MAY 2015

HONOLULU COMPLETE STREETS IMPLEMENTATION STUDY LOCATION REPORT

Kalakaua Avenue from Kapiolani Boulevard to Ala Wai Boulevard (FINAL)

City & County of Honolulu

Department of Transportation Services

Prepared by
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With

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Summary: Kalakaua Avenue from Kapiolani to Ala Wai Boulevards

Primary Urban Center Planning Area, Kapahulu Sub-Area, Council District IV

NEED FOR PROJECT

Kalakaua Avenue already serves a large number of drivers, pedestrians, and cyclists, but people on foot are forced to cross one intersection with multiple movements (due to the lack of crosswalks on all intersection legs) and cyclists must ride in the street with high-volume auto traffic. As a major conduit into Waikiki and a link to the Convention Center, this study area requires extra care to ensure that people visiting Hawai'i find conditions safe and attractive.

Applying Complete Streets to this location will: 1) create safer street crossings, 2) strengthen the sense of arrival into Waikiki, 3) encourage walking and biking in Waikiki by improving connectivity.

SUMMARY OF RECOMMENDATIONS

The recommendations for Kalakaua Avenue will create a street environment that is inviting, safe, and emphasizes pedestrian activities. The proposed improvements are designed to slow vehicle speeds and create a welcoming transition into and out of Waikiki for multi-modal transportation users. Recommendations include:

- Reduce turning radius to shorten pedestrian crossing distances and reduce vehicle speeds
- Widen sidewalks on both sides of the Kalakaua Avenue bridge
- Add leading pedestrian intervals to signalized crossings with high-volume right turning movements
- Install raised crosswalks in channelized right-turn lanes
- Add sharrows to both sides of Kalakaua Avenue

COST BREAKDOWN

Total: $3,650,141.38

Design: $206,611.78

Construction: $3,443,529.60

Table of Contents

List of Figures

List of Tables

Part One: Introduction, Study Area, & Need for Project

WHAT ARE COMPLETE STREETS?

Complete Streets is a transportation policy and design approach that aims to create a comprehensive, integrated network of streets that are safe and convenient for all people whether traveling by foot, bicycle, transit, or automobile, and regardless of age or ability. Complete Streets moves away from streets designed with a singular focus on automobiles towards a design approach that is context-sensitive, multi-modal, and integrated with the community's vision and sense of place. The end result is a road network that provides safe travel, promotes public health, and creates stronger communities.

Implementing Complete Streets requires integrating transportation with community planning. Changes are brought about by transforming the built environment. Engineers, planners, architects, landscape architects, and urban design professionals work along with health providers, business leaders, elected officials, community organizations, and residents to promote Complete Streets implementation. Actively engaged community members in Complete Streets are important participants and stakeholders. They help to ensure that efforts are relevant to the community's use, values, and priorities for the neighborhood.

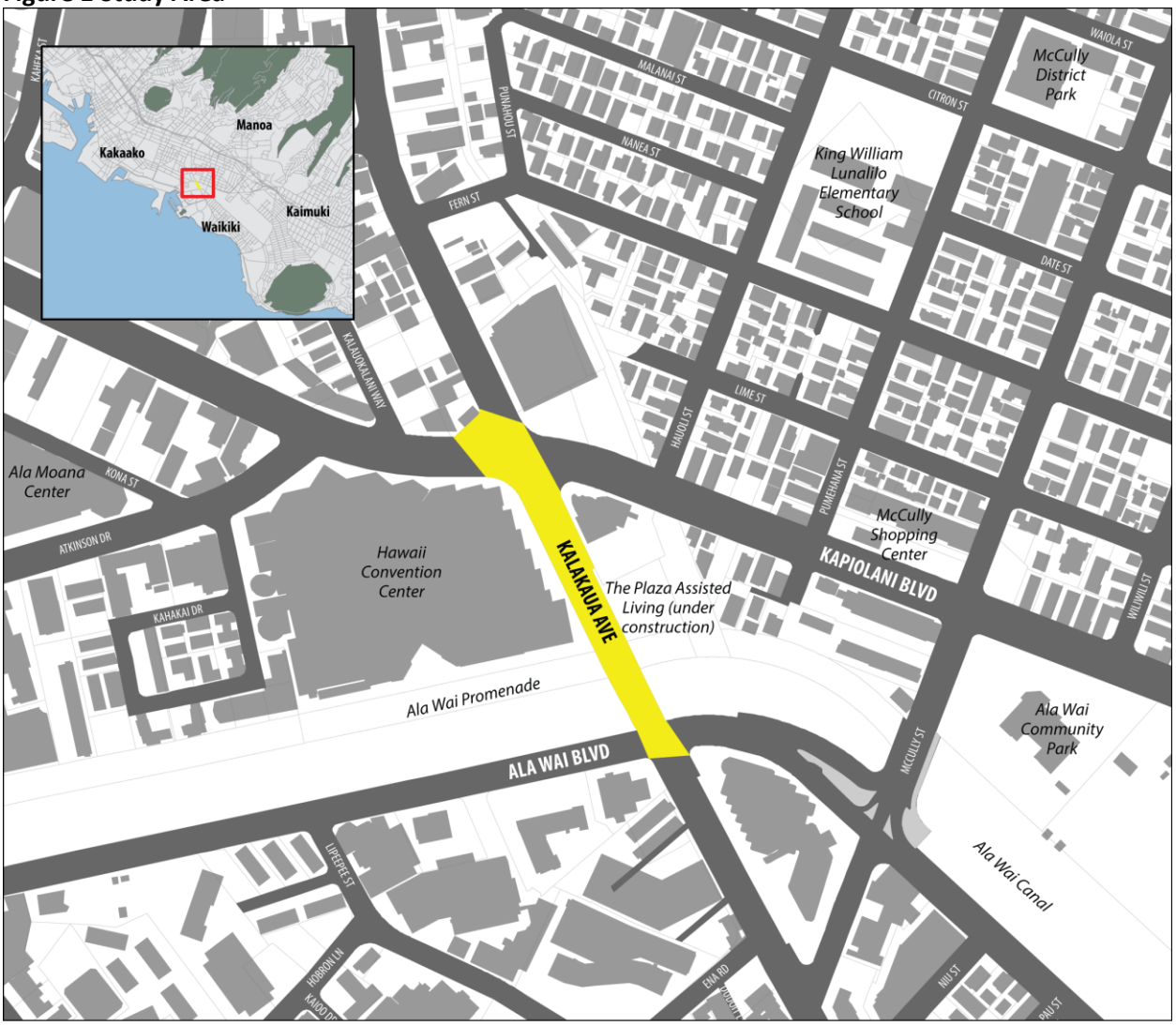
The State of Hawaii adopted Complete Streets in 2009 and required each County to follow suit. In May 2012, the Honolulu City Council adopted a "Complete Streets" policy and passed Ordinance 12-15. The City and County of Honolulu is now taking aggressive steps to implement Complete Streets by updating policies, applying guidelines during maintenance and paving projects, and designing projects in specific locations. The City and County of Honolulu selected fourteen sites across the island of Oahu for in-depth study to illustrate how Complete Streets can be applied in a specific location. This report describes one of the selected sites and presents recommendations to implement Complete Streets at that location.

STUDY AREA

The subject location of this assessment is Kalakaua Avenue from Kapiolani Boulevard to Ala Wai Boulevard (Figure 1). It is located in the Primary Urban Center area, and the Kapahulu sub-area, in City Council District IV. Kalakaua Avenue, McCully Street, and Kapiolani Boulevard form a triangle touching the Ala Wai Canal, the Hawaii Convention Center, and the entrance to Waikiki. These corridors – Kapiolani Boulevard in particular – also carry high volumes of vehicles, which has resulted in wide intersections with multiple signal phases and turn lanes.

Despite its auto-centric nature, pedestrians, and cyclists use this site heavily – recreational users on Ala Wai Promenade, convention center users, and those accessing Waikiki. Kalakaua Avenue serves a downtown boulevard function and, as such, has both a high mobility function and a high place function.

Figure 1 Study Area



Kalakaua Ave, from Kapiolani Blvd to Ala Wai Blvd

Figure 1 Study Area

0′ 100′ 200′ 300′ 400′

NORTH

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NEED FOR PROJECT

This location was selected for Complete Streets treatment because of its high traffic volume, role as a gateway into Waikiki, proximity to major destinations (e.g., Hawaii Convention Center), and known safety issues identified in other neighborhood plans. The posted speed limit is 25 mph, but vehicle speeding is a chronic concern. The street crosses and effectively splits the Ala Wai Promenade, a major recreational resource. The Plaza at Waikiki will be a 153-bed, senior assisted living community that will open later this year (2015). The Plaza will be located at the corner of Kalakaua Avenue and the Ala Wai Canal, with its entrance off of Kalakaua Avenue.

Kalakaua Avenue presents an opportunity to create a beautiful and inviting entrance to the Hawaii Convention Center and Waikiki. It also marks the route of the future Waikiki Circulator.

Ala Wai Promenade users must travel out of their way to cross Kalakaua Avenue at a marked crosswalk.

The Hawaii Convention Center on Kalakaua Avenue is a major trip generator.

EXISTING LAND USE, TRANSPORTATION FACILITIES, AND USAGE PATTERNS

Land Use, Transportation Facilities and Traffic Accidents

Figure 2 summarizes the land uses surrounding Kalakaua Avenue. Located in the heart of urbanized Honolulu, the land use density surrounding the project area is high. Walk and transit scores ranked above average (mid 80s and mid 70s respectively) in the areas surrounding the project site, which indicates a moderately favorable pedestrian and transit environment[1]. However, bike scores were mediocre. Poor bike scores are likely due to the lack of dedicated bicycle facilities on Kalakaua Avenue.

Along Kalakaua Avenue, the study area includes two major intersections. At the intersection of Kalakaua Avenue and Kapiolani Boulevard, there is a wide, multi-lane, multi-phase signalized intersection at the corner of the Convention Center. This intersection is daunting to cross, given multiple turn lanes and wide curb radii. The *Ala Moana Neighborhood Transit-Oriented Development Plan* (City and County of Honolulu, 2014) produced recommendations for this intersection as well, recognizing both its importance as a gateway and its auto-centric design. These include striping the missing crosswalk on the makai side of the intersection, bike lanes on both streets, landscaping, and a potential future elevated crossing.

Kalakaua Avenue crosses the Ala Wai Promenade. Path users have been observed to dart out in front of traffic or walk out of the way to the intersection of Ala Wai Boulevard to cross at a crosswalk. Having safe and seamless connections along the Ala Wai Promenade is in line with the City's Lei of Parks plan.

The intersection of Kalakaua Avenue and Ala Wai Boulevard, the second major study area intersection, also contains multiple turn lanes and provides access to residential areas. This intersection does not have marked crosswalks on all legs.

Connecting the two intersections, the Kalakaua Avenue bridge provides a narrow sidewalk on each side, which is heavily used by pedestrians and cyclists. Kalakaua Avenue is dedicated as a future bicycle route per the Oahu Bicycle Plan.

[1] Walk, transit, and bike scores are an index of walkability, transit accessibility, and bikeability (respectively) based on proximity to amenities and destinations (e.g., grocery stores, schools, parks, restaurants, and retail). Walk scores are developed by "Walk Score" a private company (https://www.walkscore.com/).

Usage Patterns

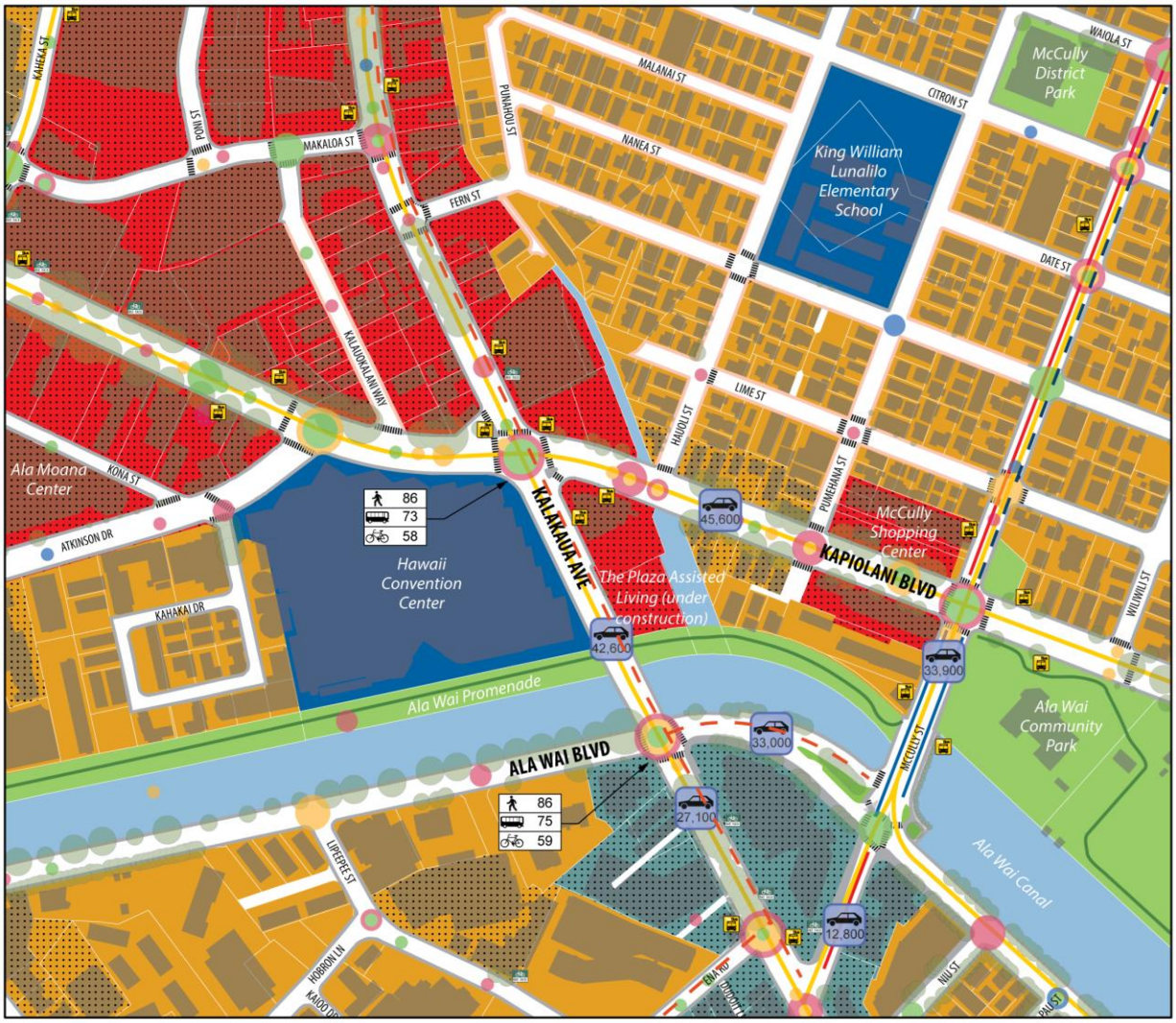
Table 1 describes existing usage patterns by pedestrians, bicyclists, vehicles, and transit users in the study area.

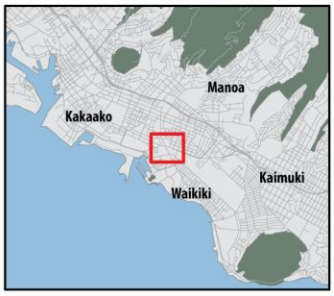
Pedestrian counts were not available; however, during a morning walk audit conducted in the summer of 2014, participants noted a high level of pedestrian activity, which is likely because Kalakaua Avenue is a major connection between Waikiki, Hawaii Convention Center, and Ala Moana Center. A moderate level of bicycle activity was also observed. Transit usage is high in the area surrounding the project. Nearly 2,000 people board or alight from City bus transit at Kalakaua Avenue and Kapiolani Boulevard. This results in a high number of pedestrians crossing this large intersection, which does not have marked crosswalks on all legs.

Traffic count data from 2011 and 2012 shows that a large number of vehicles, 30,349 vehicles per day, travel along Kalakaua Avenue past Ala Wai Boulevard. Peak hour data shows that volumes along Kalakaua Avenue total 2,281 vehicles over six lanes.

During the past five years, 83 crashes occurred. Forty percent of crashes occurred at Kalakaua Avenue and Kapiolani Boulevard, and 38% of crashes involved only cars or trucks. More than one-quarter of the crashes involved a bicycle, and 12% involved injury to a pedestrian.

Figure 2 Existing Land Use, Transportation Facilities, and Accidents in the Study Area





0' 100' 200' 300' 400'

NORTH

*Source: City and County of Honolulu, Department of Planning & Permitting, Honolulu Land; *www.walkscore.com*

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Kalakaua Ave, from Kapiolani Blvd to Ala Wai Blvd

Bicycle Facilities
Existing=Solid, Proposed=dashed

- Lane
- Path
- Route
- Bicycle Racks

Transit Facilities

- Bus Route
- Bus Stop

Walk Scores

- ## Walk Score
- ## Transit Score
- ## Bike Score

Traffic Accidents

- 1 crash
- 2 crashes
- 3-9 crashes
- 10+ crashes

Red = Car/Truck,
Orange = Motorcycle/Moped,
Blue = Bicyclist,
Green = Pedestrian

Traffic Counts

- ### Average Daily Traffic

Street Trees

- Canopy Diameter

Existing Land Use

- Apartment
- Apartment Mixed Use
- Business Mixed Use
- Institutional
- Park/Open Space
- Resort Mixed Use

Pedestrian Facilities

- No Sidewalk
- Sidewalk
- Crosswalk

Table 1 Existing Usage Patterns along Kalakaua Avenue

Pedestrian Use	High
Bicycle Use	Moderate
Transit Use: Average Daily Boardings + Alightings (Source: *Global Stop Summary by Trip*, TheBus, 2012)	A total of 1,905 daily boardings and alightings occur, all of which are on a particular corner of Kalakaua Avenue and Kapiolani Boulevard. <u>Stops</u> Kalakaua Ave + Kapiolani Blvd: 876 average daily ridership (ADR) Kapiolani Blvd + Kalakaua Ave: 1,029 ADR <u>Boardings and Alightings by Route</u> Route 2: 768 ADR Route 3: 448 ADR Route 4: 134 ADR Route 9: 221 ADR Route 13: 271 ADR Route A: 63 ADR
Daily Vehicular Volumes (Source: *Historical Traffic Station Maps*, HDOT, 2013-2009)	Kalakaua Avenue at Ala Wai Boulevard: 30,349 (2011) Kapiolani Boulevard: 45,599 (2012) Ala Wai Boulevard from McCully Street to Kalakaua Avenue: 22,753 (2012)
Use by Trucks or Large Vehicles	Moderate
Peak Periods (Source: *Historical Traffic Station Maps*, HDOT, 2013)	Kalakaua Avenue: 7:15-8:15 AM; 5-6 PM (2011) Kapiolani Boulevard: 7:15-8:15 AM; 4:45-5:45 PM (2012) Ala Wai Boulevard: 7:15-8:15 AM; 4:30-5:30 PM (2012)
Accident History (Source*: Motor Vehicle Accident Reports,* Honolulu Police Department, 2011-2014)	83 crashes have occurred in the study area over the past 5 years. The area with the most crashes is Kalakaua Avenue and Kapiolani Boulevard. Crash involvement included 20 bicycle incidents, 55 car/truck/moped, and 8 pedestrians.

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Part Two: Field Work and Key Findings

STAKEHOLDER INPUT

Community stakeholders participated in a walking audit along the Ala Wai Promenade and along Kalakaua Avenue from Kapiolani Boulevard to Ala Wai Boulevard on Monday, Sept. 15, 2014. SSFM International, Inc., and a team of consultants, including Dan Burden, national walkability expert, led a walking audit with several City engineers. The following stakeholder groups participated in the walking audit:

- City and County of Honolulu Department of Transportation Services (DTS), including Mark Garrity, Chris Sayers, Craig Chung, Yamato Milner, Kelly Cruz, Shawn Butler, and Jack Patterson;
- Neighborhood leaders including Daniel Alexander from the Hawaii Bicycling League; and,
- Consultant Team: Mike Packard, Alan Fujimori, and Mike Motoki from SSFM; Dan Burden and Samantha Thomas from Blue Zones; Stephanie Wright from Nelson\Nygaard.

A walking audit brought together eight stakeholders from the City and County of Honolulu and community stakeholders including representatives of the Hawaii Bicycling League, and the Consultant Team.

Together, the group identified conditions that affect active living; social connectivity; access to daily needs; and, safe routes to school, work and play. The key issues identified by participants included:

- Numerous cyclists and pedestrians on a narrow sidewalk along the bridge
- No direct connection along Ala Wai Promenade across Kalakaua Avenue
- A large and complex crossing at the intersection with Kapiolani Boulevard
- Intersections at Kapiolani Boulevard and at Ala Wai Boulevard do not have marked crosswalks on all legs
- Excess travel way space at Kapiolani Boulevard induce higher driver speeds

Participants shared barriers and opportunities for Complete Streets along Kalakaua Avenue.

Photo descriptions: Top row – Members of the community and DTS; Middle row – Explanation of issues and walking tour; Bottom row – audit participants share observations.

Photo descriptions clockwise from top left: A stream of cyclists rides in the vehicle lane; Pedestrians crossing Ala Wai Boulevard; Painted medians present an opportunity for raised diverters; Pedestrians using Kalakaua Avenue bridge; Bus stop at Kalakaua Avenue and Kapiolani Boulevard, Peaceful Ala Wai Promenade.

FINDINGS

This section summarizes key findings based on observations made by the consultant team with input from Department of Transportation Services staff and community stakeholders who participated in the walking audit. These inform the recommendations summarized in the next section.

Finding: The connection from the Ala Wai shared use path to the Ala Wai Promenade is not direct

The Ala Wai promenade makes up a key link in the city's Lei of Parks concept. Yet at Kalakaua Avenue, path users must divert hundreds of feet out of their way to cross at a marked crosswalk. This detracts from the path's usability. For first-time users, there is also no signage directing people where and how to cross.

The promenade at the Convention Center is green and inviting.

The promenade at Kalakaua Avenue does not have a marked crosswalk.

Finding: Excess lane capacity exists along Kalakaua Avenue

During the peak of the peak (the highest volume of traffic occurring when analyzing both morning and afternoon volumes), 1,187 cars travel mauka-bound over the Kalakaua Avenue Bridge over three lanes of traffic. On average, this equates to 395 vehicles per lane per peak hour. Capacity on an urban signalized street lies in the range of 800-900 vehicles per lane per hour, thus there is excess capacity on the mauka bound side.

Finding: The intersection of Kalakaua Avenue and Ala Wai Boulevard has a non-standard configuration

The intersection of Kalakaua Avenue and Ala Wai Boulevard has a non-standard configuration due to two one-way streets meeting and the splitting of the three lanes on Kalakaua Avenue up around the island further makai-bound entering Waikiki.

Finding: The Kalakaua Avenue corridor is heavily used by cyclists and pedestrians

The study area includes dense mixed-use developments and major trip generators like the Convention Center. Kalakaua Avenue and Kapiolani Boulevard is also a transit hub, serving nearly 2,000 boardings and alightings per day. Enhanced bikeway infrastructure such as bike lanes or protected bike lanes should be considered as a part of future improvements along the whole corridor however the constraints of this project area do not lend themselves to spot improvements that aren't connected to existing bike facilities.

Cyclists sharing the road along Kalakaua Avenue.

Pedestrians crossing Kalakaua Avenue in a marked crosswalk at Kapiolani Boulevard.

Finding: The narrow sidewalk on either side of the Kalakaua Avenue bridge is congested with people on foot and bicycle

Cyclists and pedestrians share space on the sidewalk along the Kalakaua Avenue bridge.

The Kalakaua Avenue, Ala Moana Boulevard, and McCully Street Bridges mark the only way to get across the Ala Wai Canal. Therefore, they are heavily used by all travelers, including people on foot and bicycle. The narrow sidewalks on the Kalakaua Avenue bridge, in particular, were observed as congested during the walk audit. Utility poles within the sidewalk on the bridge further constrain the pedestrian through space.

Finding: High turning volumes require multi-phase signals and long pedestrian crossings

Street design is a function of space and time. The wider a road becomes, the more time it takes a person to cross. As intersections are widened and turn lanes are added, additional signal timing and phases are needed, resulting in longer than average wait times for all users. For pedestrians, required clearance interval timing also lengthens as intersection geometry expands. For example, the clearance interval to cross a 50 foot roadway is 14 seconds, using the average walking speed of 3.5 feet per section included in the *Manual on Uniform Traffic Control Devices*. One leg of the Kalakaua Avenue and Kapiolani Boulevard intersection measures 85 feet – requiring a 24 second clearance time.

Multiple turn lanes exist at the right-turn from Kapi'olani Boulevard to Kalakaua Boulevard.

The right turn movement from Kapiolani Boulevard to Kalakaua Avenue makai-bound is extremely heavy – 809 vehicles during the peak hour. Currently the intersection has one through/right lane and one right-turn only lane.

Finding: Skewed intersection results in high turning speeds in some corners and obstructed pedestrian crossings in others

Wider curb radii accommodate higher speeds because drivers can navigate them without slowing down. Curb radius also has a direct correlation to crossing distance; the smaller the radius, the shorter the pedestrian crossing distance. At Kalakaua Avenue and Kapiolani Boulevard, especially at the corner by the Convention Center, excess asphalt and a wide radius means drivers can turn onto Kalakaua Avenue at high speeds. The intersection is skewed, and this turning movement occurs at an obtuse angle further exacerbating the situation.

Southwest corner of Kalakaua Avenue and Kapi'olani Boulevard.

Currently the right-turn lane at the southeast corner of Kalakaua Avenue and Kapiolani Boulevard has a sharp curve. Drivers are focused upon looking for an opening in oncoming traffic and the geometry forces the car around an acute turn, making it difficult to see crosswalks or pedestrians. The optimal pedestrian crossing occurs perpendicular, or parallel, to drivers' paths.

Finding: Intersections lack crosswalks on all legs

At both Kalakaua Avenue at Kapiolani Boulevard and Kalakaua Avenue at Ala Wai Boulevard, only three legs of the intersection have marked crosswalks. This means that people crossing the street on the makai side of the Kalakaua/Kapiolani intersection must cross all three legs of the intersection. Complete Streets means providing safe and attractive environments for all users. Intersection design without crosswalks sends a clear message of who or what has priority. Participants noted that because of the high turning volumes from Kapiolani to Kalakaua makai-bound, pedestrian signals may impede traffic flow.

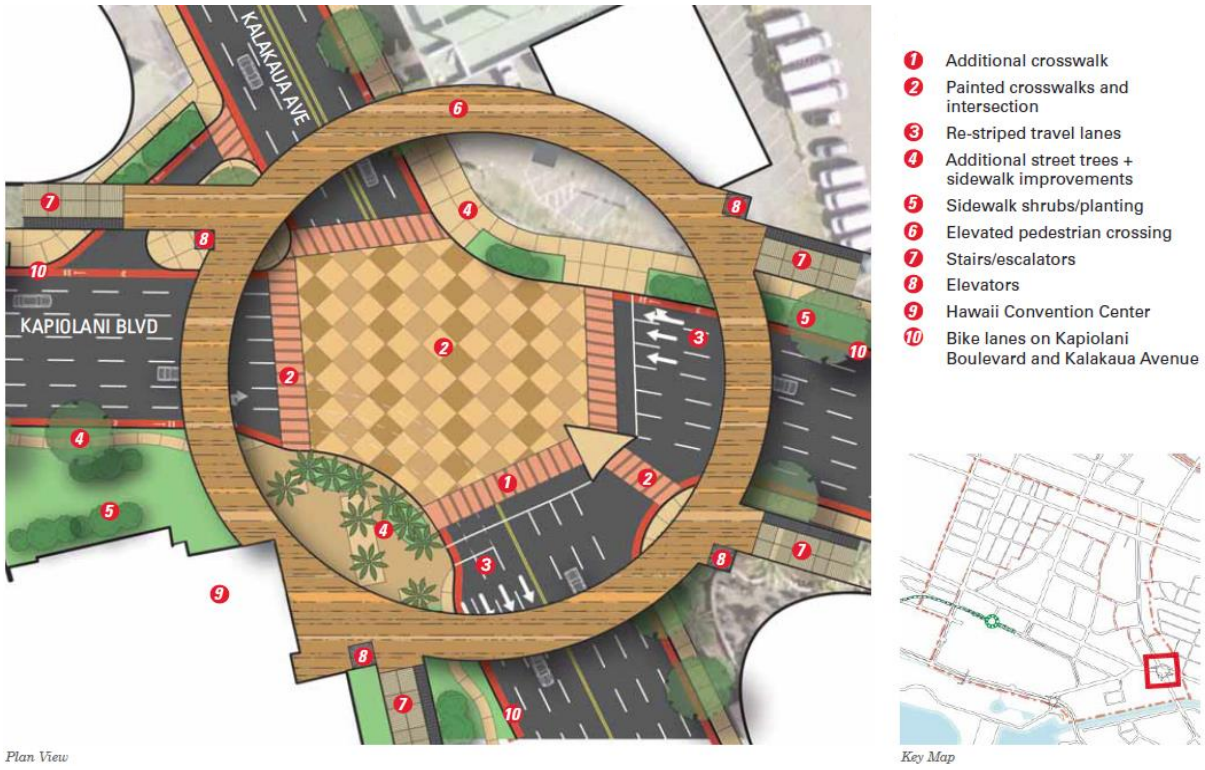
Aerial view of the intersection of Kalakaua Avenue and Kapiolani Boulevard.

Finding: On-street parking presents opportunities to add curb extensions and shorten crossing distances

Along Ala Wai Boulevard, land uses are primarily mixed-use and residential, with on-street parking provided. Curb extensions visually and physically narrow the roadway, creating safer and shorter crossings for pedestrians while increasing the available space for other sidewalk amenities.

Finding: The Kapi'olani Boulevard and Kalakaua Avenue intersection is integral to supporting Honolulu Rail Transit and transit-oriented development

The *Ala Moana Neighborhood Transit-Oriented Development Plan* recognizes the role of the intersection of Kalakaua Avenue and Kapiolani Boulevard as a gateway into Waikiki and Ala Moana. The plan's proposed design includes striping the missing crosswalk on the makai side of the intersection, bike lanes on both streets, landscaping, and a potential future elevated crossing. This conceptual plan was re-envisioned and incorporated into this report's conceptual designs.



The *Ala Moana Neighborhood Transit-Oriented Development Plan proposed* 9 modifications *at the intersection of Kalakaua Avenue and Kapiolani Boulevard*

Part Three: Recommended Application of Complete Streets Concepts

This section describes the recommended application of Complete Streets concepts for Kalakaua Avenue. It includes a written description of recommendations accompanied by illustrative drawings. The Complete Streets principles incorporated are:

- Encourage multiple modes of transportation, particularly walking and biking,
- Promote safety for all modes of transportation,
- Enable connections of recreational facilities and sidewalks across major roadways,
- Promote safer street crossings, and
- Strengthen the sense of placemaking at the entrance to Waikiki and the Convention Center.

COMPLETE STREETS RECOMMENDATIONS

Conceptual Illustrations of Recommendations

Figures 3 and 4 graphically show how Complete Streets principles can be applied to transform Kalakaua Avenue. The conceptual drawings depict the recommended improvements along three segments of the road:

- Kalakaua Avenue at Kapiolani Boulevard (Figure 3)
- Kalakaua Avenue at Ala Wai Boulevard (Figure 4)

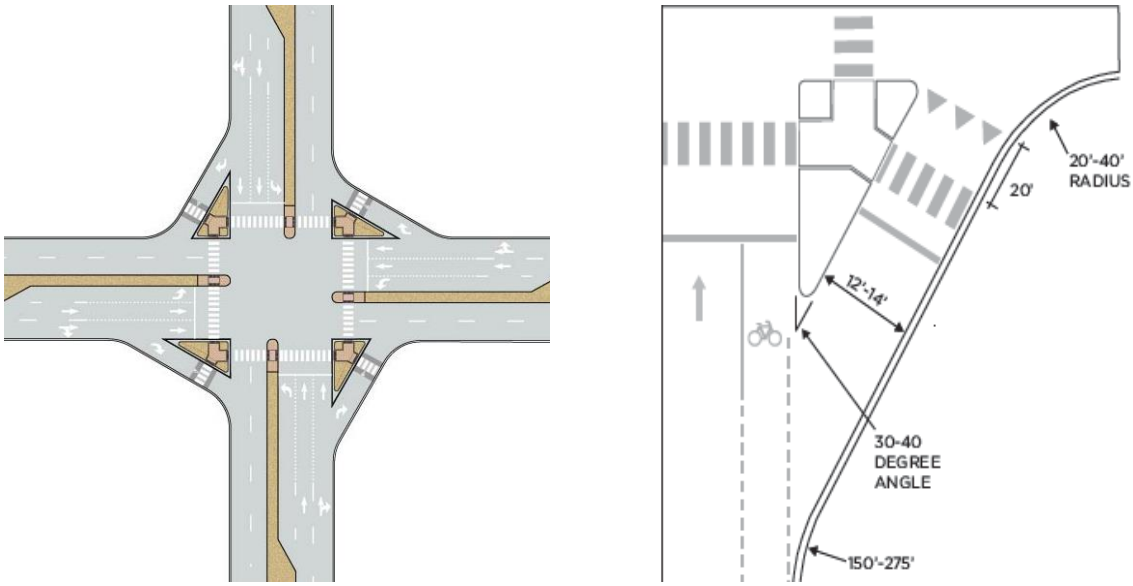
These recommended changes are described in the following section and summarized in Table 2.

Description of Recommendations

The recommendations in Figures 3-4 are summarized below.

A) Enable safer pedestrian crossings by shortening crossing distances and slowing vehicular traffic

- Create "pork chop" style turn channels and islands at Kapiolani Boulevard and Kalakaua Avenue. In general, right-turn channels are discouraged at urban intersections because they typically facilitate high-speed turns and add to crossing distance. In cases where peak right turn volumes warrant a dedicated lane (more than 200 per peak hour), many cities employ "pork chop" design with crosswalks aligned to the center of the island. This design needs to be able to accommodate the turning movement of a tour bus.



The "pork chop" style turn lane ensures right-angle design, increasing visibility between drivers and pedestrians

- At the corners of Kalakaua Avenue and Kapiolani Boulevard, reduce turning radius to shorten pedestrian crossing distances and reduce vehicle speed.

Slightly raised pad added to corner in Portland, OR.

Paint and gravel extension in New York City.

- On the right-turn lanes at Kalakaua Avenue and Kapiolani Boulevard, install raised crosswalks in the center of the turn channel, increasing visibility of pedestrians as well as calming traffic.

Boulder, CO installs raised crosswalks at all slip lanes.

- Install curb extensions along Ala Wai Boulevard where on street parking is present. This shortens the pedestrian crossing distance. In the short term, planters can be installed to enforce vehicle movements around the extensions.
- Extend the existing median along the makai-side of Kalakaua Avenue and raise the striped area at the intersection to provide a pedestrian refuge and enforce the restricted turning movements. Drivers turning from Ala Wai Boulevard onto Kalakaua Avenue makai-bound have an opportunity farther down Kalakaua Avenue to move into the right lane.

Median protection of crossing in College Park, MD

B) Install a pedestrian-activated marked crossing across Kalakaua Avenue to connect both sides of the Ala Wai Promenade

- To complete this corridor and enhance usage of the Ala Wai Promenade, add a midblock pedestrian/cyclist activated signal at the crossing of Kalakaua Avenue. The path crossing sits 200 feet from the Ala Wai Boulevard signal on Kalakaua Avenue and 240 feet from the Kapiolani Boulevard and McCully Street signal. The signal may use flashing lights similar to a HAWK or RRFB style crossing, or use full signal heads activated only by push button which would allow vehicular progression to be maintained.

Trail crossing in Fayetteville, NC using HAWK-style flashing warning lights. Source: Fayetteville Flyer

Trail crossing in Cambridge, MA with full signal heads. Source: Bike Expert

C) Enable multi-modal travel over the Kalakaua Avenue bridge

- As a designated bike route in the Oahu Bicycle Plan, add sharrows to Kalakaua Avenue. Even though sharing the lane with traffic on a five-lane road is not ideal, for Hawaii's experienced cyclists who probably already take the lane, the sharrows signal to drivers that cyclists will be present. This will alleviate the current mixing of modes on the sidewalks crossing the bridge.
- Mauka of the Kapiolani Boulevard intersection, Kalakaua Avenue contains two lanes per direction. Approaching Kapiolani, the makai-bound street widens to include a third lane. Left turns are not allowed from Kalakaua onto Kapiolani, thus the three lanes are only for through traffic. The peak volumes during the afternoon, which are higher than the morning, show a total of 1,924 vehicles makai-bound, or 642 vehicles per lane, which is well under capacity.
- By removing a mauka-bound lane along Kalakaua Avenue, the sidewalks on either side can be widened to 10 to 12 feet. Pedestrian-scale lighting can also be added to increase visibility. The path could function as a shared use path with proper signage, allowing cyclists who feel uncomfortable taking a lane over the bridge to ride on the path.

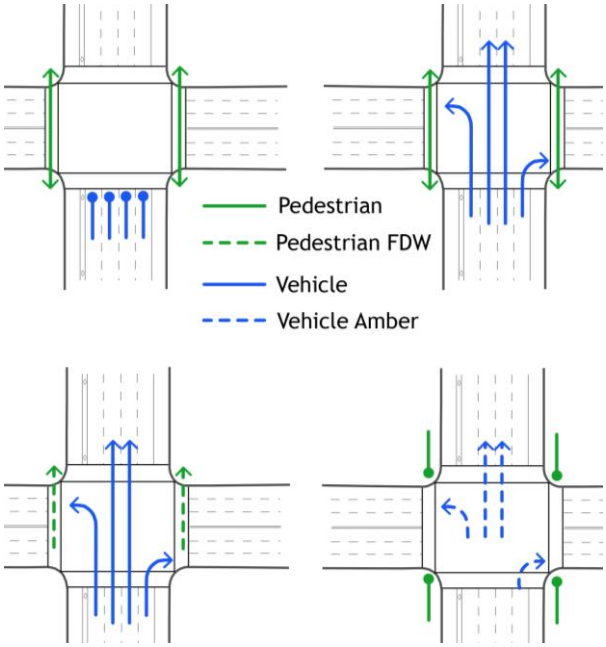
10' shared use path on a bridge in Portland, OR. Source: Bike Portland

D) Install Leading Pedestrian Interval signal phase at crosswalks that are crossed by high volume right turn movements

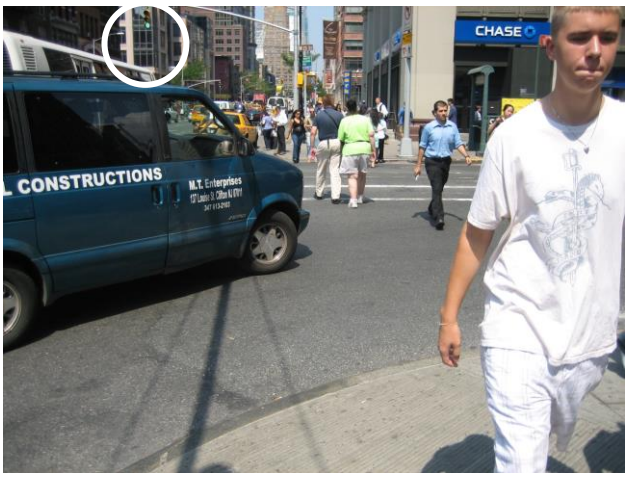
- By installing Leading Pedestrian Intervals (LPI) at permitted right-turn movements, it gives pedestrian 3-4 seconds of "head start" to establish themselves in the crosswalk, which helps enforce yielding to pedestrians by turning drivers.

How LPI works:

1. *WALK sign turns on; vehicle signal remains red*
2. *Vehicle signal turns green*
3. *Flashing Don't Walk phase – by this point most pedestrians have crossed*
4. *Don't Walk sign on – allows turning vehicles to clear through Amber phase*



During the LPI, the vehicle signal remains red but the WALK sign goes on.



After a few seconds, the vehicle signal turns green. Turning vehicles yield to pedestrians.

Table 2 Proposed Design Changes to Kalakaua Avenue

	CURRENT	AFTER RECOMMENDATIONS ARE IMPLEMENTED
Type of Facility	Minor Arterial	No change
Street Width	69.5’ at the Kapiolani Blvd intersection, 56’ at Ala Wai Blvd intersection	60’ at Kapiolani Boulevard intersection (due to addition of pork chop); 47’ along Kalakaua Avenue Bridge and at Ala Wai Boulevard
Speed Limit	25 mph	No change
Crosswalk Length (longest)	91’ Kalakaua Ave and Kapiolani Blvd (east leg)	80’ Kalakaua Ave and Kapiolani Blvd (east leg)
Number of Lanes	2 to 4 mauka-bound lanes, 2 to 3 makai-bound lanes (to Waikiki)	Same
Distance to Side Streets	~300’ to Hauoli St, ~250 to Kalauokalani Way	Same
Driveways	3 Diamond Head driveways, 2 Ewa driveways	Same
Parking	No street parking in immediate proximity of project, Hawaii Convention Center Parking lot	Same
Sidewalks	Sidewalks existing on all portions of Kalakaua Avenue with in the study area; 8’ to 12’ typical in most areas. The bridge crossing has the narrowest sidewalk width of 7’.	Sidewalks are widened at intersections and across Kalakaua Avenue Bridge. See Figures 3 and 4 for details.
Transit Routes, Stops, Shelters	5 stops at the project site	Same
Proximity to Future Rail	~0.5 miles to the Ala Moana Rail Terminus	Same
Bicycle Features	Bike path along the Lei of Parks	Sharrows on Kalakaua Avenue; shared path on bridge
Nearby Schools	Lunalilo Elementary School	Same
Nearby Institutions	Hawaii Convention Center, Ala Moana Center	Same

Figure 3 Concepts for Kalakaua Avenue at Kapiolani Boulevard

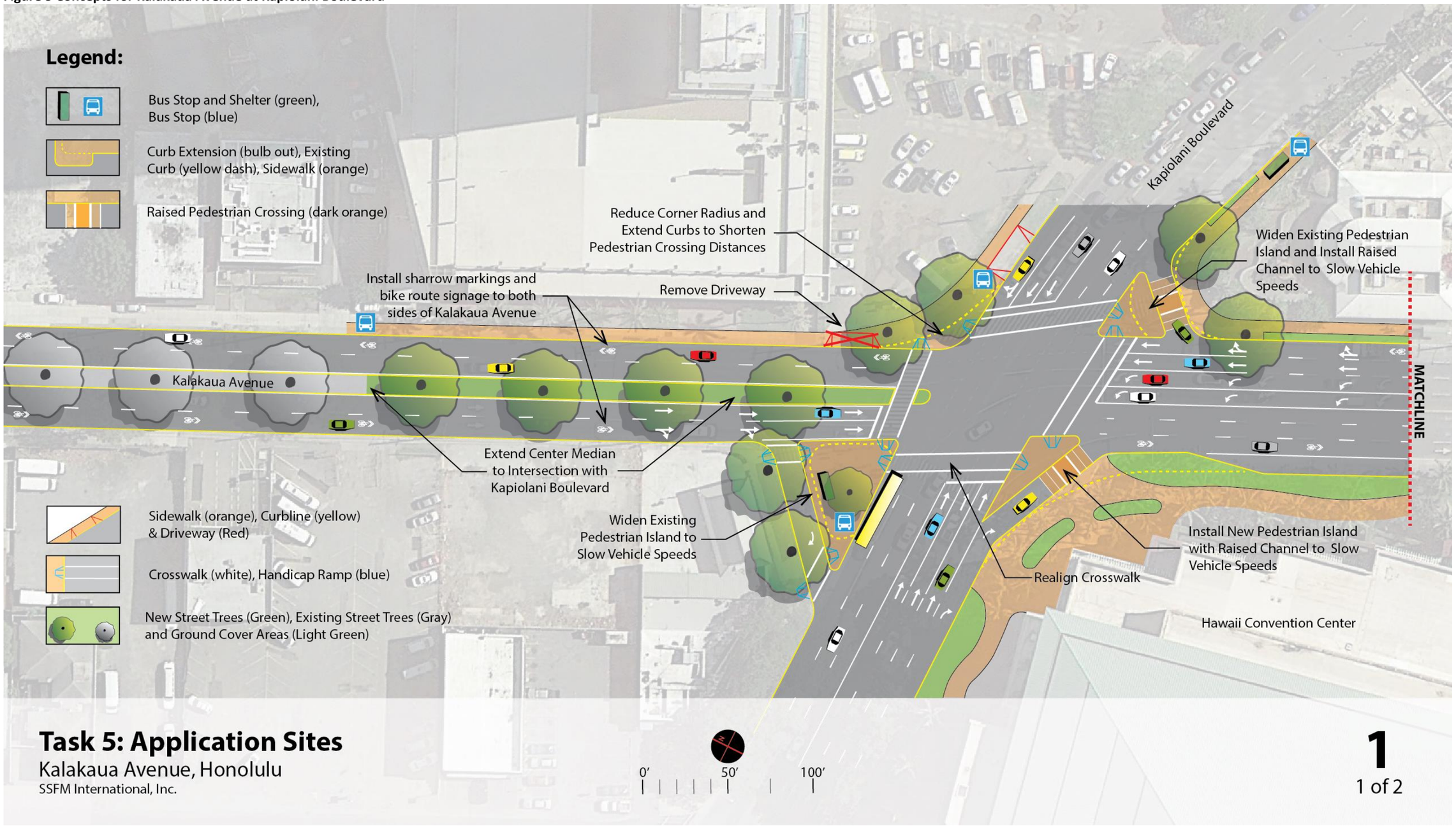


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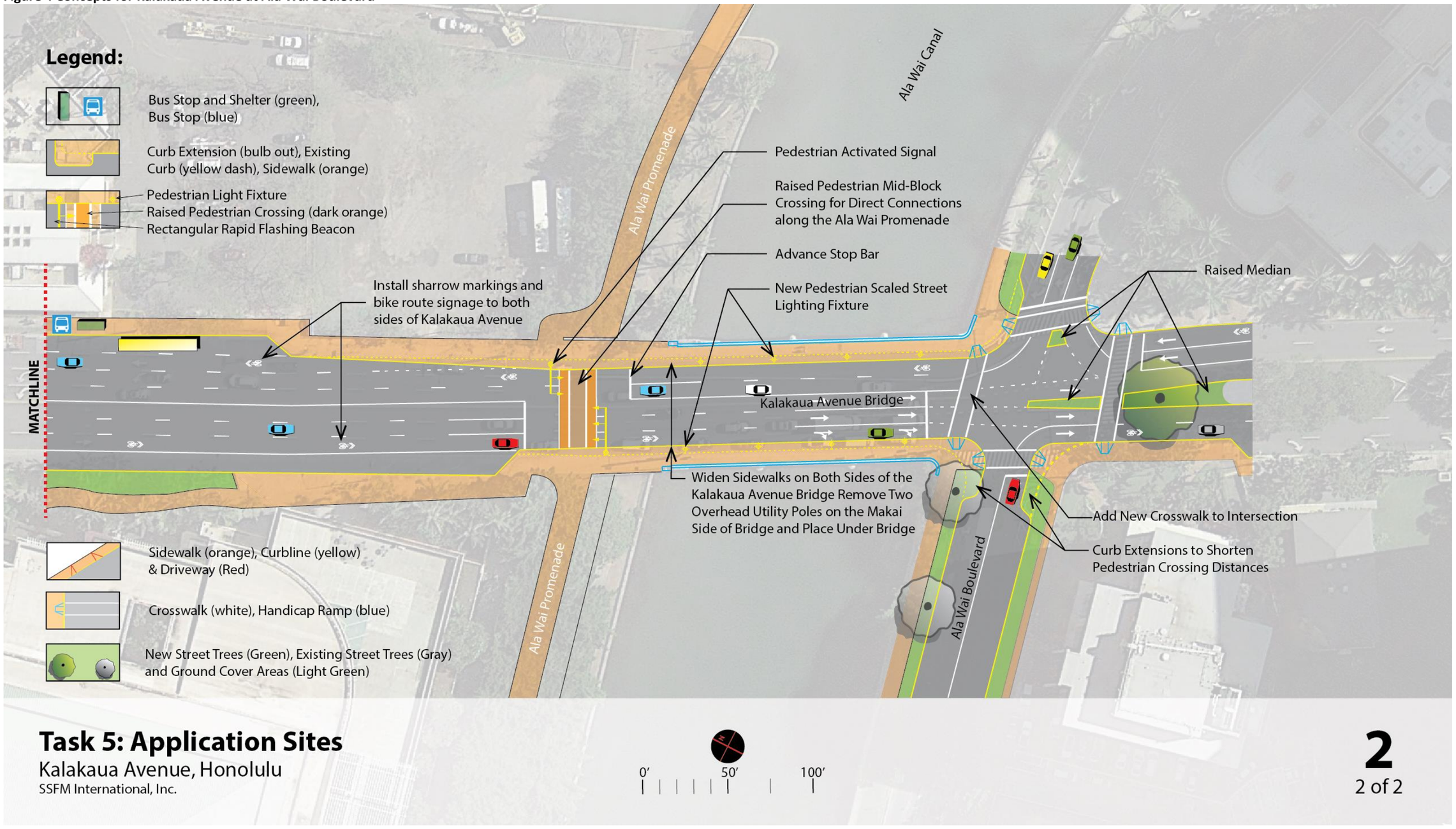
Figure 4 Concepts for Kalakaua Avenue at Ala Wai Boulevard



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Part Four: Implementation

This section presents a recommended timeline for actions that support implementation of the Complete Streets recommendations. Recommendations are numbered according to how they were presented in the preceding section, with actions bulleted beneath. Near-term actions are those that may be implemented immediately through incorporation into existing City paving, marking, or signage projects or maintenance funding. Mid-term actions are those that may require or warrant a longer planning horizon (1 to 5 years) due to logistical, financial, or other considerations. Longer-term actions are those that may require or warrant an even longer planning horizon (5 years and beyond).

Near-Term Actions (0-1 year):

A) Enable safer pedestrian crossing by shortening crossing distances and slowing vehicular traffic

- Use roadway striping to reduce turning radii at the corners of Kalakaua Avenue and Kapiolani Boulevard.
- Install new pedestrian island at the southwest corner of Kalakaua Avenue and Kapiolani Boulevard using striping, planters, and traffic delineator posts.
- Restripe crosswalk to realign with new pedestrian island.

B) Install a pedestrian-activated marked crossing across Kalakaua Avenue to connect both sides of the Ala Wai Promenade

- Install a marked crosswalk with advanced stop lines and “Stop Here for Pedestrians State Law” signs (R1-5b and R1-9a).

C) Enable multi-modal travel over the Kalakaua Avenue bridge

- Add sharrows markings and bike route signage to both sides of Kalakaua Avenue.

D) Install Leading Pedestrian Interval signal phase at crosswalks that are crossed by high volume right turn movements

- Reconfigure traffic signal timing and phasing.
- Install additional crosswalk at the south leg of the intersection of Kalakaua Avenue and Kapiolani Boulevard.

Mid-Term Actions (1 to 5 years):

A) Enable safer pedestrian crossing by shortening crossing distances and slowing vehicular traffic

- Use A/C berms to reduce curb turning radii at the obtuse corner angles of Kalakaua Avenue and Kapiolani Boulevard.
- Use A/C berm to enlarge the pedestrian islands at the corners of Kapiolani Boulevard and Kalakaua Avenue.
- Use A/C berms to extend the existing median along the makai side of Kalakaua Avenue at the intersection with Ala Wai Boulevard to provide a pedestrian refuge and to discourage illegal traffic movements. Install planters to enhance the streetscape.

B) Install a pedestrian-activated marked crossing across Kalakaua Avenue to connect both sides of the Ala Wai Promenade

- Add a mid-block pedestrian/cyclist activated signal at the crossing of Kalakaua Avenue to complete this corridor and encourage usage of the Ala Wai Promenade.

C) Enable multi-modal travel over the Kalakaua Avenue bridge

- None.

D) Install Leading Pedestrian Interval signal phase at crosswalks that are crossed by high volume right turn movements

- None.

Longer-Term Actions (5 years and Beyond):

A) Enable safer pedestrian crossing by shortening crossing distances and slowing vehicular traffic

- Construct a concrete curb extension that is flush with the existing sidewalk at the obtuse corner angles of Kalakaua Avenue and Kapiolani Boulevard to reduce curb radii and enhance pedestrian space.
- Reconstruct curb ramps at intersections so that there are two per corner.
- Install "pork chop" style raised islands at obtuse corners of Kapiolani Boulevard and Kalakaua Avenue.
- Install raised pedestrian crosswalks in the channelized right turn lanes.
- Extend the existing median along the makai side of Kalakaua Avenue at the intersection with Ala Wai Boulevard to provide a pedestrian refuge and to discourage illegal traffic movements. Construct the new median to include landscaping area, which can accommodate street trees.

B) Install a pedestrian-activated marked crossing across Kalakaua Avenue to connect both sides of the Ala Wai Promenade

- None.

C) Enable multi-modal travel over the Kalakaua Avenue bridge

- Remove one mauka-bound lane along Kalakaua Avenue.
- Widen sidewalks on both sides from 10 feet to 12 feet.
- Install pedestrian-scale lighting with footings on the outside edge of the bridge instead of within the pedestrian zone.
- The path could function as a shared use path with proper signage, allowing cyclists who feel uncomfortable taking a lane over the bridge to ride on the path.

D) Install Leading Pedestrian Interval signal phase at crosswalks that are crossed by high volume right turn movements

- None.

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Part Five: Cost Sheet

ITEM	*UNIT*	*QUANTITY*	*UNIT COST*	*TOTAL COST*
Removals/Demo				
Demolish existing sidewalk	Sq. Ft.	3400	$ 5.00	$ 17,000.00
Demolish existing Pavement	Sq. Ft.	14510	$ 8.00	$ 116,080.00
Erosion Control	L.S.	1	$ 10,000.00	$ 10,000.00
Site improvements				
Roadway				
Mill and Overlay existing AC pavement	Sq. Ft.	94440	$ 6.00	$ 566,640.00
Curb Gutter and Sidewalk	Sq. Ft.	7400	$ 20.00	$ 148,000.00
Drainage works	each	6	$ 14,000.00	$ 84,000.00
Raised Median	Sq. Ft.	4485	$ 20.00	$ 89,700.00
Raised Traffic Island	Sq. Ft.	4171	$ 20.00	$ 83,420.00
Raised Channel (ped crossing)	Sq. Ft.	1860	$ 20.00	$ 37,200.00
4" Stripe (white/Yellow)	Lin. Ft.	7411	$ 6.00	$ 44,466.00
12"stripe (white)	Lin. Ft.	1162	$ 9.00	$ 10,458.00
Striping Symbols	each	69	$ 300.00	$ 20,700.00
Intersection				
Ped Activated Traffic Signal	each	1	$ 400,000.00	$ 400,000.00
Traffic Signal Modification	each	2	$ 350,000.00	$ 700,000.00
Street Light	each	8	$ 15,000.00	$ 120,000.00
Landscaping				
Trees	each	12	$ 1,000.00	$ 12,000.00
Misc.				
Traffic Control	L.S.	1	5%	$ 122,983.20
Mobilization	L.S.	1	10%	$ 245,966.40
Contingency - 25%			25%	$ 614,916.00
Design				
Design Cost			6%	$ 206,611.78
TOTAL CONSTRUCTION				**$ 3,443,529.60**
TOTAL COST				**$ 3,650,141.38**