.8	A
6	Harbor Dr and N Pacific Ave	AWS	7.9	A	9.3	A	10.1	B

Delay reported in seconds. LOS – Level of Service. AWS – All-Way Stop Control

[1]Reported HCM 2000 methodology results.

Table 2-6: Opening Year 2027 With Project Intersection LOS Analysis Summary

Study Intersection		Control	AM		MD		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
1	Harbor Dr/ Hermosa Ave and Herondo St [1]	Signal	17.8	B	21.6	C	30.4	C
2	Harbor Dr and Yacht Club Way[1]	Signal	11.3	B	16.0	B	22.4	C
3	Harbor Dr and Marina Way [1]	Signal	13.2	B	15.1	B	15.6	B
4	Harbor Dr and Beryl St - Portofino Way [1]	Signal	21.9	C	32.0	C	49.1	D
5	Harbor Dr and RB Marina Entrance	AWS	7.7	A	8.7	A	10.0	A
6	Harbor Dr and N Pacific Ave	AWS	7.9	A	9.3	A	10.2	B

Delay reported in seconds. LOS – Level of Service. AWS – All-Way Stop Control

[1]Reported HCM 2000 methodology results.

As shown in Table 2-4, Table 2-5 and Table 2-6, all intersections operate at an acceptable LOS D or better during all peak hours for all scenarios. The addition of the project trips does not result in degradation of the intersection conditions at any of the study intersections.

3 PARKING EVALUATION

The parking evaluation was performed to determine parking adequacy of the proposed project site design layout and to compare future parking requirements and supply. With the addition of the boat launch ramp and vehicle + trailer parking, the project proposes reconfiguring the south parking lot (Mole D) and the north parking lot to provide an optimum number of parking spaces and efficient circulation.

The following tasks were performed as part of the study:

- Assessment of the existing parking supply.
- Evaluation of proposed conceptual parking layout and circulation.
- City Parking Requirements
- Recommendations

3.1 EXISTING PARKING ASSESSMENT

This section provides an assessment of the existing parking spaces available (parking supply) and the existing demand. Existing parking conditions were evaluated during field visits on Wednesday September 25, 2024. Some spaces were inaccessible as they were being used by facilities and maintenance crews. Parking space counts were also conducted using aerial imagery. The Parking occupancy surveys were conducted on Friday October 4, Saturday October 5, and Sunday October 6, 2024. Results are provided in **Appendix D**. The existing parking space counts are summarized in **Table 3-1**.

Table 3-1: Existing Parking Condition

Parking Lot	Parking Spaces	Land Use/Activity Served
North Parking Lot	Regular & ADA – 333 Vehicle + Trailer – 49 **Total = 382**	- Seaside Lagoon - California Surf Club & Restaurant
South Parking Lot	Regular & ADA – 337 **Total = 337**	- Captain Kidd's Fish Market and Restaurant - Riviera Mexican Cantina - R/10 Social House Restaurant - Boat Hoist - FOSS Marine Services
Total (North + South Lots)	Regular & ADA – 670 Vehicle + Trailer – 49 **Total = 719**	- All waterfront land uses

The parking lots may also be utilized by visitors for other activities including walking, running, biking and water activities.

The Captain Kidds's Fish Market and Restaurant, which is located north-east of the south parking lot has an additional 27 parking spaces within the property of the restaurant, which is reserved to its customers. Vehicle access between the south parking lot and the restaurant is restricted.

Results from the parking occupancy survey showed that in terms of parking space utilization, the busiest time was 10:00 AM on Sunday October 6, 2024 with 136 spaces occupied in the north and south lot. However, the count could have been influenced by the 19th Annual Car Show. The second busiest time was 5:00 PM on Saturday October 5, when 124 spaces were occupied in both lots. Both counts mean that the north and south lots were less than 20% utilized at these times. It should be noted that the seaside lagoon is not open in October when the counts were conducted.

3.2 PROPOSED PARKING EVALUATION

The project proposes the following changes to the parking:

- Install a total of 54 vehicle + trailer parking spaces and 6 RV + trailer parking spaces.
- Reconfigure both parking lots to provide an optimum number of parking spaces.

The proposed site design layout is shown in Figure 1-2. The proposed parking conditions are summarized in **Table 3-2**.

Table 3-2: Proposed Parking Condition

Parking Lot	Parking Spaces	Land Use/Activity Served
North Parking Lot	Regular – 346 Regular ADA – 3 Vehicle +Trailer – 20 Vehicle +Trailer ADA – 2 RV +Trailer - 6 **Total = 377**	- Seaside Lagoon - California Surf Club & Restaurant
South Parking Lot	Regular – 110 Regular ADA – 6 Vehicle + Trailer – 30 Vehicle + Trailer ADA - 2 **Total = 148**	- Captain Kidd's Fish Market and Restaurant - R/10 Social House Restaurant - FOSS Marine Services - Boat Launch Ramp (2 lanes)
Total (North + South Lots)	Regular – 456 Regular ADA – 9 Vehicle + Trailer – 50 Vehicle + Trailer ADA – 4 RV + Trailer - 6 **Total = 525**	- All waterfront land uses

The parking lots may also be utilized by visitors for other activities including walking, running, biking and water activities.

A comparison of existing and proposed parking is shown in **Table 3-3**.

Table 3-3 Existing and Proposed Parking Comparison (North + South Lots)

Type	Existing	Proposed	Increase (+) / Decrease (-)
Regular Parking Spaces (including ADA)	670	465	-205
Vehicle + Trailer Spaces (including ADA)	49	54	+6
RV + Trailer Parking	0	6	+5
Total	**719**	**525**	**-194**

Table 3-3 shows that the project will result in a reduction of 194 parking spaces.

There are an additional 346 parking spaces available in the vicinity of the project site at the following locations. These are shown in **Figure 3-1** and are less than 600 feet from the project site (measured from the center of the south parking lot on Mole D).

- 331 parking spaces within the Redondo Beach Waterfront multi-story parking garage which is located east of the project site and accessed off the Harbor Drive and N Pacific Avenue stop controlled intersection. Pedestrian access exists between the parking garage, the south parking lot and the International Boardwalk.
- 15 on-street parking spaces along east side of Harbor Drive between Beryl Street and Redondo Beach Marina entrance.

Figure 3-1
Other Waterfront Parking Locations

3.3 CITY PARKING REQUIREMENTS

This section considers the parking space requirements for existing businesses within Mole D, the parking requirements for the project, and whether the proposed parking supply is sufficient to meet these requirements. The following information, shown in **Table 3-4**, was provided by the City and includes floor area, parking space rate, and the number of parking spaces required based on the municipal code. The City does not have a parking requirement for open space so the data for Seaside Lagoon was provided by the City and is based on adult visitors paying for entry at the Seaside Lagoon between its open season of Memorial Day weekend through Labor Day Weekend. This data is provided in **Appendix D**.

Table 3-4 Parking Requirements for Existing Uses

Location	Business Name and Type of Use	Parking Rate	Building Square Footage or Number of Seats	Parking Spaces Required
181 N Harbor Drive	Redondo Beach Marina Office	1 space per 300 SF	1491 SF	5
181 N Harbor Drive	Basin 3 Commercial Vessel Operators. Boat Slips.	3/4 space per boat slip	15 slips	11
161 N Harbor Drive	Foss Building Office	1 space per 300 SF	1,216 SF	4
179 N Harbor Drive	R10 Sitdown Restaurant	1 per 4 seats but not less than 1 space per 50 SF of seating area	90 seats or 1,178 SF	24
		Outdoor Seating - No additional parking required for first 12 seats. Thereafter, 1 per 6 seats	20 seats	3
209 N Harbor Drive	Captain Kidd's Sitdown Restaurant	1 per 4 seats but not less than 1 space per 50 SF of seating area	216 seats or 2,835.41 SF	30[1]
		Outdoor Seating - No additional parking required for first 12 seats. Thereafter, 1 per 6 seats	12 seats	0
239 N Harbor Drive	CA Surf Club. Commercial Recreation	1 per 250 SF	5,867 SF	25
245 N Harbor Drive	CA Surf Club Sitdown Restaurant	1 per 4 seats but not less than 1 space per 50 SF of seating area	44 seats or 1,321 SF	26
		Outdoor Seating - No additional parking required for first 12 seats. Thereafter, 1 per 6 seats	61 seats	8
200 Portofino Way	Seaside Lagoon	213 peak season demand based on 2024 open season		213[2]
			Total	**349**

[1]A total of 57 spaces are required but 27 spaces are provided in purpose-built parking lot.
[2]The seaside lagoon number of spaces is based on open season demand since the City does not have a parking requirement for this land use.

Table 3-4 shows that 349 spaces are required for the existing uses based on City parking requirements.

Project Parking Requirements

Per the California Department of Parks and Recreation Division of Boating and Waterways Layout & Design Guidelines for Boat Launching Facilities (2021) the minimum parking space ratio for the project should be between 20 and 30 vehicle and trailer parking spaces per launch lane. Sixty (60) spaces in total were assumed for a conservative estimate for the two proposed launch lanes and to comply with Measure C requirements. **Table 3-5** compares the Existing + Project parking requirements with the proposed parking supply.

Table 3-5 Parking Requirements for Existing + Proposed Land Uses vs Parking Supply

Parking Spaces	Total
Existing Municipal Code Requirement	349
Project Requirement	60
Existing + Project Requirement	**409**
Total Proposed Parking Supply North & South Parking Lots	525
Parking Space Surplus	**116**

Table 3-2 shows that 525 parking spaces are proposed in Mole D following the completion of the project. Table 3-5 shows that with the completion of the project a total of 409 parking spaces will be required resulting in a surplus of 116 parking spaces. Therefore, it can be concluded that the proposed parking supply will accommodate municipal code parking requirements for the existing land uses plus the proposed project.

4 PROJECT ACCESS, ON-SITE AND PEDESTRIAN CIRCULATION ASSESSMENT

This section presents an evaluation of the project access, on-site vehicle and pedestrian circulation of the proposed project site design layout.

4.1 PROJECT ACCESS

The access to the project site will be retained at the Redondo Beach Marina entrance on Harbor Drive with the following changes:

- The outbound lanes will be reduced from the current two lanes to one lane. This should reduce the conflict zone between vehicles, bicyclists and pedestrians at the driveway access/ egress. The existing one inbound lane will be retained.
- Parking fees will be collected through pay over cell phone or pay stations within the parking lot.
- We understand that the City would like to modify curb returns and make lanes as narrow as possible to shrink the intersection and turning templates at the Harbor Drive access are provided in **Appendix E**.

4.1.1 Operations and Queue Analysis

The queue length is based on the Synchro analysis software and is reported as 95th percentile queue length in number of vehicles. The intersection operations and queue analysis for the Harbor Drive and Redondo Beach Marina entrance for the Opening Year 2027 With Project is summarized in **Table 4-1**.

Table 4-1: Opening Year 2027 With Project Access Analysis

Mov	AM			MD			PM		
	QL	App D/LOS	Int D/LOS	QL	App D/LOS	Int D/LOS	QL	App D/LOS	Int D/LOS
EB LR	1	7.4 / A	7.7 / A	1	8.6 / A	8.7 / A	1	9.9 / A	10.0 / A
NB L	1	7.8 / A		1	8.6 / A		1	10.2 / B	
NB T	1			1			2		
SB TR	1	7.7 / A		1	8.9 / A		2	9.9 / A	

- Mov-Movement, QL-Queue Length, App-Approach, D-Delay, LOS-Level of Service, EB-Eastbound, NB-Northbound, SB-Southbound, L-Left Turn, T-Through, R-Right Turn
- 95th Percentile queue length reported in vehicles.
- Delay reported in seconds.

As shown in Table 4-1 for all the peak hours, with the addition of project trips to the project access intersection, all approaches and the whole intersection is forecast to operate at a LOS B or better. Excess queueing is not anticipated at the intersection approaches.

4.1.2 Project Access Design Assessment

The existing curb returns at the project access will be retained which are designed per the applicable standards to accommodate large vehicles with trailer maneuvers. In addition, the reduction in the number of outbound lanes and the removal of the roadway median and the parking ticket booths at the entrance, more room is provided for maneuvering through the parking lots. This will also reduce the number of potential conflict points with the bike lane on Harbor Drive. It should also be noted that vehicles with trailers are currently accessing the project site through this access under existing conditions.

4.2 ON-SITE VEHICLE CIRCULATION

The following is a summary of the on-site vehicle circulation elements of the proposed project site design layout:

- As per the applicable design standard, a minimum parking drive aisle width and internal circulation roadway width of 26 feet will be provided for one-way traffic and a width of 28 feet for two-way traffic. The width for two-way traffic is sufficient for safe passage of vehicles in both directions.
- The parking aisle and internal circulation roadway width are adequate for vehicles with trailers maneuvering, including driving into and out of the parking space and turnaround from one parking drive aisle to the other.
- The end of the parking aisle may consist of raised median island or striping, the corners of which are designed to accommodate vehicles with trailers turning maneuvers.
- Excess queuing and delay are not anticipated within the internal circulation roadways, that will result in adverse impact on internal circulation.

The adequacy of the proposed project site design layout for vehicles with trailers maneuver is demonstrated with turn template and included in Appendix E.

4.3 PEDESTRIAN CIRCULATION

The following is a summary of the on-site pedestrian circulation for the proposed project site design layout:

- The project will retain the pedestrian pathway from the Redondo Beach Marina entrance, which connects the sidewalk on Harbor Drive to the pedestrian promenade.
- The project will modify the pedestrian pathway connecting the International Boardwalk and the pedestrian promenade, to include a minimum of 8 feet pedestrian pathway and planter area on either side of the pathway.
- Pedestrian crosswalk markings will be provided at the stop control locations within the parking lot drive aisles. This provides a comfortable pedestrian connection from the pedestrian promenade along the waterfront to the International Boardwalk and may be more attractive to pedestrians than the existing conditions.

5 SUMMARY AND CONCLUSION

A summary of the project and analysis findings are as follows:

Project Description

- The project proposes constructing a two-lane boat launch ramp on Mole D and includes vehicle + trailer parking, a boat launch queueing area, a turn-around area and new tenant restrooms.
- The project will reconfigure the south parking lot (Mole D) and the north parking lot to accommodate the new boat launch facility, vehicle + trailer parking and to provide an optimum number of parking spaces.
- At the project access at the Redondo Beach Marina entrance on Harbor Drive, the project proposes to reduce the number of outbound lanes from two to one and retain the one inbound lane. The parking ticket booths have been removed.

Local Transportation Assessment

- The new boat launch facility is estimated to generate a total of 120 daily trips (60 inbound and 60 outbound). Most trips were assumed to occur during the peak hours. The VMT Screening Evaluation (STC Traffic, 2025) shows a lower trip generation using updated information. The level of service analysis used the higher trip generation for a conservative analysis.
- Six intersections, including the project access intersection, were evaluated for project impacts in the project opening year 2027, for the AM, MD, and PM peak hours on a Saturday (busiest day of the week) during the peak season (July) by applying a seasonal growth factor to existing volumes. All intersections were forecast to operate at an acceptable LOS D or better and the addition of the project trips does not result in degradation of the intersection conditions.

Parking Evaluation

- The existing north and south parking lots provide a total of 719 spaces. The proposed project site design layout will include a total of 525 parking spaces (377 north parking lot and 148 south parking lot), resulting in a decrease in 194 parking spaces from the current condition.
- The total parking requirement (Existing Plus Project) is estimated to be 409. This can be accommodated using the proposed 525 spaces in the north and south lots resulting in a surplus of 116 parking spaces following completion of the project.
- In addition, there are 346 parking spaces available in the vicinity of the project site, including the Beach Waterfront multi-story parking garage (331 spaces) and on-street parking (15 spaces).

Project Access, On-Site and Pedestrian Circulation Assessment

- With the addition of project trips to the project access intersection, all approaches and the intersection as a whole, are forecast to operate at a LOS B or better. Excess queuing is not anticipated at the intersection approaches.
- The project site access and the on-site circulation layout are designed to accommodate vehicles with trailers maneuvering through the parking lots.

- The proposed project site design layout consists of pedestrian pathways that connect the pedestrian promenade to the sidewalk on Harbor Drive and the International Boardwalk. Pedestrian crosswalk markings will be provided where required.

Appendix A

Traffic Count Data

Placer.ai Data

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Redondo Beach
N/S: Hermosa Avenue/N Harbor Drive
E/W: Herondo Street
Weather: Clear

File Name : 01_RDB_Har_Her AM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	Hermosa Avenue Southbound			Herondo Street Westbound			N Harbor Drive Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	7	9	16	16	17	33	12	2	14	63
07:15 AM	4	9	13	8	21	29	11	2	13	55
07:30 AM	14	7	21	21	9	30	13	9	22	73
07:45 AM	8	15	23	18	17	35	20	15	35	93
Total	33	40	73	63	64	127	56	28	84	284
08:00 AM	18	8	26	22	28	50	18	5	23	99
08:15 AM	11	10	21	18	24	42	23	14	37	100
08:30 AM	16	13	29	24	22	46	20	11	31	106
08:45 AM	25	14	39	25	28	53	25	11	36	128
Total	70	45	115	89	102	191	86	41	127	433
Grand Total	103	85	188	152	166	318	142	69	211	717
Apprch %	54.8	45.2		47.8	52.2		67.3	32.7		
Total %	14.4	11.9	26.2	21.2	23.2	44.4	19.8	9.6	29.4	

	Hermosa Avenue Southbound			Herondo Street Westbound			N Harbor Drive Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	18	8	26	22	**28**	50	18	5	23	99
08:15 AM	11	10	21	18	24	42	23	**14**	**37**	100
08:30 AM	16	13	29	24	22	46	20	11	31	106
08:45 AM	**25**	**14**	**39**	**25**	28	**53**	**25**	11	36	**128**
Total Volume	70	45	115	89	102	191	86	41	127	433
% App. Total	60.9	39.1		46.6	53.4		67.7	32.3		
PHF	.700	.804	.737	.890	.911	.901	.860	.732	.858	.846

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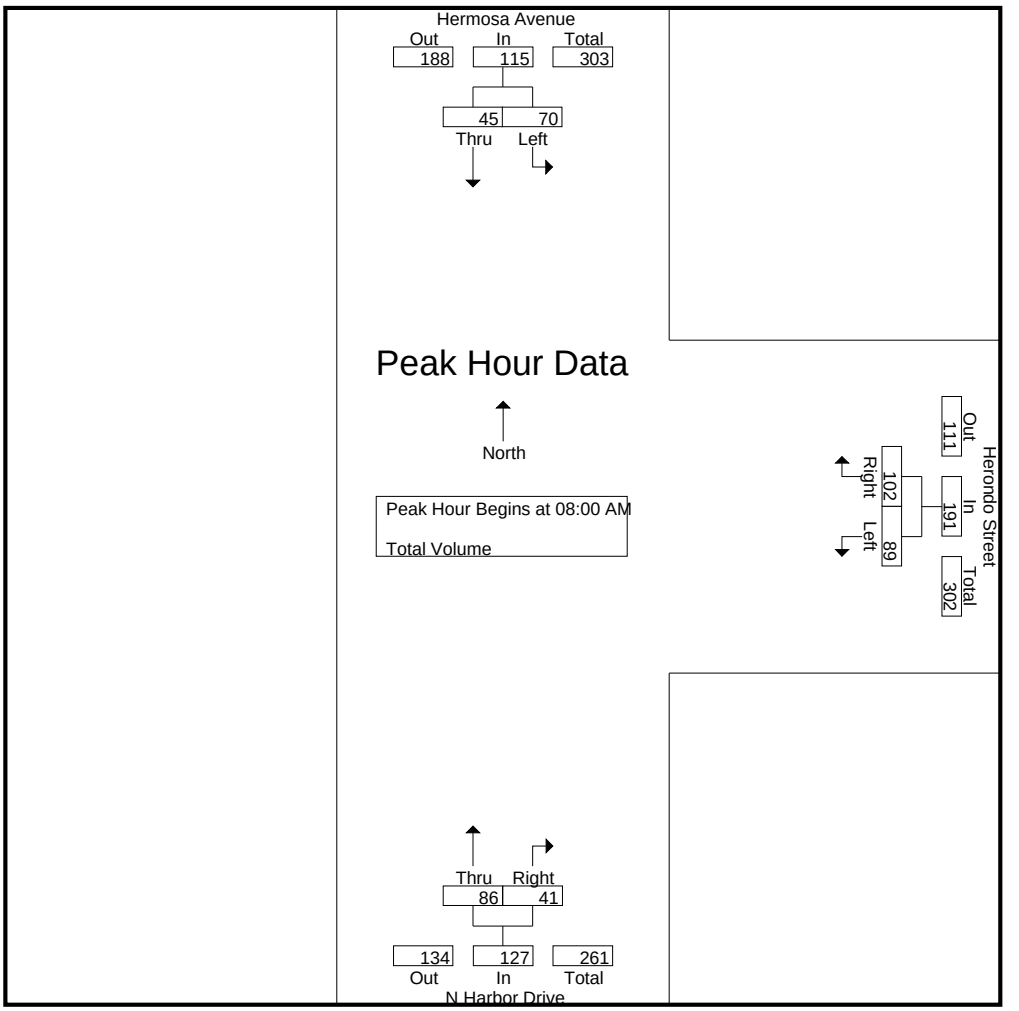

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM			08:00 AM			08:00 AM		
+0 mins.	18	8	26	22	**28**	50	18	5	23
+15 mins.	11	10	21	18	24	42	23	**14**	**37**
+30 mins.	16	13	29	24	22	46	20	11	31
+45 mins.	**25**	**14**	**39**	**25**	28	**53**	**25**	11	36
Total Volume	70	45	115	89	102	191	86	41	127
% App. Total	60.9	39.1		46.6	53.4		67.7	32.3	
PHF	.700	.804	.737	.890	.911	.901	.860	.732	.858

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Groups Printed- Total Volume

	Hermosa Avenue Southbound			Herondo Street Westbound			N Harbor Drive Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
11:00 AM	30	32	62	22	39	61	33	19	52	175
11:15 AM	27	32	59	35	28	63	34	20	54	176
11:30 AM	37	39	76	29	33	62	39	15	54	192
11:45 AM	35	30	65	36	15	51	50	11	61	177
Total	129	133	262	122	115	237	156	65	221	720
12:00 PM	24	46	70	29	34	63	42	23	65	198
12:15 PM	29	34	63	23	38	61	37	22	59	183
12:30 PM	35	36	71	30	41	71	45	25	70	212
12:45 PM	44	41	85	22	39	61	39	19	58	204
Total	132	157	289	104	152	256	163	89	252	797
Grand Total	261	290	551	226	267	493	319	154	473	1517
Apprch %	47.4	52.6		45.8	54.2		67.4	32.6		
Total %	17.2	19.1	36.3	14.9	17.6	32.5	21	10.2	31.2	

	Hermosa Avenue Southbound			Herondo Street Westbound			N Harbor Drive Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	24	**46**	70	29	34	63	42	23	65	198
12:15 PM	29	34	63	23	38	61	37	22	59	183
12:30 PM	35	36	71	**30**	**41**	**71**	**45**	**25**	**70**	**212**
12:45 PM	**44**	41	**85**	22	39	61	39	19	58	204
Total Volume	132	157	289	104	152	256	163	89	252	797
% App. Total	45.7	54.3		40.6	59.4		64.7	35.3		
PHF	.750	.853	.850	.867	.927	.901	.906	.890	.900	.940

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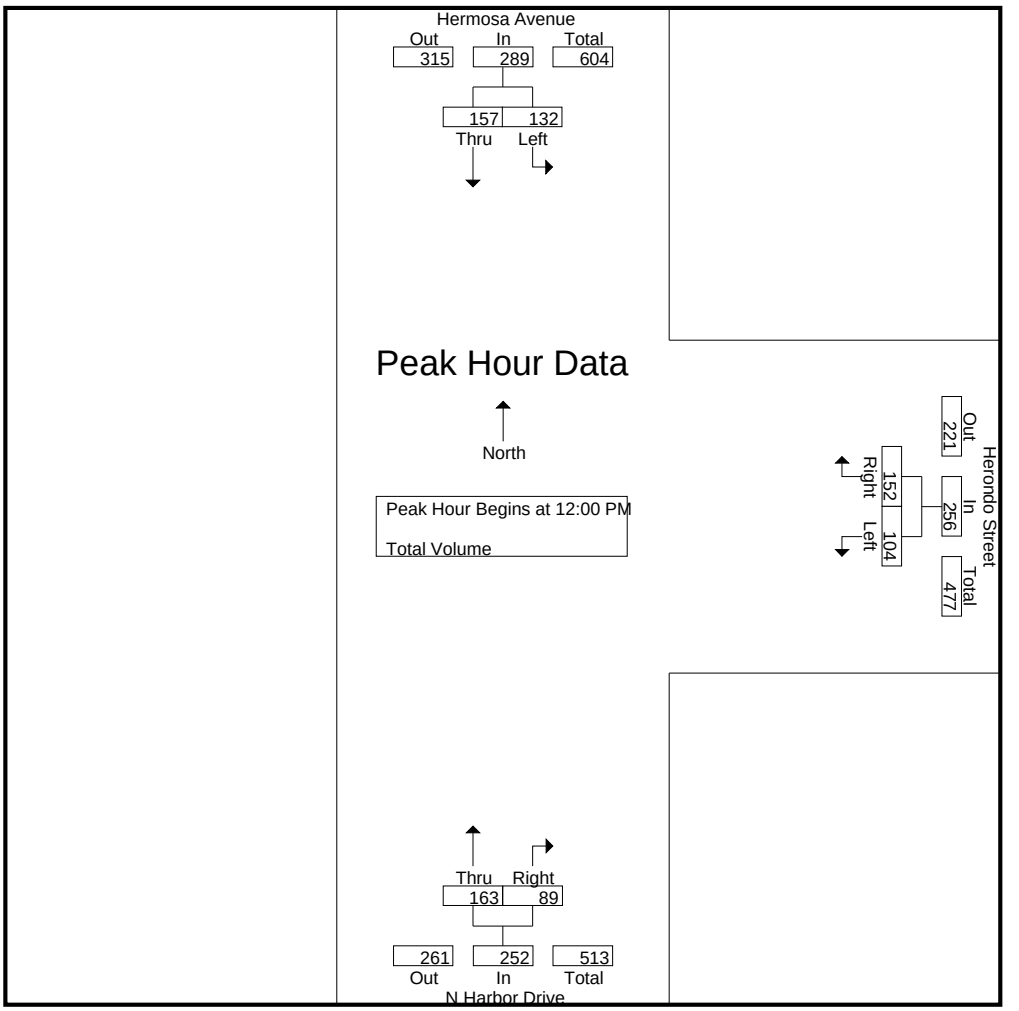

Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM			12:00 PM			11:45 AM		
+0 mins.	24	**46**	70	29	34	63	**50**	11	61
+15 mins.	29	34	63	23	38	61	42	23	65
+30 mins.	35	36	71	**30**	**41**	**71**	37	22	59
+45 mins.	**44**	41	**85**	22	39	61	45	**25**	**70**
Total Volume	132	157	289	104	152	256	174	81	255
% App. Total	45.7	54.3		40.6	59.4		68.2	31.8	
PHF	.750	.853	.850	.867	.927	.901	.870	.810	.911

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Groups Printed- Total Volume

	Hermosa Avenue Southbound			Herondo Street Westbound			N Harbor Drive Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	28	47	75	37	31	68	39	19	58	201
04:15 PM	25	42	67	32	36	68	49	27	76	211
04:30 PM	37	33	70	28	40	68	44	23	67	205
04:45 PM	29	38	67	41	45	86	49	26	75	228
Total	119	160	279	138	152	290	181	95	276	845
05:00 PM	38	60	98	32	34	66	40	26	66	230
05:15 PM	22	47	69	31	36	67	45	25	70	206
05:30 PM	29	39	68	34	38	72	42	26	68	208
05:45 PM	28	39	67	29	22	51	39	24	63	181
Total	117	185	302	126	130	256	166	101	267	825
Grand Total	236	345	581	264	282	546	347	196	543	1670
Apprch %	40.6	59.4		48.4	51.6		63.9	36.1		
Total %	14.1	20.7	34.8	15.8	16.9	32.7	20.8	11.7	32.5	

	Hermosa Avenue Southbound			Herondo Street Westbound			N Harbor Drive Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:15 PM										
04:15 PM	25	42	67	32	36	68	**49**	**27**	**76**	211
04:30 PM	37	33	70	28	40	68	44	23	67	205
04:45 PM	29	38	67	**41**	**45**	**86**	49	26	75	228
05:00 PM	**38**	**60**	**98**	32	34	66	40	26	66	**230**
Total Volume	129	173	302	133	155	288	182	102	284	874
% App. Total	42.7	57.3		46.2	53.8		64.1	35.9		
PHF	.849	.721	.770	.811	.861	.837	.929	.944	.934	.950

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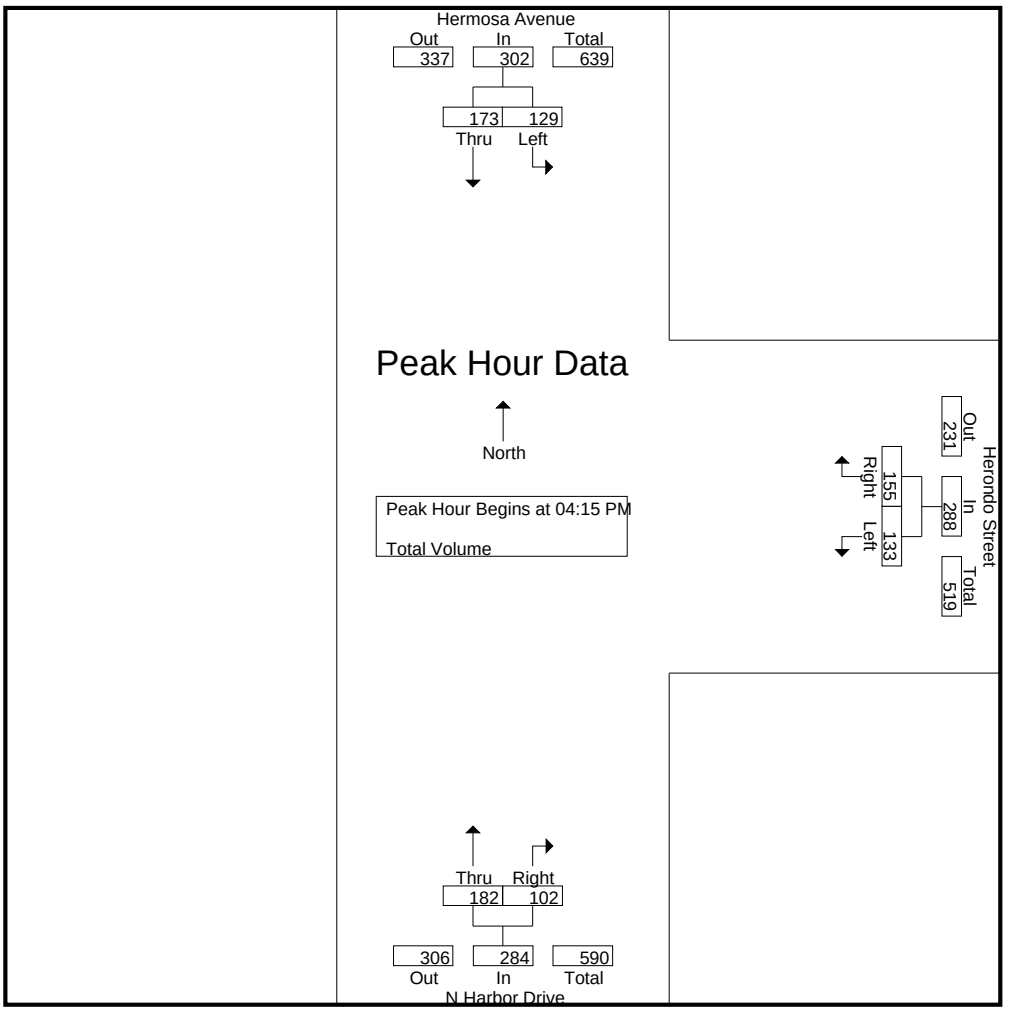
City of Redondo Beach
N/S: Hermosa Avenue/N Harbor Drive
E/W: Herondo Street
Weather: Clear

File Name : 01_RDB_Har_Her PM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM			04:45 PM			04:15 PM		
+0 mins.	37	33	70	**41**	**45**	**86**	**49**	**27**	**76**
+15 mins.	29	38	67	32	34	66	44	23	67
+30 mins.	**38**	**60**	**98**	31	36	67	49	26	75
+45 mins.	22	47	69	34	38	72	40	26	66
Total Volume	126	178	304	138	153	291	182	102	284
% App. Total	41.4	58.6		47.4	52.6		64.1	35.9	
PHF	.829	.742	.776	.841	.850	.846	.929	.944	.934

Location: Redondo Beach
N/S: Hermosa Ave/Harbor Dr
E/W: Herondo Street

Date: 10/5/2024
Day: Saturday

PEDESTRIANS

	North Leg Hermosa Avenue	East Leg Herondo Street	South Leg N Harbor Drive	West Leg Gateway Parkette	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	6	1	17	20	44
7:15 AM	8	2	5	8	23
7:30 AM	16	2	5	6	29
7:45 AM	12	1	2	5	20
8:00 AM	7	4	14	16	41
8:15 AM	8	3	4	6	21
8:30 AM	14	3	19	23	59
8:45 AM	11	1	10	14	36
TOTAL VOLUMES:	82	17	76	98	273

	North Leg Hermosa Avenue	East Leg Herondo Street	South Leg N Harbor Drive	West Leg Gateway Parkette	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
11:00 AM	8	3	9	11	31
11:15 AM	14	2	8	20	44
11:30 AM	9	1	5	10	25
11:45 AM	6	7	13	7	33
12:00 PM	8	5	8	10	31
12:15 PM	7	1	1	3	12
12:30 PM	15	5	3	6	29
12:45 PM	7	5	7	9	28
TOTAL VOLUMES:	74	29	54	76	233

	North Leg Hermosa Avenue	East Leg Herondo Street	South Leg N Harbor Drive	West Leg Gateway Parkette	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
4:00 PM	9	5	6	6	26
4:15 PM	12	2	11	9	34
4:30 PM	5	3	7	10	25
4:45 PM	5	7	7	6	25
5:00 PM	4	1	4	5	14
5:15 PM	5	4	6	14	29
5:30 PM	9	2	2	8	21
5:45 PM	5	1	5	7	18
TOTAL VOLUMES:	54	25	48	65	192

Location: Redondo Beach
N/S: Hermosa Ave/Harbor Dr
E/W: Herondo Street

Date: 10/5/2024
Day: Saturday

BICYCLES

	Southbound Hermosa Avenue			Westbound Herondo Street			Northbound N Harbor Drive			Eastbound Gateway Parkette			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	2	9	0	0	3	7	3	5	1	0	0	3	33
7:30 AM	3	3	0	0	0	2	15	8	1	0	0	0	32
7:45 AM	1	22	0	3	2	3	19	2	1	0	1	8	62
8:00 AM	0	13	0	1	2	2	11	3	0	0	1	10	43
8:15 AM	0	33	0	2	0	0	20	7	0	0	0	14	76
8:30 AM	1	15	0	5	2	2	13	22	1	0	0	9	70
8:45 AM	2	17	0	2	0	5	17	5	1	0	0	10	59
TOTAL VOLUMES:	9	112	0	13	9	21	98	52	5	0	2	54	375

	Southbound Hermosa Avenue			Westbound Herondo Street			Northbound N Harbor Drive			Eastbound Gateway Parkette			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	1	31	0	3	1	1	31	9	2	0	0	22	101
11:15 AM	3	12	0	2	4	1	41	11	1	0	4	14	93
11:30 AM	1	15	0	0	0	2	30	12	0	0	0	16	76
11:45 AM	1	16	0	2	0	3	51	9	1	1	1	24	109
12:00 PM	6	24	0	2	0	3	18	6	3	0	0	35	97
12:15 PM	2	27	0	2	0	2	60	6	3	0	2	22	126
12:30 PM	5	20	0	0	0	2	47	7	1	0	0	36	118
12:45 PM	2	8	0	3	7	0	43	7	2	0	2	37	111
TOTAL VOLUMES:	21	153	0	14	12	14	321	67	13	1	9	206	831

	Southbound Hermosa Avenue			Westbound Herondo Street			Northbound N Harbor Drive			Eastbound Gateway Parkette			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	5	11	0	2	0	0	24	5	0	0	2	26	75
4:15 PM	1	10	0	1	0	0	27	5	1	1	0	24	70
4:30 PM	1	10	0	1	0	1	29	4	5	0	5	19	75
4:45 PM	1	6	0	2	0	1	31	3	0	0	0	31	75
5:00 PM	2	14	0	0	0	0	10	3	0	0	0	17	46
5:15 PM	2	6	0	0	0	1	25	6	0	0	1	19	60
5:30 PM	2	16	0	2	0	1	10	3	0	0	5	23	62
5:45 PM	3	6	0	1	0	1	26	1	0	1	4	13	56
TOTAL VOLUMES:	17	79	0	9	0	5	182	30	6	2	17	172	519

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City of Redondo Beach
N/S: N Harbor Drive
E/W: Yacht Club Way
Weather: Clear

File Name : 02_RDB_Har_YC AM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Harbor Drive Southbound				Yacht Club Way Westbound				N Harbor Drive Northbound				Yacht Club Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	20	4	24	0	0	0	0	0	12	0	12	1	0	2	3	39
07:15 AM	0	15	1	16	0	0	0	0	0	13	0	13	1	0	0	1	30
07:30 AM	0	25	3	28	0	0	0	0	0	20	0	20	1	0	1	2	50
07:45 AM	0	33	0	33	0	0	0	0	0	34	0	34	1	0	0	1	68
Total	0	93	8	101	0	0	0	0	0	79	0	79	4	0	3	7	187
08:00 AM	0	23	4	27	0	0	0	0	1	21	0	22	1	0	0	1	50
08:15 AM	0	27	1	28	0	0	0	0	1	39	0	40	0	0	1	1	69
08:30 AM	0	32	4	36	0	0	0	0	0	30	0	30	2	0	1	3	69
08:45 AM	0	38	2	40	0	0	0	0	0	34	0	34	0	0	1	1	75
Total	0	120	11	131	0	0	0	0	2	124	0	126	3	0	3	6	263
Grand Total	0	213	19	232	0	0	0	0	2	203	0	205	7	0	6	13	450
Apprch %	0	91.8	8.2		0	0	0		1	99	0		53.8	0	46.2		
Total %	0	47.3	4.2	51.6	0	0	0	0	0.4	45.1	0	45.6	1.6	0	1.3	2.9	

	N Harbor Drive Southbound				Yacht Club Way Westbound				N Harbor Drive Northbound				Yacht Club Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	23	**4**	27	0	0	0	0	**1**	21	0	22	1	0	0	1	50
08:15 AM	0	27	1	28	0	0	0	0	1	**39**	0	**40**	0	0	**1**	1	69
08:30 AM	0	32	4	36	0	0	0	0	0	30	0	30	**2**	0	1	**3**	69
08:45 AM	0	**38**	2	**40**	0	0	0	0	0	34	0	34	0	0	1	1	**75**
Total Volume	0	120	11	131	0	0	0	0	2	124	0	126	3	0	3	6	263
% App. Total	0	91.6	8.4		0	0	0		1.6	98.4	0		50	0	50		
PHF	.000	.789	.688	.819	.000	.000	.000	.000	.500	.795	.000	.788	.375	.000	.750	.500	.877

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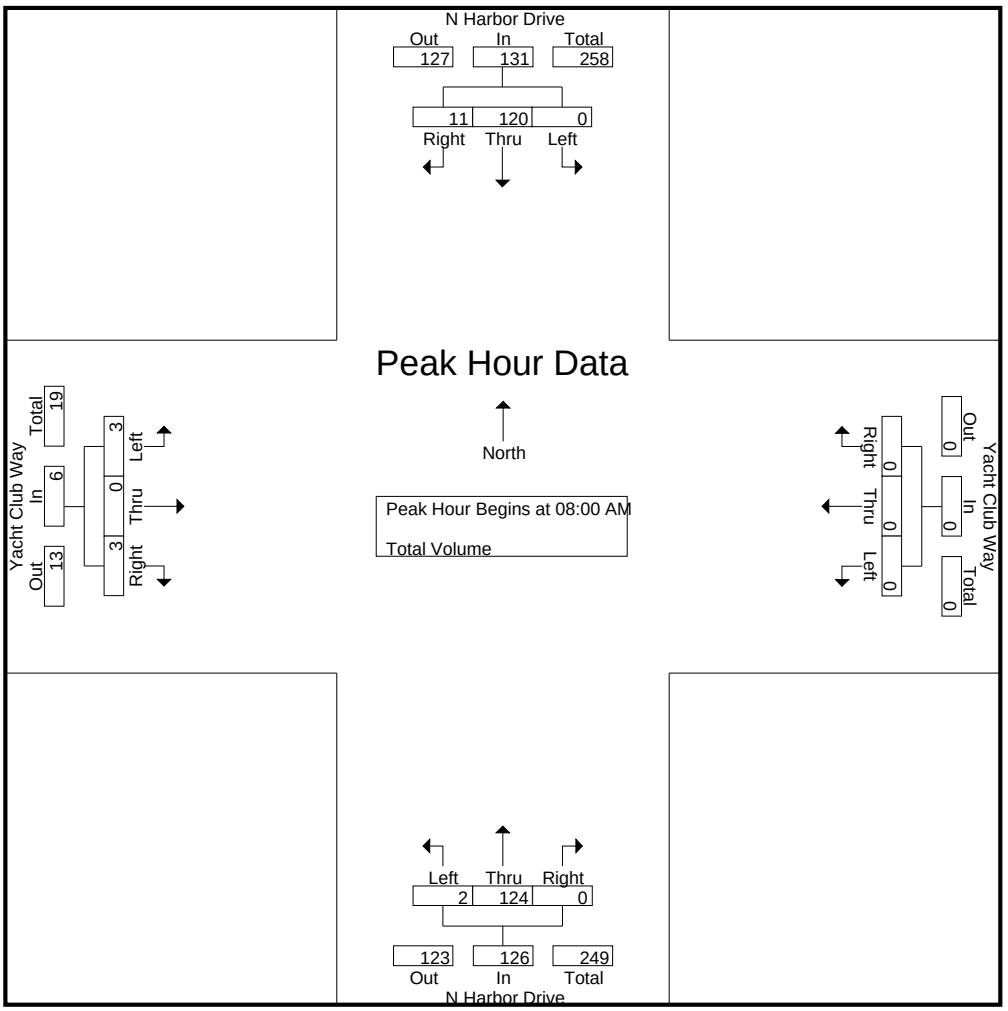

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				07:00 AM				07:45 AM				07:00 AM			
+0 mins.	0	23	**4**	27	0	0	0	0	0	34	0	34	**1**	0	**2**	**3**
+15 mins.	0	27	1	28	0	0	0	0	**1**	21	0	22	1	0	0	1
+30 mins.	0	32	4	36	0	0	0	0	1	**39**	0	**40**	1	0	1	2
+45 mins.	0	**38**	2	**40**	0	0	0	0	0	30	0	30	1	0	0	1
Total Volume	0	120	11	131	0	0	0	0	2	124	0	126	4	0	3	7
% App. Total	0	91.6	8.4		0	0	0		1.6	98.4	0		57.1	0	42.9	
PHF	.000	.789	.688	.819	.000	.000	.000	.000	.500	.795	.000	.788	1.000	.000	.375	.583

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City of Redondo Beach
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File Name : 02_RDB_Har_YC MD
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Groups Printed- Total Volume

	N Harbor Drive Southbound				Yacht Club Way Westbound				N Harbor Drive Northbound				Yacht Club Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
11:00 AM	0	52	3	55	0	0	0	0	1	51	0	52	5	0	3	8	115
11:15 AM	0	64	3	67	0	0	0	0	1	49	0	50	2	0	4	6	123
11:30 AM	2	61	5	68	0	0	0	0	0	52	0	52	1	0	3	4	124
11:45 AM	1	59	4	64	0	0	0	0	1	61	0	62	2	0	2	4	130
Total	3	236	15	254	0	0	0	0	3	213	0	216	10	0	12	22	492
12:00 PM	1	76	0	77	0	0	0	0	2	61	0	63	4	0	3	7	147
12:15 PM	0	56	1	57	0	0	0	0	0	55	0	55	3	0	1	4	116
12:30 PM	0	59	5	64	0	0	0	0	0	69	0	69	1	0	2	3	136
12:45 PM	0	60	3	63	0	0	0	0	3	58	1	62	1	0	1	2	127
Total	1	251	9	261	0	0	0	0	5	243	1	249	9	0	7	16	526
Grand Total	4	487	24	515	0	0	0	0	8	456	1	465	19	0	19	38	1018
Apprch %	0.8	94.6	4.7		0	0	0		1.7	98.1	0.2		50	0	50		
Total %	0.4	47.8	2.4	50.6	0	0	0	0	0.8	44.8	0.1	45.7	1.9	0	1.9	3.7	

	N Harbor Drive Southbound				Yacht Club Way Westbound				N Harbor Drive Northbound				Yacht Club Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:45 AM																	
11:45 AM	**1**	59	4	64	0	0	0	0	1	61	0	62	2	0	2	4	130
12:00 PM	1	**76**	0	**77**	0	0	0	0	**2**	61	0	63	**4**	0	**3**	**7**	**147**
12:15 PM	0	56	1	57	0	0	0	0	0	55	0	55	3	0	1	4	116
12:30 PM	0	59	**5**	64	0	0	0	0	0	**69**	0	**69**	1	0	2	3	136
Total Volume	2	250	10	262	0	0	0	0	3	246	0	249	10	0	8	18	529
% App. Total	0.8	95.4	3.8		0	0	0		1.2	98.8	0		55.6	0	44.4		
PHF	.500	.822	.500	.851	.000	.000	.000	.000	.375	.891	.000	.902	.625	.000	.667	.643	.900

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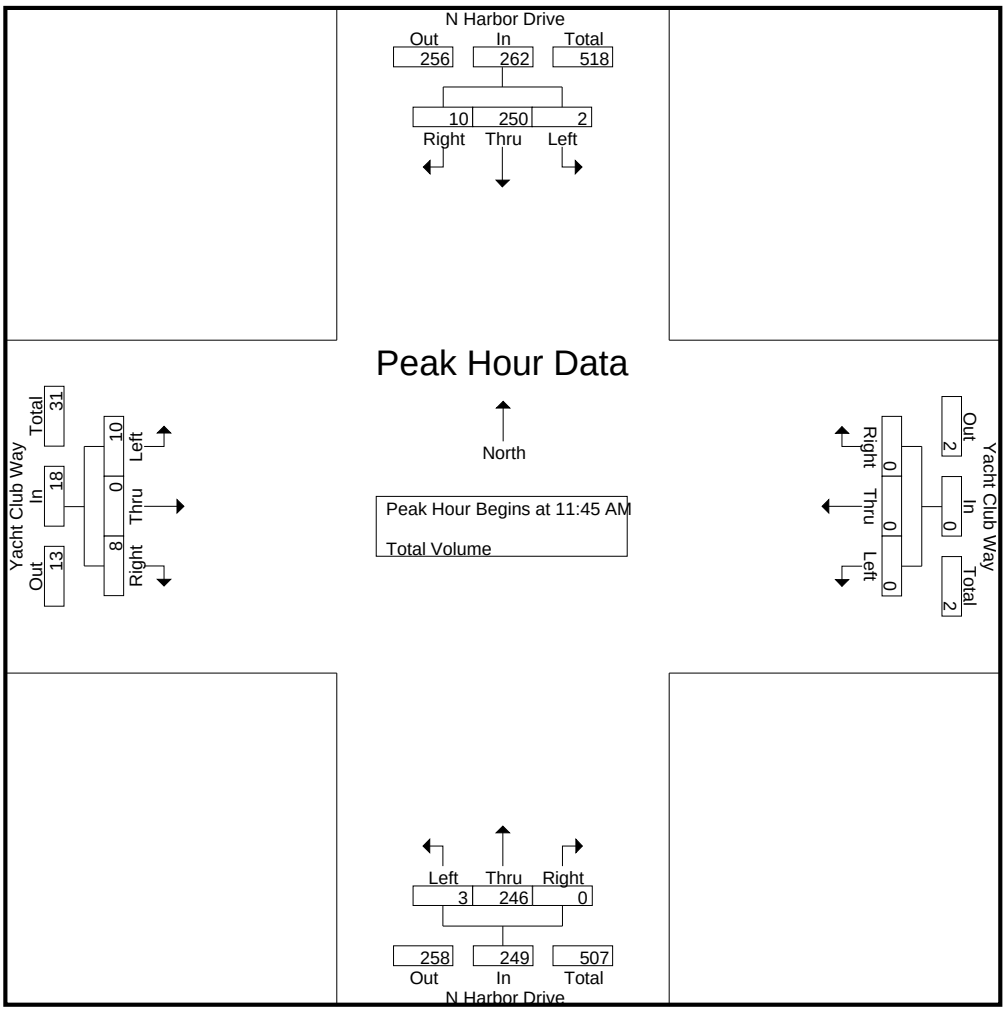

Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	11:15 AM				11:00 AM				11:45 AM				11:00 AM			
+0 mins.	0	64	3	67	0	0	0	0	1	61	0	62	**5**	0	3	**8**
+15 mins.	**2**	61	**5**	68	0	0	0	0	**2**	61	0	63	2	0	**4**	6
+30 mins.	1	59	4	64	0	0	0	0	0	55	0	55	1	0	3	4
+45 mins.	1	**76**	0	**77**	0	0	0	0	0	**69**	0	**69**	2	0	2	4
Total Volume	4	260	12	276	0	0	0	0	3	246	0	249	10	0	12	22
% App. Total	1.4	94.2	4.3		0	0	0		1.2	98.8	0		45.5	0	54.5	
PHF	.500	.855	.600	.896	.000	.000	.000	.000	.375	.891	.000	.902	.500	.000	.750	.688

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Groups Printed- Total Volume

	N Harbor Drive Southbound				Yacht Club Way Westbound				N Harbor Drive Northbound				Yacht Club Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	79	3	82	0	0	1	1	1	53	0	54	3	0	1	4	141
04:15 PM	0	71	3	74	0	0	0	0	1	73	1	75	3	0	2	5	154
04:30 PM	0	58	2	60	0	0	0	0	1	66	0	67	1	0	6	7	134
04:45 PM	0	76	2	78	0	0	0	0	3	72	0	75	5	0	6	11	164
Total	0	284	10	294	0	0	1	1	6	264	1	271	12	0	15	27	593
05:00 PM	0	89	4	93	0	0	0	0	2	62	0	64	2	0	3	5	162
05:15 PM	0	72	7	79	0	0	0	0	1	68	0	69	2	0	6	8	156
05:30 PM	0	67	6	73	0	0	0	0	7	68	0	75	0	0	12	12	160
05:45 PM	0	58	9	67	1	0	0	1	0	62	1	63	3	0	3	6	137
Total	0	286	26	312	1	0	0	1	10	260	1	271	7	0	24	31	615
Grand Total	0	570	36	606	1	0	1	2	16	524	2	542	19	0	39	58	1208
Apprch %	0	94.1	5.9		50	0	50		3	96.7	0.4		32.8	0	67.2		
Total %	0	47.2	3	50.2	0.1	0	0.1	0.2	1.3	43.4	0.2	44.9	1.6	0	3.2	4.8	

	N Harbor Drive Southbound				Yacht Club Way Westbound				N Harbor Drive Northbound				Yacht Club Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	76	2	78	0	0	0	0	3	**72**	0	**75**	**5**	0	6	11	**164**
05:00 PM	0	**89**	4	**93**	0	0	0	0	2	62	0	64	2	0	3	5	162
05:15 PM	0	72	**7**	79	0	0	0	0	1	68	0	69	2	0	6	8	156
05:30 PM	0	67	6	73	0	0	0	0	**7**	68	0	75	0	0	**12**	**12**	160
Total Volume	0	304	19	323	0	0	0	0	13	270	0	283	9	0	27	36	642
% App. Total	0	94.1	5.9		0	0	0		4.6	95.4	0		25	0	75		
PHF	.000	.854	.679	.868	.000	.000	.000	.000	.464	.938	.000	.943	.450	.000	.563	.750	.979

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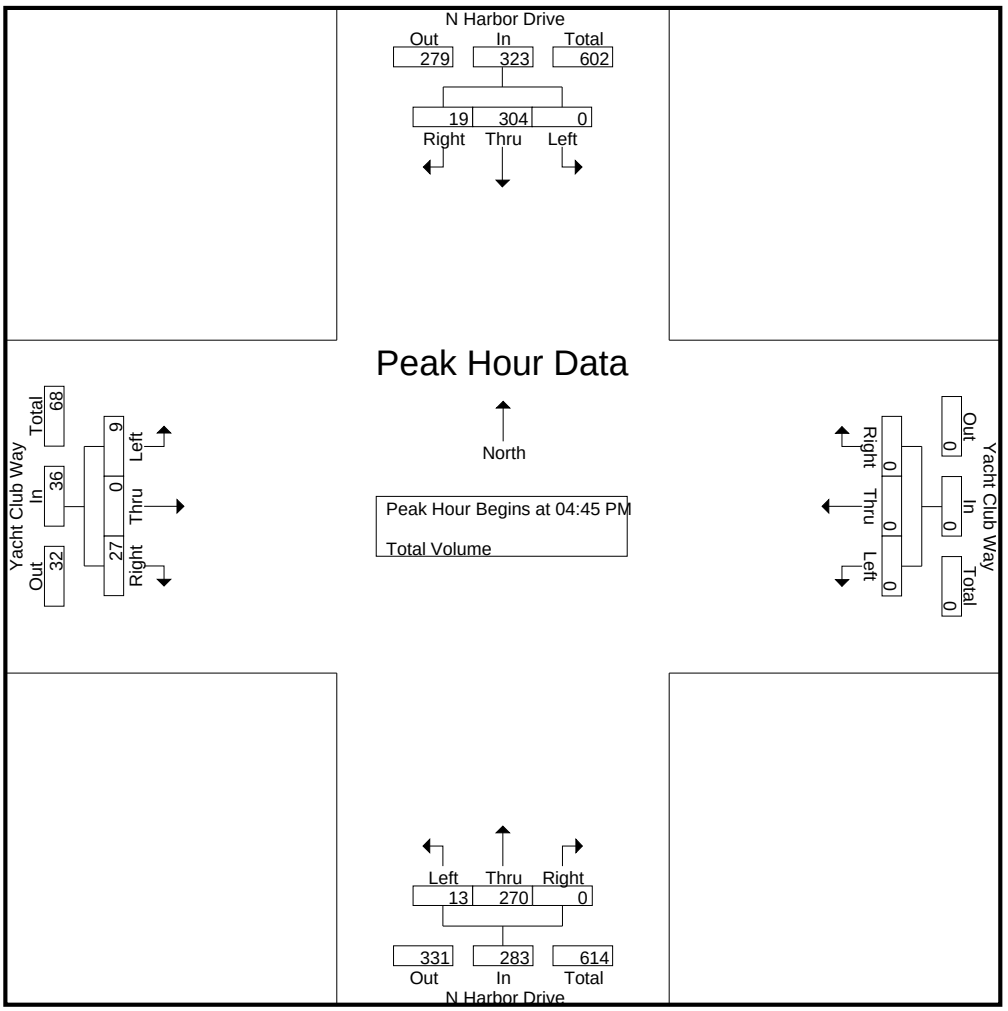

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:00 PM				04:45 PM				04:45 PM			
+0 mins.	0	76	2	78	0	0	**1**	**1**	3	**72**	0	**75**	**5**	0	6	11
+15 mins.	0	**89**	4	**93**	0	0	0	0	2	62	0	64	2	0	3	5
+30 mins.	0	72	**7**	79	0	0	0	0	1	68	0	69	2	0	6	8
+45 mins.	0	67	6	73	0	0	0	0	**7**	68	0	75	0	0	**12**	**12**
Total Volume	0	304	19	323	0	0	1	1	13	270	0	283	9	0	27	36
% App. Total	0	94.1	5.9		0	0	100		4.6	95.4	0		25	0	75	
PHF	.000	.854	.679	.868	.000	.000	.250	.250	.464	.938	.000	.943	.450	.000	.563	.750

Location: Redondo Beach
N/S: N Harbor Drive
E/W: Yacht Club Way

Date: 10/5/2024
Day: Saturday

PEDESTRIANS

	North Leg N Harbor Drive	East Leg Yacht Club Way	South Leg N Harbor Drive	West Leg Yacht Club Way	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	0	4	1	31	36
7:15 AM	0	4	0	25	29
7:30 AM	0	5	0	23	28
7:45 AM	0	2	1	36	39
8:00 AM	0	3	2	24	29
8:15 AM	0	6	1	38	45
8:30 AM	0	4	0	45	49
8:45 AM	0	5	0	42	47
TOTAL VOLUMES:	0	33	5	264	302

	North Leg N Harbor Drive	East Leg Yacht Club Way	South Leg N Harbor Drive	West Leg Yacht Club Way	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
11:00 AM	0	5	0	41	46
11:15 AM	0	3	0	59	62
11:30 AM	0	0	2	24	26
11:45 AM	0	6	1	21	28
12:00 PM	1	9	1	39	50
12:15 PM	0	2	1	32	35
12:30 PM	0	2	0	27	29
12:45 PM	0	4	0	28	32
TOTAL VOLUMES:	1	31	5	271	308

	North Leg N Harbor Drive	East Leg Yacht Club Way	South Leg N Harbor Drive	West Leg Yacht Club Way	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
4:00 PM	0	7	0	23	30
4:15 PM	0	3	0	17	20
4:30 PM	0	1	0	16	17
4:45 PM	0	2	0	13	15
5:00 PM	0	1	0	12	13
5:15 PM	0	0	0	15	15
5:30 PM	0	1	0	17	18
5:45 PM	0	4	0	16	20
TOTAL VOLUMES:	0	19	0	129	148

Location: Redondo Beach
N/S: N Harbor Drive
E/W: Yacht Club Way

Date: 10/5/2024
Day: Saturday

BICYCLES

	Southbound N Harbor Drive			Westbound Yacht Club Way			Northbound N Harbor Drive			Eastbound Yacht Club Way			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	11	0	0	0	0	0	12	0	0	0	0	23
7:15 AM	0	4	0	0	0	0	0	24	0	0	0	0	28
7:30 AM	1	29	0	0	0	0	0	19	0	0	0	0	49
7:45 AM	0	24	0	0	0	0	0	16	0	0	0	0	40
8:00 AM	0	46	0	0	0	0	1	27	0	0	0	0	74
8:15 AM	0	26	2	0	0	0	0	37	0	0	0	1	66
8:30 AM	0	30	1	0	0	0	0	24	0	0	0	1	56
8:45 AM	0	41	0	0	0	0	0	37	0	0	0	0	78
TOTAL VOLUMES:	1	211	3	0	0	0	1	196	0	0	0	2	414

	Southbound N Harbor Drive			Westbound Yacht Club Way			Northbound N Harbor Drive			Eastbound Yacht Club Way			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	0	51	0	0	0	0	0	42	0	0	0	0	93
11:15 AM	0	29	1	0	0	0	0	49	0	0	0	1	80
11:30 AM	0	29	0	0	0	0	0	42	0	0	0	0	71
11:45 AM	0	38	0	0	0	0	0	60	0	0	0	0	98
12:00 PM	0	63	0	0	0	0	0	29	0	0	0	2	94
12:15 PM	0	47	0	0	0	0	0	56	0	0	0	0	103
12:30 PM	0	59	0	0	0	0	0	48	0	0	0	1	108
12:45 PM	0	50	0	0	0	0	1	49	0	0	0	1	101
TOTAL VOLUMES:	0	366	1	0	0	0	1	375	0	0	0	5	748

	Southbound N Harbor Drive			Westbound Yacht Club Way			Northbound N Harbor Drive			Eastbound Yacht Club Way			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	34	1	0	0	0	2	32	0	0	0	1	70
4:15 PM	0	34	0	0	0	0	0	30	0	0	0	0	64
4:30 PM	0	28	0	0	0	0	0	33	0	0	0	0	61
4:45 PM	0	33	3	0	0	0	0	34	0	1	0	0	71
5:00 PM	1	25	1	0	0	0	1	13	0	0	0	0	41
5:15 PM	0	24	0	0	0	0	1	27	0	0	0	0	52
5:30 PM	0	43	0	0	0	0	0	13	0	0	0	0	56
5:45 PM	0	19	0	0	0	0	0	27	0	0	0	0	46
TOTAL VOLUMES:	1	240	5	0	0	0	4	209	0	1	0	1	461

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City of Redondo Beach
N/S: N Harbor Drive
E/W: Marina Way
Weather: Clear

File Name : 03_RDB_Har_Mar AM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Harbor Drive Southbound				Gated Driveway Westbound				N Harbor Drive Northbound				Marina Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	7	18	25	0	0	0	0	10	11	0	21	1	0	3	4	50
07:15 AM	0	9	8	17	0	0	0	0	11	11	0	22	4	0	0	4	43
07:30 AM	0	6	20	26	0	0	0	0	10	15	0	25	4	0	1	5	56
07:45 AM	0	10	20	30	0	0	0	0	22	20	0	42	12	0	6	18	90
Total	0	32	66	98	0	0	0	0	53	57	0	110	21	0	10	31	239
08:00 AM	0	8	18	26	0	0	0	0	9	17	0	26	7	0	7	14	66
08:15 AM	0	13	11	24	0	0	0	0	8	24	0	32	16	0	11	27	83
08:30 AM	0	14	19	33	0	0	0	0	12	20	0	32	8	0	9	17	82
08:45 AM	0	22	16	38	0	0	0	0	16	26	0	42	11	0	14	25	105
Total	0	57	64	121	0	0	0	0	45	87	0	132	42	0	41	83	336
Grand Total	0	89	130	219	0	0	0	0	98	144	0	242	63	0	51	114	575
Apprch %	0	40.6	59.4		0	0	0		40.5	59.5	0		55.3	0	44.7		
Total %	0	15.5	22.6	38.1	0	0	0	0	17	25	0	42.1	11	0	8.9	19.8	

	N Harbor Drive Southbound				Gated Driveway Westbound				N Harbor Drive Northbound				Marina Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	8	18	26	0	0	0	0	9	17	0	26	7	0	7	14	66
08:15 AM	0	13	11	24	0	0	0	0	8	24	0	32	**16**	0	11	**27**	83
08:30 AM	0	14	**19**	33	0	0	0	0	12	20	0	32	8	0	9	17	82
08:45 AM	0	**22**	16	**38**	0	0	0	0	**16**	**26**	0	**42**	11	0	**14**	25	**105**
Total Volume	0	57	64	121	0	0	0	0	45	87	0	132	42	0	41	83	336
% App. Total	0	47.1	52.9		0	0	0		34.1	65.9	0		50.6	0	49.4		
PHF	.000	.648	.842	.796	.000	.000	.000	.000	.703	.837	.000	.786	.656	.000	.732	.769	.800

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City of Redondo Beach
N/S: N Harbor Drive
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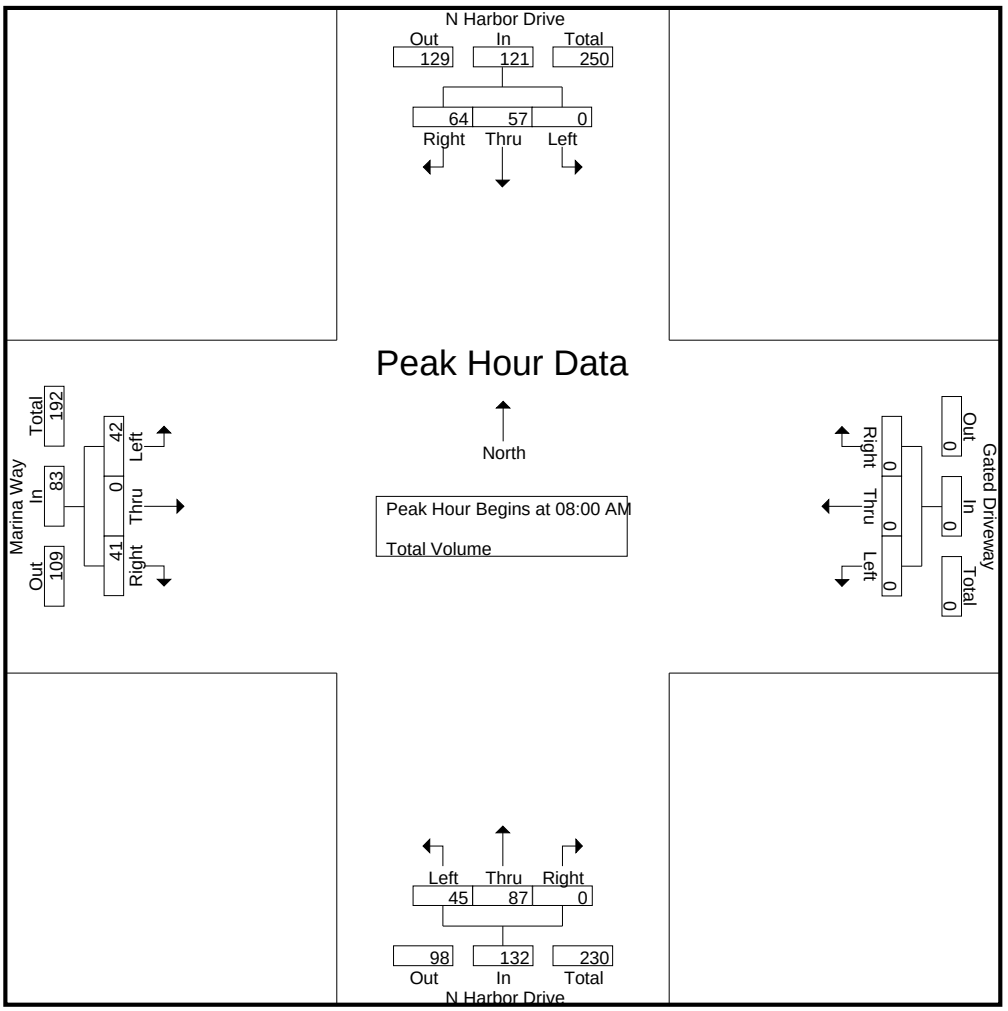
File Name : 03_RDB_Har_Mar AM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				07:00 AM				07:45 AM				08:00 AM			
+0 mins.	0	8	18	26	0	0	0	0	**22**	20	0	**42**	7	0	7	14
+15 mins.	0	13	11	24	0	0	0	0	9	17	0	26	**16**	0	11	**27**
+30 mins.	0	14	**19**	33	0	0	0	0	8	**24**	0	32	8	0	9	17
+45 mins.	0	**22**	16	**38**	0	0	0	0	12	20	0	32	11	0	**14**	25
Total Volume	0	57	64	121	0	0	0	0	51	81	0	132	42	0	41	83
% App. Total	0	47.1	52.9		0	0	0		38.6	61.4	0		50.6	0	49.4	
PHF	.000	.648	.842	.796	.000	.000	.000	.000	.580	.844	.000	.786	.656	.000	.732	.769

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City of Redondo Beach
N/S: N Harbor Drive
E/W: Marina Way
Weather: Clear

File Name : 03_RDB_Har_Mar MD
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Harbor Drive Southbound				Gated Driveway Westbound				N Harbor Drive Northbound				Marina Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
11:00 AM	0	39	15	54	0	0	0	0	16	26	0	42	23	0	15	38	134
11:15 AM	0	42	25	67	0	0	0	0	19	37	0	56	15	0	15	30	153
11:30 AM	0	36	28	64	0	0	0	0	22	31	0	53	24	0	21	45	162
11:45 AM	0	38	25	63	0	0	0	0	27	40	0	67	24	0	16	40	170
Total	0	155	93	248	0	0	0	0	84	134	0	218	86	0	67	153	619
12:00 PM	0	37	43	80	0	0	0	0	15	36	0	51	23	0	17	40	171
12:15 PM	0	44	18	62	0	0	0	0	18	37	0	55	18	0	13	31	148
12:30 PM	0	39	21	60	0	0	0	0	10	44	0	54	27	0	23	50	164
12:45 PM	0	39	15	54	0	0	0	0	22	41	0	63	21	0	13	34	151
Total	0	159	97	256	0	0	0	0	65	158	0	223	89	0	66	155	634
Grand Total	0	314	190	504	0	0	0	0	149	292	0	441	175	0	133	308	1253
Apprch %	0	62.3	37.7		0	0	0		33.8	66.2	0		56.8	0	43.2		
Total %	0	25.1	15.2	40.2	0	0	0	0	11.9	23.3	0	35.2	14	0	10.6	24.6	

	N Harbor Drive Southbound				Gated Driveway Westbound				N Harbor Drive Northbound				Marina Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:15 AM																	
11:15 AM	0	**42**	25	67	0	0	0	0	19	37	0	56	15	0	15	30	153
11:30 AM	0	36	28	64	0	0	0	0	22	31	0	53	**24**	0	**21**	**45**	162
11:45 AM	0	38	25	63	0	0	0	0	**27**	**40**	0	**67**	24	0	16	40	170
12:00 PM	0	37	**43**	**80**	0	0	0	0	15	36	0	51	23	0	17	40	**171**
Total Volume	0	153	121	274	0	0	0	0	83	144	0	227	86	0	69	155	656
% App. Total	0	55.8	44.2		0	0	0		36.6	63.4	0		55.5	0	44.5		
PHF	.000	.911	.703	.856	.000	.000	.000	.000	.769	.900	.000	.847	.896	.000	.821	.861	.959

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City of Redondo Beach
N/S: N Harbor Drive
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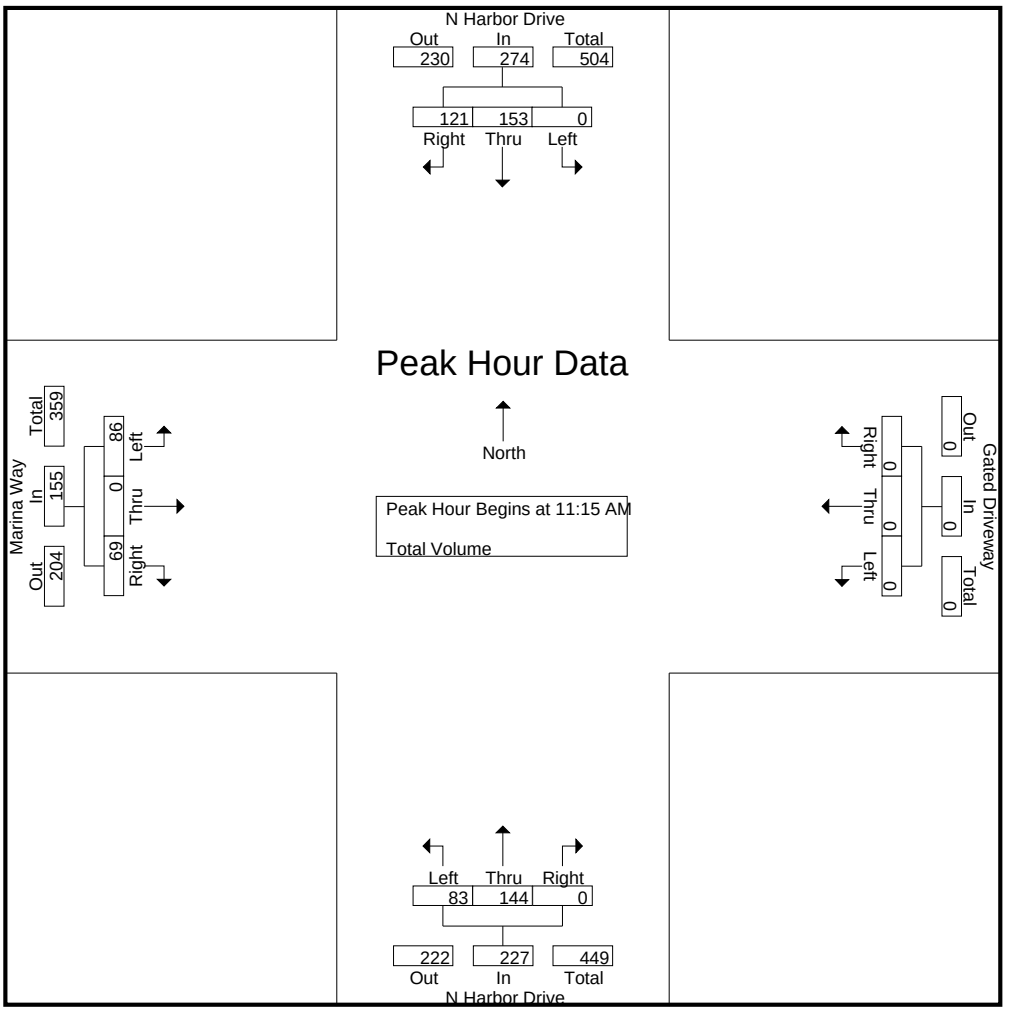

Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	11:15 AM				11:00 AM				11:15 AM				11:45 AM			
+0 mins.	0	**42**	25	67	0	0	0	0	19	37	0	56	24	0	16	40
+15 mins.	0	36	28	64	0	0	0	0	22	31	0	53	23	0	17	40
+30 mins.	0	38	25	63	0	0	0	0	**27**	**40**	0	**67**	18	0	13	31
+45 mins.	0	37	**43**	**80**	0	0	0	0	15	36	0	51	**27**	0	**23**	**50**
Total Volume	0	153	121	274	0	0	0	0	83	144	0	227	92	0	69	161
% App. Total	0	55.8	44.2		0	0	0		36.6	63.4	0		57.1	0	42.9	
PHF	.000	.911	.703	.856	.000	.000	.000	.000	.769	.900	.000	.847	.852	.000	.750	.805

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City of Redondo Beach
N/S: N Harbor Drive
E/W: Marina Way
Weather: Clear

File Name : 03_RDB_Har_Mar PM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Harbor Drive Southbound				Gated Driveway Westbound				N Harbor Drive Northbound				Marina Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	52	19	71	0	0	0	0	18	39	0	57	18	0	13	31	159
04:15 PM	0	50	19	69	0	0	0	0	18	54	0	72	22	0	15	37	178
04:30 PM	0	40	25	65	0	0	0	0	19	46	0	65	18	0	18	36	166
04:45 PM	0	47	37	84	0	0	0	0	16	47	0	63	26	0	25	51	198
Total	0	189	100	289	0	0	0	0	71	186	0	257	84	0	71	155	701
05:00 PM	0	58	28	86	0	0	0	0	21	34	0	55	24	0	26	50	191
05:15 PM	0	56	25	81	0	0	0	0	13	52	0	65	18	0	24	42	188
05:30 PM	0	52	28	80	0	0	0	0	23	43	0	66	36	0	20	56	202
05:45 PM	0	40	25	65	0	0	0	0	29	43	0	72	18	0	16	34	171
Total	0	206	106	312	0	0	0	0	86	172	0	258	96	0	86	182	752
Grand Total	0	395	206	601	0	0	0	0	157	358	0	515	180	0	157	337	1453
Apprch %	0	65.7	34.3		0	0	0		30.5	69.5	0		53.4	0	46.6		
Total %	0	27.2	14.2	41.4	0	0	0	0	10.8	24.6	0	35.4	12.4	0	10.8	23.2	

	N Harbor Drive Southbound				Gated Driveway Westbound				N Harbor Drive Northbound				Marina Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	47	**37**	84	0	0	0	0	16	47	0	63	26	0	25	51	198
05:00 PM	0	**58**	28	**86**	0	0	0	0	21	34	0	55	24	0	**26**	50	191
05:15 PM	0	56	25	81	0	0	0	0	13	**52**	0	65	18	0	24	42	188
05:30 PM	0	52	28	80	0	0	0	0	**23**	43	0	**66**	**36**	0	20	**56**	**202**
Total Volume	0	213	118	331	0	0	0	0	73	176	0	249	104	0	95	199	779
% App. Total	0	64.4	35.6		0	0	0		29.3	70.7	0		52.3	0	47.7		
PHF	.000	.918	.797	.962	.000	.000	.000	.000	.793	.846	.000	.943	.722	.000	.913	.888	.964

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City of Redondo Beach
N/S: N Harbor Drive
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File Name : 03_RDB_Har_Mar PM
Site Code : 23224873
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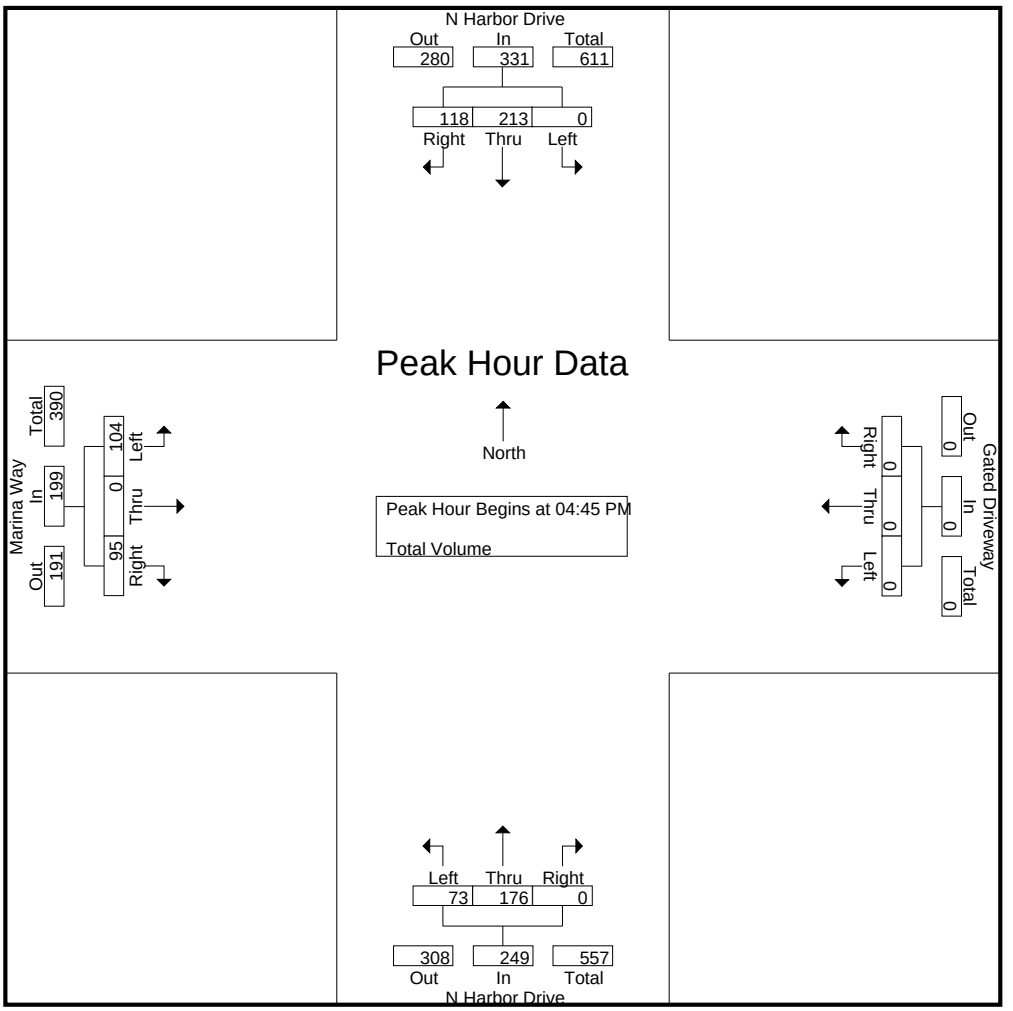

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:00 PM				05:00 PM				04:45 PM			
+0 mins.	0	47	**37**	84	0	0	0	0	21	34	0	55	26	0	25	51
+15 mins.	0	**58**	28	**86**	0	0	0	0	13	**52**	0	65	24	0	**26**	50
+30 mins.	0	56	25	81	0	0	0	0	23	43	0	66	18	0	24	42
+45 mins.	0	52	28	80	0	0	0	0	**29**	43	0	**72**	**36**	0	20	**56**
Total Volume	0	213	118	331	0	0	0	0	86	172	0	258	104	0	95	199
% App. Total	0	64.4	35.6		0	0	0		33.3	66.7	0		52.3	0	47.7	
PHF	.000	.918	.797	.962	.000	.000	.000	.000	.741	.827	.000	.896	.722	.000	.913	.888

Location: Redondo Beach
N/S: N Harbor Drive
E/W: Marina Way

Date: 10/5/2024
Day: Saturday

PEDESTRIANS

	North Leg N Harbor Drive	East Leg Gated Driveway	South Leg N Harbor Drive	West Leg Marina Way	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	0	5	0	25	30
7:15 AM	0	2	0	31	33
7:30 AM	0	4	0	21	25
7:45 AM	1	0	1	32	34
8:00 AM	1	3	0	19	23
8:15 AM	0	6	0	46	52
8:30 AM	1	1	0	35	37
8:45 AM	6	8	0	32	46
TOTAL VOLUMES:	9	29	1	241	280

	North Leg N Harbor Drive	East Leg Gated Driveway	South Leg N Harbor Drive	West Leg Marina Way	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
11:00 AM	1	2	0	44	47
11:15 AM	0	2	2	46	50
11:30 AM	0	0	0	38	38
11:45 AM	0	2	0	22	24
12:00 PM	0	0	0	39	39
12:15 PM	0	1	0	32	33
12:30 PM	0	2	0	35	37
12:45 PM	2	1	0	32	35
TOTAL VOLUMES:	3	10	2	288	303

	North Leg N Harbor Drive	East Leg Gated Driveway	South Leg N Harbor Drive	West Leg Marina Way	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
4:00 PM	3	4	0	27	34
4:15 PM	0	3	0	24	27
4:30 PM	0	0	0	14	14
4:45 PM	0	2	1	17	20
5:00 PM	0	1	0	18	19
5:15 PM	0	0	0	10	10
5:30 PM	0	2	1	10	13
5:45 PM	0	2	0	13	15
TOTAL VOLUMES:	3	14	2	133	152

Location: Redondo Beach
N/S: N Harbor Drive
E/W: Marina Way

Date: 10/5/2024
Day: Saturday

BICYCLES

	Southbound N Harbor Drive			Westbound Gated Driveway			Northbound N Harbor Drive			Eastbound Marina Way			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	10	0	0	0	0	0	12	0	0	0	1	23
7:15 AM	0	4	0	0	0	0	2	26	0	0	0	0	32
7:30 AM	0	23	1	0	0	0	0	17	0	0	0	0	41
7:45 AM	0	22	2	0	0	0	1	16	0	0	0	1	42
8:00 AM	0	42	1	0	0	0	0	24	0	0	0	0	67
8:15 AM	0	22	3	0	0	0	4	40	0	0	0	0	69
8:30 AM	0	27	2	0	0	0	0	23	0	0	0	0	52
8:45 AM	0	39	3	0	0	0	0	36	0	1	0	0	79
TOTAL VOLUMES:	0	189	12	0	0	0	7	194	0	1	0	2	405

	Southbound N Harbor Drive			Westbound Gated Driveway			Northbound N Harbor Drive			Eastbound Marina Way			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	0	47	0	0	0	0	1	44	0	0	0	4	96
11:15 AM	0	31	1	0	0	0	2	46	0	2	0	0	82
11:30 AM	0	22	1	0	0	0	1	42	0	4	0	1	71
11:45 AM	0	35	2	0	0	0	1	52	0	0	0	3	93
12:00 PM	0	68	0	0	0	0	1	33	0	1	0	2	105
12:15 PM	0	40	0	0	0	0	1	47	0	1	0	1	90
12:30 PM	0	57	1	0	0	0	0	49	0	1	0	1	109
12:45 PM	0	49	1	0	0	0	0	46	0	0	0	1	97
TOTAL VOLUMES:	0	349	6	0	0	0	7	359	0	9	0	13	743

	Southbound N Harbor Drive			Westbound Gated Driveway			Northbound N Harbor Drive			Eastbound Marina Way			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	33	0	0	0	0	5	27	0	0	0	0	65
4:15 PM	0	26	6	0	0	0	0	30	0	0	0	4	66
4:30 PM	0	31	2	0	0	0	0	29	0	0	0	3	65
4:45 PM	0	30	2	0	0	0	0	31	0	0	0	1	64
5:00 PM	0	25	0	0	0	0	1	17	0	1	0	2	46
5:15 PM	0	21	3	0	0	0	0	25	0	1	0	0	50
5:30 PM	0	35	4	0	0	0	0	15	0	0	0	2	56
5:45 PM	0	18	2	0	0	0	0	20	0	2	0	5	47
TOTAL VOLUMES:	0	219	19	0	0	0	6	194	0	4	0	17	459

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Redondo Beach
N/S: N Harbor Drive
E/W: Portofino Way/Beryl Street
Weather: Clear

File Name : 04_RDB_Har_Beryl AM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Harbor Drive Southbound				Beryl Street Westbound				N Harbor Drive Northbound				Portofino Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	6	2	0	8	3	5	22	30	0	5	2	7	0	6	0	6	51
07:15 AM	5	4	0	9	2	10	17	29	0	0	3	3	0	2	0	2	43
07:30 AM	8	3	0	11	1	4	27	32	0	5	7	12	0	0	0	0	55
07:45 AM	12	3	0	15	2	17	35	54	0	4	8	12	0	2	0	2	83
Total	31	12	0	43	8	36	101	145	0	14	20	34	0	10	0	10	232
08:00 AM	15	1	1	17	2	12	31	45	0	4	5	9	0	5	0	5	76
08:15 AM	19	4	1	24	13	11	25	49	2	3	3	8	1	8	1	10	91
08:30 AM	11	9	3	23	2	15	30	47	1	3	6	10	2	5	1	8	88
08:45 AM	19	12	4	35	9	15	44	68	0	4	10	14	2	11	0	13	130
Total	64	26	9	99	26	53	130	209	3	14	24	41	5	29	2	36	385
Grand Total	95	38	9	142	34	89	231	354	3	28	44	75	5	39	2	46	617
Apprch %	66.9	26.8	6.3		9.6	25.1	65.3		4	37.3	58.7		10.9	84.8	4.3		
Total %	15.4	6.2	1.5	23	5.5	14.4	37.4	57.4	0.5	4.5	7.1	12.2	0.8	6.3	0.3	7.5	

	N Harbor Drive Southbound				Beryl Street Westbound				N Harbor Drive Northbound				Portofino Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	15	1	1	17	2	12	31	45	0	**4**	5	9	0	5	0	5	76
08:15 AM	**19**	4	1	24	**13**	11	25	49	**2**	3	3	8	1	8	**1**	10	91
08:30 AM	11	9	3	23	2	**15**	30	47	1	3	6	10	**2**	5	1	8	88
08:45 AM	19	**12**	**4**	**35**	9	15	**44**	**68**	0	4	**10**	**14**	2	**11**	0	**13**	**130**
Total Volume	64	26	9	99	26	53	130	209	3	14	24	41	5	29	2	36	385
% App. Total	64.6	26.3	9.1		12.4	25.4	62.2		7.3	34.1	58.5		13.9	80.6	5.6		
PHF	.842	.542	.563	.707	.500	.883	.739	.768	.375	.875	.600	.732	.625	.659	.500	.692	.740

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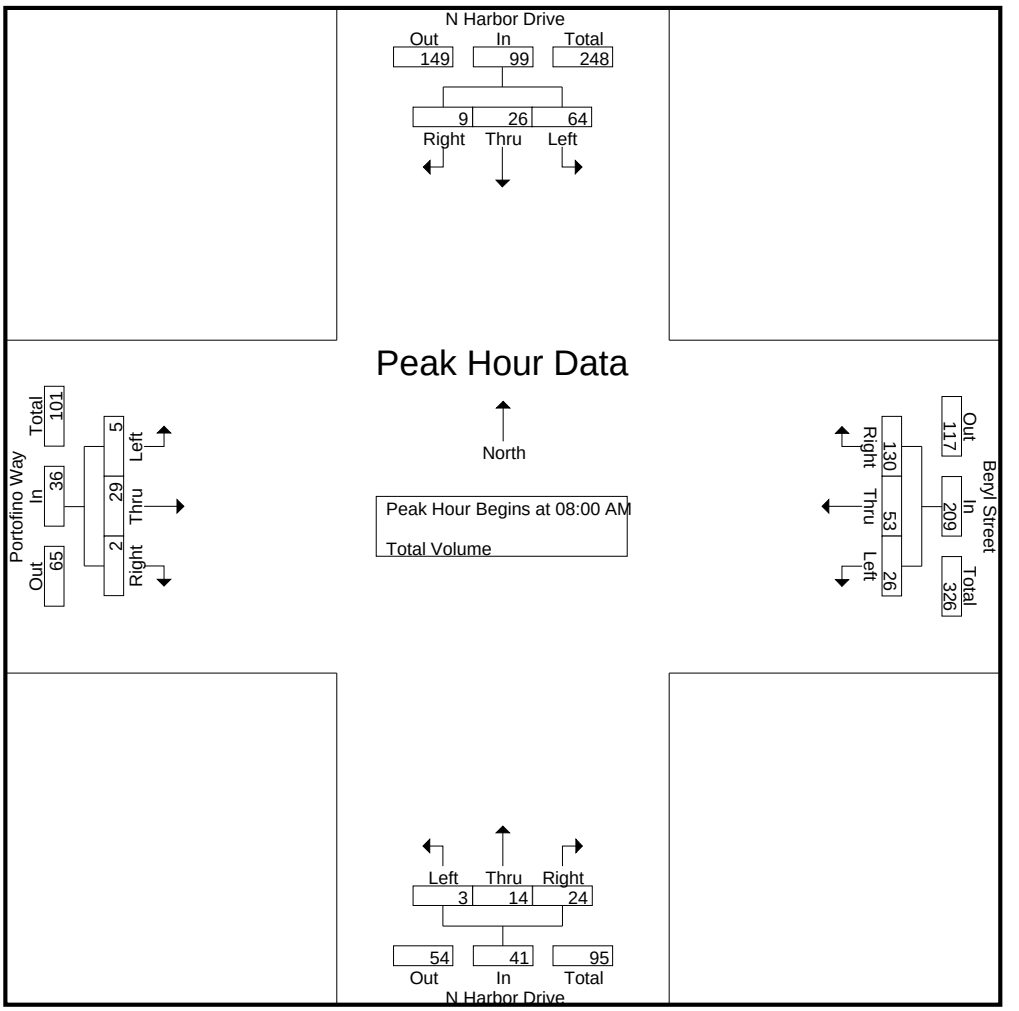
File Name : 04_RDB_Har_Beryl AM
Site Code : 23224873
Start Date : 10/5/2024



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				08:00 AM				07:30 AM				08:00 AM			
+0 mins.	15	1	1	17	2	12	31	45	0	**5**	7	**12**	0	5	0	5
+15 mins.	**19**	4	1	24	**13**	11	25	49	0	4	**8**	12	1	8	**1**	10
+30 mins.	11	9	3	23	2	**15**	30	47	0	4	5	9	**2**	5	1	8
+45 mins.	19	**12**	**4**	**35**	9	15	**44**	**68**	**2**	3	3	8	2	**11**	0	**13**
Total Volume	64	26	9	99	26	53	130	209	2	16	23	41	5	29	2	36
% App. Total	64.6	26.3	9.1		12.4	25.4	62.2		4.9	39	56.1		13.9	80.6	5.6	
PHF	.842	.542	.563	.707	.500	.883	.739	.768	.250	.800	.719	.854	.625	.659	.500	.692

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City of Redondo Beach
N/S: N Harbor Drive
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Weather: Clear

File Name : 04_RDB_Har_Beryl MD
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Harbor Drive Southbound				Beryl Street Westbound				N Harbor Drive Northbound				Portofino Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
11:00 AM	37	14	8	59	7	15	44	66	0	8	14	22	2	12	0	14	161
11:15 AM	34	16	4	54	13	19	58	90	0	5	10	15	5	12	0	17	176
11:30 AM	33	20	6	59	7	11	62	80	0	6	8	14	5	13	2	20	173
11:45 AM	33	13	7	53	13	8	61	82	0	5	13	18	9	12	1	22	175
Total	137	63	25	225	40	53	225	318	0	24	45	69	21	49	3	73	685
12:00 PM	38	12	4	54	11	11	51	73	1	7	10	18	2	11	2	15	160
12:15 PM	38	18	6	62	20	8	49	77	2	8	16	26	3	11	1	15	180
12:30 PM	50	12	3	65	15	10	52	77	0	7	30	37	2	13	2	17	196
12:45 PM	36	15	1	52	17	8	59	84	1	13	19	33	2	14	0	16	185
Total	162	57	14	233	63	37	211	311	4	35	75	114	9	49	5	63	721
Grand Total	299	120	39	458	103	90	436	629	4	59	120	183	30	98	8	136	1406
Apprch %	65.3	26.2	8.5		16.4	14.3	69.3		2.2	32.2	65.6		22.1	72.1	5.9		
Total %	21.3	8.5	2.8	32.6	7.3	6.4	31	44.7	0.3	4.2	8.5	13	2.1	7	0.6	9.7	

	N Harbor Drive Southbound				Beryl Street Westbound				N Harbor Drive Northbound				Portofino Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	38	12	4	54	11	**11**	51	73	1	7	10	18	2	11	**2**	15	160
12:15 PM	38	**18**	**6**	62	**20**	8	49	77	**2**	8	16	26	**3**	11	1	15	180
12:30 PM	**50**	12	3	**65**	15	10	52	77	0	7	**30**	**37**	2	13	2	**17**	**196**
12:45 PM	36	15	1	52	17	8	**59**	**84**	1	**13**	19	33	2	**14**	0	16	185
Total Volume	162	57	14	233	63	37	211	311	4	35	75	114	9	49	5	63	721
% App. Total	69.5	24.5	6		20.3	11.9	67.8		3.5	30.7	65.8		14.3	77.8	7.9		
PHF	.810	.792	.583	.896	.788	.841	.894	.926	.500	.673	.625	.770	.750	.875	.625	.926	.920

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File Name : 04_RDB_Har_Beryl MD
Site Code : 23224873
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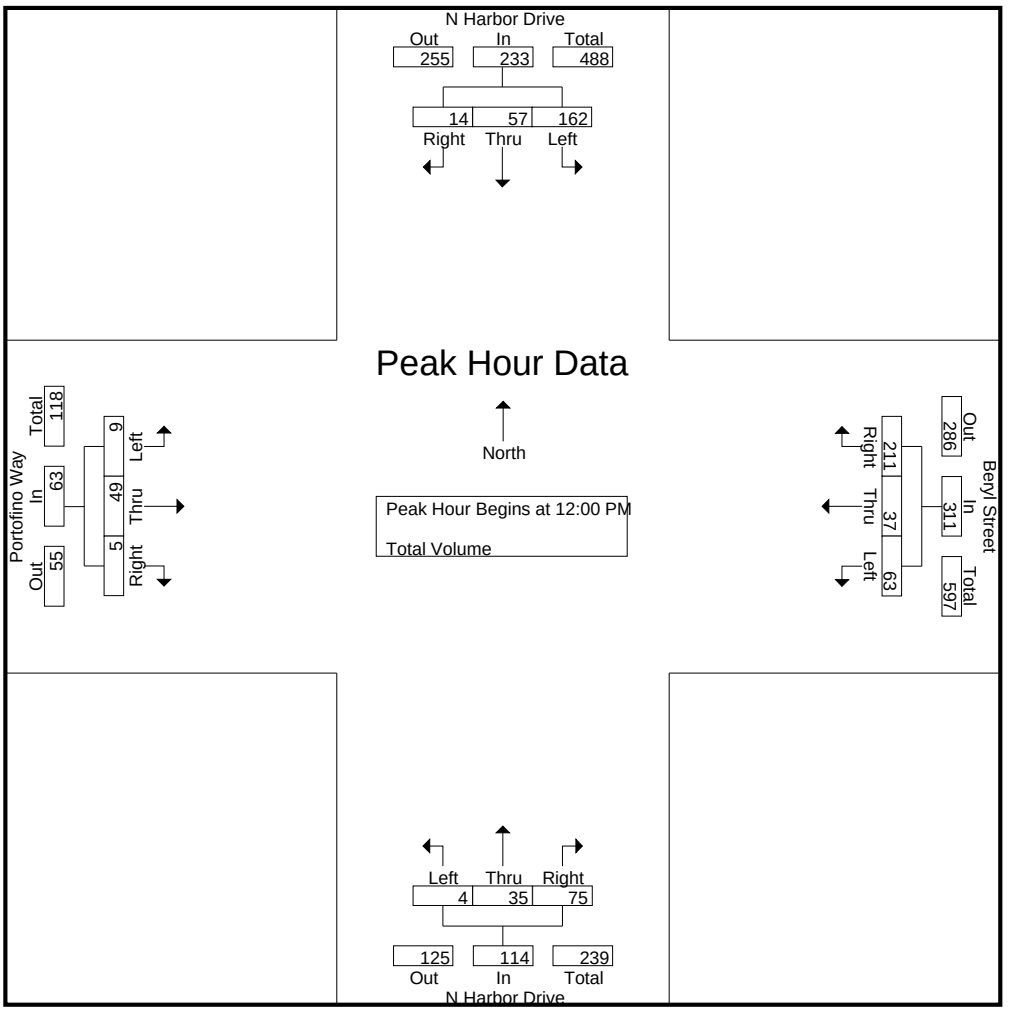
Page No : 2



Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	11:45 AM				11:15 AM				12:00 PM				11:15 AM			
+0 mins.	33	13	**7**	53	**13**	**19**	58	**90**	1	7	10	18	5	12	0	17
+15 mins.	38	12	4	54	7	11	**62**	80	**2**	8	16	26	5	**13**	**2**	20
+30 mins.	38	**18**	6	62	13	8	61	82	0	7	**30**	**37**	**9**	12	1	**22**
+45 mins.	**50**	12	3	**65**	11	11	51	73	1	**13**	19	33	2	11	2	15
Total Volume	159	55	20	234	44	49	232	325	4	35	75	114	21	48	5	74
% App. Total	67.9	23.5	8.5		13.5	15.1	71.4		3.5	30.7	65.8		28.4	64.9	6.8	
PHF	.795	.764	.714	.900	.846	.645	.935	.903	.500	.673	.625	.770	.583	.923	.625	.841

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City of Redondo Beach
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Weather: Clear

File Name : 04_RDB_Har_Beryl PM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Harbor Drive Southbound				Beryl Street Westbound				N Harbor Drive Northbound				Portofino Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	49	19	2	70	24	9	59	92	1	14	19	34	4	16	2	22	218
04:15 PM	52	21	6	79	12	12	68	92	1	7	17	25	4	11	3	18	214
04:30 PM	47	16	13	76	11	11	58	80	2	11	16	29	5	13	1	19	204
04:45 PM	46	17	4	67	18	8	73	99	2	10	17	29	3	12	1	16	211
Total	194	73	25	292	65	40	258	363	6	42	69	117	16	52	7	75	847
05:00 PM	57	24	15	96	25	18	66	109	0	9	11	20	3	19	1	23	248
05:15 PM	62	18	10	90	36	9	69	114	2	16	15	33	2	13	0	15	252
05:30 PM	43	18	5	66	33	7	74	114	0	13	17	30	4	17	1	22	232
05:45 PM	50	17	4	71	22	13	78	113	1	17	21	39	19	8	2	29	252
Total	212	77	34	323	116	47	287	450	3	55	64	122	28	57	4	89	984
Grand Total	406	150	59	615	181	87	545	813	9	97	133	239	44	109	11	164	1831
Apprch %	66	24.4	9.6		22.3	10.7	67		3.8	40.6	55.6		26.8	66.5	6.7		
Total %	22.2	8.2	3.2	33.6	9.9	4.8	29.8	44.4	0.5	5.3	7.3	13.1	2.4	6	0.6	9	

	N Harbor Drive Southbound				Beryl Street Westbound				N Harbor Drive Northbound				Portofino Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	57	**24**	**15**	**96**	25	**18**	66	109	0	9	11	20	3	**19**	1	23	248
05:15 PM	**62**	18	10	90	**36**	9	69	**114**	**2**	16	15	33	2	13	0	15	**252**
05:30 PM	43	18	5	66	33	7	74	114	0	13	17	30	4	17	1	22	232
05:45 PM	50	17	4	71	22	13	**78**	113	1	**17**	**21**	**39**	**19**	8	**2**	**29**	252
Total Volume	212	77	34	323	116	47	287	450	3	55	64	122	28	57	4	89	984
% App. Total	65.6	23.8	10.5		25.8	10.4	63.8		2.5	45.1	52.5		31.5	64	4.5		
PHF	.855	.802	.567	.841	.806	.653	.920	.987	.375	.809	.762	.782	.368	.750	.500	.767	.976

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File Name : 04_RDB_Har_Beryl PM
Site Code : 23224873
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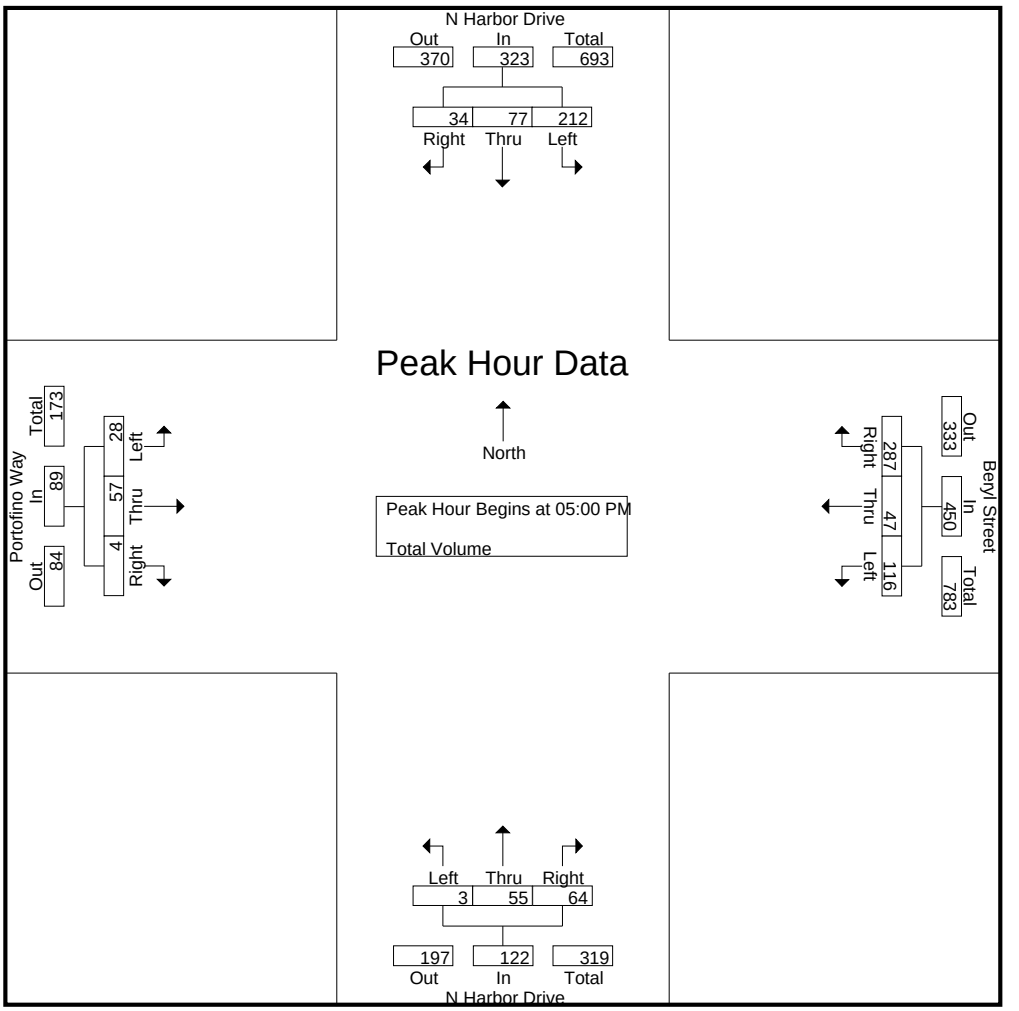

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				05:00 PM				05:00 PM				05:00 PM			
+0 mins.	47	16	13	76	25	**18**	66	109	0	9	11	20	3	**19**	1	23
+15 mins.	46	17	4	67	**36**	9	69	**114**	**2**	16	15	33	2	13	0	15
+30 mins.	57	**24**	**15**	**96**	33	7	74	114	0	13	17	30	4	17	1	22
+45 mins.	**62**	18	10	90	22	13	**78**	113	1	**17**	**21**	**39**	**19**	8	**2**	**29**
Total Volume	212	75	42	329	116	47	287	450	3	55	64	122	28	57	4	89
% App. Total	64.4	22.8	12.8		25.8	10.4	63.8		2.5	45.1	52.5		31.5	64	4.5	
PHF	.855	.781	.700	.857	.806	.653	.920	.987	.375	.809	.762	.782	.368	.750	.500	.767

Location: Redondo Beach
N/S: N Harbor Drive
E/W: Portofino Way/Beryl St

Date: 10/5/2024
Day: Saturday

PEDESTRIANS

	North Leg N Harbor Drive	East Leg Beryl Street	South Leg N Harbor Drive	West Leg Portofino Way	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	5	1	1	17	24
7:15 AM	6	5	2	32	45
7:30 AM	3	0	2	26	31
7:45 AM	6	1	4	16	27
8:00 AM	10	7	4	26	47
8:15 AM	12	7	8	45	72
8:30 AM	6	6	4	31	47
8:45 AM	7	7	3	34	51
TOTAL VOLUMES:	55	34	28	227	344

	North Leg N Harbor Drive	East Leg Beryl Street	South Leg N Harbor Drive	West Leg Portofino Way	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
11:00 AM	20	8	6	36	70
11:15 AM	5	2	6	32	45
11:30 AM	16	1	0	36	53
11:45 AM	3	3	2	27	35
12:00 PM	7	7	5	32	51
12:15 PM	9	9	8	39	65
12:30 PM	5	4	12	30	51
12:45 PM	5	3	5	36	49
TOTAL VOLUMES:	70	37	44	268	419

	North Leg N Harbor Drive	East Leg Beryl Street	South Leg N Harbor Drive	West Leg Portofino Way	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
4:00 PM	10	13	15	41	79
4:15 PM	2	11	6	13	32
4:30 PM	12	6	2	18	38
4:45 PM	12	5	2	29	48
5:00 PM	8	2	3	11	24
5:15 PM	4	2	7	17	30
5:30 PM	7	12	7	35	61
5:45 PM	19	11	6	22	58
TOTAL VOLUMES:	74	62	48	186	370

Location: Redondo Beach
N/S: N Harbor Drive
E/W: Portofino Way/Beryl St

Date: 10/5/2024
Day: Saturday

BICYCLES

	Southbound N Harbor Drive			Westbound Beryl Street			Northbound N Harbor Drive			Eastbound Portofino Way			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	3	8	0	1	0	5	0	12	0	0	0	0	29
7:15 AM	0	5	0	0	0	6	0	19	0	0	0	0	30
7:30 AM	2	22	0	0	0	5	0	13	0	1	0	0	43
7:45 AM	1	20	0	0	0	1	0	15	0	0	1	0	38
8:00 AM	3	43	0	0	0	11	0	25	0	1	0	0	83
8:15 AM	1	20	0	0	0	3	0	22	0	3	0	0	49
8:30 AM	5	23	2	0	0	5	0	17	0	1	0	0	53
8:45 AM	4	29	0	0	0	4	0	29	0	1	0	0	67
TOTAL VOLUMES:	19	170	2	1	0	40	0	152	0	7	1	0	392

	Southbound N Harbor Drive			Westbound Beryl Street			Northbound N Harbor Drive			Eastbound Portofino Way			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	3	42	0	1	0	6	0	41	1	2	0	0	96
11:15 AM	0	38	0	1	0	10	1	35	0	0	1	0	86
11:30 AM	2	23	0	0	0	8	0	29	2	4	1	0	69
11:45 AM	4	31	0	0	0	14	0	39	3	0	0	1	92
12:00 PM	6	60	5	2	0	8	0	34	4	0	0	0	119
12:15 PM	1	43	0	1	0	9	0	32	1	1	0	0	88
12:30 PM	5	49	2	0	0	7	0	38	0	0	0	2	103
12:45 PM	6	35	6	0	1	7	2	32	0	6	0	0	95
TOTAL VOLUMES:	27	321	13	5	1	69	3	280	11	13	2	3	748

	Southbound N Harbor Drive			Westbound Beryl Street			Northbound N Harbor Drive			Eastbound Portofino Way			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	1	24	1	0	0	1	0	22	0	1	0	0	50
4:15 PM	2	30	1	0	0	3	0	36	0	0	0	0	72
4:30 PM	8	15	6	0	0	1	2	23	4	0	0	2	61
4:45 PM	2	25	0	0	0	4	0	25	4	2	0	0	62
5:00 PM	5	28	0	0	0	2	0	10	0	0	0	0	45
5:15 PM	1	18	0	0	0	0	0	21	1	0	0	1	42
5:30 PM	2	33	1	1	0	2	0	16	0	0	0	0	55
5:45 PM	4	19	0	2	0	0	0	20	0	0	0	0	45
TOTAL VOLUMES:	25	192	9	3	0	13	2	173	9	3	0	3	432

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Redondo Beach
N/S: N Harbor Drive
E/W: Project Driveway
Weather: Clear

File Name : 05_RDB_Har_Project DW AM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Harbor Drive Southbound			N Harbor Drive Northbound			Project Driveway Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
07:00 AM	3	2	5	4	3	7	0	0	0	12
07:15 AM	4	1	5	2	0	2	2	3	5	12
07:30 AM	1	1	2	4	5	9	3	1	4	15
07:45 AM	3	1	4	6	6	12	3	1	4	20
Total	11	5	16	16	14	30	8	5	13	59
08:00 AM	2	1	3	2	8	10	2	1	3	16
08:15 AM	7	2	9	4	5	9	1	1	2	20
08:30 AM	8	1	9	1	5	6	1	1	2	17
08:45 AM	10	5	15	0	10	10	1	1	2	27
Total	27	9	36	7	28	35	5	4	9	80
Grand Total	38	14	52	23	42	65	13	9	22	139
Apprch %	73.1	26.9		35.4	64.6		59.1	40.9		
Total %	27.3	10.1	37.4	16.5	30.2	46.8	9.4	6.5	15.8	

	N Harbor Drive Southbound			N Harbor Drive Northbound			Project Driveway Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	2	1	3	2	8	**10**	**2**	**1**	**3**	16
08:15 AM	7	2	9	**4**	5	9	1	1	2	20
08:30 AM	8	1	9	1	5	6	1	1	2	17
08:45 AM	**10**	**5**	**15**	0	**10**	10	1	1	2	**27**
Total Volume	27	9	36	7	28	35	5	4	9	80
% App. Total	75	25		20	80		55.6	44.4		
PHF	.675	.450	.600	.438	.700	.875	.625	1.00	.750	.741

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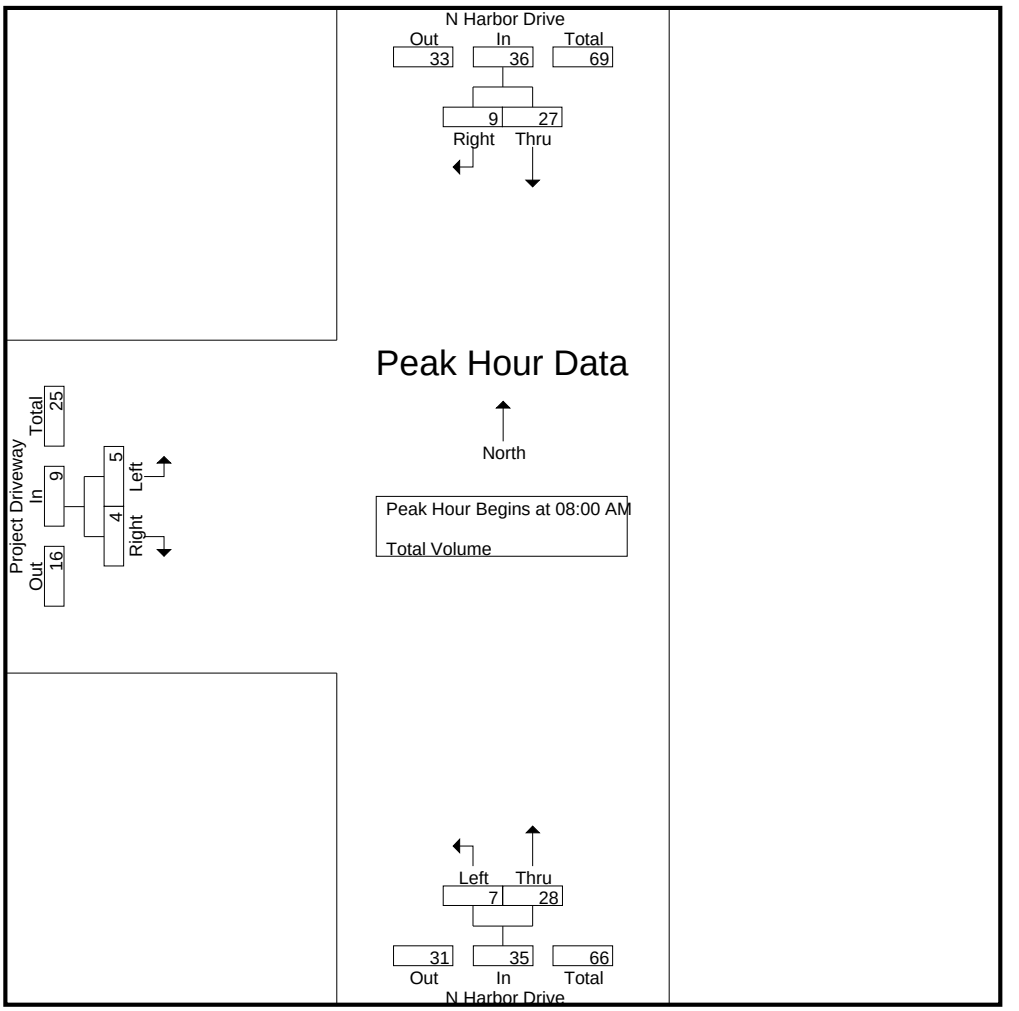

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM			07:30 AM			07:15 AM		
+0 mins.	2	1	3	4	5	9	2	**3**	**5**
+15 mins.	7	2	9	**6**	6	**12**	**3**	1	4
+30 mins.	8	1	9	2	**8**	10	3	1	4
+45 mins.	**10**	**5**	**15**	4	5	9	2	1	3
Total Volume	27	9	36	16	24	40	10	6	16
% App. Total	75	25		40	60		62.5	37.5	
PHF	.675	.450	.600	.667	.750	.833	.833	.500	.800

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Page No : 1

Groups Printed- Total Volume

	N Harbor Drive Southbound			N Harbor Drive Northbound			Project Driveway Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
11:00 AM	11	4	15	2	13	15	1	2	3	33
11:15 AM	17	7	24	7	7	14	1	6	7	45
11:30 AM	22	4	26	2	7	9	3	3	6	41
11:45 AM	16	10	26	5	10	15	1	6	7	48
Total	66	25	91	16	37	53	6	17	23	167
12:00 PM	19	5	24	4	10	14	1	7	8	46
12:15 PM	22	5	27	9	9	18	4	4	8	53
12:30 PM	11	9	20	5	16	21	11	5	16	57
12:45 PM	20	6	26	5	15	20	10	5	15	61
Total	72	25	97	23	50	73	26	21	47	217
Grand Total	138	50	188	39	87	126	32	38	70	384
Apprch %	73.4	26.6		31	69		45.7	54.3		
Total %	35.9	13	49	10.2	22.7	32.8	8.3	9.9	18.2	

	N Harbor Drive Southbound			N Harbor Drive Northbound			Project Driveway Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	19	5	24	4	10	14	1	**7**	8	46
12:15 PM	**22**	5	**27**	**9**	9	18	4	4	8	53
12:30 PM	11	**9**	20	5	**16**	**21**	**11**	5	**16**	57
12:45 PM	20	6	26	5	15	20	10	5	15	**61**
Total Volume	72	25	97	23	50	73	26	21	47	217
% App. Total	74.2	25.8		31.5	68.5		55.3	44.7		
PHF	.818	.694	.898	.639	.781	.869	.591	.750	.734	.889

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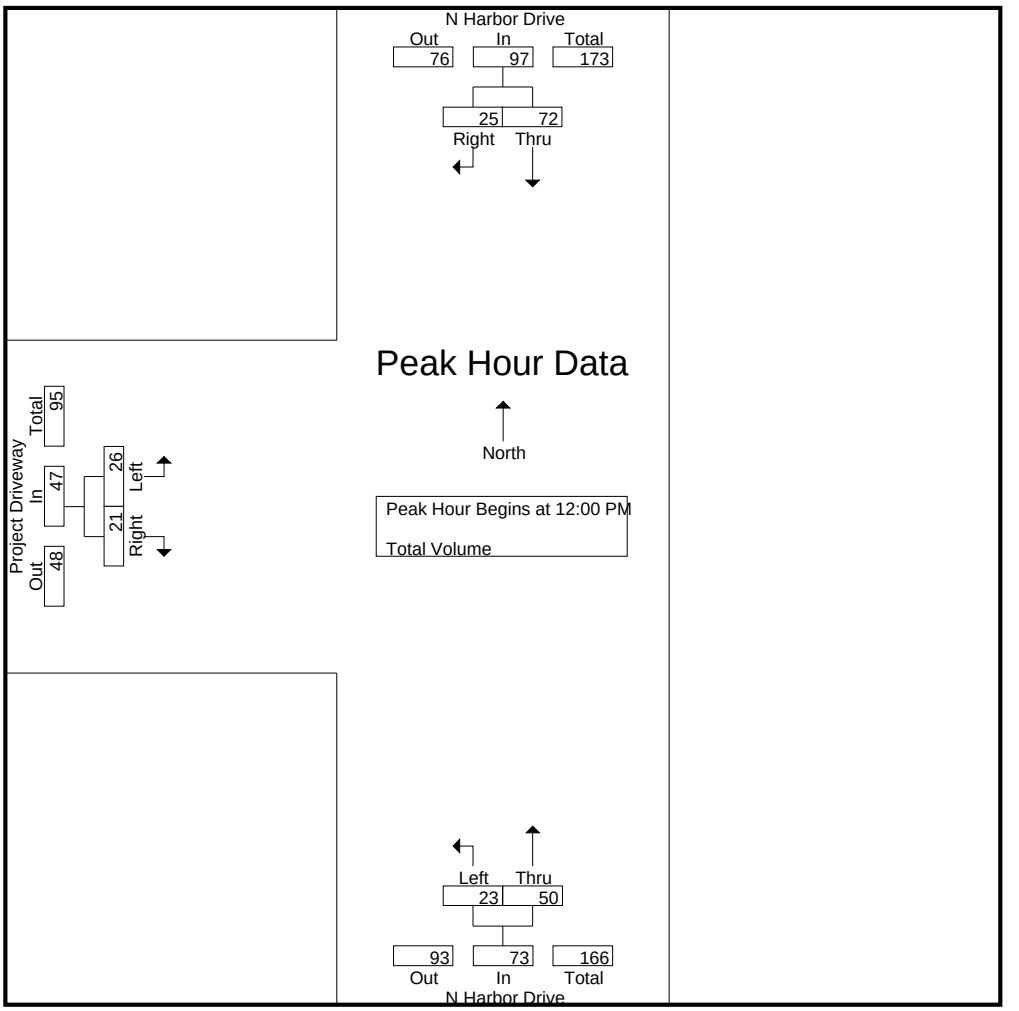

Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	11:30 AM			12:00 PM			12:00 PM		
+0 mins.	**22**	4	26	4	10	14	1	**7**	8
+15 mins.	16	**10**	26	**9**	9	18	4	4	8
+30 mins.	19	5	24	5	**16**	**21**	**11**	5	**16**
+45 mins.	22	5	**27**	5	15	20	10	5	15
Total Volume	79	24	103	23	50	73	26	21	47
% App. Total	76.7	23.3		31.5	68.5		55.3	44.7	
PHF	.898	.600	.954	.639	.781	.869	.591	.750	.734

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City of Redondo Beach
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File Name : 05_RDB_Har_Project DW PM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Harbor Drive Southbound			N Harbor Drive Northbound			Project Driveway Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
04:00 PM	27	12	39	10	18	28	9	5	14	81
04:15 PM	21	6	27	11	13	24	3	9	12	63
04:30 PM	15	7	22	8	19	27	8	3	11	60
04:45 PM	21	5	26	8	25	33	7	2	9	68
Total	84	30	114	37	75	112	27	19	46	272
05:00 PM	27	5	32	6	17	23	9	5	14	69
05:15 PM	21	8	29	11	29	40	7	4	11	80
05:30 PM	29	3	32	10	32	42	8	6	14	88
05:45 PM	14	3	17	5	23	28	12	7	19	64
Total	91	19	110	32	101	133	36	22	58	301
Grand Total	175	49	224	69	176	245	63	41	104	573
Apprch %	78.1	21.9		28.2	71.8		60.6	39.4		
Total %	30.5	8.6	39.1	12	30.7	42.8	11	7.2	18.2	

	N Harbor Drive Southbound			N Harbor Drive Northbound			Project Driveway Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	21	5	26	8	25	33	7	2	9	68
05:00 PM	27	5	**32**	6	17	23	**9**	5	**14**	69
05:15 PM	21	**8**	29	**11**	29	40	7	4	11	80
05:30 PM	**29**	3	32	10	**32**	**42**	8	**6**	14	**88**
Total Volume	98	21	119	35	103	138	31	17	48	305
% App. Total	82.4	17.6		25.4	74.6		64.6	35.4		
PHF	.845	.656	.930	.795	.805	.821	.861	.708	.857	.866

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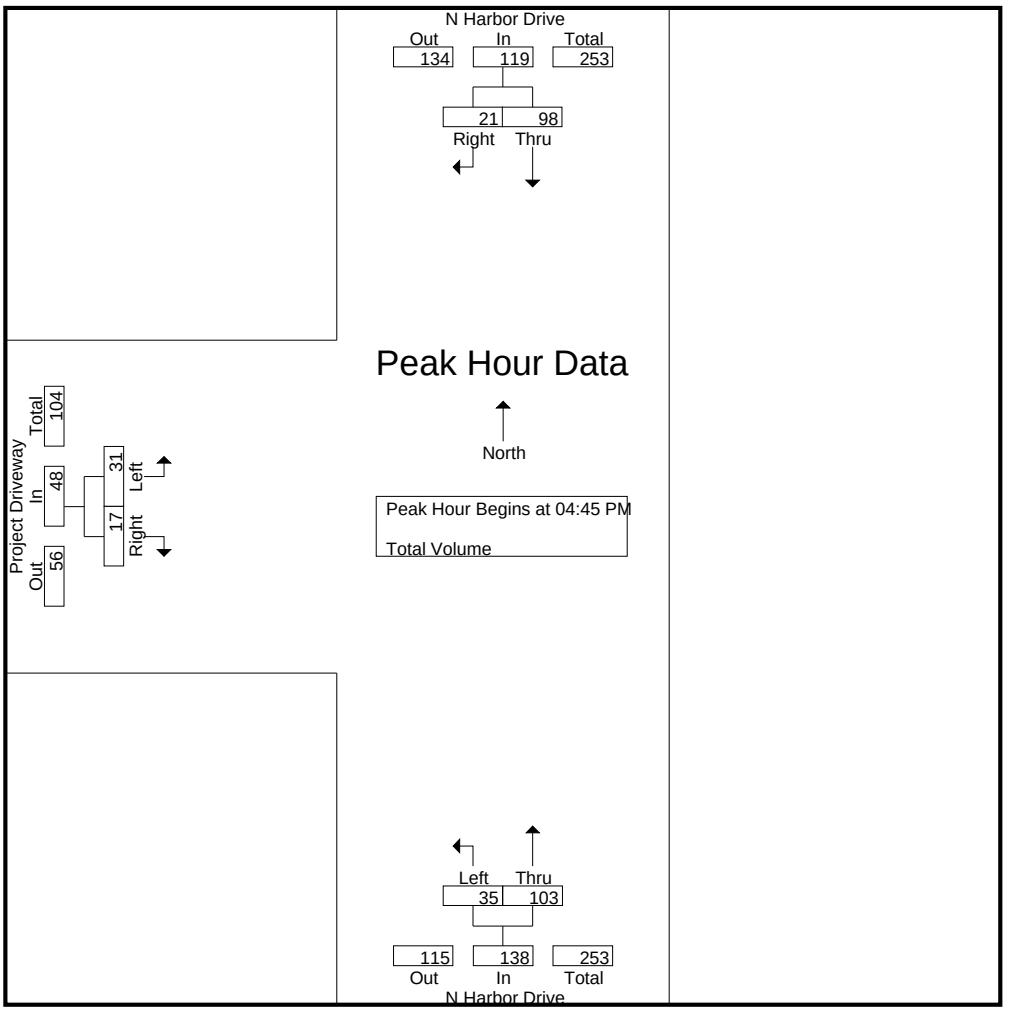

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM			04:45 PM			05:00 PM		
+0 mins.	21	5	26	8	25	33	9	5	14
+15 mins.	27	5	**32**	6	17	23	7	4	11
+30 mins.	21	**8**	29	**11**	29	40	8	6	14
+45 mins.	**29**	3	32	10	**32**	**42**	**12**	**7**	**19**
Total Volume	98	21	119	35	103	138	36	22	58
% App. Total	82.4	17.6		25.4	74.6		62.1	37.9	
PHF	.845	.656	.930	.795	.805	.821	.750	.786	.763

Location: Redondo Beach
N/S: N Harbor Drive
E/W: Project Driveway

Date: 10/5/2024
Day: Saturday

PEDESTRIANS

	North Leg N Harbor Drive	East Leg Dead End	South Leg N Harbor Drive	West Leg Project Driveway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	0	0	1	12	13
7:15 AM	0	1	1	29	31
7:30 AM	0	2	0	29	31
7:45 AM	2	5	5	15	27
8:00 AM	0	3	3	24	30
8:15 AM	2	2	1	29	34
8:30 AM	1	4	3	35	43
8:45 AM	2	8	6	41	57
TOTAL VOLUMES:	7	25	20	214	266

	North Leg N Harbor Drive	East Leg Dead End	South Leg N Harbor Drive	West Leg Project Driveway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
11:00 AM	0	4	11	39	54
11:15 AM	3	12	13	34	62
11:30 AM	1	6	6	33	46
11:45 AM	1	8	9	20	38
12:00 PM	1	9	10	37	57
12:15 PM	1	12	11	39	63
12:30 PM	1	6	9	24	40
12:45 PM	0	13	8	39	60
TOTAL VOLUMES:	8	70	77	265	420

	North Leg N Harbor Drive	East Leg Dead End	South Leg N Harbor Drive	West Leg Project Driveway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
4:00 PM	0	14	16	28	58
4:15 PM	1	8	10	22	41
4:30 PM	0	19	20	16	55
4:45 PM	5	20	21	24	70
5:00 PM	0	10	8	18	36
5:15 PM	1	11	13	14	39
5:30 PM	2	16	7	23	48
5:45 PM	0	14	19	30	63
TOTAL VOLUMES:	9	112	114	175	410

Location: Redondo Beach
N/S: N Harbor Drive
E/W: Project Driveway

Date: 10/5/2024
Day: Saturday

BICYCLES

	Southbound N Harbor Drive			Westbound Dead End			Northbound N Harbor Drive			Eastbound Project Driveway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	5	2	0	0	0	0	13	0	0	0	0	20
7:15 AM	0	4	0	0	0	0	0	16	0	1	0	0	21
7:30 AM	0	18	0	0	0	0	1	13	0	0	0	1	33
7:45 AM	0	22	0	0	0	0	0	16	0	0	0	0	38
8:00 AM	0	38	1	0	0	0	0	24	0	0	0	0	63
8:15 AM	0	23	0	0	0	0	0	22	0	0	0	0	45
8:30 AM	0	24	0	0	0	0	0	18	0	0	0	0	42
8:45 AM	0	24	0	0	0	0	0	27	0	0	0	0	51
TOTAL VOLUMES:	0	158	3	0	0	0	1	149	0	1	0	1	313

	Southbound N Harbor Drive			Westbound Dead End			Northbound N Harbor Drive			Eastbound Project Driveway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	0	34	1	0	0	0	1	33	0	4	0	0	73
11:15 AM	0	34	0	0	0	0	0	36	0	2	0	0	72
11:30 AM	0	27	1	0	0	0	0	29	0	0	0	0	57
11:45 AM	0	32	0	0	0	0	0	38	0	2	0	0	72
12:00 PM	2	51	3	0	0	0	0	36	0	1	0	1	94
12:15 PM	0	32	2	0	0	0	0	35	0	0	0	0	69
12:30 PM	2	61	0	0	0	0	0	34	0	0	0	0	97
12:45 PM	0	36	0	0	0	0	0	36	0	0	0	0	72
TOTAL VOLUMES:	4	307	7	0	0	0	1	277	0	9	0	1	606

	Southbound N Harbor Drive			Westbound Dead End			Northbound N Harbor Drive			Eastbound Project Driveway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	21	0	0	0	0	0	31	0	0	0	0	52
4:15 PM	0	32	0	0	0	0	0	30	0	0	0	0	62
4:30 PM	0	17	0	0	0	0	0	31	0	0	0	0	48
4:45 PM	0	25	0	0	0	0	1	28	0	0	0	0	54
5:00 PM	0	21	0	0	0	0	1	13	0	0	0	0	35
5:15 PM	0	22	0	0	0	0	0	18	0	3	0	0	43
5:30 PM	0	34	0	0	0	0	0	17	0	0	0	0	51
5:45 PM	0	12	2	0	0	0	0	15	0	0	0	0	29
TOTAL VOLUMES:	0	184	2	0	0	0	2	183	0	3	0	0	374

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File Name : 06_RDB_Pac_Har AM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Pacific Avenue Southbound				Seascape Two Condominiums DW Westbound				Parking Lot Driveway Northbound				N Harbor Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	0	8	8	0	0	0	0	1	0	0	1	1	0	1	2	11
07:15 AM	1	1	3	5	0	0	0	0	0	0	0	0	7	0	0	7	12
07:30 AM	1	1	6	8	0	1	0	1	0	0	0	0	2	0	0	2	11
07:45 AM	0	3	11	14	0	1	1	2	0	0	0	0	4	0	0	4	20
Total	2	5	28	35	0	2	1	3	1	0	0	1	14	0	1	15	54
08:00 AM	0	4	9	13	0	0	0	0	2	0	0	2	2	0	2	4	19
08:15 AM	0	1	8	9	0	0	1	1	1	3	0	4	5	1	2	8	22
08:30 AM	1	2	6	9	0	0	1	1	1	1	0	2	8	0	1	9	21
08:45 AM	0	4	11	15	0	0	1	1	0	1	0	1	12	0	0	12	29
Total	1	11	34	46	0	0	3	3	4	5	0	9	27	1	5	33	91
Grand Total	3	16	62	81	0	2	4	6	5	5	0	10	41	1	6	48	145
Apprch %	3.7	19.8	76.5		0	33.3	66.7		50	50	0		85.4	2.1	12.5		
Total %	2.1	11	42.8	55.9	0	1.4	2.8	4.1	3.4	3.4	0	6.9	28.3	0.7	4.1	33.1	

	N Pacific Avenue Southbound				Seascape Two Condominiums DW Westbound				Parking Lot Driveway Northbound				N Harbor Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	**4**	9	13	0	0	0	0	**2**	0	0	2	2	0	**2**	4	19
08:15 AM	0	1	8	9	0	0	**1**	**1**	1	**3**	0	**4**	5	**1**	2	8	22
08:30 AM	**1**	2	6	9	0	0	1	1	1	1	0	2	8	0	1	9	21
08:45 AM	0	4	**11**	**15**	0	0	1	1	0	1	0	1	**12**	0	0	**12**	**29**
Total Volume	1	11	34	46	0	0	3	3	4	5	0	9	27	1	5	33	91
% App. Total	2.2	23.9	73.9		0	0	100		44.4	55.6	0		81.8	3	15.2		
PHF	.250	.688	.773	.767	.000	.000	.750	.750	.500	.417	.000	.563	.563	.250	.625	.688	.784

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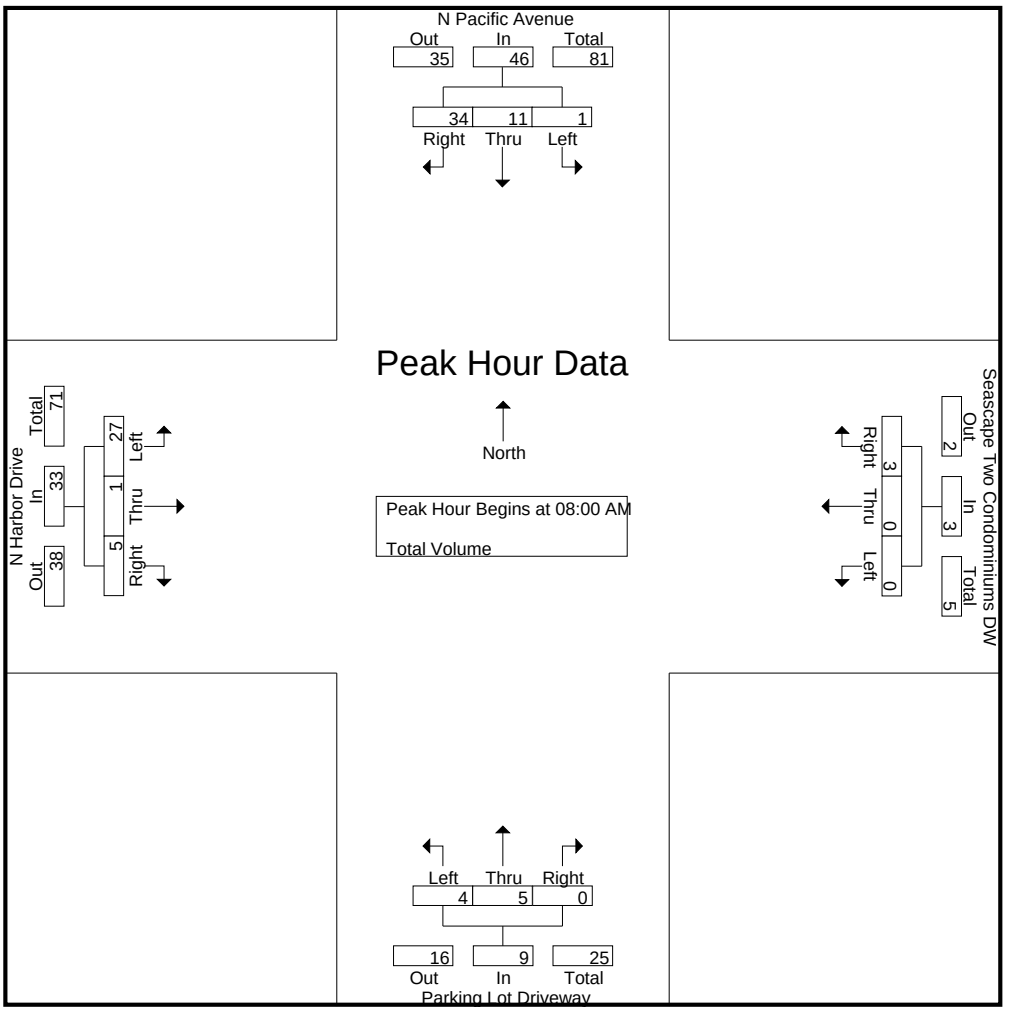

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				07:30 AM				08:00 AM				08:00 AM			
+0 mins.	0	**4**	9	13	0	**1**	0	1	**2**	0	0	2	2	0	**2**	4
+15 mins.	0	1	8	9	0	1	**1**	**2**	1	**3**	0	**4**	5	**1**	2	8
+30 mins.	**1**	2	6	9	0	0	0	0	1	1	0	2	8	0	1	9
+45 mins.	0	4	**11**	**15**	0	0	1	1	0	1	0	1	**12**	0	0	**12**
Total Volume	1	11	34	46	0	2	2	4	4	5	0	9	27	1	5	33
% App. Total	2.2	23.9	73.9		0	50	50		44.4	55.6	0		81.8	3	15.2	
PHF	.250	.688	.773	.767	.000	.500	.500	.500	.500	.417	.000	.563	.563	.250	.625	.688

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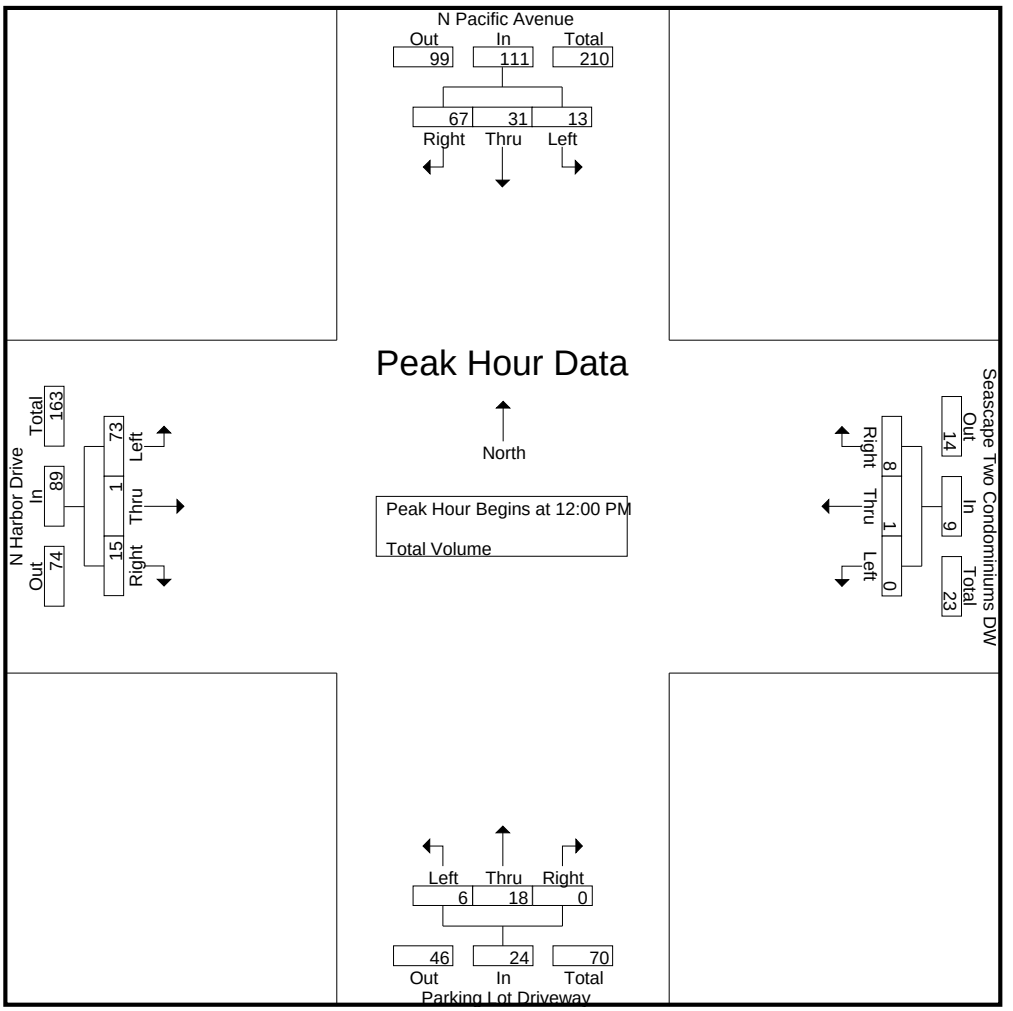
	N Pacific Avenue Southbound				Seascape Two Condominiums DW Westbound				Parking Lot Driveway Northbound				N Harbor Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
11:00 AM	0	10	14	24	0	0	0	0	2	3	0	5	13	0	1	14	43
11:15 AM	0	2	14	16	0	0	1	1	0	4	0	4	17	1	3	21	42
11:30 AM	1	6	5	12	0	1	1	2	3	5	0	8	18	0	6	24	46
11:45 AM	0	5	14	19	0	0	0	0	2	0	0	2	15	1	4	20	41
Total	1	23	47	71	0	1	2	3	7	12	0	19	63	2	14	79	172
12:00 PM	2	9	14	25	0	0	2	2	1	3	0	4	22	0	2	24	55
12:15 PM	6	8	20	34	0	1	3	4	0	4	0	4	22	0	6	28	70
12:30 PM	3	9	19	31	0	0	2	2	3	2	0	5	11	1	4	16	54
12:45 PM	2	5	14	21	0	0	1	1	2	9	0	11	18	0	3	21	54
Total	13	31	67	111	0	1	8	9	6	18	0	24	73	1	15	89	233
Grand Total	14	54	114	182	0	2	10	12	13	30	0	43	136	3	29	168	405
Apprch %	7.7	29.7	62.6		0	16.7	83.3		30.2	69.8	0		81	1.8	17.3		
Total %	3.5	13.3	28.1	44.9	0	0.5	2.5	3	3.2	7.4	0	10.6	33.6	0.7	7.2	41.5	

	N Pacific Avenue Southbound				Seascape Two Condominiums DW Westbound				Parking Lot Driveway Northbound				N Harbor Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	2	**9**	14	25	0	0	2	2	1	3	0	4	**22**	0	2	24	55
12:15 PM	**6**	8	**20**	**34**	0	**1**	**3**	**4**	0	4	0	4	22	0	**6**	**28**	**70**
12:30 PM	3	9	19	31	0	0	2	2	**3**	2	0	5	11	**1**	4	16	54
12:45 PM	2	5	14	21	0	0	1	1	2	**9**	0	**11**	18	0	3	21	54
Total Volume	13	31	67	111	0	1	8	9	6	18	0	24	73	1	15	89	233
% App. Total	11.7	27.9	60.4		0	11.1	88.9		25	75	0		82	1.1	16.9		
PHF	.542	.861	.838	.816	.000	.250	.667	.563	.500	.500	.000	.545	.830	.250	.625	.795	.832

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Redondo Beach
N/S: N Pacific Avenue
E/W: N Harbor Drive
Weather: Clear

File Name : 06_RDB_Pac_Har MD
Site Code : 23224873
Start Date : 10/5/2024
Page No : 2



Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM				12:00 PM				12:00 PM				11:30 AM			
+0 mins.	2	**9**	14	25	0	0	2	2	1	3	0	4	18	0	**6**	24
+15 mins.	**6**	8	**20**	**34**	0	**1**	**3**	**4**	0	4	0	4	15	**1**	4	20
+30 mins.	3	9	19	31	0	0	2	2	**3**	2	0	5	**22**	0	2	24
+45 mins.	2	5	14	21	0	0	1	1	2	**9**	0	**11**	22	0	6	**28**
Total Volume	13	31	67	111	0	1	8	9	6	18	0	24	77	1	18	96
% App. Total	11.7	27.9	60.4		0	11.1	88.9		25	75	0		80.2	1	18.8	
PHF	.542	.861	.838	.816	.000	.250	.667	.563	.500	.500	.000	.545	.875	.250	.750	.857

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City of Redondo Beach
N/S: N Pacific Avenue
E/W: N Harbor Drive
Weather: Clear

File Name : 06_RDB_Pac_Har PM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 1

Groups Printed- Total Volume

	N Pacific Avenue Southbound				Seascape Two Condominiums DW Westbound				Parking Lot Driveway Northbound				N Harbor Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	1	6	26	33	0	0	0	0	5	16	0	21	32	0	5	37	91
04:15 PM	1	13	19	33	0	0	1	1	1	13	0	14	29	1	3	33	81
04:30 PM	2	3	25	30	0	0	0	0	3	16	0	19	19	0	3	22	71
04:45 PM	2	2	30	34	0	0	1	1	2	10	0	12	18	1	5	24	71
Total	6	24	100	130	0	0	2	2	11	55	0	66	98	2	16	116	314
05:00 PM	4	9	25	38	0	0	1	1	1	12	0	13	25	0	7	32	84
05:15 PM	0	1	35	36	0	0	0	0	3	8	0	11	24	0	4	28	75
05:30 PM	1	6	37	44	0	1	2	3	2	10	0	12	27	0	5	32	91
05:45 PM	0	6	20	26	0	0	0	0	7	10	0	17	19	1	2	22	65
Total	5	22	117	144	0	1	3	4	13	40	0	53	95	1	18	114	315
Grand Total	11	46	217	274	0	1	5	6	24	95	0	119	193	3	34	230	629
Apprch %	4	16.8	79.2		0	16.7	83.3		20.2	79.8	0		83.9	1.3	14.8		
Total %	1.7	7.3	34.5	43.6	0	0.2	0.8	1	3.8	15.1	0	18.9	30.7	0.5	5.4	36.6	

	N Pacific Avenue Southbound				Seascape Two Condominiums DW Westbound				Parking Lot Driveway Northbound				N Harbor Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	2	2	30	34	0	0	1	1	2	10	0	12	18	**1**	5	24	71
05:00 PM	**4**	**9**	25	38	0	0	1	1	1	**12**	0	**13**	25	0	**7**	**32**	84
05:15 PM	0	1	35	36	0	0	0	0	**3**	8	0	11	24	0	4	28	75
05:30 PM	1	6	**37**	**44**	0	**1**	**2**	**3**	2	10	0	12	**27**	0	5	32	**91**
Total Volume	7	18	127	152	0	1	4	5	8	40	0	48	94	1	21	116	321
% App. Total	4.6	11.8	83.6		0	20	80		16.7	83.3	0		81	0.9	18.1		
PHF	.438	.500	.858	.864	.000	.250	.500	.417	.667	.833	.000	.923	.870	.250	.750	.906	.882

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City of Redondo Beach
N/S: N Pacific Avenue
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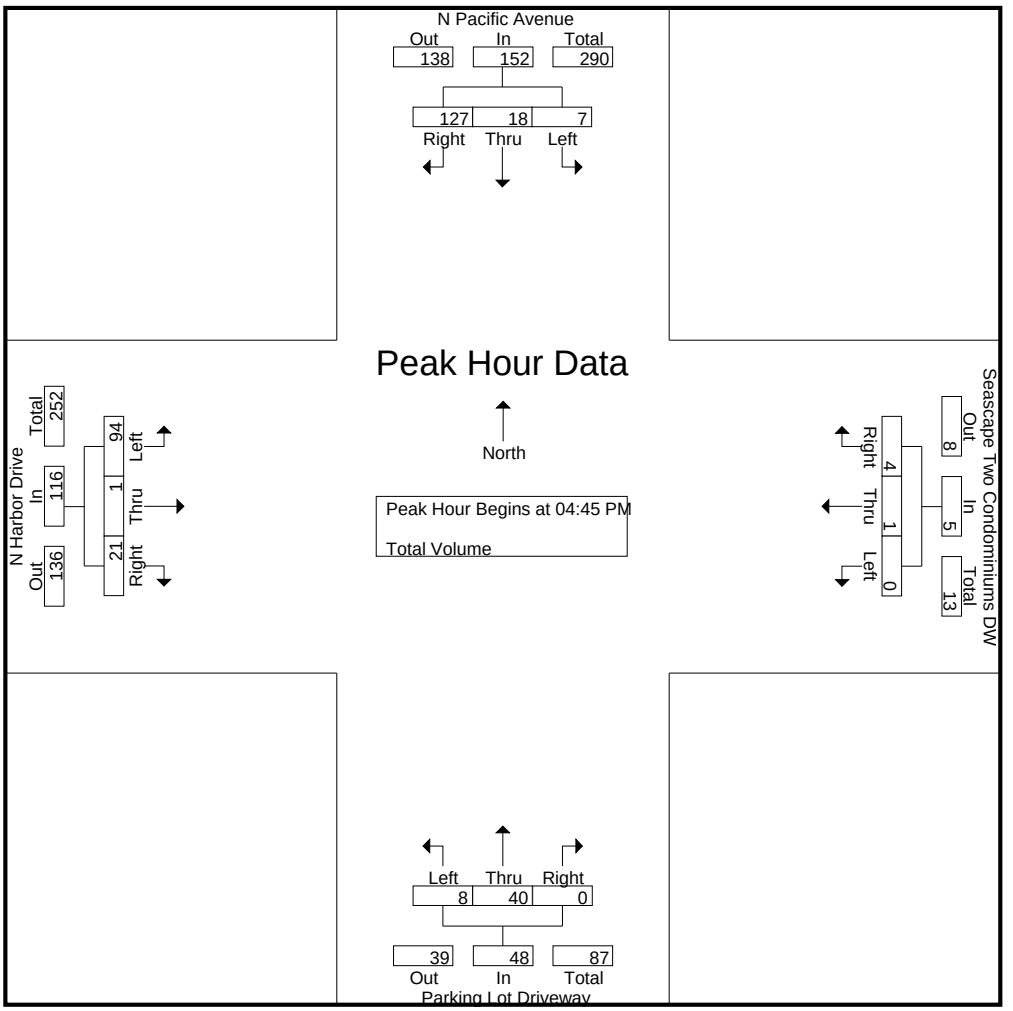
File Name : 06_RDB_Pac_Har PM
Site Code : 23224873
Start Date : 10/5/2024
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:45 PM				04:00 PM				04:00 PM			
+0 mins.	2	2	30	34	0	0	1	1	**5**	**16**	0	**21**	**32**	0	**5**	**37**
+15 mins.	**4**	**9**	25	38	0	0	1	1	1	13	0	14	29	**1**	3	33
+30 mins.	0	1	35	36	0	0	0	0	3	16	0	19	19	0	3	22
+45 mins.	1	6	**37**	**44**	0	**1**	**2**	**3**	2	10	0	12	18	1	5	24
Total Volume	7	18	127	152	0	1	4	5	11	55	0	66	98	2	16	116
% App. Total	4.6	11.8	83.6		0	20	80		16.7	83.3	0		84.5	1.7	13.8	
PHF	.438	.500	.858	.864	.000	.250	.500	.417	.550	.859	.000	.786	.766	.500	.800	.784

Location: Redondo Beach
N/S: N Pacific Avenue
E/W: N Harbor Drive

Date: 10/5/2024
Day: Saturday

PEDESTRIANS

	North Leg N Pacific Avenue Pedestrians	East Leg Seascape 2 Driveway Pedestrians	South Leg Parking Lot Driveway Pedestrians	West Leg N Harbor Drive Pedestrians	
7:00 AM	1	0	2	1	4
7:15 AM	0	0	2	0	2
7:30 AM	0	0	2	2	4
7:45 AM	0	0	3	1	4
8:00 AM	0	0	1	0	1
8:15 AM	0	0	5	1	6
8:30 AM	1	0	3	4	8
8:45 AM	2	0	3	1	6
TOTAL VOLUMES:	4	0	21	10	35

	North Leg N Pacific Avenue Pedestrians	East Leg Seascape 2 Driveway Pedestrians	South Leg Parking Lot Driveway Pedestrians	West Leg N Harbor Drive Pedestrians	
11:00 AM	4	0	1	1	6
11:15 AM	0	0	4	0	4
11:30 AM	0	0	4	3	7
11:45 AM	1	0	4	1	6
12:00 PM	1	0	4	3	8
12:15 PM	0	0	0	1	1
12:30 PM	3	2	6	1	12
12:45 PM	0	0	4	0	4
TOTAL VOLUMES:	9	2	27	10	48

	North Leg N Pacific Avenue Pedestrians	East Leg Seascape 2 Driveway Pedestrians	South Leg Parking Lot Driveway Pedestrians	West Leg N Harbor Drive Pedestrians	
4:00 PM	0	0	0	0	0
4:15 PM	0	2	2	2	6
4:30 PM	0	0	0	1	1
4:45 PM	0	0	5	0	5
5:00 PM	9	4	5	6	24
5:15 PM	0	0	4	0	4
5:30 PM	0	0	7	7	14
5:45 PM	4	0	0	0	4
TOTAL VOLUMES:	13	6	23	16	58

Location: Redondo Beach
N/S: N Pacific Avenue
E/W: N Harbor Drive

Date: 10/5/2024
Day: Saturday

BICYCLES

	Southbound N Pacific Avenue			Westbound Seascape 2 Driveway			Northbound Parking Lot Driveway			Eastbound N Harbor Drive			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	5	0	0	0	1	0	0	0	0	0	6
7:15 AM	0	0	1	0	0	1	2	0	0	2	0	0	6
7:30 AM	0	0	3	0	0	0	1	0	0	5	0	1	10
7:45 AM	0	1	0	0	0	0	0	0	0	4	0	0	5
8:00 AM	0	0	1	0	0	0	0	0	0	9	0	0	10
8:15 AM	0	0	4	0	0	0	1	0	0	5	0	0	10
8:30 AM	0	0	6	0	0	0	0	0	0	6	0	0	12
8:45 AM	0	0	6	0	0	0	0	0	0	4	0	0	10
TOTAL VOLUMES:	0	1	26	0	0	1	5	0	0	35	0	1	69

	Southbound N Pacific Avenue			Westbound Seascape 2 Driveway			Northbound Parking Lot Driveway			Eastbound N Harbor Drive			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	0	0	2	0	0	0	2	0	0	9	0	3	16
11:15 AM	0	0	1	0	0	0	4	0	0	5	0	0	10
11:30 AM	0	0	1	0	0	0	0	0	0	2	0	0	3
11:45 AM	1	0	2	0	0	0	2	0	0	5	0	0	10
12:00 PM	0	0	12	0	0	0	3	0	0	5	0	0	20
12:15 PM	0	0	0	0	0	0	1	0	0	4	0	1	6
12:30 PM	0	0	2	0	0	0	2	0	0	11	0	3	18
12:45 PM	0	0	0	0	0	0	0	0	0	3	0	5	8
TOTAL VOLUMES:	1	0	20	0	0	0	14	0	0	44	0	12	91

	Southbound N Pacific Avenue			Westbound Seascape 2 Driveway			Northbound Parking Lot Driveway			Eastbound N Harbor Drive			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	0	2	0	0	0	1	0	0	0	0	2	5
4:15 PM	0	0	1	0	0	0	2	0	0	2	0	4	9
4:30 PM	0	0	0	0	0	0	0	0	0	3	0	3	6
4:45 PM	0	0	0	0	0	0	1	0	0	2	0	0	3
5:00 PM	0	0	2	0	0	0	3	0	0	1	0	4	10
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	1
5:30 PM	0	0	0	0	0	0	0	1	0	0	0	5	6
5:45 PM	0	0	0	0	0	0	0	0	0	1	0	3	4
TOTAL VOLUMES:	0	0	5	0	0	0	7	1	0	10	0	21	44

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Mole D 12- Month Analysis

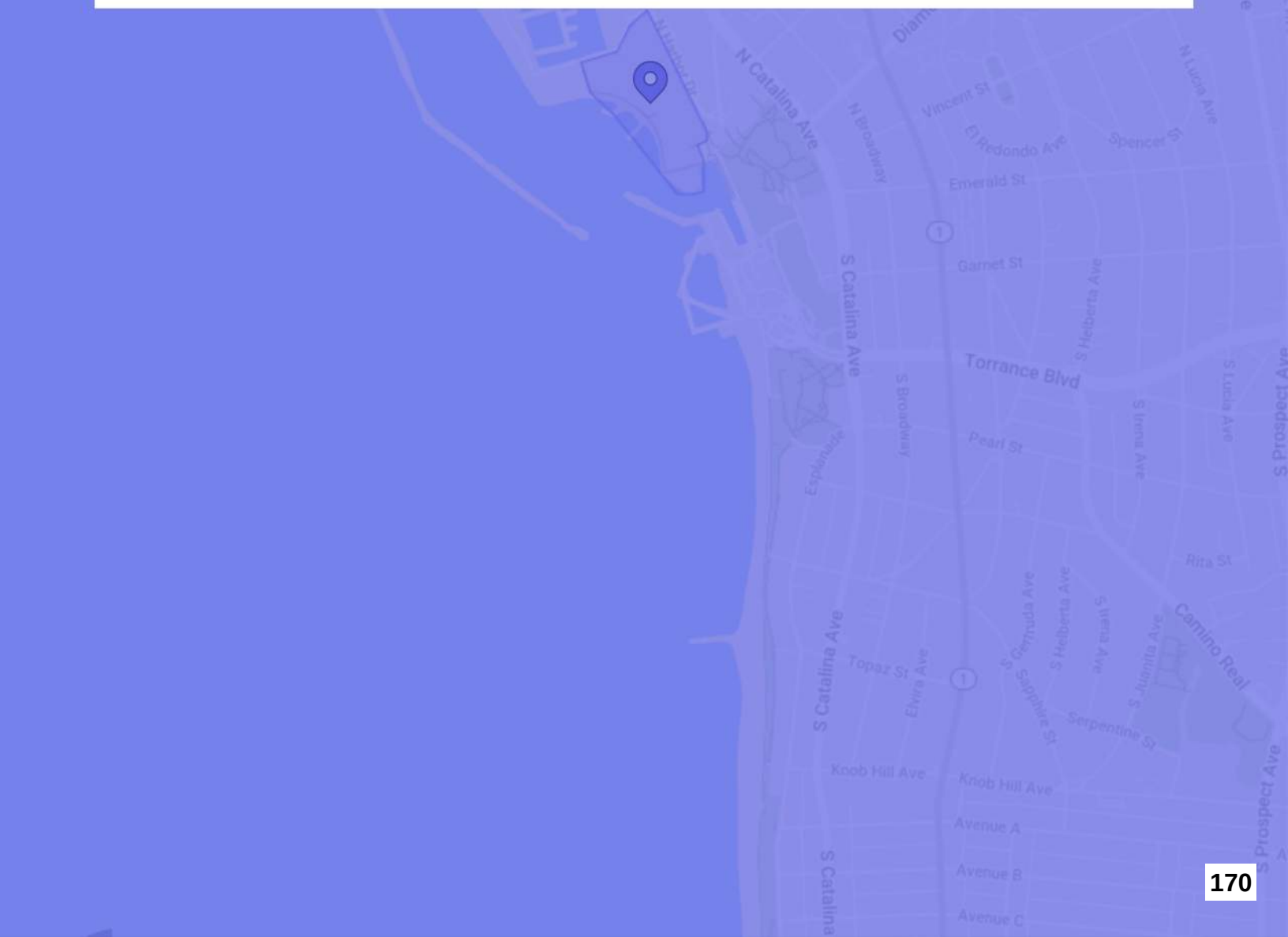
Nov 1, 2023 - Oct 31, 2024

Property:

MD

Mole D - Redondo Beach
Harbor Drive, Redondo Beach, CA 90277

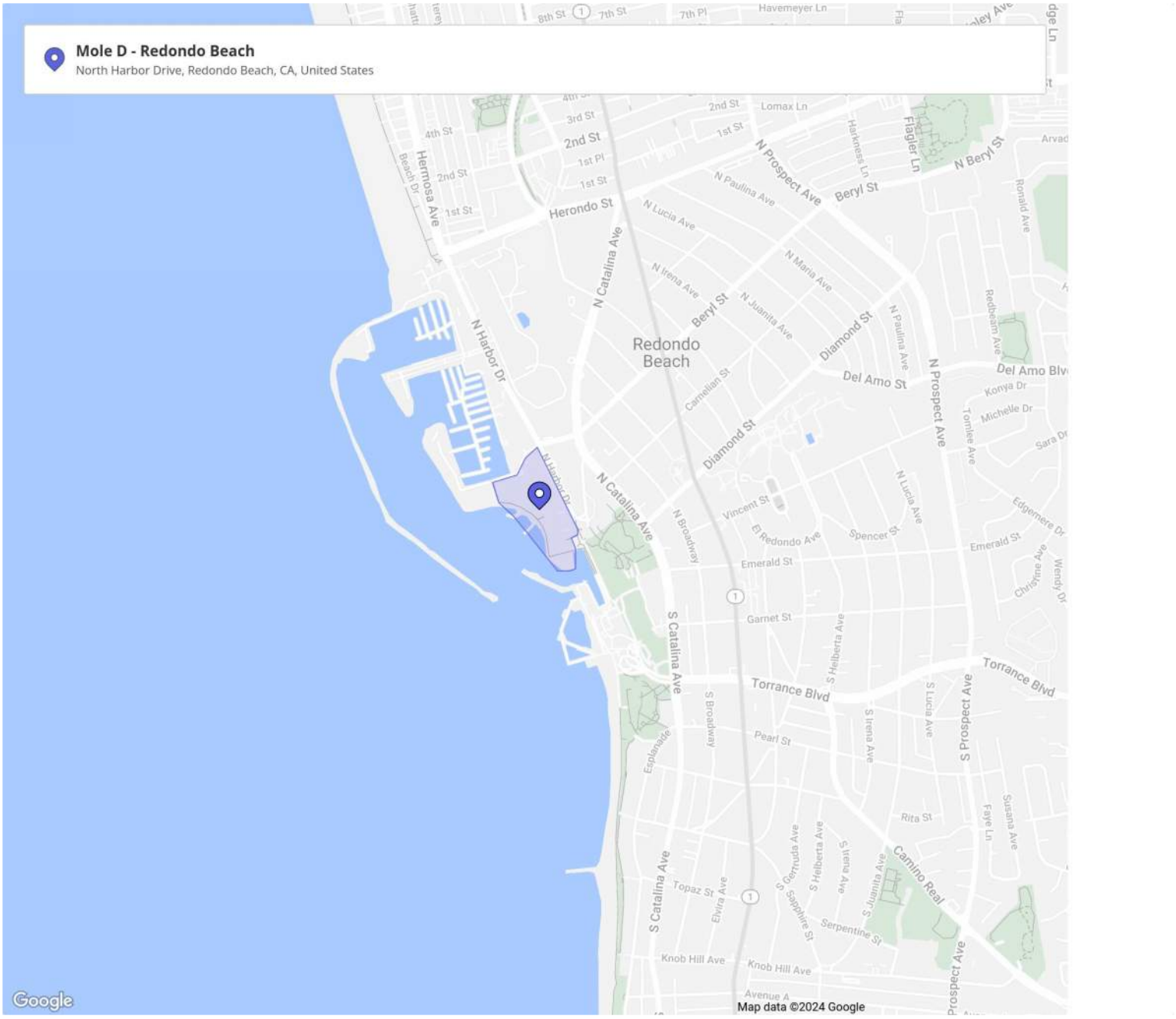
Visitation data for Mole D - Redondo Beach is adjusted to exclude restricted locations.
For additional info, please visit https://www.placer.ai/company/privacy-faq



Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

Visitation data for Mole D - Redondo Beach is adjusted to exclude restricted locations.For additional info, please visit https://www.placer.ai/company/privacy-faq



Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

Visitation data for Mole D - Redondo Beach is adjusted to exclude restricted locations.For additional info, please visit https://www.placer.ai/company/privacy-faq

Metrics

Mole D - Redondo Beach
Harbor Drive, Redondo Beach, CA 90277

Visits	401.6K	Panel Visits	14.2K
Visitors	239.3K	Visits YoY	-0.2%
Visit Frequency	1.68	Visits Yo2Y	-12.6%
Avg. Dwell Time	61 min	Visits Yo3Y	-7.5%

Nov 1st, 2023 - Oct 31st, 2024
Data provided by Placer Labs Inc. (www.placer.ai)

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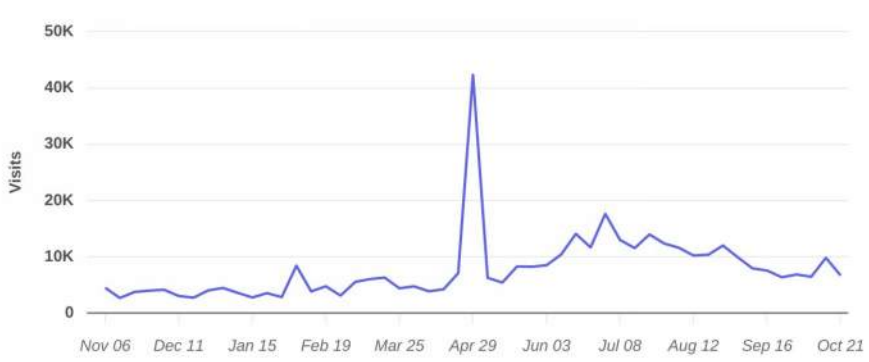
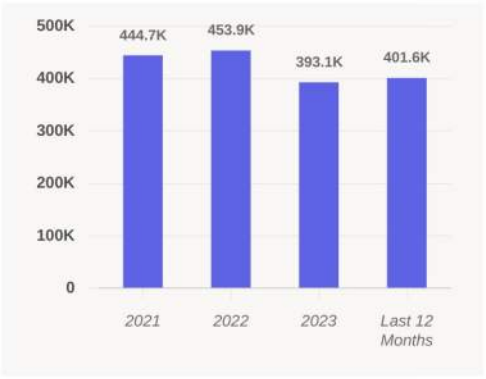
Visits Trend

Mole D - Redondo Beach
Harbor Drive, Redondo Beach, CA





Weekly | Visits | Nov 1st, 2023 - Oct 31st, 2024
Data provided by Placer Labs Inc. (www.placer.ai)

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Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

Visitation data for Mole D - Redondo Beach is adjusted to exclude restricted locations.For additional info, please visit https://www.placer.ai/company/privacy-faq

Audience Overview

Summary

Property	Median Household Income	Bachelor's Degree or Higher	Median Age	Most Common Ethnicity	Persons per Household
Mole D - Redondo B... Harbor Drive, Redondo B...	$80.9K	37.9%	36.7	Hispanic or Latino (44%)	2.85
California	$84.8K	35.3%	36.6	Hispanic or Latino (39.5%)	2.99

Nov 1st, 2023 - Oct 31st, 2024 | Data Source: Census 2021
Data provided by Placer Labs Inc. (www.placer.ai)

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Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

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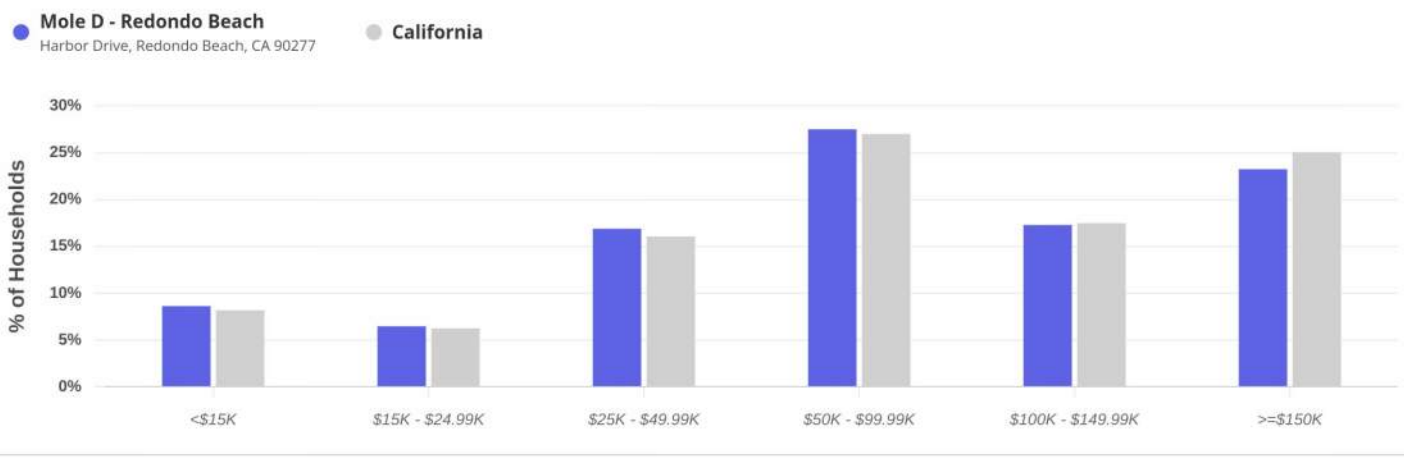
Household Income



Nov 1st, 2023 - Oct 31st, 2024 | Data Source: Census 2021
Data provided by Placer Labs Inc. (www.placer.ai)

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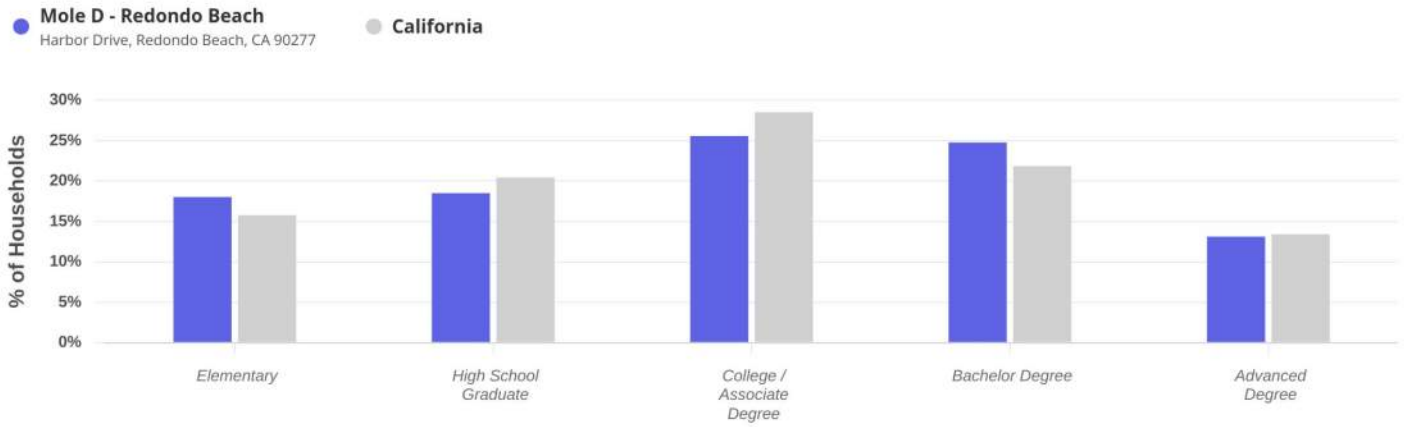
Education



Nov 1st, 2023 - Oct 31st, 2024 | Data Source: Census 2021
Data provided by Placer Labs Inc. (www.placer.ai)

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Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

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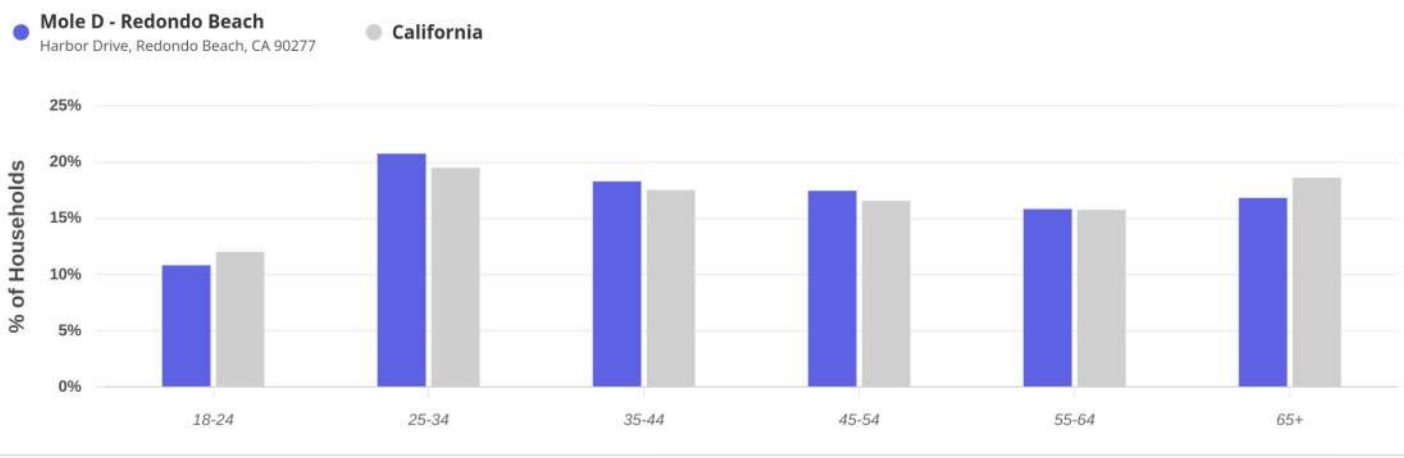
Age



Nov 1st, 2023 - Oct 31st, 2024 | Data Source: Census 2021
Data provided by Placer Labs Inc. (www.placer.ai)

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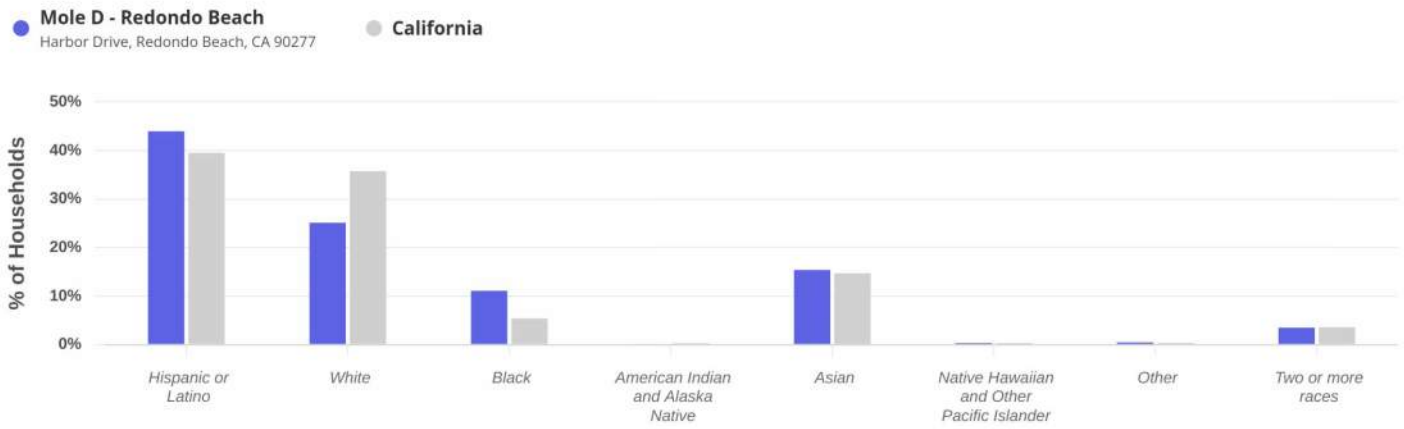
Ethnicity



Nov 1st, 2023 - Oct 31st, 2024 | Data Source: Census 2021
Data provided by Placer Labs Inc. (www.placer.ai)

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Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

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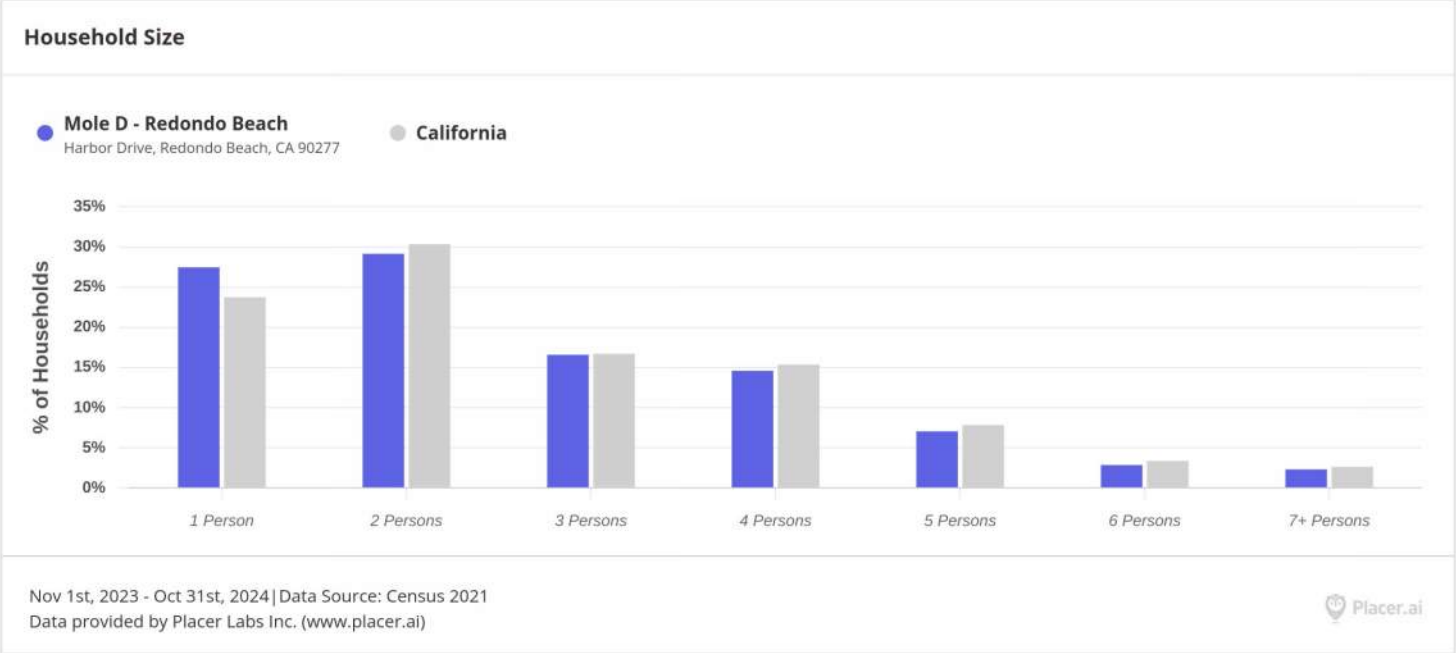

Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

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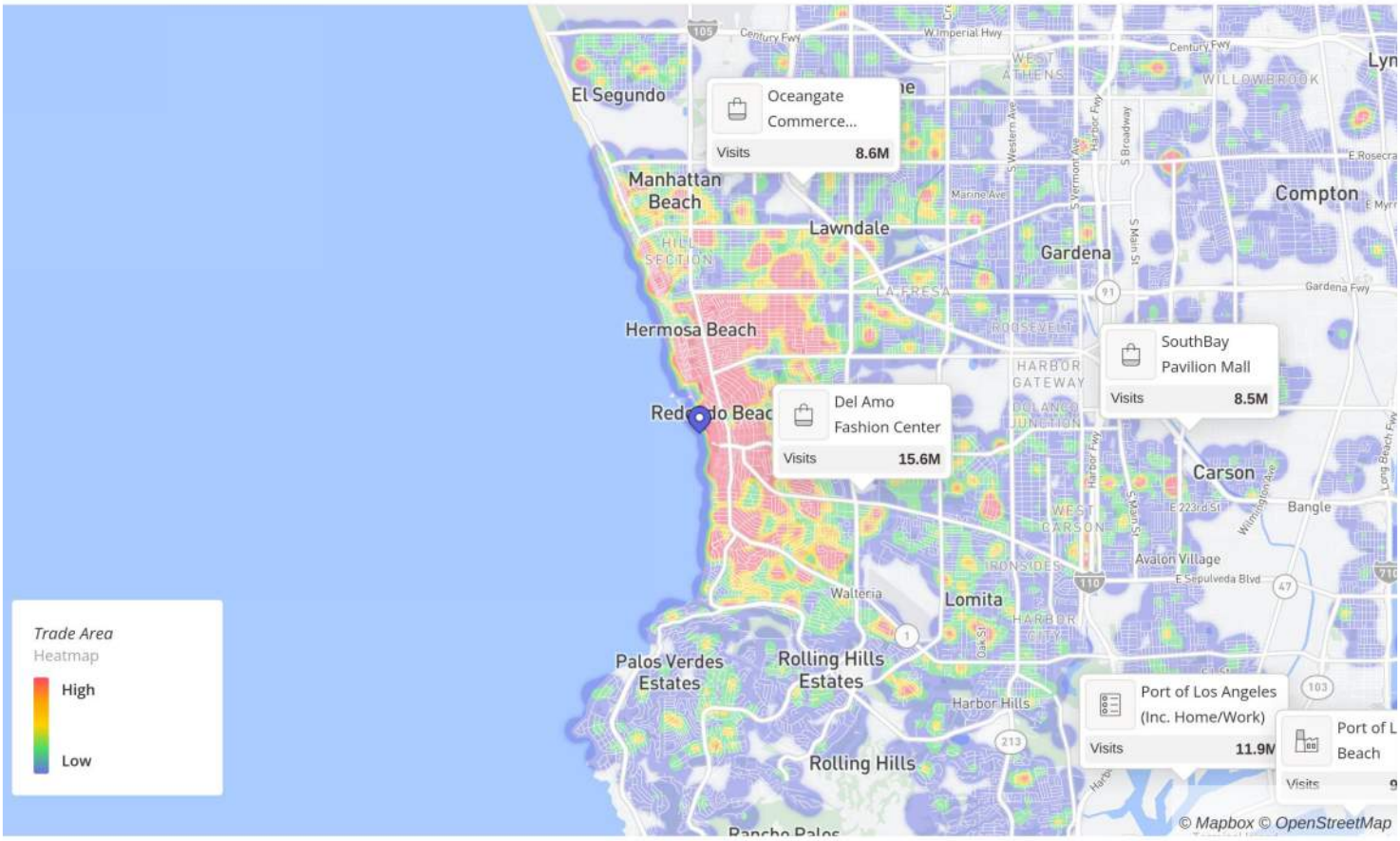
Market Landscape



Home locations are obfuscated for privacy and randomly placed within a census block. They do not represent actual home addresses.

Nov 1st, 2023 - Oct 31st, 2024
Data provided by Placer Labs Inc. (www.placer.ai)

Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

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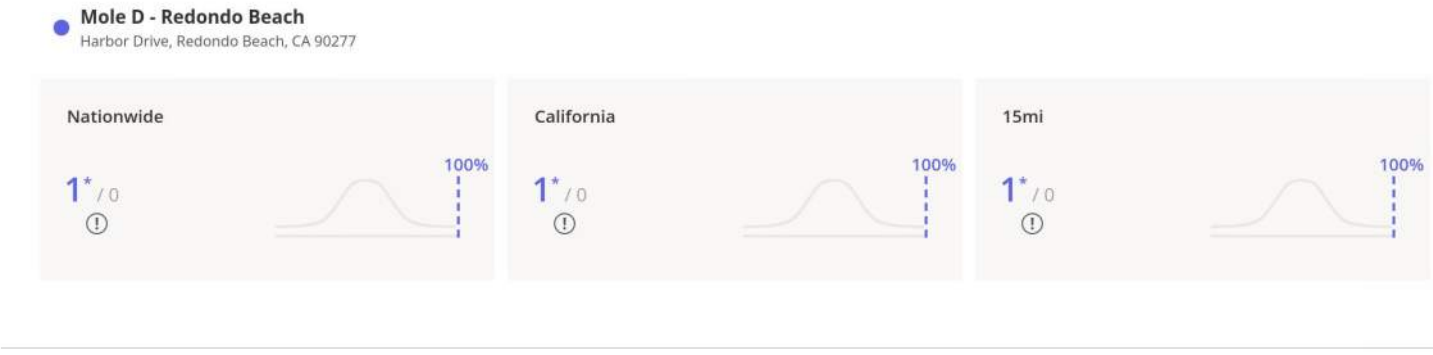
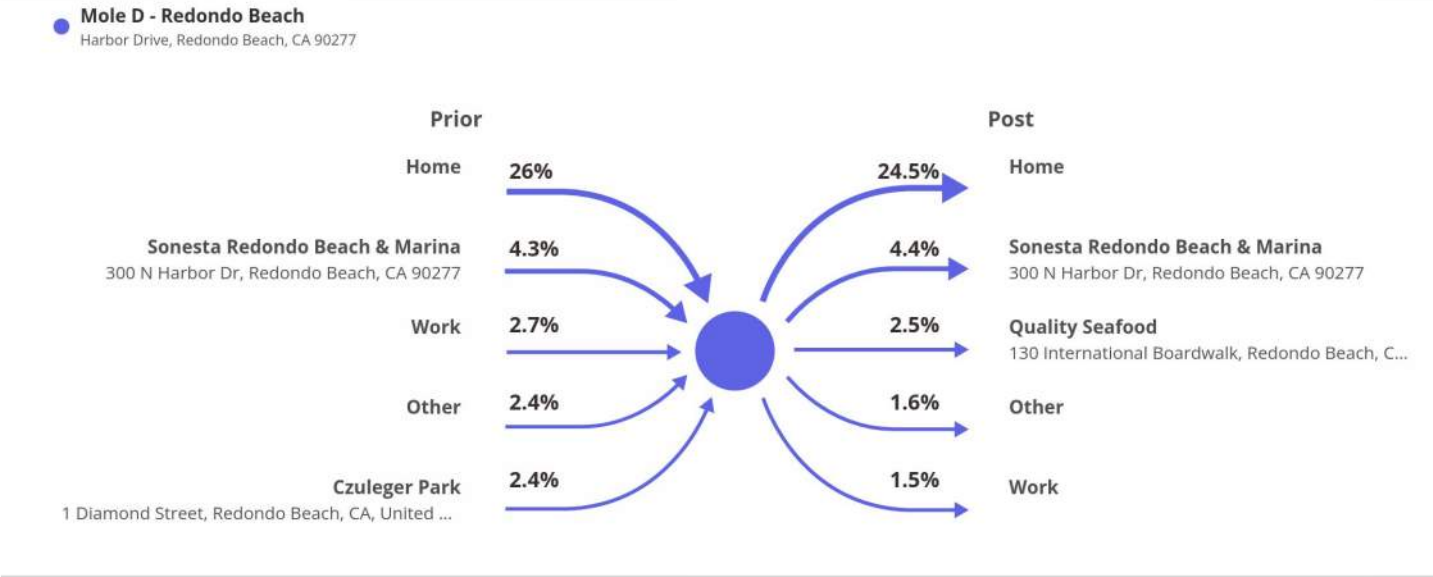
Ranking Overview



Category: Address | Visits | Nov 1st, 2023 - Oct 31st, 2024
Data provided by Placer Labs Inc. (www.placer.ai)

Visitor Journey



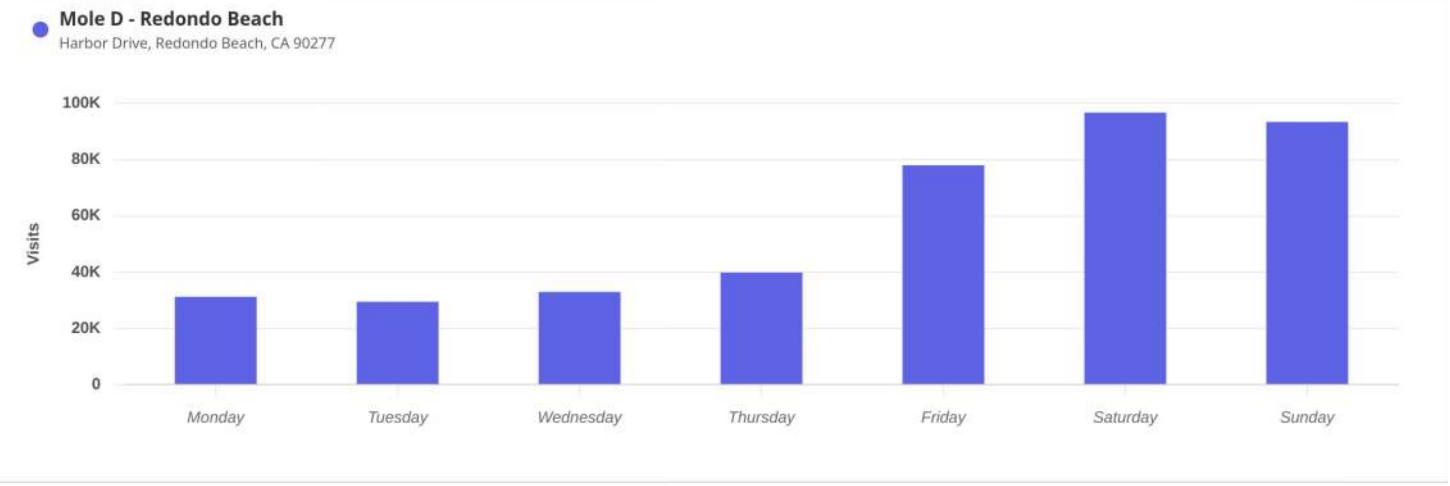
Show by: | Nov 1st, 2023 - Oct 31st, 2024
Data provided by Placer Labs Inc. (www.placer.ai)

Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

Visitation data for Mole D - Redondo Beach is adjusted to exclude restricted locations.For additional info, please visit https://www.placer.ai/company/privacy-faq

Daily Visits



Visits | Nov 1st, 2023 - Oct 31st, 2024
Data provided by Placer Labs Inc. (www.placer.ai)

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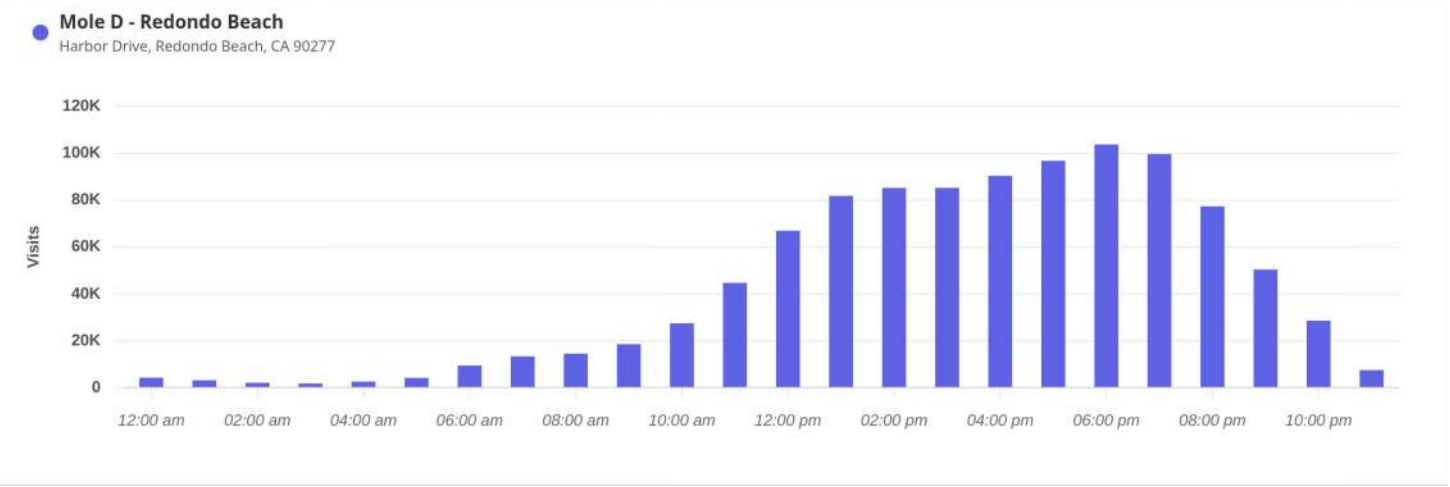
Hourly Visits



Visits | Nov 1st, 2023 - Oct 31st, 2024
Data provided by Placer Labs Inc. (www.placer.ai)

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Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

Visitation data for Mole D - Redondo Beach is adjusted to exclude restricted locations.For additional info, please visit https://www.placer.ai/company/privacy-faq

Favorite Places

Mole D - Redondo Beach / Harbor Drive, Redondo Beach, CA

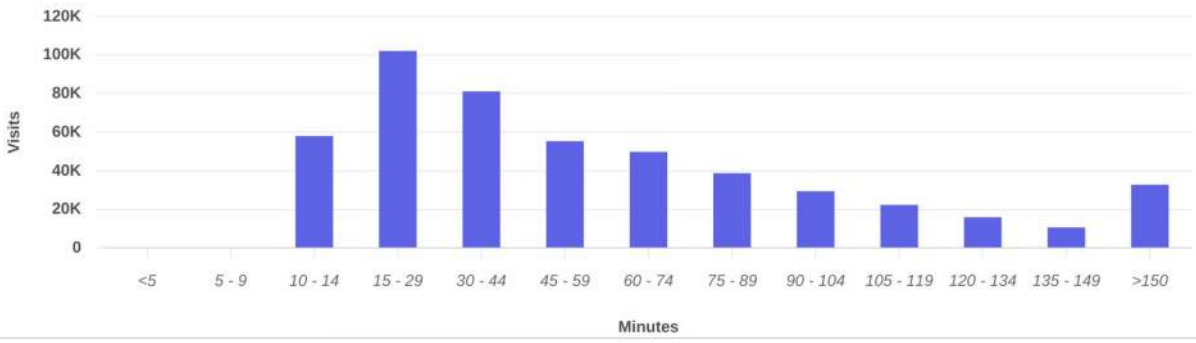
Rank	Name	Distance	Visitors
1	**Los Angeles International Airport** / 1 World Way, Los Angeles, CA 90045	7.1 mi	159.9K (66.8%)
2	**Redondo Beach Pier** / 100 Fishermans Wharf, Redondo Beach, CA 90277	0.3 mi	123.1K (51.5%)
3	**Del Amo Fashion Center** / 3525 W Carson St, Torrance, CA 90503	2.5 mi	116.2K (48.6%)
4	**Parking lot** / 161 N Harbor Dr, Redondo Beach, CA 90277	0.1 mi	90.4K (37.8%)
5	**Manhattan Village** / 3200 N Sepulveda Blvd, Manhattan Beach, CA 90266	4 mi	76.2K (31.8%)
6	**Lax International Airport Los Angeles California** / 1 World Way, Los Angeles, CA 90045	6.9 mi	59.4K (24.8%)
7	**Gateway Center** / 14501 Hindry Ave, Hawthorne, CA 90250	4 mi	59.2K (24.8%)
8	**Oceangate Commerce Center** / 14555 S Ocean Gate Ave, Hawthorne, CA 90250	4.2 mi	59K (24.7%)
9	**Disneyland Park** / 1313 Disneyland Dr, Anaheim, CA 92802	27.3 mi	58.6K (24.5%)
10	**South Bay Marketplace** / 1517 Hawthorne Blvd, Redondo Beach, CA 90278	2.8 mi	57.5K (24.1%)

Category: All Categories | Min. Visits: 1 | Nov 1st, 2023 - Oct 31st, 2024
Data provided by Placer Labs Inc. (www.placer.ai)

Placer.ai

Visit Duration

Mole D - Redondo Beach
Harbor Drive, Redondo Beach, CA 90277



Average Stay	61 min
Median Stay	47 min

Visits | Nov 1st, 2023 - Oct 31st, 2024
Data provided by Placer Labs Inc. (www.placer.ai)

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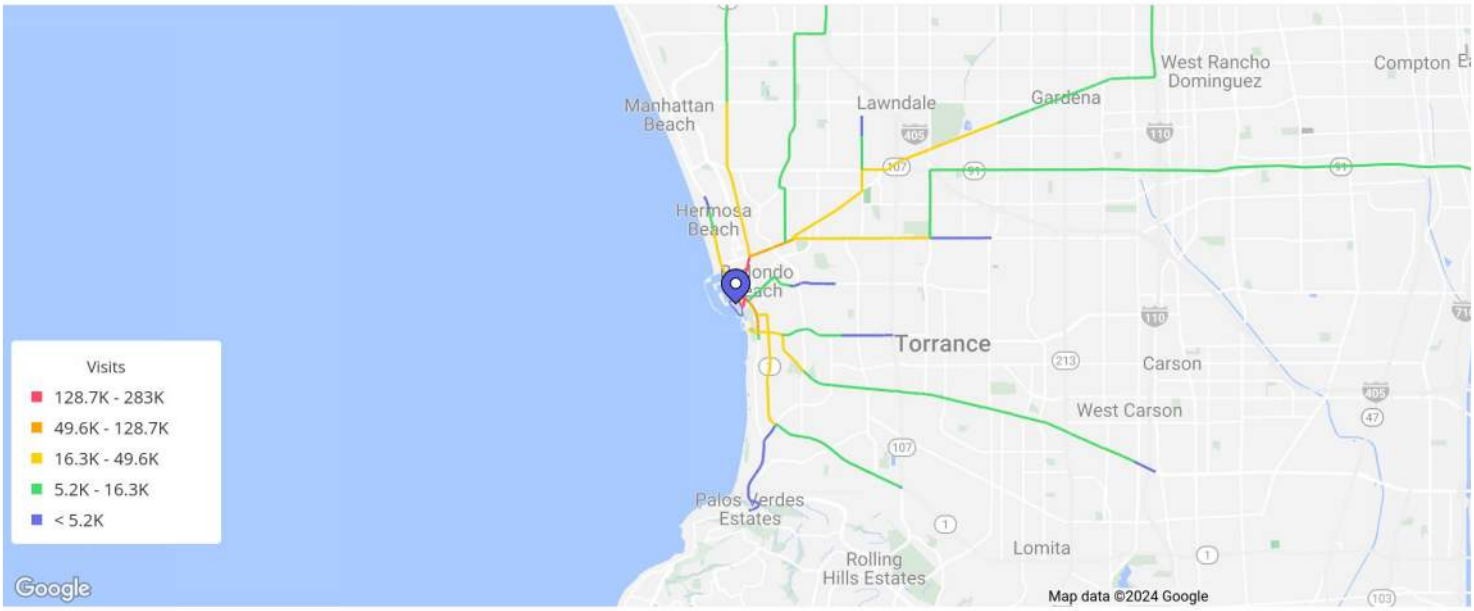
Mole D 12- Month Analysis

Nov 1, 2023 - Oct 31, 2024

Visitation data for Mole D - Redondo Beach is adjusted to exclude restricted locations.For additional info, please visit https://www.placer.ai/company/privacy-faq

Visitor Journey - Routes



To protect individual privacy, the beginning points shown for each route are approximations and do not represent actual home locations.

Journey Direction: To Property | Nov 1st, 2023 - Oct 31st, 2024
Data provided by Placer Labs Inc. (www.placer.ai)

Appendix B

SCAG Data

employment growth reflecting different land use scenarios. As part of the SB375's Sustainable Communities Strategy guidelines, SCAG held twenty-seven public outreach meetings to solicit input on these alternatives. The goal of this scenario planning exercise is to maximize the benefits of Greenhouse Gas/ Vehicle Miles Travelled (GHG/VMT) reductions, public health, and other co-benefits from large transportation investments in the region. Following public input and SCAG's analysis of the GHG/VMT benefits of the alternative scenarios, a preferred growth forecast scenario was chosen which prioritizes growth in areas such as job centers and transit priority areas which have regional transportation benefits. See the Sustainable Communities Strategy Technical Report for additional details (see **EXHIBITS 1-9**).

After developing the draft 2020 RTP/SCS between July 2019 and October 2019, SCAG released the draft 2020 RTP/SCS in November 2019. The Regional Council adopted the 2020 RTP/SCS, including the regional growth forecast at the county and jurisdictional-levels.

GROWTH TRENDS

POPULATION

According to the January 1, 2019 population estimates from the California Department of Finance (DOF), the population of the SCAG region is 19,155,405. This represents 5.8 percent of the 328 million people in the United States and 48.0 percent of California's population. The SCAG region is the nation's second-largest combined statistical area (CSA) behind the New York-Newark CSA. If the SCAG region were its own state, it would rank fifth in population just behind New York (19.2 million) and well ahead of Pennsylvania (12.8 million) (**TABLE 2**).

While job growth and unemployment drops have characterized the recovery from the Great Recession, slower population growth is anticipated not just in the SCAG region but across California and nationwide. Historically, the SCAG region's population growth has dramatically outpaced the United States—1.7 percent compared to 1.1 percent for the period from 1970 to 2000. However, since 2000 average annual growth rates in the region have been comparable with the United States at roughly 0.8 percent annually.

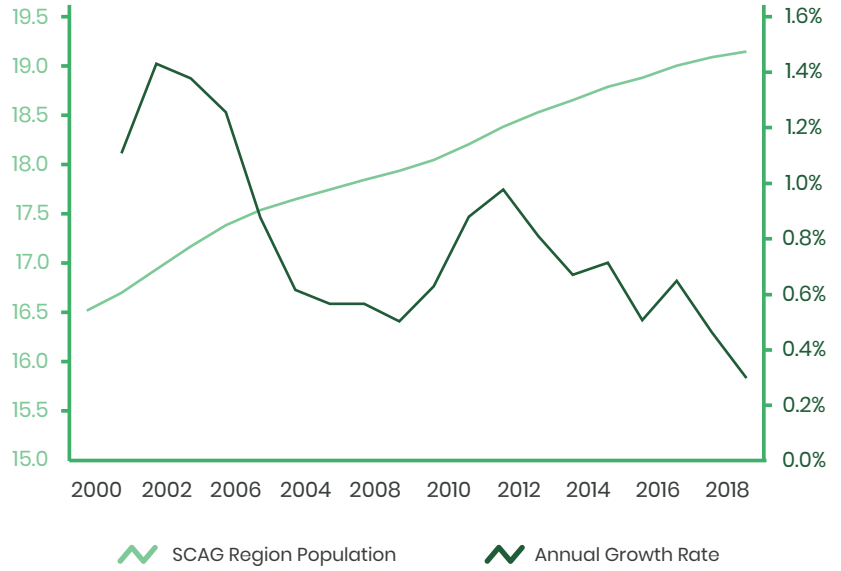
Population growth dipped noticeably during the Great Recession reaching a low of 0.5 percent in 2009 before rebounding to nearly 1.0 percent by 2012 **(FIGURE 1)**. Despite this, the annual rate of population growth has continued

TABLE 2 Annual Average Population Growth Rate, 1970–2045

	1970–2000	2000–2016	2016–2045
SCAG Region	1.65%	0.82%	0.61%
California	1.76%	0.93%	0.66%
United States	1.09%	0.86%	0.57%

Source: U.S. Census Bureau, CA DOF, SCAG

FIGURE 1 SCAG Region Population (in Millions) and Annual Growth Rate, 2000–2019



Source: CA DOF

TABLE 14 Jurisdiction-Level Growth Forecast - Continued

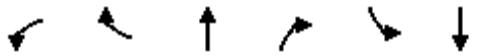
County	Jurisdiction	Population		Households		Employment	
		2016	2045	2016	2045	2016	2045
Los Angeles	Lancaster city	157,800	213,300	46,900	74,600	56,300	65,500
Los Angeles	La Puente city	40,400	41,600	9,400	9,900	6,600	8,200
Los Angeles	La Verne city	33,100	34,400	11,700	12,400	17,000	18,300
Los Angeles	Lawndale city	33,400	34,400	9,700	10,200	7,400	8,300
Los Angeles	Lomita city	20,400	21,200	8,000	8,500	5,600	6,100
Los Angeles	Long Beach city	470,900	489,600	168,600	198,200	155,900	185,400
Los Angeles	Los Angeles city	3,933,800	4,771,300	1,367,000	1,793,000	1,848,300	2,135,900
Los Angeles	Lynwood city	71,900	76,900	14,900	16,500	12,000	13,100
Los Angeles	Malibu city	12,700	13,000	5,200	5,400	9,900	11,000
Los Angeles	Manhattan Beach city	35,400	35,600	13,900	14,000	22,000	23,600
Los Angeles	Maywood city	28,000	29,000	6,600	7,000	4,000	4,300
Los Angeles	Monrovia city	38,000	42,100	14,000	16,700	22,700	24,800
Los Angeles	Montebello city	63,900	67,800	19,100	21,100	29,300	31,300
Los Angeles	Monterey Park city	61,500	65,600	20,000	22,200	45,500	48,000
Los Angeles	Norwalk city	105,500	107,000	26,700	27,300	25,700	28,100
Los Angeles	Palmdale city	158,600	207,000	43,800	61,800	36,700	45,900
Los Angeles	Palos Verdes Estates city	13,700	14,000	5,100	5,300	3,000	3,300
Los Angeles	Paramount city	55,900	57,500	14,100	14,500	21,400	23,000
Los Angeles	Pasadena city	142,100	155,500	56,300	65,100	116,200	140,200
Los Angeles	Pico Rivera city	63,500	67,400	16,600	18,500	24,900	27,200
Los Angeles	Pomona city	154,700	187,600	39,300	52,800	55,700	63,400
Los Angeles	Rancho Palos Verdes city	42,800	43,000	15,700	15,800	8,000	8,200
Los Angeles	Redondo Beach city	68,200	72,900	29,200	31,100	25,400	28,300
Los Angeles	Rolling Hills city	1,900	2,000	700	700	100	100
Los Angeles	Rolling Hills Estates city	8,100	8,500	2,900	3,200	7,100	7,600

Population = 0.24% / Year (Total=6.9%)

Employment = 0.39% / Year (Total=11.4%)

Appendix C

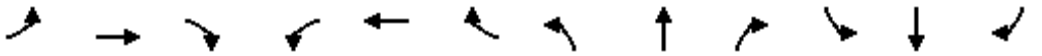
Intersection Analysis Worksheets



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	160	184	155	74	126	81
Future Volume (vph)	160	184	155	74	126	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.5		4.0	5.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	0.90	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1597	1583	1742		1762	1863
Flt Permitted	0.95	1.00	1.00		0.48	1.00
Satd. Flow (perm)	1597	1583	1742		890	1863
Peak-hour factor, PHF	0.90	0.90	0.86	0.86	0.74	0.74
Adj. Flow (vph)	178	204	180	86	170	109
RTOR Reduction (vph)	0	133	8	0	0	0
Lane Group Flow (vph)	178	71	258	0	170	109
Confl. Peds. (#/hr)	47			11	11	
Confl. Bikes (#/hr)				37		
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1 12	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	18.0	18.0	36.9		62.9	42.7
Effective Green, g (s)	18.0	18.0	36.9		57.9	42.7
Actuated g/C Ratio	0.20	0.20	0.40		0.63	0.47
Clearance Time (s)	5.0	5.0	5.5			5.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	314	311	703		725	870
v/s Ratio Prot			c0.15		c0.04	0.06
v/s Ratio Perm	c0.11	0.04			0.10	
v/c Ratio	0.57	0.23	0.37		0.23	0.13
Uniform Delay, d1	33.2	30.9	19.1		7.2	13.8
Progression Factor	1.00	1.00	0.15		1.00	1.00
Incremental Delay, d2	2.3	0.4	0.3		0.2	0.1
Delay (s)	35.5	31.2	3.2		7.4	13.8
Level of Service	D	C	A		A	B
Approach Delay (s)	33.2		3.2			9.9
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	91.4	Sum of lost time (s)	24.5
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		

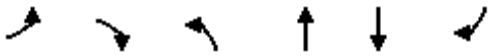
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	5	0	0	0	4	223	0	0	216	20
Future Volume (vph)	5	0	5	0	0	0	4	223	0	0	216	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0					4.0	5.5			5.5	5.5
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.99					1.00	1.00			1.00	1.00
Flpb, ped/bikes		1.00					1.00	1.00			1.00	1.00
Frt		0.93					1.00	1.00			1.00	0.85
Flt Protected		0.98					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1672					1770	1863			1863	1583
Flt Permitted		0.95					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1628					1770	1863			1863	1583
Peak-hour factor, PHF	0.50	0.50	0.50	0.92	0.92	0.92	0.79	0.79	0.79	0.82	0.82	0.82
Adj. Flow (vph)	10	0	10	0	0	0	5	282	0	0	263	24
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	2	0	0	0	0	5	282	0	0	263	24
Confl. Peds. (#/hr)			3	3					18	18		149
Confl. Bikes (#/hr)									125			143
Turn Type	custom	NA					Prot	NA		Perm	NA	custom
Protected Phases							5	2			6 3	6 3 4
Permitted Phases	12	12		11	11					6 3		
Actuated Green, G (s)		9.9					1.3	36.9			66.2	81.1
Effective Green, g (s)		9.9					1.3	36.9			66.2	76.1
Actuated g/C Ratio		0.11					0.01	0.40			0.72	0.83
Clearance Time (s)		5.0					4.0	5.5				
Vehicle Extension (s)		3.0					1.5	3.0				
Lane Grp Cap (vph)		176					25	752			1349	1318
v/s Ratio Prot							c0.00	c0.15			c0.14	c0.02
v/s Ratio Perm		0.00										
v/c Ratio		0.01					0.20	0.38			0.19	0.02
Uniform Delay, d1		36.4					44.5	19.1			4.0	1.3
Progression Factor		1.00					1.00	1.00			0.21	0.00
Incremental Delay, d2		0.0					1.4	0.3			0.1	0.0
Delay (s)		36.4					46.0	19.5			0.9	0.0
Level of Service		D					D	B			A	A
Approach Delay (s)		36.4			0.0			19.9			0.8	
Approach LOS		D			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	91.4	Sum of lost time (s)	24.5
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

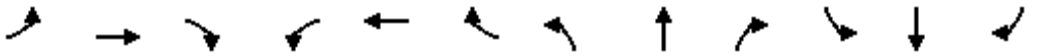
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	76	74	81	157	103	115
Future Volume (vph)	76	74	81	157	103	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.90
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1749	1583	1770	1863	1863	1419
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1749	1583	1770	1863	1863	1419
Peak-hour factor, PHF	0.77	0.77	0.79	0.79	0.80	0.80
Adj. Flow (vph)	99	96	103	199	129	144
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	99	96	103	199	129	144
Confl. Peds. (#/hr)	8					132
Confl. Bikes (#/hr)						130
Turn Type	Perm	Perm	Prot	NA	NA	custom
Protected Phases			5	2	6	8
Permitted Phases	4	4				6
Actuated Green, G (s)	9.0	9.0	6.9	45.3	33.9	42.9
Effective Green, g (s)	9.0	9.0	6.9	45.3	33.9	42.9
Actuated g/C Ratio	0.14	0.14	0.11	0.71	0.53	0.67
Clearance Time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Vehicle Extension (s)	3.0	3.0	1.5	3.0	3.0	0.2
Lane Grp Cap (vph)	246	223	191	1322	989	954
v/s Ratio Prot			c0.06	c0.11	0.07	0.02
v/s Ratio Perm	0.06	c0.06				0.08
v/c Ratio	0.40	0.43	0.54	0.15	0.13	0.15
Uniform Delay, d1	25.0	25.1	26.9	3.0	7.5	3.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	1.3	1.5	0.1	0.1	0.0
Delay (s)	26.0	26.4	28.4	3.1	7.6	3.8
Level of Service	C	C	C	A	A	A
Approach Delay (s)	26.2			11.7	5.6	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	63.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	52	4	47	95	234	5	25	43	115	47	16
Future Volume (vph)	9	52	4	47	95	234	5	25	43	115	47	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		3.5	4.5	4.5	3.5	5.5		4.5	5.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.92		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1835		1770	1863	1544	1770	1554		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1835		1770	1863	1544	1770	1554		1770	1863	1583
Peak-hour factor, PHF	0.69	0.69	0.69	0.77	0.77	0.77	0.73	0.73	0.73	0.71	0.71	0.71
Adj. Flow (vph)	13	75	6	61	123	304	7	34	59	162	66	23
RTOR Reduction (vph)	0	0	0	0	0	176	0	46	0	0	0	0
Lane Group Flow (vph)	13	81	0	61	123	128	7	47	0	162	66	23
Confl. Peds. (#/hr)			19			35			27			136
Confl. Bikes (#/hr)									93			115
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	custom
Protected Phases	7	4		3	8	1	5	2 9		1	6 9	7 9
Permitted Phases						8						
Actuated Green, G (s)	2.5	9.1		4.0	10.1	30.6	0.7	16.3		20.5	37.1	7.1
Effective Green, g (s)	2.5	9.1		4.0	10.1	30.6	0.7	16.3		20.5	37.1	7.1
Actuated g/C Ratio	0.03	0.12		0.05	0.14	0.42	0.01	0.22		0.28	0.51	0.10
Clearance Time (s)	4.0	4.5		3.5	4.5	4.5	3.5			4.5		
Vehicle Extension (s)	1.5	1.5		1.5	1.5	3.0	1.5			3.0		
Lane Grp Cap (vph)	60	229		97	258	648	16	347		497	948	154
v/s Ratio Prot	0.01	0.04		c0.03	c0.07	0.06	0.00	c0.03		c0.09	0.04	c0.01
v/s Ratio Perm						0.03						
v/c Ratio	0.22	0.35		0.63	0.48	0.20	0.44	0.14		0.33	0.07	0.15
Uniform Delay, d1	34.2	29.2		33.7	29.0	13.4	35.9	22.7		20.7	9.1	30.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.3		8.8	0.5	0.1	6.8	0.2		0.4	0.0	0.2
Delay (s)	34.9	29.6		42.6	29.5	13.5	42.7	22.9		21.1	9.2	30.3
Level of Service	C	C		D	C	B	D	C		C	A	C
Approach Delay (s)		30.3			21.2			24.3			18.8	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	72.9	Sum of lost time (s)	23.5
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	7	13	50	49	16
Future Vol, veh/h	9	7	13	50	49	16
Peak Hour Factor	0.75	0.75	0.88	0.88	0.60	0.60
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	9	15	57	82	27
Number of Lanes	1	1	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	2
HCM Control Delay	7.7	7.8	8
HCM LOS	A	A	A

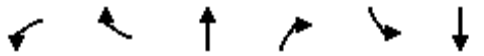
Lane	NBLn1	NBLn2	EBLn1	EBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	0%
Vol Thru, %	0%	100%	0%	0%	75%
Vol Right, %	0%	0%	0%	100%	25%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	13	50	9	7	65
LT Vol	13	0	9	0	0
Through Vol	0	50	0	0	49
RT Vol	0	0	0	7	16
Lane Flow Rate	15	57	12	9	108
Geometry Grp	5	5	5	5	3b
Degree of Util (X)	0.021	0.073	0.018	0.011	0.129
Departure Headway (Hd)	5.125	4.624	5.457	4.254	4.276
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	697	773	660	846	835
Service Time	2.863	2.363	3.157	1.954	2.32
HCM Lane V/C Ratio	0.022	0.074	0.018	0.011	0.129
HCM Control Delay	8	7.7	8.3	7	8
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.1	0.2	0.1	0	0.4

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	49	2	9	0	0	5	7	9	0	2	20	61
Future Vol, veh/h	49	2	9	0	0	5	7	9	0	2	20	61
Peak Hour Factor	0.69	0.69	0.69	0.75	0.75	0.75	0.56	0.56	0.56	0.77	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	71	3	13	0	0	7	13	16	0	3	26	79
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	2
HCM Control Delay	8.4	7.4	8.2	7.4
HCM LOS	A	A	A	A

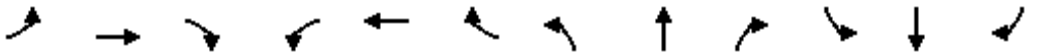
Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	44%	100%	0%	0%	9%	0%
Vol Thru, %	56%	0%	18%	0%	91%	0%
Vol Right, %	0%	0%	82%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	16	49	11	5	22	61
LT Vol	7	49	0	0	2	0
Through Vol	9	0	2	0	20	0
RT Vol	0	0	9	5	0	61
Lane Flow Rate	29	71	16	7	29	79
Geometry Grp	4b	5	5	4b	5	5
Degree of Util (X)	0.04	0.104	0.019	0.008	0.039	0.09
Departure Headway (Hd)	4.982	5.268	4.194	4.355	4.856	4.109
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	723	673	840	825	742	877
Service Time	2.985	3.061	1.986	2.362	2.556	1.809
HCM Lane V/C Ratio	0.04	0.105	0.019	0.008	0.039	0.09
HCM Control Delay	8.2	8.7	7.1	7.4	7.8	7.2
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.1	0.3	0.1	0	0.1	0.3



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	187	274	293	160	238	283
Future Volume (vph)	187	274	293	160	238	283
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.5		4.0	5.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	0.96	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1690	1583	1731		1767	1863
Flt Permitted	0.95	1.00	1.00		0.22	1.00
Satd. Flow (perm)	1690	1583	1731		417	1863
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.85	0.85
Adj. Flow (vph)	208	304	326	178	280	333
RTOR Reduction (vph)	0	165	10	0	0	0
Lane Group Flow (vph)	208	139	494	0	280	333
Confl. Peds. (#/hr)	19			16	16	
Confl. Bikes (#/hr)				26		
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1 12	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	22.7	22.7	39.9		70.5	45.7
Effective Green, g (s)	22.7	22.7	39.9		65.5	45.7
Actuated g/C Ratio	0.22	0.22	0.38		0.63	0.44
Clearance Time (s)	5.0	5.0	5.5			5.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	369	346	666		544	821
v/s Ratio Prot			c0.29		c0.11	0.18
v/s Ratio Perm	c0.12	0.09			0.22	
v/c Ratio	0.56	0.40	0.74		0.51	0.41
Uniform Delay, d1	36.1	34.7	27.5		12.2	19.8
Progression Factor	1.00	1.00	0.27		1.00	1.00
Incremental Delay, d2	2.0	0.8	3.2		0.8	0.3
Delay (s)	38.1	35.5	10.6		13.0	20.1
Level of Service	D	D	B		B	C
Approach Delay (s)	36.5		10.6			16.8
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	103.7	Sum of lost time (s)	24.5
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

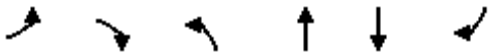
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	14	0	0	0	5	443	0	4	450	18
Future Volume (vph)	18	0	14	0	0	0	5	443	0	4	450	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0					4.0	5.5		5.5	5.5	5.5
Lane Util. Factor		1.00					1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		0.99					1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes		1.00					1.00	1.00		0.99	1.00	1.00
Frt		0.94					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.97					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1683					1770	1863		1753	1863	1583
Flt Permitted		0.95					0.95	1.00		0.32	1.00	1.00
Satd. Flow (perm)		1644					1770	1863		599	1863	1583
Peak-hour factor, PHF	0.64	0.64	0.64	0.92	0.92	0.92	0.90	0.90	0.90	0.85	0.85	0.85
Adj. Flow (vph)	28	0	22	0	0	0	6	492	0	5	529	21
RTOR Reduction (vph)	0	43	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	7	0	0	0	0	6	492	0	5	529	21
Confl. Peds. (#/hr)			3	3					19	19		119
Confl. Bikes (#/hr)									193			207
Turn Type	custom	NA					Prot	NA		Perm	NA	custom
Protected Phases							5	2			6 3	6 3 4
Permitted Phases	12	12		11	11					6 3		
Actuated Green, G (s)		14.5					1.3	39.9		73.9	73.9	93.4
Effective Green, g (s)		14.5					1.3	39.9		73.9	73.9	88.4
Actuated g/C Ratio		0.14					0.01	0.38		0.71	0.71	0.85
Clearance Time (s)		5.0					4.0	5.5				
Vehicle Extension (s)		3.0					1.5	3.0				
Lane Grp Cap (vph)		229					22	716		426	1327	1349
v/s Ratio Prot							c0.00	c0.26			c0.28	0.01
v/s Ratio Perm		c0.00								0.01		
v/c Ratio		0.03					0.27	0.69		0.01	0.40	0.02
Uniform Delay, d1		38.5					50.7	26.7		4.3	6.0	1.1
Progression Factor		1.00					1.00	1.00		0.16	0.11	0.01
Incremental Delay, d2		0.1					2.4	2.8		0.0	0.2	0.0
Delay (s)		38.6					53.2	29.4		0.7	0.9	0.0
Level of Service		D					D	C		A	A	A
Approach Delay (s)		38.6			0.0			29.7			0.8	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	103.7	Sum of lost time (s)	24.5
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

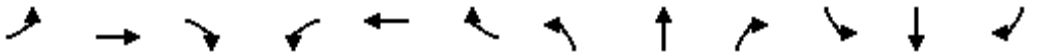
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	155	124	149	259	275	218
Future Volume (vph)	155	124	149	259	275	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.89
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1547	1770	1863	1863	1411
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1547	1770	1863	1863	1411
Peak-hour factor, PHF	0.86	0.86	0.85	0.85	0.86	0.86
Adj. Flow (vph)	180	144	175	305	320	253
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	180	144	175	305	320	253
Confl. Peds. (#/hr)		2				145
Confl. Bikes (#/hr)						156
Turn Type	Perm	Perm	Prot	NA	NA	custom
Protected Phases			5	2	6	8
Permitted Phases	4	4				6
Actuated Green, G (s)	13.0	13.0	11.1	46.1	30.5	43.5
Effective Green, g (s)	13.0	13.0	11.1	46.1	30.5	43.5
Actuated g/C Ratio	0.19	0.19	0.16	0.67	0.44	0.63
Clearance Time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Vehicle Extension (s)	3.0	3.0	1.5	3.0	3.0	0.2
Lane Grp Cap (vph)	335	293	286	1251	828	894
v/s Ratio Prot			c0.10	0.16	c0.17	0.05
v/s Ratio Perm	c0.10	0.09				0.13
v/c Ratio	0.54	0.49	0.61	0.24	0.39	0.28
Uniform Delay, d1	25.1	24.8	26.7	4.4	12.8	5.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	1.3	2.7	0.1	0.3	0.1
Delay (s)	26.7	26.1	29.5	4.5	13.1	5.7
Level of Service	C	C	C	A	B	A
Approach Delay (s)	26.5			13.6	9.8	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	88	9	113	67	380	7	63	135	292	103	25
Future Volume (vph)	16	88	9	113	67	380	7	63	135	292	103	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		3.5	4.5	4.5	3.5	5.5		4.5	5.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.97	1.00	0.91		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1821		1770	1863	1531	1770	1524		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1821		1770	1863	1531	1770	1524		1770	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.77	0.77	0.77	0.90	0.90	0.90
Adj. Flow (vph)	17	95	10	122	72	409	9	82	175	324	114	28
RTOR Reduction (vph)	0	0	0	0	0	242	0	67	0	0	0	0
Lane Group Flow (vph)	17	105	0	122	72	167	9	190	0	324	114	28
Confl. Peds. (#/hr)			30			26			23			137
Confl. Bikes (#/hr)						1			136			187
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	custom
Protected Phases	7	4		3	8	1	5	2 9		1	6 9	7 9
Permitted Phases						8						
Actuated Green, G (s)	3.1	10.9		10.1	17.4	38.6	0.9	29.2		21.2	50.5	11.9
Effective Green, g (s)	3.1	10.9		10.1	17.4	38.6	0.9	29.2		21.2	50.5	11.9
Actuated g/C Ratio	0.03	0.12		0.11	0.18	0.41	0.01	0.31		0.22	0.53	0.13
Clearance Time (s)	4.0	4.5		3.5	4.5	4.5	3.5			4.5		
Vehicle Extension (s)	1.5	1.5		1.5	1.5	3.0	1.5			3.0		
Lane Grp Cap (vph)	58	210		189	343	626	16	471		397	996	199
v/s Ratio Prot	0.01	c0.06		c0.07	0.04	0.06	0.01	c0.12		c0.18	0.06	0.02
v/s Ratio Perm						0.05						
v/c Ratio	0.29	0.50		0.65	0.21	0.27	0.56	0.40		0.82	0.11	0.14
Uniform Delay, d1	44.6	39.2		40.4	32.7	18.5	46.6	25.7		34.7	10.9	36.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	0.7		5.6	0.1	0.2	24.2	0.8		12.2	0.1	0.1
Delay (s)	45.6	39.9		46.0	32.8	18.7	70.8	26.5		47.0	10.9	36.8
Level of Service	D	D		D	C	B	E	C		D	B	D
Approach Delay (s)		40.7			25.9			28.0			37.5	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	31.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	94.4	Sum of lost time (s)	23.5
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	47	38	41	90	130	45
Future Vol, veh/h	47	38	41	90	130	45
Peak Hour Factor	0.73	0.73	0.87	0.87	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	64	52	47	103	144	50
Number of Lanes	1	1	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	2
HCM Control Delay	8.6	8.6	9.3
HCM LOS	A	A	A

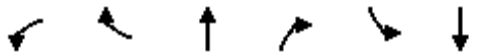
Lane	NBLn1	NBLn2	EBLn1	EBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	0%
Vol Thru, %	0%	100%	0%	0%	74%
Vol Right, %	0%	0%	0%	100%	26%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	41	90	47	38	175
LT Vol	41	0	47	0	0
Through Vol	0	90	0	0	130
RT Vol	0	0	0	38	45
Lane Flow Rate	47	103	64	52	194
Geometry Grp	5	5	5	5	3b
Degree of Util (X)	0.072	0.144	0.105	0.067	0.252
Departure Headway (Hd)	5.509	5.006	5.868	4.662	4.668
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	652	718	612	768	770
Service Time	3.231	2.728	3.596	2.389	2.689
HCM Lane V/C Ratio	0.072	0.143	0.105	0.068	0.252
HCM Control Delay	8.7	8.6	9.3	7.7	9.3
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.2	0.5	0.4	0.2	1

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	131	2	27	0	2	14	11	32	0	23	56	121
Future Vol, veh/h	131	2	27	0	2	14	11	32	0	23	56	121
Peak Hour Factor	0.80	0.80	0.80	0.56	0.56	0.56	0.55	0.55	0.55	0.82	0.82	0.82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	164	3	34	0	4	25	20	58	0	28	68	148
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	2
HCM Control Delay	10.2	8.3	9.3	8.6
HCM LOS	B	A	A	A

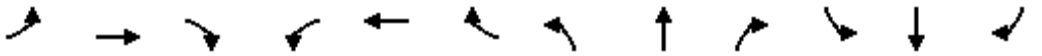
Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	26%	100%	0%	0%	29%	0%
Vol Thru, %	74%	0%	7%	12%	71%	0%
Vol Right, %	0%	0%	93%	88%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	43	131	29	16	79	121
LT Vol	11	131	0	0	23	0
Through Vol	32	0	2	2	56	0
RT Vol	0	0	27	14	0	121
Lane Flow Rate	78	164	36	29	96	148
Geometry Grp	4b	5	5	4b	5	5
Degree of Util (X)	0.119	0.266	0.047	0.04	0.145	0.187
Departure Headway (Hd)	5.498	5.841	4.683	5.066	5.4	4.55
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	650	614	761	703	664	787
Service Time	3.548	3.591	2.432	3.127	3.138	2.287
HCM Lane V/C Ratio	0.12	0.267	0.047	0.041	0.145	0.188
HCM Control Delay	9.3	10.7	7.7	8.3	9.1	8.3
HCM Lane LOS	A	B	A	A	A	A
HCM 95th-tile Q	0.4	1.1	0.1	0.1	0.5	0.7



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	239	279	328	184	232	342
Future Volume (vph)	239	279	328	184	232	342
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.5		4.0	5.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1637	1583	1736		1769	1863
Flt Permitted	0.95	1.00	1.00		0.15	1.00
Satd. Flow (perm)	1637	1583	1736		272	1863
Peak-hour factor, PHF	0.84	0.84	0.93	0.93	0.77	0.77
Adj. Flow (vph)	285	332	353	198	301	444
RTOR Reduction (vph)	0	125	11	0	0	0
Lane Group Flow (vph)	285	207	540	0	301	444
Confl. Peds. (#/hr)	29			13	13	
Confl. Bikes (#/hr)				15		
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1 12	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	28.9	28.9	40.4		72.5	43.0
Effective Green, g (s)	28.9	28.9	40.4		67.5	43.0
Actuated g/C Ratio	0.26	0.26	0.36		0.60	0.38
Clearance Time (s)	5.0	5.0	5.5			5.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	417	403	619		485	707
v/s Ratio Prot			c0.31		c0.13	0.24
v/s Ratio Perm	c0.17	0.13			0.23	
v/c Ratio	0.68	0.51	0.87		0.62	0.63
Uniform Delay, d1	38.1	36.2	34.0		19.0	28.6
Progression Factor	1.00	1.00	0.24		1.00	1.00
Incremental Delay, d2	4.6	1.1	8.2		2.5	1.8
Delay (s)	42.7	37.3	16.3		21.4	30.4
Level of Service	D	D	B		C	C
Approach Delay (s)	39.8		16.3			26.8
Approach LOS	D		B			C

Intersection Summary			
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	113.3	Sum of lost time (s)	24.5
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

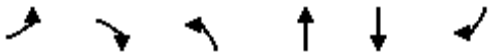
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	0	49	0	0	0	23	495	0	0	547	34
Future Volume (vph)	16	0	49	0	0	0	23	495	0	0	547	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0					4.0	5.5			5.5	5.5
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frpb, ped/bikes		1.00					1.00	1.00			1.00	1.00
Flpb, ped/bikes		1.00					1.00	1.00			1.00	1.00
Frt		0.90					1.00	1.00			1.00	0.85
Flt Protected		0.99					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1653					1770	1863			1863	1583
Flt Permitted		0.95					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1589					1770	1863			1863	1583
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.94	0.94	0.94	0.87	0.87	0.87
Adj. Flow (vph)	21	0	65	0	0	0	24	527	0	0	629	39
RTOR Reduction (vph)	0	73	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	13	0	0	0	0	24	527	0	0	629	39
Confl. Peds. (#/hr)									57	57		4
Confl. Bikes (#/hr)									87			125
Turn Type	custom	NA					Prot	NA		Perm	NA	custom
Protected Phases							5	2			6 3	6 3 4
Permitted Phases	12	12		11	11					6 3		
Actuated Green, G (s)		17.4					4.5	40.4			77.4	99.8
Effective Green, g (s)		17.4					4.5	40.4			77.4	94.8
Actuated g/C Ratio		0.15					0.04	0.36			0.68	0.84
Clearance Time (s)		5.0					4.0	5.5				
Vehicle Extension (s)		3.0					1.5	3.0				
Lane Grp Cap (vph)		244					70	664			1272	1324
v/s Ratio Prot							c0.01	c0.28			c0.34	0.02
v/s Ratio Perm		c0.01										
v/c Ratio		0.05					0.34	0.79			0.49	0.03
Uniform Delay, d1		40.9					53.0	32.7			8.6	1.5
Progression Factor		1.00					1.00	1.00			0.15	0.00
Incremental Delay, d2		0.1					1.1	6.5			0.2	0.0
Delay (s)		41.0					54.0	39.2			1.5	0.0
Level of Service		D					D	D			A	A
Approach Delay (s)		41.0			0.0			39.8			1.4	
Approach LOS		D			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	113.3	Sum of lost time (s)	24.5
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		

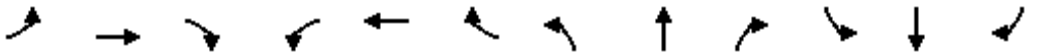
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	187	171	131	317	383	212
Future Volume (vph)	187	171	131	317	383	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1547	1770	1863	1863	1493
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1547	1770	1863	1863	1493
Peak-hour factor, PHF	0.89	0.89	0.94	0.94	0.96	0.96
Adj. Flow (vph)	210	192	139	337	399	221
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	210	192	139	337	399	221
Confl. Peds. (#/hr)		2				55
Confl. Bikes (#/hr)						111
Turn Type	Perm	Perm	Prot	NA	NA	custom
Protected Phases			5	2	6	8
Permitted Phases	4	4				6
Actuated Green, G (s)	14.0	14.0	8.0	43.7	31.2	45.2
Effective Green, g (s)	14.0	14.0	8.0	43.7	31.2	45.2
Actuated g/C Ratio	0.21	0.21	0.12	0.65	0.46	0.67
Clearance Time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Vehicle Extension (s)	3.0	3.0	1.5	3.0	3.0	0.2
Lane Grp Cap (vph)	368	322	210	1211	864	1004
v/s Ratio Prot			c0.08	0.18	c0.21	0.05
v/s Ratio Perm	0.12	c0.12				0.10
v/c Ratio	0.57	0.60	0.66	0.28	0.46	0.22
Uniform Delay, d1	23.9	24.0	28.3	5.0	12.3	4.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	3.0	5.9	0.1	0.4	0.0
Delay (s)	26.0	27.0	34.2	5.1	12.7	4.3
Level of Service	C	C	C	A	B	A
Approach Delay (s)	26.5			13.6	9.7	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	67.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	103	7	209	85	517	5	99	115	382	139	61
Future Volume (vph)	50	103	7	209	85	517	5	99	115	382	139	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		3.5	4.5	4.5	3.5	5.5		4.5	5.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.95	1.00	0.95		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1836		1770	1863	1507	1770	1622		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1836		1770	1863	1507	1770	1622		1770	1863	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.99	0.99	0.99	0.78	0.78	0.78	0.84	0.84	0.84
Adj. Flow (vph)	65	134	9	211	86	522	6	127	147	455	165	73
RTOR Reduction (vph)	0	0	0	0	0	251	0	34	0	0	0	0
Lane Group Flow (vph)	65	143	0	211	86	271	6	240	0	455	165	73
Confl. Peds. (#/hr)			23			38			27			85
Confl. Bikes (#/hr)									67			98
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	custom
Protected Phases	7	4		3	8	1	5	2 9		1	6 9	7 9
Permitted Phases						8						
Actuated Green, G (s)	6.5	14.6		15.2	22.8	53.3	1.0	30.3		30.5	60.8	16.5
Effective Green, g (s)	6.5	14.6		15.2	22.8	53.3	1.0	30.3		30.5	60.8	16.5
Actuated g/C Ratio	0.06	0.13		0.13	0.20	0.47	0.01	0.27		0.27	0.54	0.15
Clearance Time (s)	4.0	4.5		3.5	4.5	4.5	3.5			4.5		
Vehicle Extension (s)	1.5	1.5		1.5	1.5	3.0	1.5			3.0		
Lane Grp Cap (vph)	101	235		236	373	707	15	432		475	997	229
v/s Ratio Prot	0.04	c0.08		c0.12	0.05	0.10	0.00	c0.15		c0.26	0.09	0.05
v/s Ratio Perm						0.08						
v/c Ratio	0.64	0.61		0.89	0.23	0.38	0.40	0.55		0.96	0.17	0.32
Uniform Delay, d1	52.4	46.8		48.4	38.0	19.5	56.0	35.8		40.9	13.5	43.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.1	3.0		31.2	0.1	0.3	6.3	1.9		30.4	0.1	0.3
Delay (s)	62.5	49.8		79.6	38.2	19.9	62.3	37.7		71.4	13.6	43.8
Level of Service	E	D		E	D	B	E	D		E	B	D
Approach Delay (s)		53.8			37.2			38.3			54.7	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	45.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	113.6	Sum of lost time (s)	23.5
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	9.8
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	56	31	63	185	176	38
Future Vol, veh/h	56	31	63	185	176	38
Peak Hour Factor	0.86	0.86	0.82	0.82	0.93	0.93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	36	77	226	189	41
Number of Lanes	1	1	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	2
HCM Control Delay	9.3	9.8	10.1
HCM LOS	A	A	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	0%
Vol Thru, %	0%	100%	0%	0%	82%
Vol Right, %	0%	0%	0%	100%	18%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	63	185	56	31	214
LT Vol	63	0	56	0	0
Through Vol	0	185	0	0	176
RT Vol	0	0	0	31	38
Lane Flow Rate	77	226	65	36	230
Geometry Grp	5	5	5	5	3b
Degree of Util (X)	0.118	0.315	0.114	0.051	0.311
Departure Headway (Hd)	5.523	5.021	6.3	5.089	4.861
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	649	715	568	701	739
Service Time	3.257	2.754	4.052	2.841	2.895
HCM Lane V/C Ratio	0.119	0.316	0.114	0.051	0.311
HCM Control Delay	9	10.1	9.9	8.1	10.1
HCM Lane LOS	A	B	A	A	B
HCM 95th-tile Q	0.4	1.3	0.4	0.2	1.3

Intersection	
Intersection Delay, s/veh	10
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	169	2	38	0	2	7	14	72	0	13	32	229
Future Vol, veh/h	169	2	38	0	2	7	14	72	0	13	32	229
Peak Hour Factor	0.91	0.91	0.91	0.42	0.42	0.42	0.92	0.92	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	186	2	42	0	5	17	15	78	0	15	37	266
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	1

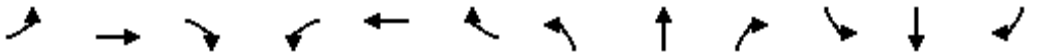
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	2
HCM Control Delay	10.8	8.7	9.7	9.6
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	16%	100%	0%	0%	29%	0%
Vol Thru, %	84%	0%	5%	22%	71%	0%
Vol Right, %	0%	0%	95%	78%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	86	169	40	9	45	229
LT Vol	14	169	0	0	13	0
Through Vol	72	0	2	2	32	0
RT Vol	0	0	38	7	0	229
Lane Flow Rate	93	186	44	21	52	266
Geometry Grp	4b	5	5	4b	5	5
Degree of Util (X)	0.147	0.311	0.059	0.032	0.08	0.344
Departure Headway (Hd)	5.646	6.032	4.858	5.391	5.504	4.654
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	632	592	731	657	649	770
Service Time	3.713	3.806	2.632	3.486	3.252	2.402
HCM Lane V/C Ratio	0.147	0.314	0.06	0.032	0.08	0.345
HCM Control Delay	9.7	11.5	7.9	8.7	8.7	9.8
HCM Lane LOS	A	B	A	A	A	A
HCM 95th-tile Q	0.5	1.3	0.2	0.1	0.3	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	162	186	157	75	127	82
Future Volume (vph)	162	186	157	75	127	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.5		4.0	5.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	0.90	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1597	1583	1742		1762	1863
Flt Permitted	0.95	1.00	1.00		0.47	1.00
Satd. Flow (perm)	1597	1583	1742		880	1863
Peak-hour factor, PHF	0.90	0.90	0.86	0.86	0.74	0.74
Adj. Flow (vph)	180	207	183	87	172	111
RTOR Reduction (vph)	0	133	8	0	0	0
Lane Group Flow (vph)	180	74	262	0	172	111
Confl. Peds. (#/hr)	47			11	11	
Confl. Bikes (#/hr)				37		
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1 12	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	18.2	18.2	36.8		62.8	42.6
Effective Green, g (s)	18.2	18.2	36.8		57.8	42.6
Actuated g/C Ratio	0.20	0.20	0.40		0.63	0.47
Clearance Time (s)	5.0	5.0	5.5			5.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	317	314	700		719	867
v/s Ratio Prot			c0.15		c0.04	0.06
v/s Ratio Perm	c0.11	0.05			0.11	
v/c Ratio	0.57	0.24	0.37		0.24	0.13
Uniform Delay, d1	33.1	30.8	19.2		7.3	13.9
Progression Factor	1.00	1.00	0.15		1.00	1.00
Incremental Delay, d2	2.3	0.4	0.3		0.2	0.1
Delay (s)	35.4	31.2	3.2		7.5	14.0
Level of Service	D	C	A		A	B
Approach Delay (s)	33.2		3.2			10.0
Approach LOS	C		A			B

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	91.5	Sum of lost time (s)	24.5
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

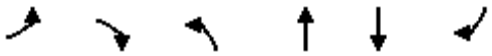
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	5	0	0	0	4	226	0	0	219	20
Future Volume (vph)	5	0	5	0	0	0	4	226	0	0	219	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0					4.0	5.5			5.5	5.5
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.99					1.00	1.00			1.00	1.00
Flpb, ped/bikes		1.00					1.00	1.00			1.00	1.00
Frt		0.93					1.00	1.00			1.00	0.85
Flt Protected		0.98					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1672					1770	1863			1863	1583
Flt Permitted		0.95					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1628					1770	1863			1863	1583
Peak-hour factor, PHF	0.50	0.50	0.50	0.92	0.92	0.92	0.79	0.79	0.79	0.82	0.82	0.82
Adj. Flow (vph)	10	0	10	0	0	0	5	286	0	0	267	24
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	2	0	0	0	0	5	286	0	0	267	24
Confl. Peds. (#/hr)			3	3					18	18		149
Confl. Bikes (#/hr)									125			143
Turn Type	custom	NA					Prot	NA		Perm	NA	custom
Protected Phases							5	2			6 3	6 3 4
Permitted Phases	12	12		11	11					6 3		
Actuated Green, G (s)		9.9					1.3	36.8			66.3	81.2
Effective Green, g (s)		9.9					1.3	36.8			66.3	76.2
Actuated g/C Ratio		0.11					0.01	0.40			0.72	0.83
Clearance Time (s)		5.0					4.0	5.5				
Vehicle Extension (s)		3.0					1.5	3.0				
Lane Grp Cap (vph)		176					25	749			1349	1318
v/s Ratio Prot							c0.00	c0.15			c0.14	c0.02
v/s Ratio Perm		0.00										
v/c Ratio		0.01					0.20	0.38			0.20	0.02
Uniform Delay, d1		36.4					44.6	19.3			4.1	1.3
Progression Factor		1.00					1.00	1.00			0.20	0.00
Incremental Delay, d2		0.0					1.4	0.3			0.1	0.0
Delay (s)		36.5					46.0	19.6			0.9	0.0
Level of Service		D					D	B			A	A
Approach Delay (s)		36.5			0.0			20.1			0.8	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	91.5	Sum of lost time (s)	24.5
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

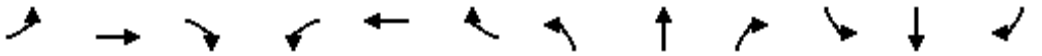
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	77	75	82	159	104	116
Future Volume (vph)	77	75	82	159	104	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.90
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1749	1583	1770	1863	1863	1419
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1749	1583	1770	1863	1863	1419
Peak-hour factor, PHF	0.77	0.77	0.79	0.79	0.80	0.80
Adj. Flow (vph)	100	97	104	201	130	145
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	100	97	104	201	130	145
Confl. Peds. (#/hr)	8					132
Confl. Bikes (#/hr)						130
Turn Type	Perm	Perm	Prot	NA	NA	custom
Protected Phases			5	2	6	8
Permitted Phases	4	4				6
Actuated Green, G (s)	9.0	9.0	6.9	45.2	33.8	42.8
Effective Green, g (s)	9.0	9.0	6.9	45.2	33.8	42.8
Actuated g/C Ratio	0.14	0.14	0.11	0.71	0.53	0.67
Clearance Time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Vehicle Extension (s)	3.0	3.0	1.5	3.0	3.0	0.2
Lane Grp Cap (vph)	247	223	191	1321	988	953
v/s Ratio Prot			c0.06	c0.11	0.07	0.02
v/s Ratio Perm	0.06	c0.06				0.08
v/c Ratio	0.40	0.43	0.54	0.15	0.13	0.15
Uniform Delay, d1	24.9	25.0	26.9	3.0	7.5	3.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	1.4	1.7	0.1	0.1	0.0
Delay (s)	26.0	26.4	28.6	3.1	7.6	3.8
Level of Service	C	C	C	A	A	A
Approach Delay (s)	26.2			11.8	5.6	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	63.7	Sum of lost time (s)	14.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	53	4	48	96	237	5	25	44	116	48	16
Future Volume (vph)	9	53	4	48	96	237	5	25	44	116	48	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		3.5	4.5	4.5	3.5	5.5		4.5	5.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.92		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1836		1770	1863	1544	1770	1552		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1836		1770	1863	1544	1770	1552		1770	1863	1583
Peak-hour factor, PHF	0.69	0.69	0.69	0.77	0.77	0.77	0.73	0.73	0.73	0.71	0.71	0.71
Adj. Flow (vph)	13	77	6	62	125	308	7	34	60	163	68	23
RTOR Reduction (vph)	0	0	0	0	0	179	0	47	0	0	0	0
Lane Group Flow (vph)	13	83	0	62	125	129	7	47	0	163	68	23
Confl. Peds. (#/hr)			19			35			27			136
Confl. Bikes (#/hr)									93			115
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	custom
Protected Phases	7	4		3	8	1	5	2 9		1	6 9	7 9
Permitted Phases						8						
Actuated Green, G (s)	2.5	9.0		4.1	10.1	30.6	0.7	16.4		20.5	37.2	7.1
Effective Green, g (s)	2.5	9.0		4.1	10.1	30.6	0.7	16.4		20.5	37.2	7.1
Actuated g/C Ratio	0.03	0.12		0.06	0.14	0.42	0.01	0.22		0.28	0.51	0.10
Clearance Time (s)	4.0	4.5		3.5	4.5	4.5	3.5			4.5		
Vehicle Extension (s)	1.5	1.5		1.5	1.5	3.0	1.5			3.0		
Lane Grp Cap (vph)	60	226		99	257	647	16	348		497	949	153
v/s Ratio Prot	0.01	0.05		c0.04	c0.07	0.06	0.00	c0.03		c0.09	0.04	c0.01
v/s Ratio Perm						0.03						
v/c Ratio	0.22	0.37		0.63	0.49	0.20	0.44	0.14		0.33	0.07	0.15
Uniform Delay, d1	34.3	29.4		33.7	29.1	13.4	36.0	22.6		20.8	9.1	30.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.4		8.6	0.5	0.2	6.8	0.2		0.4	0.0	0.2
Delay (s)	35.0	29.8		42.3	29.6	13.6	42.8	22.9		21.2	9.2	30.4
Level of Service	C	C		D	C	B	D	C		C	A	C
Approach Delay (s)		30.5			21.2			24.3			18.8	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	23.5
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	7	13	51	50	16
Future Vol, veh/h	9	7	13	51	50	16
Peak Hour Factor	0.75	0.75	0.88	0.88	0.60	0.60
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	9	15	58	83	27
Number of Lanes	1	1	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	2
HCM Control Delay	7.7	7.8	8
HCM LOS	A	A	A

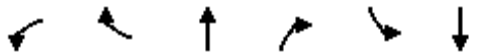
Lane	NBLn1	NBLn2	EBLn1	EBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	0%
Vol Thru, %	0%	100%	0%	0%	76%
Vol Right, %	0%	0%	0%	100%	24%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	13	51	9	7	66
LT Vol	13	0	9	0	0
Through Vol	0	51	0	0	50
RT Vol	0	0	0	7	16
Lane Flow Rate	15	58	12	9	110
Geometry Grp	5	5	5	5	3b
Degree of Util (X)	0.021	0.074	0.018	0.011	0.131
Departure Headway (Hd)	5.126	4.625	5.463	4.26	4.279
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	697	773	659	845	835
Service Time	2.865	2.364	3.163	1.96	2.323
HCM Lane V/C Ratio	0.022	0.075	0.018	0.011	0.132
HCM Control Delay	8	7.7	8.3	7	8
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.1	0.2	0.1	0	0.5

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	2	9	0	0	5	7	9	0	2	20	62
Future Vol, veh/h	50	2	9	0	0	5	7	9	0	2	20	62
Peak Hour Factor	0.69	0.69	0.69	0.75	0.75	0.75	0.56	0.56	0.56	0.77	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	72	3	13	0	0	7	13	16	0	3	26	81
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	2
HCM Control Delay	8.4	7.4	8.2	7.4
HCM LOS	A	A	A	A

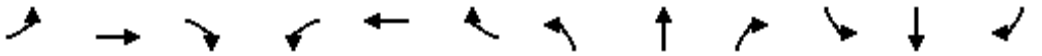
Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	44%	100%	0%	0%	9%	0%
Vol Thru, %	56%	0%	18%	0%	91%	0%
Vol Right, %	0%	0%	82%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	16	50	11	5	22	62
LT Vol	7	50	0	0	2	0
Through Vol	9	0	2	0	20	0
RT Vol	0	0	9	5	0	62
Lane Flow Rate	29	72	16	7	29	81
Geometry Grp	4b	5	5	4b	5	5
Degree of Util (X)	0.04	0.106	0.019	0.008	0.039	0.092
Departure Headway (Hd)	4.988	5.272	4.197	4.36	4.86	4.113
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	722	672	839	824	741	877
Service Time	2.99	3.065	1.99	2.368	2.56	1.813
HCM Lane V/C Ratio	0.04	0.107	0.019	0.008	0.039	0.092
HCM Control Delay	8.2	8.7	7.1	7.4	7.8	7.2
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.1	0.4	0.1	0	0.1	0.3



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	189	277	296	162	241	286
Future Volume (vph)	189	277	296	162	241	286
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.5		4.0	5.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	0.96	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1690	1583	1730		1767	1863
Flt Permitted	0.95	1.00	1.00		0.22	1.00
Satd. Flow (perm)	1690	1583	1730		407	1863
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.85	0.85
Adj. Flow (vph)	210	308	329	180	284	336
RTOR Reduction (vph)	0	166	10	0	0	0
Lane Group Flow (vph)	210	142	499	0	284	336
Confl. Peds. (#/hr)	19			16	16	
Confl. Bikes (#/hr)				26		
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1 12	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	22.8	22.8	40.0		70.8	45.8
Effective Green, g (s)	22.8	22.8	40.0		65.8	45.8
Actuated g/C Ratio	0.22	0.22	0.38		0.63	0.44
Clearance Time (s)	5.0	5.0	5.5			5.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	370	346	664		542	819
v/s Ratio Prot			c0.29		c0.11	0.18
v/s Ratio Perm	c0.12	0.09			0.22	
v/c Ratio	0.57	0.41	0.75		0.52	0.41
Uniform Delay, d1	36.3	34.9	27.8		12.4	19.9
Progression Factor	1.00	1.00	0.27		1.00	1.00
Incremental Delay, d2	2.0	0.8	3.4		0.9	0.3
Delay (s)	38.3	35.7	10.8		13.3	20.3
Level of Service	D	D	B		B	C
Approach Delay (s)	36.7		10.8			17.1
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	104.1	Sum of lost time (s)	24.5
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

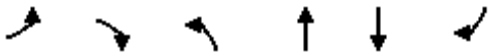
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	14	0	0	0	5	448	0	4	455	18
Future Volume (vph)	18	0	14	0	0	0	5	448	0	4	455	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0					4.0	5.5		5.5	5.5	5.5
Lane Util. Factor		1.00					1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		0.99					1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes		1.00					1.00	1.00		0.99	1.00	1.00
Frt		0.94					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.97					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1683					1770	1863		1753	1863	1583
Flt Permitted		0.95					0.95	1.00		0.32	1.00	1.00
Satd. Flow (perm)		1644					1770	1863		590	1863	1583
Peak-hour factor, PHF	0.64	0.64	0.64	0.92	0.92	0.92	0.90	0.90	0.90	0.85	0.85	0.85
Adj. Flow (vph)	28	0	22	0	0	0	6	498	0	5	535	21
RTOR Reduction (vph)	0	43	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	7	0	0	0	0	6	498	0	5	535	21
Confl. Peds. (#/hr)			3	3					19	19		119
Confl. Bikes (#/hr)									193			207
Turn Type	custom	NA					Prot	NA		Perm	NA	custom
Protected Phases							5	2			6 3	6 3 4
Permitted Phases	12	12		11	11					6 3		
Actuated Green, G (s)		14.7					1.3	40.0		74.1	74.1	93.8
Effective Green, g (s)		14.7					1.3	40.0		74.1	74.1	88.8
Actuated g/C Ratio		0.14					0.01	0.38		0.71	0.71	0.85
Clearance Time (s)		5.0					4.0	5.5				
Vehicle Extension (s)		3.0					1.5	3.0				
Lane Grp Cap (vph)		232					22	715		419	1326	1350
v/s Ratio Prot							c0.00	c0.27			c0.29	0.01
v/s Ratio Perm		c0.00								0.01		
v/c Ratio		0.03					0.27	0.70		0.01	0.40	0.02
Uniform Delay, d1		38.6					50.9	26.9		4.4	6.1	1.1
Progression Factor		1.00					1.00	1.00		0.16	0.11	0.01
Incremental Delay, d2		0.1					2.4	3.0		0.0	0.2	0.0
Delay (s)		38.6					53.4	29.9		0.7	0.9	0.0
Level of Service		D					D	C		A	A	A
Approach Delay (s)		38.6			0.0			30.2			0.8	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	104.1	Sum of lost time (s)	24.5
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

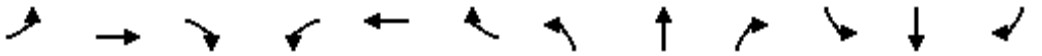
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	157	125	151	262	278	221
Future Volume (vph)	157	125	151	262	278	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.89
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1547	1770	1863	1863	1411
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1547	1770	1863	1863	1411
Peak-hour factor, PHF	0.86	0.86	0.85	0.85	0.86	0.86
Adj. Flow (vph)	183	145	178	308	323	257
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	183	145	178	308	323	257
Confl. Peds. (#/hr)		2				145
Confl. Bikes (#/hr)						156
Turn Type	Perm	Perm	Prot	NA	NA	custom
Protected Phases			5	2	6	8
Permitted Phases	4	4				6
Actuated Green, G (s)	13.1	13.1	11.2	46.2	30.5	43.6
Effective Green, g (s)	13.1	13.1	11.2	46.2	30.5	43.6
Actuated g/C Ratio	0.19	0.19	0.16	0.67	0.44	0.63
Clearance Time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Vehicle Extension (s)	3.0	3.0	1.5	3.0	3.0	0.2
Lane Grp Cap (vph)	337	294	288	1251	825	894
v/s Ratio Prot			c0.10	0.17	c0.17	0.05
v/s Ratio Perm	c0.10	0.09				0.13
v/c Ratio	0.54	0.49	0.62	0.25	0.39	0.29
Uniform Delay, d1	25.1	24.9	26.8	4.4	12.9	5.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	1.3	2.8	0.1	0.3	0.1
Delay (s)	26.9	26.2	29.6	4.6	13.2	5.7
Level of Service	C	C	C	A	B	A
Approach Delay (s)	26.6			13.7	9.9	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	68.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	89	9	114	68	384	7	64	137	295	104	25
Future Volume (vph)	16	89	9	114	68	384	7	64	137	295	104	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		3.5	4.5	4.5	3.5	5.5		4.5	5.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.97	1.00	0.91		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1821		1770	1863	1531	1770	1524		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1821		1770	1863	1531	1770	1524		1770	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.77	0.77	0.77	0.90	0.90	0.90
Adj. Flow (vph)	17	96	10	123	73	413	9	83	178	328	116	28
RTOR Reduction (vph)	0	0	0	0	0	244	0	67	0	0	0	0
Lane Group Flow (vph)	17	106	0	123	73	169	9	194	0	328	116	28
Confl. Peds. (#/hr)			30			26			23			137
Confl. Bikes (#/hr)						1			136			187
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	custom
Protected Phases	7	4		3	8	1	5	2 9		1	6 9	7 9
Permitted Phases						8						
Actuated Green, G (s)	3.1	11.0		10.1	17.5	38.7	0.9	29.2		21.2	50.5	11.9
Effective Green, g (s)	3.1	11.0		10.1	17.5	38.7	0.9	29.2		21.2	50.5	11.9
Actuated g/C Ratio	0.03	0.12		0.11	0.19	0.41	0.01	0.31		0.22	0.53	0.13
Clearance Time (s)	4.0	4.5		3.5	4.5	4.5	3.5			4.5		
Vehicle Extension (s)	1.5	1.5		1.5	1.5	3.0	1.5			3.0		
Lane Grp Cap (vph)	58	211		189	345	626	16	470		397	995	199
v/s Ratio Prot	0.01	c0.06		c0.07	0.04	0.06	0.01	c0.13		c0.19	0.06	0.02
v/s Ratio Perm						0.05						
v/c Ratio	0.29	0.50		0.65	0.21	0.27	0.56	0.41		0.83	0.12	0.14
Uniform Delay, d1	44.6	39.2		40.5	32.6	18.5	46.6	25.9		34.9	10.9	36.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	0.7		6.0	0.1	0.2	24.2	0.8		13.1	0.1	0.1
Delay (s)	45.7	39.9		46.5	32.8	18.8	70.8	26.7		48.0	11.0	36.9
Level of Service	D	D		D	C	B	E	C		D	B	D
Approach Delay (s)		40.7			26.0			28.1			38.3	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	94.5	Sum of lost time (s)	23.5
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	48	38	41	91	132	46
Future Vol, veh/h	48	38	41	91	132	46
Peak Hour Factor	0.73	0.73	0.87	0.87	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	66	52	47	105	147	51
Number of Lanes	1	1	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	2
HCM Control Delay	8.6	8.6	9.3
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	0%
Vol Thru, %	0%	100%	0%	0%	74%
Vol Right, %	0%	0%	0%	100%	26%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	41	91	48	38	178
LT Vol	41	0	48	0	0
Through Vol	0	91	0	0	132
RT Vol	0	0	0	38	46
Lane Flow Rate	47	105	66	52	198
Geometry Grp	5	5	5	5	3b
Degree of Util (X)	0.072	0.146	0.107	0.068	0.257
Departure Headway (Hd)	5.517	5.015	5.879	4.672	4.674
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	650	716	610	766	769
Service Time	3.24	2.738	3.609	2.402	2.695
HCM Lane V/C Ratio	0.072	0.147	0.108	0.068	0.257
HCM Control Delay	8.7	8.6	9.3	7.7	9.3
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.2	0.5	0.4	0.2	1

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	133	2	27	0	2	14	11	32	0	23	57	122
Future Vol, veh/h	133	2	27	0	2	14	11	32	0	23	57	122
Peak Hour Factor	0.80	0.80	0.80	0.56	0.56	0.56	0.55	0.55	0.55	0.82	0.82	0.82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	166	3	34	0	4	25	20	58	0	28	70	149
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	1

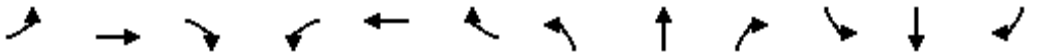
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	2
HCM Control Delay	10.2	8.4	9.3	8.7
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	26%	100%	0%	0%	29%	0%
Vol Thru, %	74%	0%	7%	12%	71%	0%
Vol Right, %	0%	0%	93%	88%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	43	133	29	16	80	122
LT Vol	11	133	0	0	23	0
Through Vol	32	0	2	2	57	0
RT Vol	0	0	27	14	0	122
Lane Flow Rate	78	166	36	29	98	149
Geometry Grp	4b	5	5	4b	5	5
Degree of Util (X)	0.12	0.27	0.047	0.04	0.147	0.188
Departure Headway (Hd)	5.509	5.847	4.688	5.075	5.406	4.558
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	649	613	760	701	662	786
Service Time	3.558	3.598	2.439	3.138	3.145	2.296
HCM Lane V/C Ratio	0.12	0.271	0.047	0.041	0.148	0.19
HCM Control Delay	9.3	10.8	7.7	8.4	9.1	8.4
HCM Lane LOS	A	B	A	A	A	A
HCM 95th-tile Q	0.4	1.1	0.1	0.1	0.5	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	242	282	332	186	235	346
Future Volume (vph)	242	282	332	186	235	346
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.5		4.0	5.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	0.92	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1637	1583	1736		1769	1863
Flt Permitted	0.95	1.00	1.00		0.14	1.00
Satd. Flow (perm)	1637	1583	1736		257	1863
Peak-hour factor, PHF	0.84	0.84	0.93	0.93	0.77	0.77
Adj. Flow (vph)	288	336	357	200	305	449
RTOR Reduction (vph)	0	126	11	0	0	0
Lane Group Flow (vph)	288	210	546	0	305	449
Confl. Peds. (#/hr)	29			13	13	
Confl. Bikes (#/hr)				15		
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1 12	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	29.0	29.0	40.4		72.9	43.0
Effective Green, g (s)	29.0	29.0	40.4		67.9	43.0
Actuated g/C Ratio	0.25	0.25	0.36		0.60	0.38
Clearance Time (s)	5.0	5.0	5.5			5.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	417	403	616		484	703
v/s Ratio Prot			c0.31		c0.14	0.24
v/s Ratio Perm	c0.18	0.13			0.24	
v/c Ratio	0.69	0.52	0.89		0.63	0.64
Uniform Delay, d1	38.3	36.4	34.5		20.6	29.0
Progression Factor	1.00	1.00	0.24		1.00	1.00
Incremental Delay, d2	4.9	1.2	9.0		2.7	1.9
Delay (s)	43.2	37.7	17.2		23.3	30.9
Level of Service	D	D	B		C	C
Approach Delay (s)	40.2		17.2			27.8
Approach LOS	D		B			C

Intersection Summary			
HCM 2000 Control Delay	28.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	113.8	Sum of lost time (s)	24.5
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

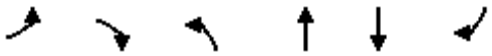
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	0	50	0	0	0	23	501	0	0	553	34
Future Volume (vph)	16	0	50	0	0	0	23	501	0	0	553	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0					4.0	5.5			5.5	5.5
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frpb, ped/bikes		1.00					1.00	1.00			1.00	1.00
Flpb, ped/bikes		1.00					1.00	1.00			1.00	1.00
Frt		0.90					1.00	1.00			1.00	0.85
Flt Protected		0.99					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1652					1770	1863			1863	1583
Flt Permitted		0.95					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1588					1770	1863			1863	1583
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.94	0.94	0.94	0.87	0.87	0.87
Adj. Flow (vph)	21	0	67	0	0	0	24	533	0	0	636	39
RTOR Reduction (vph)	0	74	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	14	0	0	0	0	24	533	0	0	636	39
Confl. Peds. (#/hr)									57	57		4
Confl. Bikes (#/hr)									87			125
Turn Type	custom	NA					Prot	NA		Perm	NA	custom
Protected Phases							5	2			6 3	6 3 4
Permitted Phases	12	12		11	11					6 3		
Actuated Green, G (s)		17.8					4.5	40.4			77.5	100.3
Effective Green, g (s)		17.8					4.5	40.4			77.5	95.3
Actuated g/C Ratio		0.16					0.04	0.36			0.68	0.84
Clearance Time (s)		5.0					4.0	5.5				
Vehicle Extension (s)		3.0					1.5	3.0				
Lane Grp Cap (vph)		248					69	661			1268	1325
v/s Ratio Prot							c0.01	c0.29			c0.34	0.02
v/s Ratio Perm		c0.01										
v/c Ratio		0.06					0.35	0.81			0.50	0.03
Uniform Delay, d1		40.8					53.2	33.2			8.8	1.5
Progression Factor		1.00					1.00	1.00			0.15	0.00
Incremental Delay, d2		0.1					1.1	7.1			0.2	0.0
Delay (s)		40.9					54.3	40.3			1.6	0.0
Level of Service		D					D	D			A	A
Approach Delay (s)		40.9			0.0			40.9			1.5	
Approach LOS		D			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	113.8	Sum of lost time (s)	24.5
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

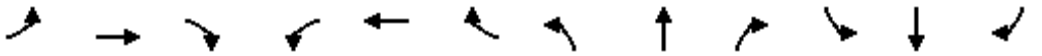
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	189	173	133	321	387	214
Future Volume (vph)	189	173	133	321	387	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1547	1770	1863	1863	1491
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1547	1770	1863	1863	1491
Peak-hour factor, PHF	0.89	0.89	0.94	0.94	0.96	0.96
Adj. Flow (vph)	212	194	141	341	403	223
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	212	194	141	341	403	223
Confl. Peds. (#/hr)		2				55
Confl. Bikes (#/hr)						111
Turn Type	Perm	Perm	Prot	NA	NA	custom
Protected Phases			5	2	6	8
Permitted Phases	4	4				6
Actuated Green, G (s)	14.2	14.2	10.2	45.5	30.8	45.0
Effective Green, g (s)	14.2	14.2	10.2	45.5	30.8	45.0
Actuated g/C Ratio	0.21	0.21	0.15	0.66	0.45	0.65
Clearance Time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Vehicle Extension (s)	3.0	3.0	1.5	3.0	3.0	0.2
Lane Grp Cap (vph)	363	317	260	1224	829	969
v/s Ratio Prot			c0.08	0.18	c0.22	0.05
v/s Ratio Perm	0.12	c0.13				0.10
v/c Ratio	0.58	0.61	0.54	0.28	0.49	0.23
Uniform Delay, d1	24.8	25.0	27.3	5.0	13.6	5.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.4	3.5	1.2	0.1	0.5	0.0
Delay (s)	27.2	28.5	28.6	5.1	14.0	5.0
Level of Service	C	C	C	A	B	A
Approach Delay (s)	27.8			12.0	10.8	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	69.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	104	7	211	86	523	5	100	116	386	141	62
Future Volume (vph)	51	104	7	211	86	523	5	100	116	386	141	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		3.5	4.5	4.5	3.5	5.5		4.5	5.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.95	1.00	0.95		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1836		1770	1863	1507	1770	1621		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1836		1770	1863	1507	1770	1621		1770	1863	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.99	0.99	0.99	0.78	0.78	0.78	0.84	0.84	0.84
Adj. Flow (vph)	66	135	9	213	87	528	6	128	149	460	168	74
RTOR Reduction (vph)	0	0	0	0	0	250	0	34	0	0	0	0
Lane Group Flow (vph)	66	144	0	213	87	278	6	243	0	460	168	74
Confl. Peds. (#/hr)			23			38			27			85
Confl. Bikes (#/hr)									67			98
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	custom
Protected Phases	7	4		3	8	1	5	2 9		1	6 9	7 9
Permitted Phases						8						
Actuated Green, G (s)	6.5	14.6		15.2	22.8	53.3	1.0	30.6		30.5	61.1	16.8
Effective Green, g (s)	6.5	14.6		15.2	22.8	53.3	1.0	30.6		30.5	61.1	16.8
Actuated g/C Ratio	0.06	0.13		0.13	0.20	0.47	0.01	0.27		0.27	0.54	0.15
Clearance Time (s)	4.0	4.5		3.5	4.5	4.5	3.5			4.5		
Vehicle Extension (s)	1.5	1.5		1.5	1.5	3.0	1.5			3.0		
Lane Grp Cap (vph)	101	235		236	372	705	15	435		473	999	233
v/s Ratio Prot	0.04	c0.08		c0.12	0.05	0.11	0.00	c0.15		c0.26	0.09	0.05
v/s Ratio Perm						0.08						
v/c Ratio	0.65	0.61		0.90	0.23	0.39	0.40	0.56		0.97	0.17	0.32
Uniform Delay, d1	52.6	47.0		48.6	38.2	19.8	56.2	35.8		41.3	13.5	43.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.0	3.3		33.0	0.1	0.4	6.3	1.9		34.1	0.1	0.3
Delay (s)	63.6	50.3		81.7	38.3	20.1	62.4	37.7		75.4	13.6	43.7
Level of Service	E	D		F	D	C	E	D		E	B	D
Approach Delay (s)		54.5			37.9			38.3			57.3	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	46.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	113.9	Sum of lost time (s)	23.5
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	9.8
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	57	31	64	187	178	38
Future Vol, veh/h	57	31	64	187	178	38
Peak Hour Factor	0.86	0.86	0.82	0.82	0.93	0.93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	66	36	78	228	191	41
Number of Lanes	1	1	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	2
HCM Control Delay	9.3	9.8	10.1
HCM LOS	A	A	B

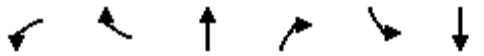
Lane	NBLn1	NBLn2	EBLn1	EBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	0%
Vol Thru, %	0%	100%	0%	0%	82%
Vol Right, %	0%	0%	0%	100%	18%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	64	187	57	31	216
LT Vol	64	0	57	0	0
Through Vol	0	187	0	0	178
RT Vol	0	0	0	31	38
Lane Flow Rate	78	228	66	36	232
Geometry Grp	5	5	5	5	3b
Degree of Util (X)	0.12	0.318	0.116	0.051	0.314
Departure Headway (Hd)	5.529	5.027	6.313	5.102	4.87
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	649	714	567	699	739
Service Time	3.263	2.76	4.064	2.853	2.904
HCM Lane V/C Ratio	0.12	0.319	0.116	0.052	0.314
HCM Control Delay	9	10.1	9.9	8.1	10.1
HCM Lane LOS	A	B	A	A	B
HCM 95th-tile Q	0.4	1.4	0.4	0.2	1.3

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	171	2	38	0	2	7	14	73	0	13	32	232
Future Vol, veh/h	171	2	38	0	2	7	14	73	0	13	32	232
Peak Hour Factor	0.91	0.91	0.91	0.42	0.42	0.42	0.92	0.92	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	188	2	42	0	5	17	15	79	0	15	37	270
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	2
HCM Control Delay	10.9	8.7	9.7	9.7
HCM LOS	B	A	A	A

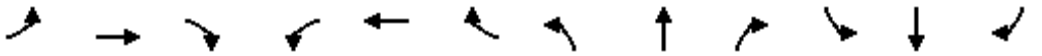
Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	16%	100%	0%	0%	29%	0%
Vol Thru, %	84%	0%	5%	22%	71%	0%
Vol Right, %	0%	0%	95%	78%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	171	40	9	45	232
LT Vol	14	171	0	0	13	0
Through Vol	73	0	2	2	32	0
RT Vol	0	0	38	7	0	232
Lane Flow Rate	95	188	44	21	52	270
Geometry Grp	4b	5	5	4b	5	5
Degree of Util (X)	0.149	0.315	0.059	0.032	0.08	0.349
Departure Headway (Hd)	5.657	6.042	4.869	5.407	5.513	4.663
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	630	592	729	654	648	769
Service Time	3.725	3.818	2.644	3.504	3.262	2.411
HCM Lane V/C Ratio	0.151	0.318	0.06	0.032	0.08	0.351
HCM Control Delay	9.7	11.6	8	8.7	8.7	9.9
HCM Lane LOS	A	B	A	A	A	A
HCM 95th-tile Q	0.5	1.3	0.2	0.1	0.3	1.6



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	169	186	157	75	127	87
Future Volume (vph)	169	186	157	75	127	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.5		4.0	5.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	0.90	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1595	1583	1742		1762	1863
Flt Permitted	0.95	1.00	1.00		0.47	1.00
Satd. Flow (perm)	1595	1583	1742		877	1863
Peak-hour factor, PHF	0.90	0.90	0.86	0.86	0.74	0.74
Adj. Flow (vph)	188	207	183	87	172	118
RTOR Reduction (vph)	0	127	8	0	0	0
Lane Group Flow (vph)	188	80	262	0	172	118
Confl. Peds. (#/hr)	47			11	11	
Confl. Bikes (#/hr)				37		
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1 12	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	18.8	18.8	36.8		62.9	42.6
Effective Green, g (s)	18.8	18.8	36.8		57.9	42.6
Actuated g/C Ratio	0.20	0.20	0.40		0.63	0.46
Clearance Time (s)	5.0	5.0	5.5			5.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	325	322	695		714	860
v/s Ratio Prot			c0.15		c0.04	0.06
v/s Ratio Perm	c0.12	0.05			0.11	
v/c Ratio	0.58	0.25	0.38		0.24	0.14
Uniform Delay, d1	33.1	30.8	19.6		7.5	14.2
Progression Factor	1.00	1.00	0.15		1.00	1.00
Incremental Delay, d2	2.5	0.4	0.3		0.2	0.1
Delay (s)	35.6	31.2	3.2		7.7	14.3
Level of Service	D	C	A		A	B
Approach Delay (s)	33.3		3.2			10.4
Approach LOS	C		A			B

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	92.2	Sum of lost time (s)	24.5
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		

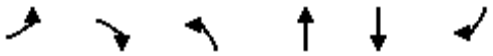
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	5	0	0	0	4	226	0	0	231	20
Future Volume (vph)	5	0	5	0	0	0	4	226	0	0	231	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0					4.0	5.5			5.5	5.5
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.99					1.00	1.00			1.00	1.00
Flpb, ped/bikes		1.00					1.00	1.00			1.00	1.00
Frt		0.93					1.00	1.00			1.00	0.85
Flt Protected		0.98					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1672					1770	1863			1863	1583
Flt Permitted		0.95					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1628					1770	1863			1863	1583
Peak-hour factor, PHF	0.50	0.50	0.50	0.92	0.92	0.92	0.79	0.79	0.79	0.82	0.82	0.82
Adj. Flow (vph)	10	0	10	0	0	0	5	286	0	0	282	24
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	2	0	0	0	0	5	286	0	0	282	24
Confl. Peds. (#/hr)			3	3					18	18		149
Confl. Bikes (#/hr)									125			143
Turn Type	custom	NA					Prot	NA		Perm	NA	custom
Protected Phases							5	2			6 3	6 3 4
Permitted Phases	12	12		11	11					6 3		
Actuated Green, G (s)		10.0					1.3	36.8			66.9	81.9
Effective Green, g (s)		10.0					1.3	36.8			66.9	76.9
Actuated g/C Ratio		0.11					0.01	0.40			0.73	0.83
Clearance Time (s)		5.0					4.0	5.5				
Vehicle Extension (s)		3.0					1.5	3.0				
Lane Grp Cap (vph)		176					24	743			1351	1320
v/s Ratio Prot							c0.00	c0.15			c0.15	c0.02
v/s Ratio Perm		0.00										
v/c Ratio		0.01					0.21	0.38			0.21	0.02
Uniform Delay, d1		36.7					44.9	19.7			4.1	1.3
Progression Factor		1.00					1.00	1.00			0.20	0.00
Incremental Delay, d2		0.0					1.6	0.3			0.1	0.0
Delay (s)		36.7					46.5	20.0			0.9	0.0
Level of Service		D					D	B			A	A
Approach Delay (s)		36.7			0.0			20.5			0.8	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	92.2	Sum of lost time (s)	24.5
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

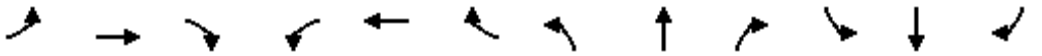
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	77	75	82	159	116	116
Future Volume (vph)	77	75	82	159	116	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.90
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1749	1583	1770	1863	1863	1419
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1749	1583	1770	1863	1863	1419
Peak-hour factor, PHF	0.77	0.77	0.79	0.79	0.80	0.80
Adj. Flow (vph)	100	97	104	201	145	145
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	100	97	104	201	145	145
Confl. Peds. (#/hr)	8					132
Confl. Bikes (#/hr)						130
Turn Type	Perm	Perm	Prot	NA	NA	custom
Protected Phases			5	2	6	8
Permitted Phases	4	4				6
Actuated Green, G (s)	9.0	9.0	6.9	45.2	33.8	42.8
Effective Green, g (s)	9.0	9.0	6.9	45.2	33.8	42.8
Actuated g/C Ratio	0.14	0.14	0.11	0.71	0.53	0.67
Clearance Time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Vehicle Extension (s)	3.0	3.0	1.5	3.0	3.0	0.2
Lane Grp Cap (vph)	247	223	191	1321	988	953
v/s Ratio Prot			c0.06	c0.11	0.08	0.02
v/s Ratio Perm	0.06	c0.06				0.08
v/c Ratio	0.40	0.43	0.54	0.15	0.15	0.15
Uniform Delay, d1	24.9	25.0	26.9	3.0	7.6	3.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	1.4	1.7	0.1	0.1	0.0
Delay (s)	26.0	26.4	28.6	3.1	7.7	3.8
Level of Service	C	C	C	A	A	A
Approach Delay (s)	26.2			11.8	5.8	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	63.7	Sum of lost time (s)	14.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	53	4	63	96	237	5	25	44	116	60	16
Future Volume (vph)	9	53	4	63	96	237	5	25	44	116	60	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		3.5	4.5	4.5	3.5	5.5		4.5	5.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.92		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1835		1770	1863	1538	1770	1547		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1835		1770	1863	1538	1770	1547		1770	1863	1583
Peak-hour factor, PHF	0.69	0.69	0.69	0.77	0.77	0.77	0.73	0.73	0.73	0.71	0.71	0.71
Adj. Flow (vph)	13	77	6	82	125	308	7	34	60	163	85	23
RTOR Reduction (vph)	0	0	0	0	0	172	0	47	0	0	0	0
Lane Group Flow (vph)	13	83	0	82	125	136	7	47	0	163	85	23
Confl. Peds. (#/hr)			19			35			27			136
Confl. Bikes (#/hr)									93			115
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	custom
Protected Phases	7	4		3	8	1	5	2 9		1	6 9	7 9
Permitted Phases						8						
Actuated Green, G (s)	2.6	9.5		6.1	12.5	33.3	0.7	16.2		20.8	37.3	7.3
Effective Green, g (s)	2.6	9.5		6.1	12.5	33.3	0.7	16.2		20.8	37.3	7.3
Actuated g/C Ratio	0.03	0.13		0.08	0.17	0.44	0.01	0.21		0.28	0.49	0.10
Clearance Time (s)	4.0	4.5		3.5	4.5	4.5	3.5			4.5		
Vehicle Extension (s)	1.5	1.5		1.5	1.5	3.0	1.5			3.0		
Lane Grp Cap (vph)	60	230		142	308	677	16	331		486	919	152
v/s Ratio Prot	0.01	0.05		c0.05	c0.07	0.06	0.00	c0.03		c0.09	0.05	c0.01
v/s Ratio Perm						0.03						
v/c Ratio	0.22	0.36		0.58	0.41	0.20	0.44	0.14		0.34	0.09	0.15
Uniform Delay, d1	35.5	30.3		33.5	28.2	13.0	37.3	24.1		21.9	10.2	31.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.4		3.5	0.3	0.1	6.8	0.3		0.4	0.1	0.2
Delay (s)	36.2	30.6		37.0	28.5	13.1	44.1	24.3		22.3	10.2	31.5
Level of Service	D	C		D	C	B	D	C		C	B	C
Approach Delay (s)		31.4			20.7			25.7			19.3	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	75.6	Sum of lost time (s)	23.5
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	7	16	51	50	43
Future Vol, veh/h	9	7	16	51	50	43
Peak Hour Factor	0.75	0.75	0.88	0.88	0.60	0.60
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	9	18	58	83	72
Number of Lanes	1	0	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	1
HCM Control Delay	7.4	7.8	7.7
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	SBLn1
Vol Left, %	100%	0%	56%	0%
Vol Thru, %	0%	100%	0%	54%
Vol Right, %	0%	0%	44%	46%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	16	51	16	93
LT Vol	16	0	9	0
Through Vol	0	51	0	50
RT Vol	0	0	7	43
Lane Flow Rate	18	58	21	155
Geometry Grp	5	5	2	4a
Degree of Util (X)	0.026	0.075	0.025	0.166
Departure Headway (Hd)	5.149	4.648	4.284	3.85
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	696	771	841	928
Service Time	2.877	2.376	2.284	1.888
HCM Lane V/C Ratio	0.026	0.075	0.025	0.167
HCM Control Delay	8	7.8	7.4	7.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.2	0.1	0.6

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	2	9	0	0	5	7	9	0	2	20	65
Future Vol, veh/h	50	2	9	0	0	5	7	9	0	2	20	65
Peak Hour Factor	0.69	0.69	0.69	0.75	0.75	0.75	0.56	0.56	0.56	0.77	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	72	3	13	0	0	7	13	16	0	3	26	84
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	1

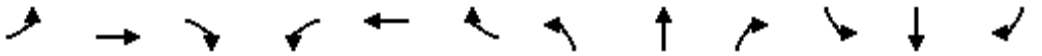
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	2
HCM Control Delay	8.4	7.4	8.2	7.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	44%	100%	0%	0%	9%	0%
Vol Thru, %	56%	0%	18%	0%	91%	0%
Vol Right, %	0%	0%	82%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	16	50	11	5	22	65
LT Vol	7	50	0	0	2	0
Through Vol	9	0	2	0	20	0
RT Vol	0	0	9	5	0	65
Lane Flow Rate	29	72	16	7	29	84
Geometry Grp	4b	5	5	4b	5	5
Degree of Util (X)	0.04	0.106	0.019	0.008	0.039	0.096
Departure Headway (Hd)	4.991	5.278	4.203	4.368	4.86	4.113
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	721	671	838	823	741	876
Service Time	2.994	3.072	1.997	2.375	2.56	1.813
HCM Lane V/C Ratio	0.04	0.107	0.019	0.009	0.039	0.096
HCM Control Delay	8.2	8.7	7.1	7.4	7.8	7.2
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.1	0.4	0.1	0	0.1	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	196	277	297	163	241	290
Future Volume (vph)	196	277	297	163	241	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.5		4.0	5.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	0.95	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1690	1583	1730		1767	1863
Flt Permitted	0.95	1.00	1.00		0.21	1.00
Satd. Flow (perm)	1690	1583	1730		398	1863
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.85	0.85
Adj. Flow (vph)	218	308	330	181	284	341
RTOR Reduction (vph)	0	158	11	0	0	0
Lane Group Flow (vph)	218	150	500	0	284	341
Confl. Peds. (#/hr)	19			16	16	
Confl. Bikes (#/hr)				26		
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1 12	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	23.4	23.4	40.0		70.9	45.8
Effective Green, g (s)	23.4	23.4	40.0		65.9	45.8
Actuated g/C Ratio	0.22	0.22	0.38		0.63	0.44
Clearance Time (s)	5.0	5.0	5.5			5.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	377	353	660		536	814
v/s Ratio Prot			c0.29		c0.11	0.18
v/s Ratio Perm	c0.13	0.09			0.22	
v/c Ratio	0.58	0.42	0.76		0.53	0.42
Uniform Delay, d1	36.3	34.9	28.2		12.7	20.3
Progression Factor	1.00	1.00	0.26		1.00	1.00
Incremental Delay, d2	2.1	0.8	3.4		0.9	0.4
Delay (s)	38.4	35.7	10.9		13.7	20.7
Level of Service	D	D	B		B	C
Approach Delay (s)	36.9		10.9			17.5
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	104.8	Sum of lost time (s)	24.5
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		

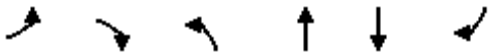
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	14	0	0	0	5	450	0	4	466	18
Future Volume (vph)	18	0	14	0	0	0	5	450	0	4	466	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0					4.0	5.5		5.5	5.5	5.5
Lane Util. Factor		1.00					1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		0.99					1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes		1.00					1.00	1.00		0.99	1.00	1.00
Frt		0.94					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.97					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1683					1770	1863		1753	1863	1583
Flt Permitted		0.95					0.95	1.00		0.32	1.00	1.00
Satd. Flow (perm)		1644					1770	1863		587	1863	1583
Peak-hour factor, PHF	0.64	0.64	0.64	0.92	0.92	0.92	0.90	0.90	0.90	0.85	0.85	0.85
Adj. Flow (vph)	28	0	22	0	0	0	6	500	0	5	548	21
RTOR Reduction (vph)	0	43	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	7	0	0	0	0	6	500	0	5	548	21
Confl. Peds. (#/hr)			3	3					19	19		119
Confl. Bikes (#/hr)									193			207
Turn Type	custom	NA					Prot	NA		Perm	NA	custom
Protected Phases							5	2			6 3	6 3 4
Permitted Phases	12	12		11	11					6 3		
Actuated Green, G (s)		14.8					1.3	40.0		74.7	74.7	94.5
Effective Green, g (s)		14.8					1.3	40.0		74.7	74.7	89.5
Actuated g/C Ratio		0.14					0.01	0.38		0.71	0.71	0.85
Clearance Time (s)		5.0					4.0	5.5				
Vehicle Extension (s)		3.0					1.5	3.0				
Lane Grp Cap (vph)		232					21	711		418	1327	1351
v/s Ratio Prot							c0.00	c0.27			c0.29	0.01
v/s Ratio Perm		c0.00								0.01		
v/c Ratio		0.03					0.29	0.70		0.01	0.41	0.02
Uniform Delay, d1		38.8					51.3	27.4		4.4	6.1	1.1
Progression Factor		1.00					1.00	1.00		0.16	0.11	0.01
Incremental Delay, d2		0.1					2.7	3.2		0.0	0.2	0.0
Delay (s)		38.9					54.0	30.5		0.7	0.9	0.0
Level of Service		D					D	C		A	A	A
Approach Delay (s)		38.9			0.0			30.8			0.9	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	104.8	Sum of lost time (s)	24.5
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

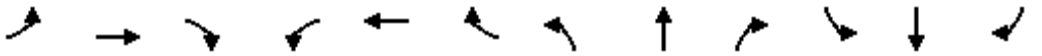
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	157	125	151	264	289	221
Future Volume (vph)	157	125	151	264	289	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.89
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1547	1770	1863	1863	1411
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1547	1770	1863	1863	1411
Peak-hour factor, PHF	0.86	0.86	0.85	0.85	0.86	0.86
Adj. Flow (vph)	183	145	178	311	336	257
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	183	145	178	311	336	257
Confl. Peds. (#/hr)		2				145
Confl. Bikes (#/hr)						156
Turn Type	Perm	Perm	Prot	NA	NA	custom
Protected Phases			5	2	6	8
Permitted Phases	4	4				6
Actuated Green, G (s)	13.1	13.1	11.2	46.2	30.5	43.6
Effective Green, g (s)	13.1	13.1	11.2	46.2	30.5	43.6
Actuated g/C Ratio	0.19	0.19	0.16	0.67	0.44	0.63
Clearance Time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Vehicle Extension (s)	3.0	3.0	1.5	3.0	3.0	0.2
Lane Grp Cap (vph)	337	294	288	1251	825	894
v/s Ratio Prot			c0.10	0.17	c0.18	0.05
v/s Ratio Perm	c0.10	0.09				0.13
v/c Ratio	0.54	0.49	0.62	0.25	0.41	0.29
Uniform Delay, d1	25.1	24.9	26.8	4.5	13.0	5.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	1.3	2.8	0.1	0.3	0.1
Delay (s)	26.9	26.2	29.6	4.6	13.3	5.7
Level of Service	C	C	C	A	B	A
Approach Delay (s)	26.6			13.7	10.0	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	68.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	89	9	127	68	384	7	66	140	295	115	25
Future Volume (vph)	16	89	9	127	68	384	7	66	140	295	115	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		3.5	4.5	4.5	3.5	5.5		4.5	5.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.97	1.00	0.91		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1821		1770	1863	1530	1770	1524		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1821		1770	1863	1530	1770	1524		1770	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.77	0.77	0.77	0.90	0.90	0.90
Adj. Flow (vph)	17	96	10	137	73	413	9	86	182	328	128	28
RTOR Reduction (vph)	0	0	0	0	0	242	0	67	0	0	0	0
Lane Group Flow (vph)	17	106	0	137	73	171	9	201	0	328	128	28
Confl. Peds. (#/hr)			30			26			23			137
Confl. Bikes (#/hr)						1			136			187
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	custom
Protected Phases	7	4		3	8	1	5	2 9		1	6 9	7 9
Permitted Phases						8						
Actuated Green, G (s)	3.1	11.0		10.7	18.1	39.3	0.9	29.2		21.2	50.5	12.0
Effective Green, g (s)	3.1	11.0		10.7	18.1	39.3	0.9	29.2		21.2	50.5	12.0
Actuated g/C Ratio	0.03	0.12		0.11	0.19	0.41	0.01	0.31		0.22	0.53	0.13
Clearance Time (s)	4.0	4.5		3.5	4.5	4.5	3.5			4.5		
Vehicle Extension (s)	1.5	1.5		1.5	1.5	3.0	1.5			3.0		
Lane Grp Cap (vph)	57	210		199	354	632	16	467		394	989	199
v/s Ratio Prot	0.01	c0.06		c0.08	0.04	0.06	0.01	c0.13		c0.19	0.07	0.02
v/s Ratio Perm						0.05						
v/c Ratio	0.30	0.50		0.69	0.21	0.27	0.56	0.43		0.83	0.13	0.14
Uniform Delay, d1	44.9	39.5		40.6	32.4	18.4	46.9	26.3		35.3	11.2	37.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	0.7		7.7	0.1	0.2	24.2	0.9		13.9	0.1	0.1
Delay (s)	46.0	40.2		48.3	32.6	18.7	71.1	27.2		49.2	11.3	37.1
Level of Service	D	D		D	C	B	E	C		D	B	D
Approach Delay (s)		41.0			26.8			28.6			38.5	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	95.1	Sum of lost time (s)	23.5
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	53	39	44	91	132	70
Future Vol, veh/h	53	39	44	91	132	70
Peak Hour Factor	0.73	0.73	0.87	0.87	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	53	51	105	147	78
Number of Lanes	1	0	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	1
HCM Control Delay	8.6	8.6	8.9
HCM LOS	A	A	A

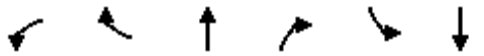
Lane	NBLn1	NBLn2	EBLn1	SBLn1
Vol Left, %	100%	0%	58%	0%
Vol Thru, %	0%	100%	0%	65%
Vol Right, %	0%	0%	42%	35%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	44	91	92	202
LT Vol	44	0	53	0
Through Vol	0	91	0	132
RT Vol	0	0	39	70
Lane Flow Rate	51	105	126	224
Geometry Grp	5	5	2	4a
Degree of Util (X)	0.077	0.146	0.163	0.269
Departure Headway (Hd)	5.514	5.011	4.661	4.318
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	651	716	770	833
Service Time	3.237	2.734	2.685	2.338
HCM Lane V/C Ratio	0.078	0.147	0.164	0.269
HCM Control Delay	8.7	8.6	8.6	8.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.2	0.5	0.6	1.1

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	134	2	27	0	2	14	11	32	0	23	57	125
Future Vol, veh/h	134	2	27	0	2	14	11	32	0	23	57	125
Peak Hour Factor	0.80	0.80	0.80	0.56	0.56	0.56	0.55	0.55	0.55	0.82	0.82	0.82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	168	3	34	0	4	25	20	58	0	28	70	152
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	2
HCM Control Delay	10.2	8.4	9.3	8.7
HCM LOS	B	A	A	A

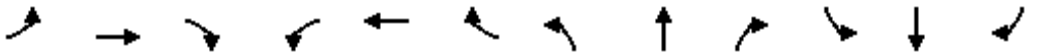
Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	26%	100%	0%	0%	29%	0%
Vol Thru, %	74%	0%	7%	12%	71%	0%
Vol Right, %	0%	0%	93%	88%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	43	134	29	16	80	125
LT Vol	11	134	0	0	23	0
Through Vol	32	0	2	2	57	0
RT Vol	0	0	27	14	0	125
Lane Flow Rate	78	168	36	29	98	152
Geometry Grp	4b	5	5	4b	5	5
Degree of Util (X)	0.12	0.272	0.047	0.04	0.147	0.193
Departure Headway (Hd)	5.517	5.855	4.697	5.086	5.41	4.561
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	648	611	759	700	662	785
Service Time	3.566	3.606	2.447	3.149	3.149	2.3
HCM Lane V/C Ratio	0.12	0.275	0.047	0.041	0.148	0.194
HCM Control Delay	9.3	10.8	7.7	8.4	9.1	8.4
HCM Lane LOS	A	B	A	A	A	A
HCM 95th-tile Q	0.4	1.1	0.1	0.1	0.5	0.7



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	243	282	340	200	235	346
Future Volume (vph)	243	282	340	200	235	346
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.5		4.0	5.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	0.92	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1637	1583	1732		1769	1863
Flt Permitted	0.95	1.00	1.00		0.11	1.00
Satd. Flow (perm)	1637	1583	1732		210	1863
Peak-hour factor, PHF	0.84	0.84	0.93	0.93	0.77	0.77
Adj. Flow (vph)	289	336	366	215	305	449
RTOR Reduction (vph)	0	125	12	0	0	0
Lane Group Flow (vph)	289	211	569	0	305	449
Confl. Peds. (#/hr)	29			13	13	
Confl. Bikes (#/hr)				15		
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1 12	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	29.1	29.1	40.4		72.9	43.0
Effective Green, g (s)	29.1	29.1	40.4		67.9	43.0
Actuated g/C Ratio	0.26	0.26	0.35		0.60	0.38
Clearance Time (s)	5.0	5.0	5.5			5.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	418	404	614		466	703
v/s Ratio Prot			c0.33		c0.14	0.24
v/s Ratio Perm	c0.18	0.13			0.25	
v/c Ratio	0.69	0.52	0.93		0.65	0.64
Uniform Delay, d1	38.3	36.4	35.3		24.7	29.1
Progression Factor	1.00	1.00	0.24		1.00	1.00
Incremental Delay, d2	4.9	1.2	12.3		3.3	1.9
Delay (s)	43.2	37.6	20.8		27.9	31.0
Level of Service	D	D	C		C	C
Approach Delay (s)	40.2		20.8			29.8
Approach LOS	D		C			C

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	113.9	Sum of lost time (s)	24.5
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

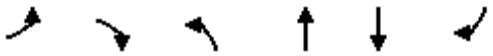
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	0	50	0	0	0	23	523	0	0	554	34
Future Volume (vph)	16	0	50	0	0	0	23	523	0	0	554	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0					4.0	5.5			5.5	5.5
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frpb, ped/bikes		1.00					1.00	1.00			1.00	1.00
Flpb, ped/bikes		1.00					1.00	1.00			1.00	1.00
Frt		0.90					1.00	1.00			1.00	0.85
Flt Protected		0.99					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1652					1770	1863			1863	1583
Flt Permitted		0.95					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1588					1770	1863			1863	1583
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.94	0.94	0.94	0.87	0.87	0.87
Adj. Flow (vph)	21	0	67	0	0	0	24	556	0	0	637	39
RTOR Reduction (vph)	0	74	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	14	0	0	0	0	24	556	0	0	637	39
Confl. Peds. (#/hr)									57	57		4
Confl. Bikes (#/hr)									87			125
Turn Type	custom	NA					Prot	NA		Perm	NA	custom
Protected Phases							5	2			6 3	6 3 4
Permitted Phases	12	12		11	11					6 3		
Actuated Green, G (s)		17.8					4.5	40.4			77.6	100.4
Effective Green, g (s)		17.8					4.5	40.4			77.6	95.4
Actuated g/C Ratio		0.16					0.04	0.35			0.68	0.84
Clearance Time (s)		5.0					4.0	5.5				
Vehicle Extension (s)		3.0					1.5	3.0				
Lane Grp Cap (vph)		248					69	660			1269	1325
v/s Ratio Prot							c0.01	c0.30			c0.34	0.02
v/s Ratio Perm		c0.01										
v/c Ratio		0.06					0.35	0.84			0.50	0.03
Uniform Delay, d1		40.9					53.3	33.8			8.8	1.5
Progression Factor		1.00					1.00	1.00			0.15	0.00
Incremental Delay, d2		0.1					1.1	9.6			0.2	0.0
Delay (s)		41.0					54.4	43.4			1.6	0.0
Level of Service		D					D	D			A	A
Approach Delay (s)		41.0			0.0			43.8			1.5	
Approach LOS		D			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	113.9	Sum of lost time (s)	24.5
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

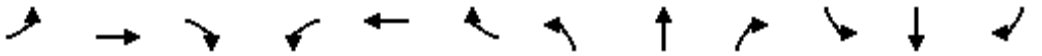
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	189	173	133	343	388	214
Future Volume (vph)	189	173	133	343	388	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1547	1770	1863	1863	1491
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1547	1770	1863	1863	1491
Peak-hour factor, PHF	0.89	0.89	0.94	0.94	0.96	0.96
Adj. Flow (vph)	212	194	141	365	404	223
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	212	194	141	365	404	223
Confl. Peds. (#/hr)		2				55
Confl. Bikes (#/hr)						111
Turn Type	Perm	Perm	Prot	NA	NA	custom
Protected Phases			5	2	6	8
Permitted Phases	4	4				6
Actuated Green, G (s)	14.2	14.2	10.2	45.5	30.8	45.0
Effective Green, g (s)	14.2	14.2	10.2	45.5	30.8	45.0
Actuated g/C Ratio	0.21	0.21	0.15	0.66	0.45	0.65
Clearance Time (s)	4.5	4.5	4.5	5.0	5.0	4.5
Vehicle Extension (s)	3.0	3.0	1.5	3.0	3.0	0.2
Lane Grp Cap (vph)	363	317	260	1224	829	969
v/s Ratio Prot			c0.08	0.20	c0.22	0.05
v/s Ratio Perm	0.12	c0.13				0.10
v/c Ratio	0.58	0.61	0.54	0.30	0.49	0.23
Uniform Delay, d1	24.8	25.0	27.3	5.0	13.6	5.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.4	3.5	1.2	0.1	0.5	0.0
Delay (s)	27.2	28.5	28.6	5.2	14.1	5.0
Level of Service	C	C	C	A	B	A
Approach Delay (s)	27.8			11.7	10.8	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	69.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	104	7	213	86	523	5	122	143	386	142	62
Future Volume (vph)	51	104	7	213	86	523	5	122	143	386	142	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		3.5	4.5	4.5	3.5	5.5		4.5	5.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.95	1.00	0.95		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1836		1770	1863	1506	1770	1622		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1836		1770	1863	1506	1770	1622		1770	1863	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.99	0.99	0.99	0.78	0.78	0.78	0.84	0.84	0.84
Adj. Flow (vph)	66	135	9	215	87	528	6	156	183	460	169	74
RTOR Reduction (vph)	0	0	0	0	0	228	0	34	0	0	0	0
Lane Group Flow (vph)	66	144	0	215	87	300	6	305	0	460	169	74
Confl. Peds. (#/hr)			23			38			27			85
Confl. Bikes (#/hr)									67			98
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	custom
Protected Phases	7	4		3	8	1	5	2 9		1	6 9	7 9
Permitted Phases						8						
Actuated Green, G (s)	6.6	14.8		15.2	22.9	53.3	1.0	32.2		30.4	62.6	17.6
Effective Green, g (s)	6.6	14.8		15.2	22.9	53.3	1.0	32.2		30.4	62.6	17.6
Actuated g/C Ratio	0.06	0.13		0.13	0.20	0.46	0.01	0.28		0.26	0.54	0.15
Clearance Time (s)	4.0	4.5		3.5	4.5	4.5	3.5			4.5		
Vehicle Extension (s)	1.5	1.5		1.5	1.5	3.0	1.5			3.0		
Lane Grp Cap (vph)	101	235		232	369	694	15	451		465	1008	241
v/s Ratio Prot	0.04	c0.08		c0.12	0.05	0.11	0.00	c0.19		c0.26	0.09	0.05
v/s Ratio Perm						0.09						
v/c Ratio	0.65	0.61		0.93	0.24	0.43	0.40	0.68		0.99	0.17	0.31
Uniform Delay, d1	53.4	47.7		49.6	39.0	21.0	57.0	37.1		42.4	13.4	43.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.0	3.3		38.7	0.1	0.4	6.3	4.4		38.5	0.1	0.3
Delay (s)	64.4	51.0		88.3	39.1	21.4	63.3	41.4		80.9	13.5	43.8
Level of Service	E	D		F	D	C	E	D		F	B	D
Approach Delay (s)		55.2			40.6			41.8			60.8	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	49.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	115.6	Sum of lost time (s)	23.5
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	10
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	106	36	64	187	178	41
Future Vol, veh/h	106	36	64	187	178	41
Peak Hour Factor	0.86	0.86	0.82	0.82	0.93	0.93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	123	42	78	228	191	44
Number of Lanes	1	0	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	1
HCM Control Delay	9.9	10.2	9.9
HCM LOS	A	B	A

Lane	NBLn1	NBLn2	EBLn1	SBLn1
Vol Left, %	100%	0%	75%	0%
Vol Thru, %	0%	100%	0%	81%
Vol Right, %	0%	0%	25%	19%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	64	187	142	219
LT Vol	64	0	106	0
Through Vol	0	187	0	178
RT Vol	0	0	36	41
Lane Flow Rate	78	228	165	235
Geometry Grp	5	5	2	4a
Degree of Util (X)	0.123	0.328	0.238	0.309
Departure Headway (Hd)	5.677	5.174	5.182	4.721
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	629	693	690	758
Service Time	3.43	2.926	3.239	2.775
HCM Lane V/C Ratio	0.124	0.329	0.239	0.31
HCM Control Delay	9.2	10.5	9.9	9.9
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.4	1.4	0.9	1.3

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	176	2	38	0	2	7	14	73	0	13	32	232
Future Vol, veh/h	176	2	38	0	2	7	14	73	0	13	32	232
Peak Hour Factor	0.91	0.91	0.91	0.42	0.42	0.42	0.92	0.92	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	193	2	42	0	5	17	15	79	0	15	37	270
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	2
HCM Control Delay	11	8.7	9.8	9.8
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	16%	100%	0%	0%	29%	0%
Vol Thru, %	84%	0%	5%	22%	71%	0%
Vol Right, %	0%	0%	95%	78%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	176	40	9	45	232
LT Vol	14	176	0	0	13	0
Through Vol	73	0	2	2	32	0
RT Vol	0	0	38	7	0	232
Lane Flow Rate	95	193	44	21	52	270
Geometry Grp	4b	5	5	4b	5	5
Degree of Util (X)	0.149	0.325	0.059	0.032	0.08	0.351
Departure Headway (Hd)	5.678	6.045	4.872	5.418	5.532	4.682
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	628	592	728	653	646	766
Service Time	3.747	3.822	2.647	3.518	3.281	2.431
HCM Lane V/C Ratio	0.151	0.326	0.06	0.032	0.08	0.352
HCM Control Delay	9.8	11.7	8	8.7	8.8	10
HCM Lane LOS	A	B	A	A	A	A
HCM 95th-tile Q	0.5	1.4	0.2	0.1	0.3	1.6

Appendix D

Existing Parking Data

2024 Season: Paid Seaside Lagoon Visitors

Visit Date	CHILD Count	ADULT Count
5/25/2024	63	68
5/26/2024	82	114
5/27/2024	159	138
5/30/2024	72	24
5/31/2024	94	24
6/1/2024	73	49
6/2/2024	73	85
6/3/2024	8	7
6/4/2024	135	39
6/5/2024	24	19
6/6/2024	44	23
6/7/2024	45	52
6/8/2024	108	127
6/9/2024	132	132
6/10/2024	27	22
6/11/2024	18	12
6/12/2024	103	54
6/13/2024	111	126
6/14/2024	102	79
6/15/2024	416	391
6/16/2024	220	260
6/17/2024	63	47
6/18/2024	81	80
6/19/2024	413	350
6/20/2024	138	103
6/21/2024	321	308
6/22/2024	463	502
6/23/2024	594	712
6/24/2024	181	168
6/25/2024	272	213
6/26/2024	234	189
6/27/2024	314	263
6/28/2024	474	293
6/29/2024	456	526
6/30/2024	537	583
7/1/2024	187	256
7/2/2024	235	301
7/3/2024	248	268
7/4/2024	637	534
7/5/2024	534	562
7/6/2024	574	519
7/7/2024	656	541
7/8/2024	120	176
7/9/2024	134	174
7/10/2024	219	260
7/11/2024	157	219
7/12/2024	153	172
7/13/2024	593	500
7/14/2024	622	460
7/15/2024	156	182
7/16/2024	164	187
7/17/2024	171	213
7/18/2024	240	291
7/19/2024	276	362
7/20/2024	593	498
7/21/2024	586	564
7/22/2024	151	192
7/23/2024	187	266
7/24/2024	188	249
7/25/2024	176	269
7/26/2024	249	297
7/27/2024	623	508
7/28/2024	662	519
7/29/2024	175	165
7/30/2024	136	175
7/31/2024	151	162
8/1/2024	107	145
8/2/2024	268	292
8/3/2024	418	362
8/4/2024	398	328
8/5/2024	206	226
8/6/2024	193	235
8/7/2024	151	226
8/8/2024	185	272
8/9/2024	210	264
8/10/2024	437	378
8/11/2024	422	296
8/12/2024	95	146
8/13/2024	91	110
8/14/2024	116	131
8/15/2024	103	145
8/16/2024	203	196
8/17/2024	374	276
8/18/2024	393	285
8/19/2024	112	154
8/20/2024	72	87
8/21/2024	101	139
8/22/2024	69	54
8/23/2024	63	57
8/24/2024	375	267
8/25/2024	438	327
8/26/2024	62	68
8/27/2024	42	34
8/28/2024	20	12
8/29/2024	15	19
8/30/2024	136	53
8/31/2024	308	222
9/1/2024	332	278
9/2/2024	391	332
	Median	**213**

Redondo Beach Marina
Parking Lot Utilization
Friday, October 4th, 2024

Time	Parking Zone	Parking Zone	
	North Lot	South Lot	
6:00 AM	2	2	4
6:10 AM	2	4	6
6:20 AM	3	3	6
6:30 AM	3	3	6
6:40 AM	4	2	6
6:50 AM	4	2	6
7:00 AM	4	6	10
7:10 AM	4	8	12
7:20 AM	6	10	16
7:30 AM	8	10	18
7:40 AM	10	6	16
7:50 AM	11	11	22
8:00 AM	12	12	24
8:10 AM	12	12	24
8:20 AM	12	12	24
8:30 AM	13	14	27
8:40 AM	13	15	28
8:50 AM	13	15	28
9:00 AM	15	13	28
9:10 AM	16	13	29
9:20 AM	18	12	30
9:30 AM	19	12	31
9:40 AM	20	13	33
9:50 AM	19	14	33
10:00 AM	19	15	34
10:10 AM	23	17	40
10:20 AM	24	19	43
10:30 AM	25	22	47
10:40 AM	26	25	51
10:50 AM	28	23	51
11:00 AM	26	28	54
11:10 AM	25	26	51
11:20 AM	24	28	52
11:30 AM	23	30	53
11:40 AM	20	33	53
11:50 AM	21	39	60
12:00 PM	25	40	65
12:10 PM	21	46	67
12:20 PM	21	54	75
12:30 PM	22	60	82
12:40 PM	24	65	89
12:50 PM	24	72	96
1:00 PM	23	72	95
1:10 PM	23	72	95
1:20 PM	23	74	97
1:30 PM	24	76	100
1:40 PM	24	73	97
1:50 PM	23	75	98
2:00 PM	23	81	104
2:10 PM	23	77	100
2:20 PM	20	81	101
2:30 PM	19	78	97
2:40 PM	17	81	98
2:50 PM	19	77	96
3:00 PM	17	72	89
3:10 PM	16	78	94
3:20 PM	16	81	97
3:30 PM	12	80	92
3:40 PM	11	80	91
3:50 PM	8	78	86
4:00 PM	7	80	87
4:10 PM	8	78	86
4:20 PM	6	83	89
4:30 PM	6	81	87
4:40 PM	6	83	89
4:50 PM	6	85	91
5:00 PM	6	91	97
5:10 PM	6	92	98
5:20 PM	6	92	98
5:30 PM	7	101	108
5:40 PM	6	103	109
5:50 PM	6	108	114
6:00 PM	4	107	111

Redondo Beach Marina
Parking Lot Utilization
Saturday, October 5th, 2024

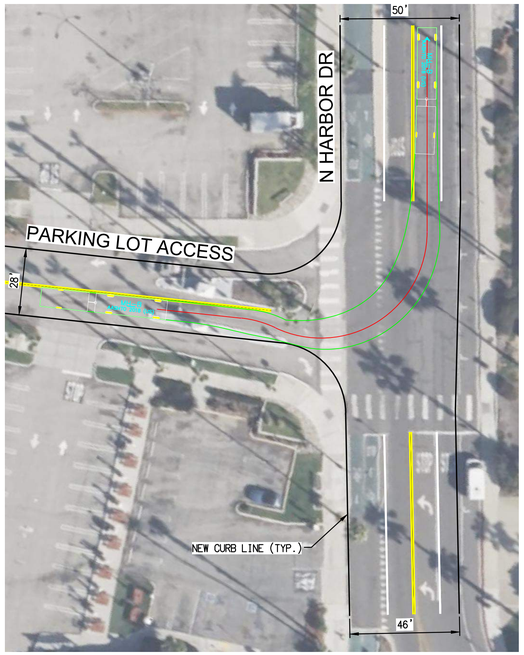
Time	Parking Zone	Parking Zone	
	North Lot	South Lot	Total
6:00 AM	4	11	15
6:10 AM	4	16	20
6:20 AM	4	17	21
6:30 AM	4	19	23
6:40 AM	5	21	26
6:50 AM	6	25	31
7:00 AM	5	30	35
7:10 AM	5	34	39
7:20 AM	5	37	42
7:30 AM	5	32	37
7:40 AM	5	32	37
7:50 AM	6	31	37
8:00 AM	7	31	38
8:10 AM	7	30	37
8:20 AM	7	31	38
8:30 AM	7	32	39
8:40 AM	7	33	40
8:50 AM	7	33	40
9:00 AM	7	35	42
9:10 AM	7	35	42
9:20 AM	7	34	41
9:30 AM	8	39	47
9:40 AM	9	40	49
9:50 AM	11	42	53
10:00 AM	13	43	56
10:10 AM	13	43	56
10:20 AM	13	47	60
10:30 AM	13	50	63
10:40 AM	13	52	65
10:50 AM	12	55	67
11:00 AM	12	57	69
11:10 AM	12	57	69
11:20 AM	12	59	71
11:30 AM	12	67	79
11:40 AM	12	67	79
11:50 AM	12	69	81
12:00 PM	13	74	87
12:10 PM	11	76	87
12:20 PM	9	82	91
12:30 PM	6	89	95
12:40 PM	6	90	96
12:50 PM	6	81	87
1:00 PM	7	81	88
1:10 PM	8	77	85
1:20 PM	8	79	87
1:30 PM	9	85	94
1:40 PM	9	85	94
1:50 PM	9	85	94
2:00 PM	9	91	100
2:10 PM	7	96	103
2:20 PM	7	97	104
2:30 PM	7	99	106
2:40 PM	6	97	103
2:50 PM	6	94	100
3:00 PM	6	96	102
3:10 PM	5	90	95
3:20 PM	5	90	95
3:30 PM	5	91	96
3:40 PM	5	95	100
3:50 PM	4	100	104
4:00 PM	4	106	110
4:10 PM	4	112	116
4:20 PM	3	116	119
4:30 PM	3	17	20
4:40 PM	3	18	21
4:50 PM	4	16	20
5:00 PM	4	120	124
5:10 PM	3	119	122
5:20 PM	3	114	117
5:30 PM	4	118	122
5:40 PM	4	19	23
5:50 PM	5	111	116
6:00 PM	5	101	106

Redondo Beach Marina
Parking Lot Utilization
Sunday, October 6th, 2024

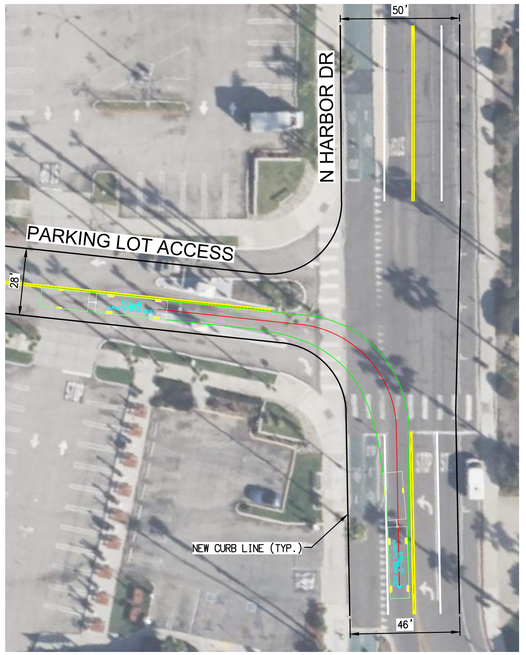
Time	Parking Zone	Parking Zone	
	North Lot	South Lot	
6:00 AM	3	9	12
6:10 AM	3	12	15
6:20 AM	3	14	17
6:30 AM	3	16	19
6:40 AM	3	19	22
6:50 AM	3	24	27
7:00 AM	3	26	29
7:10 AM	3	31	34
7:20 AM	4	37	41
7:30 AM	4	37	41
7:40 AM	5	39	44
7:50 AM	8	37	45
8:00 AM	8	37	45
8:10 AM	10	36	46
8:20 AM	13	35	48
8:30 AM	18	34	52
8:40 AM	24	34	58
8:50 AM	31	34	65
9:00 AM	34	38	72
9:10 AM	58	40	98
9:20 AM	65	45	110
9:30 AM	75	46	121
9:40 AM	81	47	128
9:50 AM	83	50	133
10:00 AM	80	56	136
10:10 AM	75	59	134
10:20 AM	62	66	128
10:30 AM	54	71	125
10:40 AM	47	74	121
10:50 AM	28	84	112
11:00 AM	20	90	110
11:10 AM	13	93	106
11:20 AM	10	89	99
11:30 AM	10	86	96
11:40 AM	9	87	96
11:50 AM	8	88	96
12:00 PM	7	92	99
12:10 PM	8	99	107
12:20 PM	7	106	113
12:30 PM	6	101	107
12:40 PM	6	100	106
12:50 PM	6	103	109
1:00 PM	8	103	111
1:10 PM	10	103	113
1:20 PM	8	103	111
1:30 PM	8	102	110
1:40 PM	7	102	109
1:50 PM	7	103	110
2:00 PM	9	104	113
2:10 PM	10	105	115
2:20 PM	10	99	109
2:30 PM	10	89	99
2:40 PM	10	96	106
2:50 PM	10	86	96
3:00 PM	9	88	97
3:10 PM	9	89	98
3:20 PM	9	85	94
3:30 PM	11	86	97
3:40 PM	10	85	95
3:50 PM	10	90	100
4:00 PM	10	89	99
4:10 PM	7	92	99
4:20 PM	6	95	101
4:30 PM	6	96	102
4:40 PM	6	97	103
4:50 PM	5	98	103
5:00 PM	5	98	103
5:10 PM	5	97	102
5:20 PM	5	106	111
5:30 PM	5	107	112
5:40 PM	4	105	109
5:50 PM	4	101	105
6:00 PM	4	99	103

Appendix E

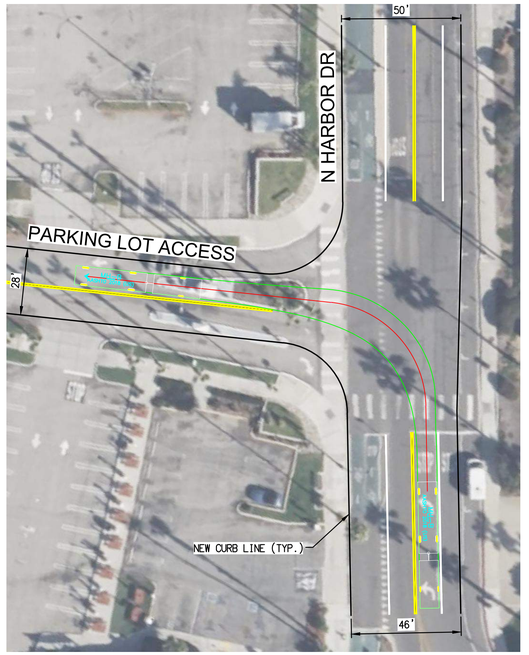
Proposed Project Site Design Layout - Turn Template



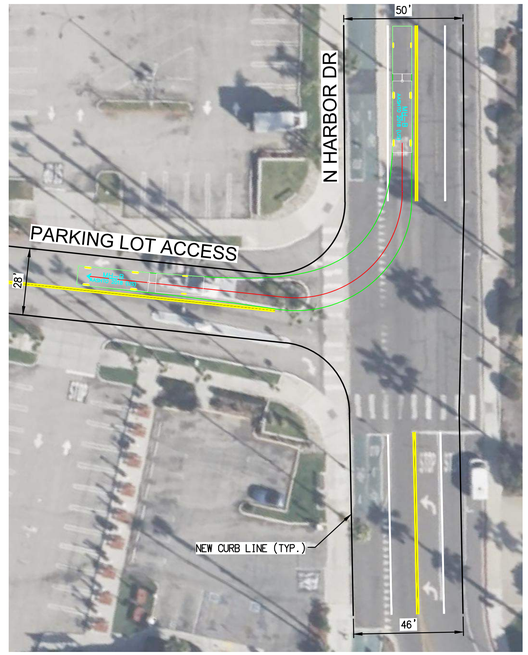
EASTBOUND LEFT MOVEMENT



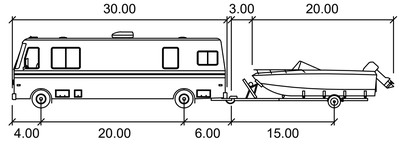
EASTBOUND RIGHT MOVEMENT



NORTHBOUND LEFT MOVEMENT

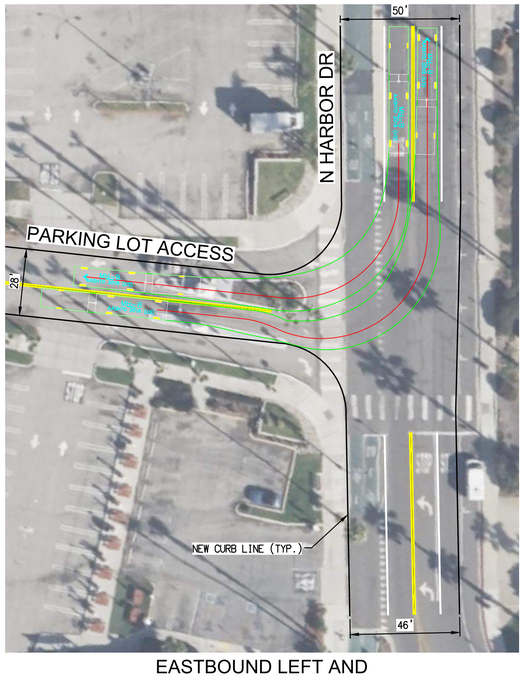


SOUTHBOUND RIGHT MOVEMENT

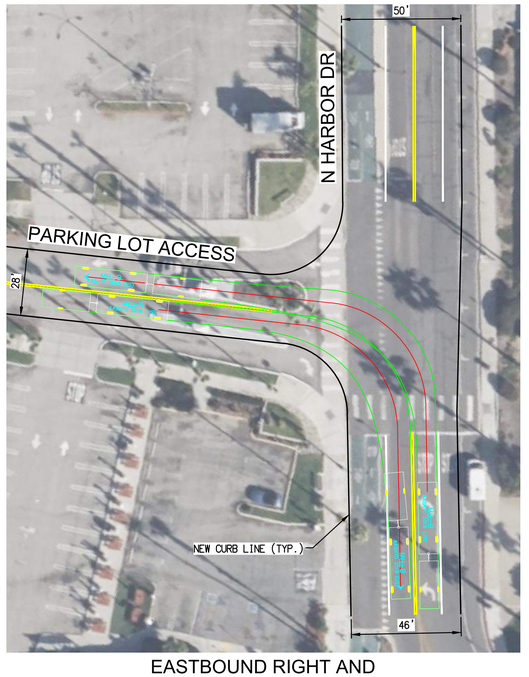


MH-B

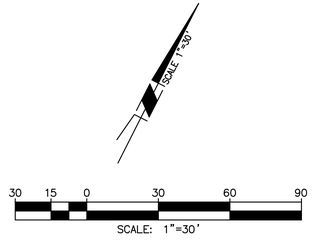
	feet		
MH Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.00	Steering Angle	: 25.8
MH Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.00		



EASTBOUND LEFT AND
SOUTHBOUND RIGHT
MOVEMENTS



EASTBOUND RIGHT AND
NORTHBOUND LEFT
MOVEMENTS



N. HARBOR DR

EXISTING RESTAURANT, PROTECT IN PLACE

EXISTING RESTAURANT, PROTECT IN PLACE

POTENTIALLY REPURPOSE FOR FOSS DOCK

MINIMUM AREA OF EXISTING DOCK TO BE DEMOLISHED

15% SLOPE

LANE #2

LANE #1

8'-0"

75'-0" CHANNEL WIDTH

40'-0"

40'-0"

20'-0"

30'-0"

75'-0"

126'-8"

50'-0" FAIRWAY LENGTH

NEW MARINA TENANT RESTROOMS

10'

50'

35'

9'

20'

14.25'

9'

20'

65'

46'

12'

Area to the north of the plan (not a part) currently includes 24 Boat + Trailer parking spaces and 206 regular spaces.

GREEN SPACE

EXISTING BUILDING, PROTECT IN PLACE

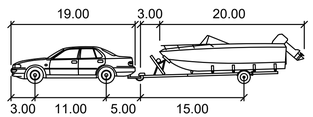
EXISTING RESTAURANT, PROTECT IN PLACE

GREEN SPACE

APPROXIMATE LOCATION OF DISCHARGE STRUCTURE

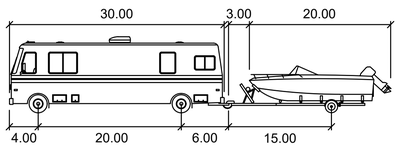
SCALE 1"=40'

MARINA BOAT TRAFFIC PATH



P-B

	feet
Car Width	: 7.00
Trailer Width	: 8.00
Car Track	: 6.00
Trailer Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 31.6
Articulating Angle	: 70.0



MH-B

	feet		
MH Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.00	Steering Angle	: 25.8
MH Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.00		

Not for construction. Further design required

40 20 0 40 80 120

SCALE: 1"=40'

Administrative Report

M.1., **File #** HC25-1418 **Meeting Date:** 10/13/2025

TO: HARBOR COMMISSION

FROM: GREG KAPOVICH, WATERFRONT & ECONOMIC DEVELOPMENT DIRECTOR

TITLE
LIAISON'S REPORT

RECOMMENDATION
Receive and file a report from the Waterfront & Economic Development Director on current and upcoming waterfront projects and activities.

EXECUTIVE SUMMARY
An oral report will be provided by the Waterfront & Economic Development Director at the Commission meeting on current and upcoming waterfront projects and activities including, but not limited to, property management and leasing activities, project updates, events and other information.