MAY 2015

HONOLULU COMPLETE STREETS IMPLEMENTATION STUDY LOCATION REPORT

Liliha Street from School Street to Kuakini Street (DRAFT II)

City & County of Honolulu

Department of Transportation Services

Prepared by
SSFM International

With
Blue Zones
Nelson\Nygaard
Gary Toth Associates

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Summary: Liliha Street from School Street to Kuakini Street

Primary Urban Center Planning Area, Liliha Sub-Area, Council District VI

NEED FOR PROJECT

Liliha Street serves several major destinations such as schools and medical facilities, but also provides a link to H-1. The street has potential to become a vibrant commercial district, but narrow sidewalks and a lack of bicycling facilities marginalizes non-motorized travel.

Applying Complete Streets to this location will: 1) encourage walking and biking, 2) reinforce the posted speed limit, 3) create safer street crossings, and 4) strengthen Liliha Street as a neighborhood retail corridor.

SUMMARY OF RECOMMENDATIONS

The recommendations for Liliha Street transform underutilized space into a place welcoming to transit riders, pedestrians, and bicyclists. The proposed design provides safer intersection crossings for pedestrians and calms vehicle traffic. Recommendations include:

- Implement road diet, transitioning street from four to three vehicle lanes.
- Add 5’ wide bike lanes on both sides of the street, providing a parallel route to the bike lanes proposed along Nuuanu Avenue ½-mile away.
- Add curb extensions to shorten crossing distance.
- Plant trees in curb extensions to add shade and greenery.
- Provide crosswalk markings across all intersection legs where conflicts don’t preclude.
- Protect crosswalks with signage and safety enhancements such as Rectangular Rapid Flash Beacons.
- Install median islands, where possible.
- Off-set road to maintain on-street parking.

COST BREAKDOWN

Total: $2,743,495.27

Design: $203,211.87

Construction: $2,540,273.40

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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 Hawaiʻi 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, instituting 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 specific locations. 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 Liliha Street from School Street to Kuakini Street (Figure 1). It is located in the Primary Urban Center Planning Area, Sub-Area of Liliha, in City Council District VI. Liliha Street is a key mauka-makai route that serves as both a neighborhood retail street and a route to H-1. Several schools and medical facilities lie just a block or two away from Liliha Street; these institutions include Saint Theresa Catholic School, Likelike Elementary School, the Kuakini Medical Center, Lanikila Elementary School, and Lanakila Health Center. Users of these institutions and others must travel along and across Liliha Street.

Figure 1 Study Area

Liliha Street is lined with retail uses, and exhibits strong transit ridership at Liliha Street and School Street, resulting in high pedestrian activity. However, Liliha Street and School Street also both provide a direct connection to H-1. Liliha Street is designed to accommodate peak period vehicle traffic, with the curbside makai-bound lane dedicated for travel during morning peaks and parking during off-peak.

NEED FOR PROJECT

Liliha Street from School Street to Kuakini Street provides an opportunity to create a vibrant neighborhood main street with pleasant walking and cycling facilities, frequent transit service, and frequent shade amenities.

Retail properties line the study area. Major trip generators including health facilities and schools are nearby, thus many pedestrians (including older adults and children) walk along Liliha Street.

Currently the street has no dedicated bike facilities. The O‘ahu Bike Plan proposes bike lanes along the project area. In many areas, sidewalks are very narrow and are obstructed by utility poles. Uncontrolled marked crosswalks exist across multi-lane roads without additional traffic devices/control to improve safety. The street lacks many trees or landscaping which results in an unshaded and uninviting streetscape. Wide turning radii, long distances between signals, and numerous driveways detract from the walking environment.

Many barriers exist for walking including numerous driveways that interrupt the walking network and long crossing distances.

The proposed design for Liliha Street provides a green, walkable, bikeable business environment along this main street. Numerous small businesses thrive on the street today, but the dominance of vehicle space detracts from its walkability. The area is served by several transit routes and is designated for bicycle lanes, which helps bring more people to the neighborhood in a more sustainable fashion. Vehicle volumes in the study area have held steady at about 20,000 per day over the past several years, and 12,500 vehicles further mauka, providing an opportunity to reshape the right-of-way into a welcoming space for all users. The changing demands on the street – less autos, more walking, and the desire for cycling – make Liliha Street ripe for transformation into a complete street.

EXISTING LAND USE, TRANSPORTATION FACILITIES, AND USAGE PATTERNS

Land Use, Transportation Facilities, and Traffic Accidents

Figure 2 depicts existing land use, transportation facilities, and traffic accident data within the study area. The gateway to the Liliha Street study area begins at School Street, which carries traffic onto and off of H-1. School Street carries high volumes of through, rather than local, traffic due to its proximity to the freeway. Walk scores ranked above average in the areas surrounding the project site and ranged between 80 and 65[1]. Transit scores were also good (~70). However, bike scores were mediocre. Poor bike scores (mid 50s) are likely due to the lack of dedicated bicycle facilities on Liliha Street and in the surrounding areas.

Mauka of School Street, the 0.2-mile study area passes through small-scale retail and residential uses; the entire corridor is zoned for Business/Mixed-Use. Each parcel has its own off-street parking, resulting in frequent driveways that detract from the walking environment. Sidewalks are also as narrow as 4' in certain places. Multi-lane uncontrolled pedestrian crosswalks exist at Holokahana Lane and just south of Kuakini Street, but neither include enhanced safety applications.

No dedicated cycling facilities currently exist along the corridor, but it has been identified to include bike lanes in the Oahu Bicycle Plan. The street maintains a minimum of three travel lanes at all times (two mauka and one makai) with parking on the Ewa side restricted during peak hours to provide a second makai-bound travel lane.

The intersection of Liliha Street and Kuakini Street marks the north end of the study area, and is well-used by pedestrians. Two major health facilities – Kuakini Medical Center and Lanakila Health Center lie on Kuakini Street on either side of Liliha Street.

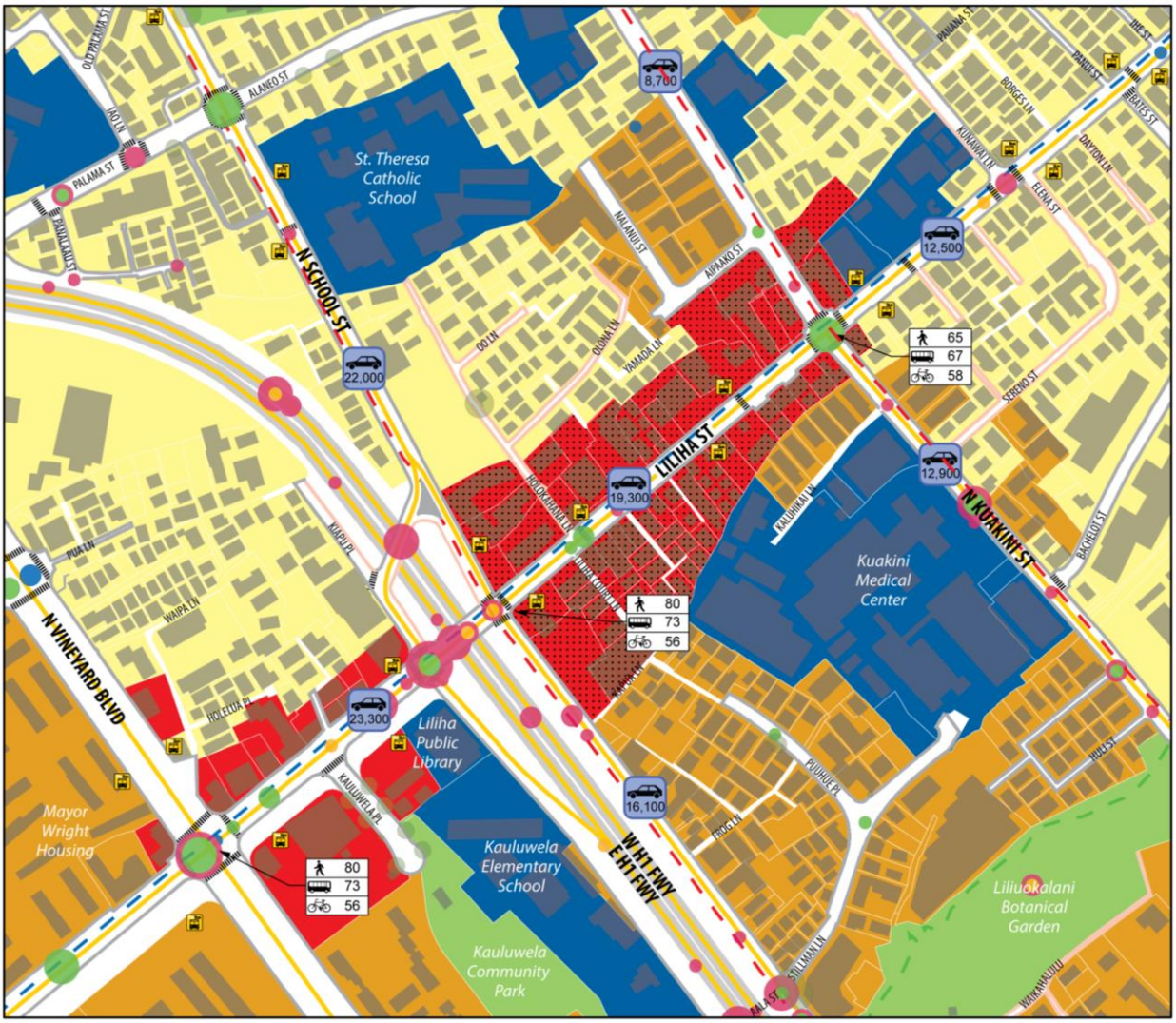
Usage Patterns

Table 1 describes existing usage patterns by pedestrians, bicyclists, vehicles, and transit users in the study area. Pedestrian count data was not available; however, during a walking audit of Liliha Street conducted during the summer of 2014, a moderate number of pedestrians were observed. The most pedestrian activity occurs on School Street at Liliha Street, due to high transit ridership. More than 2,000 transit customers board and alight at this location every day. Bicycle counts were also unavailable, but observations during the field audit showed low bicycle usage. Traffic volumes along the Liliha Street study area total just under 20,000 per day. School Street exhibits similar volumes, while other intersecting streets such as Kuakini Street have much lower volumes. Average daily traffic (ADT) along Liliha Street, mauka of Kuakini Road, is 12,500.

School Street and Liliha Street experienced the most crashes over a four-year period, with 49 incidents reported.

[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/).

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*

SSFM INTERNATIONAL

Liliha Street, from School Street to Kuakini Street

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
- Business
- Business Mixed Use
- Institutional
- Park/Open Space
- Residential

Pedestrian Facilities
- No Sidewalk
- Sidewalk
- Crosswalk

Table 1 Existing Usage Patterns along Liliha Street

Pedestrian Use	Moderate
Bicycle Use	Low
Transit Use-Average daily boardings + alightings (Source: *Global Stop Summary by Trip*, TheBus, 2012)	**Stops** Liliha St + School St: 283 Average Daily Ridership (ADR) Liliha St midblock (nearside of L&L): 179 ADR Liliha St + Kellet Ln: 210 ADR Liliha St + Holokahana Ln: 171 ADR LIliha St + Kuakini St: 591 ADR School St + Liliha St: 527 ADR Total: 843 ADR **Ridership by Route and Street** <u>Stops on Liliha Street:</u> Route 13 (Liliha - Waikiki - University – Honolulu): 690 ADR <u>Stops on School Street:</u> Route 1L (School Street – Limited Stops): 51 ADR Route 2 and 2L (School Street – Kalihi Transit Center): 471 ADR Route W3 (Kalihi via School Street): 7 ADR
Daily Vehicular Volumes (Source: *Historical Traffic Station Maps*, HDOT, 2009-2013)	Liliha Street: Liliha Shopping Center driveway to Kauluwela Place – 19,300 (2011) Judd Street: Liliha Street to Nu Place – 4,900 (2012) Kuakini Street: Huli Street to Nuuanu Avenue – 13,500 (2013) Liliha Street: Bates Street to Dayton Lane (2011) – 12,500 Kuakini Street: Lanakila Avenue to Alaneo Street (2011) – 8,600 Liliha Street: Kuakini Street to Liliha Court (2010) – 18,500 School Street: Lanakila Avenue to Kokea Street (2010) – 20,100
Use by Trucks or Large Vehicles (Source: *Historical Traffic Station Maps*, HDOT, 2013)	Liliha Street between: Shopping Center and Kauluwela Place (2012) – 5.20% Judd Street: Liliha Street to Nu Place (2013) – 1.06%
Peak Periods (Source: *Historical Traffic Station Maps*, HDOT, 2013)	Liliha Street: 7:00-8:00 AM; 3:45-4:45 PM Kuakini Street: 7:00-8:00 AM; 4:00-5:00 PM School Street: 7:00-8:00 AM; 4:00-5:00 PM <u>Peak Volumes for Liliha Street:</u> • Shopping Center and Kauluwela Place (2012) – 700 (AM mauka bound), 600 (AM makai bound), 1000 (PM mauka bound), 400 (PM makai bound) • Kuakini Street between: Huli to Nuuanu Avenue (2011) – 400 (AM westbound), 600 (AM eastbound), 400 (PM westbound), 800 (PM eastbound) • Lanakila Avenue to Alaneo Street (2011) – 700 (AM mauka bound), 600 (AM makai bound), 1000 (PM mauka bound), 400 (PM makai bound) • School Street from Lanakila Avenue to Kokea Street (2012) – 400 (AM westbound), 1600 (AM eastbound), 700 (PM westbound), 1000 (PM eastbound)
Accident History (Sources*: Motor Vehicle Accident Reports*, Honolulu Police Department, 2011-2014)	From 2007-2011, 49 crashes occurred on the corridor. The highest crash area was on Liliha Street just south of School Street (31 crashes over the five year period). Of the 49 accidents, 19% included pedestrians and 6% bicyclists.

Part Two: Field Work and Key Findings

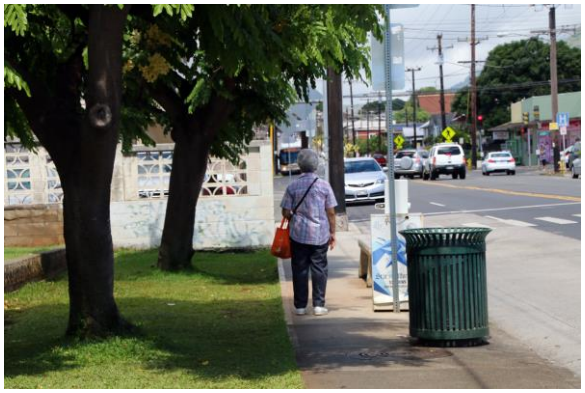
The walking audit brought together 19 stakeholders on Sept. 16, 2014 from the City and County of Honolulu, local community representatives, several key partners, and the Consultant Team.

STAKEHOLDER INPUT

Community stakeholders participated in a walking audit along Liliha Street from School Street to Kuakini Street on Tuesday, September 16, 2014. SSFM International, Inc., and a team of national consultants, including Dan Burden, national walkability expert, led a walking audit with 19 members of the community and DTS. The following stakeholder groups participated in the walking audit:

- City and County of Honolulu Department of Transportation Services (DTS), including Mark Garrity, Yamato Milner, Kelly Cruz, Erron Redoble, Randall Kurashige, Shawn Butler, Rika Uechi;
- City and County of Honolulu Department of Facility Maintenance (DFM), including Randy Leong;
- Hawaiʻi State Department of Health (DOH), Heidi Smith;
- Honolulu City Council, Councilwoman Carol Fukanaga;
- Staff representing political offices such as Councilwoman Carol Fukunaga, and Jenn Takenouchi from Representative Ohno's office;
- University of Hawaiʻi at Mānoa staff and students, including Thomas Lee and Lehua Choy;
- Neighborhood leaders including Neighborhood Board #14's Carole Kaapu, Gavan Abe from Hoʻopono and Daniel Alexander from the Hawaii Bicycling League;
- Consultant Team: Mike Packard, Alan Fujimori, and Mike Motoki from SSFM, Dan Burden and Samantha Thomas from Blue Zones, Stephanie Wright from Nelson\Nygaard.

Participants shared visions, barriers, and opportunities for Complete Streets and safer routes to school along Liliha Street. Participants envisioned ideas that would slow vehicles and improve safety for roadway users, including buffered walking and bicycling paths and gateway treatments to create a sense of arrival at Lanikila Elementary School.
Photo descriptions: Top row – Walking audit participants navigate Liliha Street's narrow sidewalks; Middle row – Members of the community and DTS share thoughts along the walk audit route; Bottom row – walkabiity expert Dan Burden interviews audit participants.



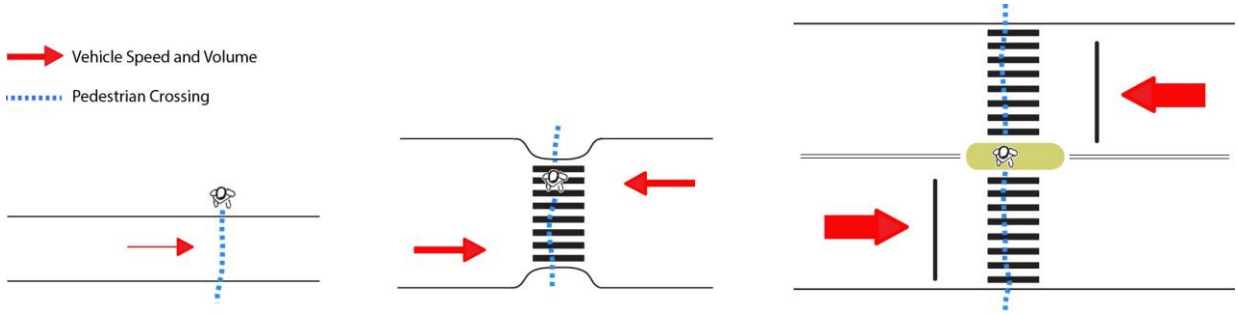
During the walking audit of Liliha Street many people were observed using transit and walking. ***Photo descriptions****, clockwise from top left: Long crossing distances at intersections; transit users along School Street; neighborhood retail; narrow sidewalks along Liliha Street; lack of shade and greenery; many school children use Liliha Street.*

FINDINGS

This section summarizes key findings based on observations made by the consultant team with input from Department of Transportation Services staff, elected officials, and community representatives. These inform the recommendations summarized in the next section.

Finding: Safety improvements needed at Liliha Street and School Street

The Liliha Street and School Street intersection acts as the gateway to the neighborhood for those crossing over the highway. It is the highest crash location in the study area. It is also a major transit stop serving more than 2,000 transit users each day. The high levels of activity in the area paired with high number of crashes make this intersection a high priority for safety enhancements.



As speed and volume increase, more protection is needed to provide a safe crossing.

Finding: Sidewalks are narrow, degrading the walking experience

The most commonly cited concern about Liliha Street is its narrow sidewalks. As a business corridor that also serves many neighborhood amenities, safe and comfortable sidewalks are the basis for Complete Streets. In some areas, sidewalks are as narrow as 4' wide. During peak periods, the makai-bound parking lane is used for vehicle travel, placing pedestrians directly against moving car traffic. The noise and movement from the vehicles, and lack of shade, makes walking uncomfortable.

Sidewalks are too narrow to support walking in a main street environment.

Finding: Unprotected street crossings endanger pedestrians

A key principle of street safety is ensuring adequate visibility and minimizing exposure. Adequate visibility requires that drivers see pedestrians and vice versa. Exposure refers to the amount of time and space pedestrians are exposed to vehicle traffic – or the distance between the curbs. Unprotected street crossings such as unsignalized mid-block crosswalks increase a pedestrian's exposure and do not adequately indicate to motorists that a pedestrian may be present.

Enhancements such as signage can improve the safety of pedestrians at crosswalks.

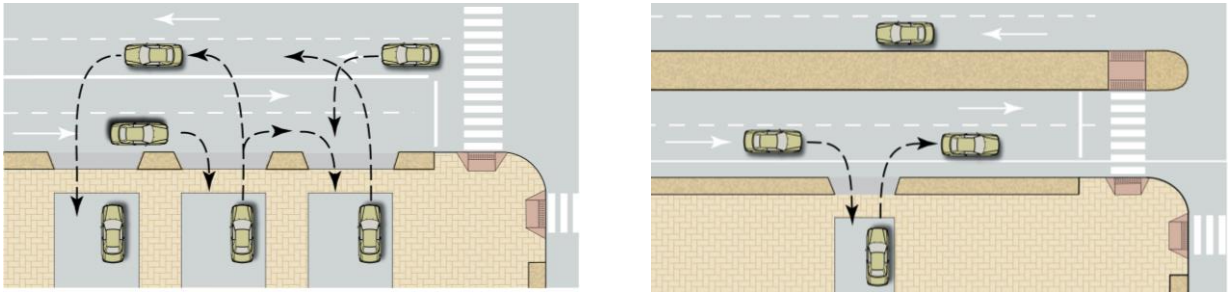
Like many streets throughout Honolulu, Liliha Street contains two unsignalized mid-block crosswalks. In general, providing a place for people to cross the street every 300-600 feet in a commercial area allows people to easily access destinations without having to walk out of their way to the signals at School Street and Kuakini Street. The locations of the crosswalks on Liliha Street make sense from a walking and network perspective, but there is no design element that signifies to drivers that they must stop at the advanced stop line. The diamond pedestrian warning sign (right) alerts motorists to pedestrian activity but participants stated that motorists do not always yield, much less stop.The ability to cross a street safely is a factor of the size of the street, the traffic volumes, and the speed of vehicles. For a three or four-lane street, more explicit signage stopping drivers, a median island, or signalization is needed.

This crosswalk by the L&L (left) has advanced stop lines and a pedestrian crossing sign. This crosswalk near the Hahn Medical Center (right) does not have stop lines. One walking audit participant had previously been hit and seriously injured here.

Finding: Numerous driveways degrade the walking environment and present many conflict points for vehicles

Driveways create conflict points for drivers, pedestrians, and cyclists.

Each establishment along Liliha Street has its own driveway. Given the small-scale nature of the uses – retail, 2-3 story apartments, etc. – this means driveways occur frequently, such as every 20-50 feet. Frequent driveways increase conflicts between drivers, pedestrians, and cyclists. Allowing parcels to share parking or providing access from alleys or side streets reduces conflicts on the higher-volume Liliha Street corridor. At a minimum, standardizing driveway widths would allow for expected vehicular movements. Removing barriers and fences between land uses over the long term would also foster intra-block circulation.



Fostering intra-block circulation with alleys and less access points increases safety for all users.

Finding: Lack of green space

Several participants noted that the lack of green space detracted from the area's walkability. The narrow sidewalks, combined with the lack of pedestrian buffer and street trees, impart a feeling that the street is dominated by asphalt and oriented in favor of vehicle usage. On hot days such as the day of the walking audit, the corridor becomes uncomfortable for pedestrians, which would be improved with the addition of shade trees.

The lack of green space detracts from walkability.

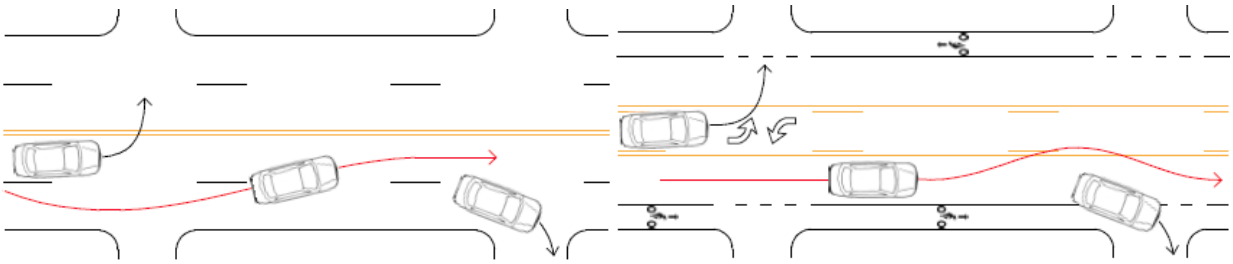
Finding: Vehicle capacity is higher than auto demand

Auto volumes on Liliha Street in the study area have maintained an ADT of 20,000 vehicles and are expected remain about the same. A typical signalized urban street can carry between 800-1,000 vehicles per lane per hour. HDOT peak hour data taken just mauka of the study area show an ADT of 12,500, maximum peak volumes of 700 makai-bound and 1,000 mauka-bound as of 2012.

During most periods of the day, Liliha Street is operating with excess vehicle capacity.

If Liliha Street were to be configured with two lanes all day – one per direction – the mauka-bound lane would carry approximately 1,000 cars during the peak hour and the makai-bound lane would carry approximately 700 cars per hour, which is within the 800-1,000 vehicles per lane per hour threshold. Peak periods also vary, from 10:30-11:30 am from Liliha Shopping Center to Kauluwela Place to 7-8 AM from Kuakini Street to Liliha Court, which spreads out peak travel.

Many communities are finding that their four-lane roads through neighborhoods and downtowns have the ability to maintain traffic flow while providing an opportunity for more cycling, transit ridership, and walking – which in turn reduces vehicle usage. A 4 to 3 lane conversion, or road diet, can reduce conflicts with turning vehicles and reallocate valuable space to create multi-modal streets. The 4-lane configuration has been shown to increase rear-end and side swipe vehicle crashes and poses a higher pedestrian crash risk.[2] Streets designed with either two lanes or a two-way left turn lane can cut crash risk by nearly half.



Weaving around left turning traffic creates conflicts in the four-lane configuration (left). Three lanes provide more safety for drivers and also creates space for other modes (right).

Road diets increase a road's efficiency by channeling turning vehicles out of the through lanes.[3] Streets carrying up to 25,000 vehicles per day function effectively with three lanes, depending on the traffic volumes of nearby adjacent streets[4]. Liliha Street's average daily traffic in the study area (12,500 further mauka) has remained steady at just under 20,000, making a three-lane configuration viable.

[2] Federal Highway Administration. "Evaluation of Lane Reduction 'Road Diet' Measures and their Effects on Crashes and Injuries." 2004

[3] Burden, Dan and Peter Lagerwey. "Road Diets: Fixing the Big Roads." 1999.

[4] Stamatiadis, Nikiforos and Adam Kirk. "Guidelines for Road Diet Conversions." 2012.

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Part Three: Recommended Application of Complete Streets Concepts

This section describes the recommended application of Complete Streets concepts for Liliha Street. 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
- Adjust the design speed of the road to match and reinforce the posted speed limit of 25 mph
- Promote safer street crossings, and
- Strengthen the sense of arrival

COMPLETE STREETS RECOMMENDATIONS

Conceptual Illustrations of Recommendations

Figures 3 and 4 graphically show how Complete Streets principles can be applied to transform Liliha Street within the study area. The conceptual drawings depict the recommended improvements along two segments of the road:

- Liliha Street at Kuakini Street (Figure 3)
- Liliha Street at School Street (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) Implement road diet, transitioning street from four to three vehicle lanes

- Restripe Liliha Street's vehicle lanes to one lane per direction plus a two-way left turn lane.
- Maintain parking when possible (see recommendation H).
- Stripe bicycle lanes (see recommendation B).

B) Improve bike facilities

- Install 5' bicycle lanes on both sides of Liliha Street, fulfilling the recommendations of the Oahu Bicycle Plan.
- Color bicycle lanes with green paint at intersection crossings and high-conflict driveways.
- Add bike parking to the streetscape and/or to curb extensions.
- Given the constrained right-of-way, widening the sidewalks along the entirety of Liliha Street is not possible; however, the bicyclists will add a buffer between people walking and driving, increasing comfort for pedestrians.

C) Add curb extensions to shorten crossing distance

- At Kuakini Street, the L&L crossing, Holokanana Lane, and School Street, install curb extensions into the parking lane to shorten the pedestrian crossing distance, increase pedestrian-motorist visibility, and add green space.

D) Plant trees in curb extensions to add shade and greenery

- Install trees in curb extensions. Trees help meet the desire for more green space and shade.
- Give the constrained right-of-way, not all sidewalks can be widened; however, adding trees will add comfort to the walking environment and help shield people from drivers.

Curb extensions with tree wells demarcate parking areas and add shade to Keoniana Street, Waikiki.

E) Stripe crosswalks at all intersection legs

- Crosswalks exist at all legs of an intersection, whether they are striped or not. Relocate crosswalk at Holokanana Lane to better match desire lines and stripe crosswalks at cross streets as well.

F) Protect crosswalks with signage and safety enhancements such as RRFBs

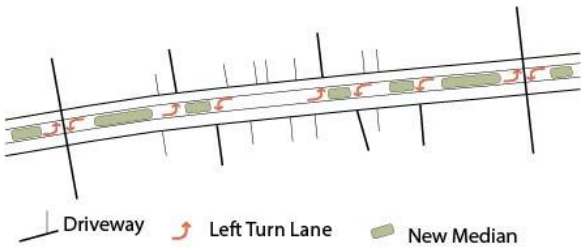
- Rectangular Rapid-Flash Pedestrian Beacons (RRFB) are activated manually by pedestrians with a push button or passively by a pedestrian detection system. They provide a high-visibility strobe-like warning to drivers when pedestrians are using the crosswalk. Pair RRFBs with signage stating "STOP for pedestrians in crosswalk."
- Install RRFBs at the uncontrolled crosswalks at Holokanana and the L&L.
- Over the long term, as driveways are consolidated and closed, protecting crosswalks with median islands will provide adequate safety for a three-lane street like Liliha Street.

RRFBs at commercial center use flashing lights and signage

Crossing islands provide pedestrians with a safe place to wait and cross one direction of traffic at a time.

G) Install median islands where possible

- Along stretches of Liliha Street without driveways, install medians in the center turn lane. The design shows an extended median just north of School Street, helping create a gateway effect.
- These medians may be landscaped, adding to the green element of the street.



Example of medians in a center-turn lane.

H) Off-set road to maintain on-street parking

- The design includes on-street parking on the Ewa side from School Street to the Lutheran Church and on the Diamond Head side from L&L to Kuakini Street.

Table 2 Proposed Design Changes to Liliha Street

	CURRENT	AFTER RECOMMENDATIONS ARE IMPLEMENTED
Type of Facility	Minor Arterial	No change
Street Width	56' at School Street, 48' between Liliha Court Ln and Kellett Ln, ~56' at Kuakini St	Same as current, except where curb extensions reduce street width
Speed Limit	25 mph	No change
Crosswalk Length (longest)	Liliha Street and N. School Street: 62'	Liliha Street and N. School Street: 60'
Number of Lanes	Two mauka-bound travel lanes, two makai-bound travel lanes with parking on both sides of the street. During peak hours, both parking lanes are converted into travel lanes	One mauka-bound travel lane, one center-turn lane, one makai-bound travel lane. In the mauka direction, one parking lane south of L&L. In the makai direction, one parking lane north of L&L
Distance to Side Streets	~250' from School St to Kapu Pl. ~650' from Kuakini St. to Kunawai Ln	Same
Driveways	Alleyways provide access to residential area. 12 driveways on Diamond Head side of street, 9 driveways on Ewa side of street	Same
Parking	6 Diamond Head stalls, 9 Ewa facing stalls. 6 private surface parking lots	All-day parking provided on the Diamond Head side from Kuakini Street to the L&L and on the Ewa side from the Lutheran Church to School Street
Sidewalks	4' in most places, wider sidewalks in areas with store frontage	Sidewalks widened to 13' at curb extensions
Transit Routes, Stops, Shelters	6 stops. Routes 1L, 2, 2L, 13, and W3	Same
Proximity to Future Rail	Dillingham Station is ~0.5 miles south of the study area	Same
Bicycle Features	None	5' bike lanes on both sides of street. Recommend treating with green paint at conflict areas due to presence of on-street parking and numerous driveways, impeding visibility of cyclists to motorists exiting driveways
Nearby Schools	Saint Theresa Catholic School, Kauluwela Elementary School, Likelike Elementary School, Lanikila Elementary School	Same
Nearby Institutions	Kuakini Medical Center, 5 smaller medical service offices, Liliha Public Library	Same

Figure 3 Concepts for Liliha Street at Kuakini Street

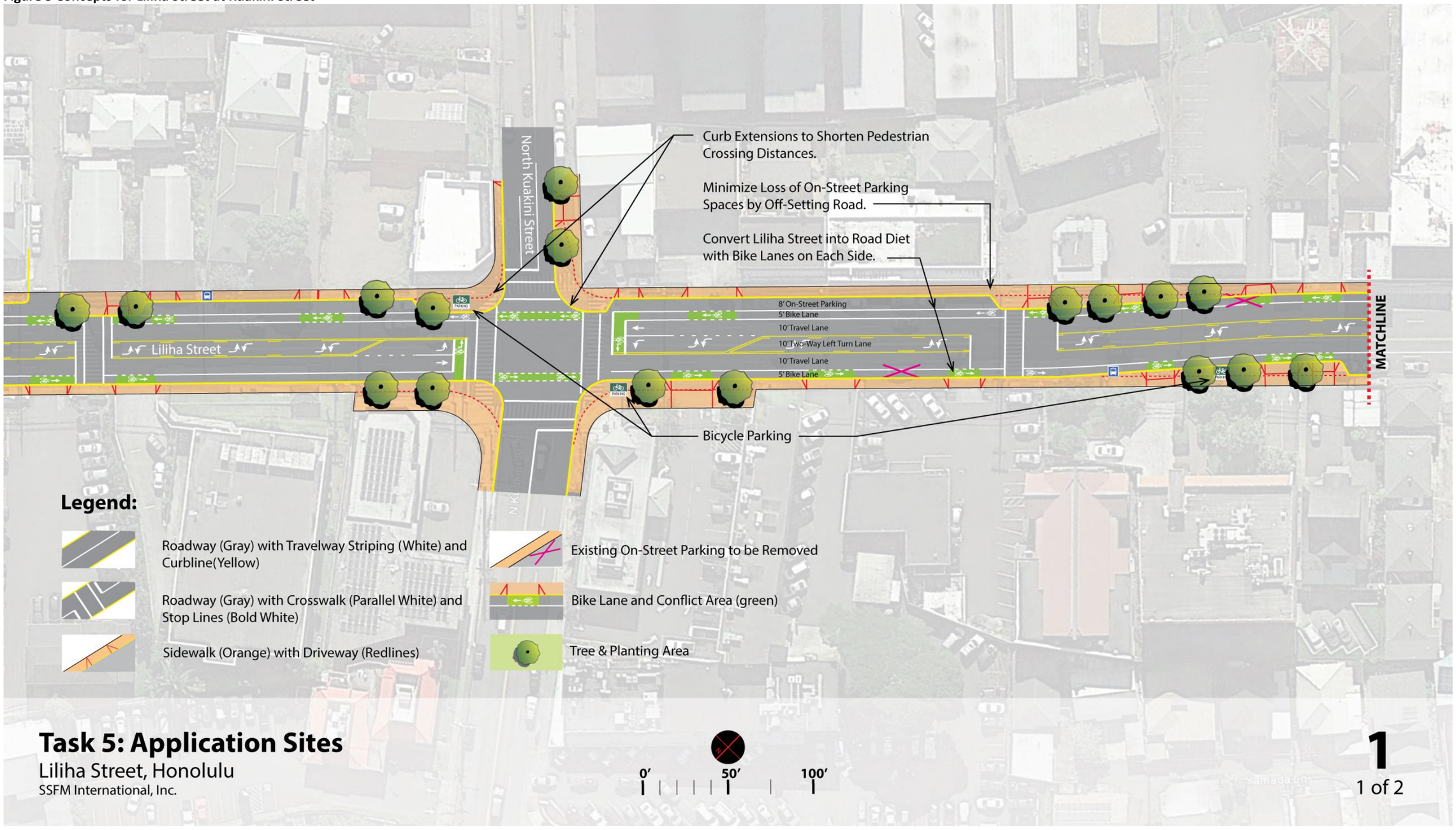


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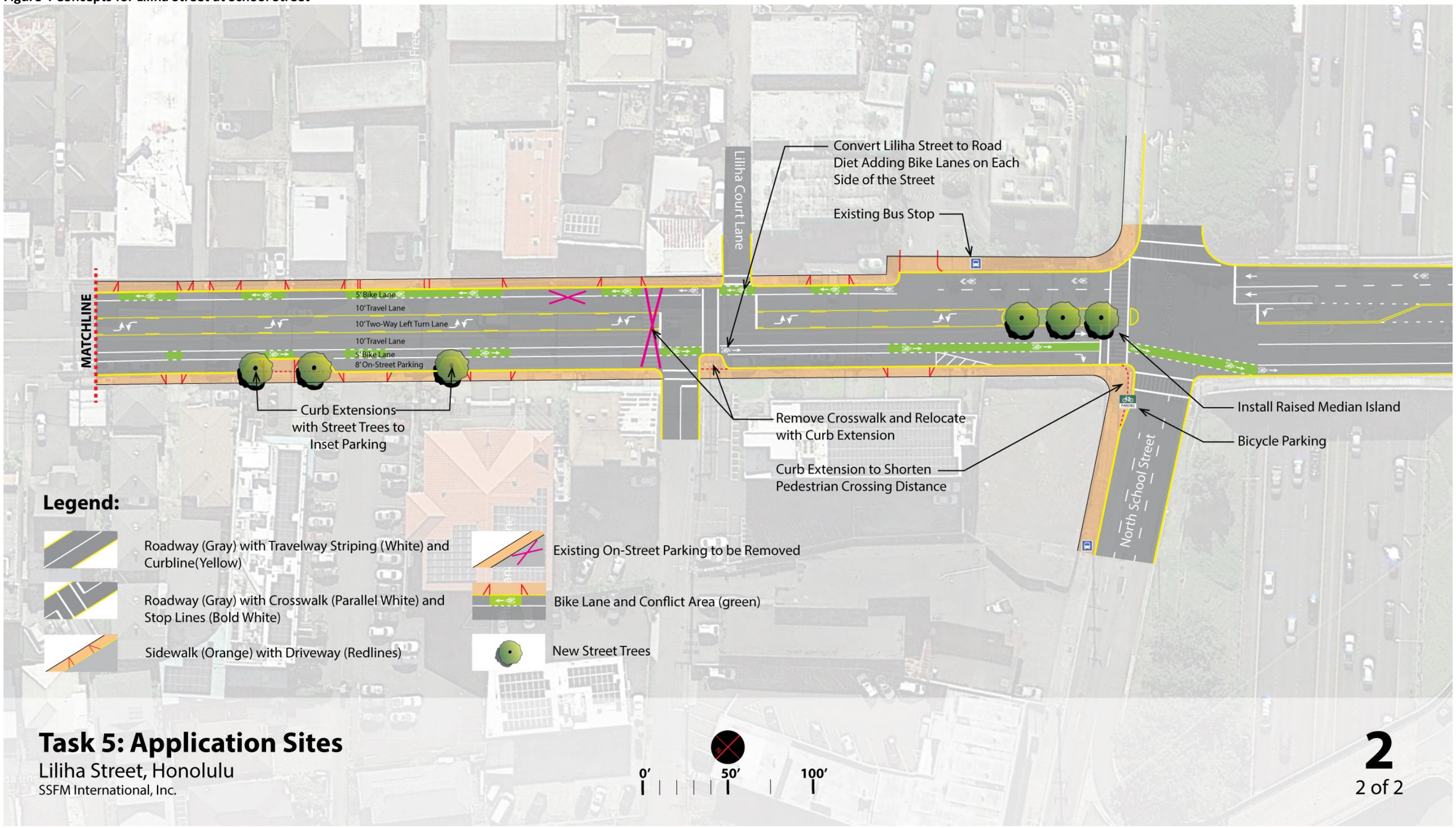
Figure 4 Concepts for Liliha Street at School Street



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Part Four: Implementation

This section presents a 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.

Near-Term Actions (0-1 year):

A) Implement road diet, transitioning street from four to three vehicle lanes

- Implement road diet with pavement marking: one 10' lane in each direction, one 10' center-turn lane, 5' bike lanes in each direction, and off-set on-street parking on one side of the road (see Figures 3 and 4 for details).
- Use striping to delineate proposed curb extensions and center medians.

B) Improve bike facilities

- Install 5' bike lanes in each direction.
- Indicate conflict areas such as driveways, bus stops, and intersections with green colored pavement and dotted white lines.
- Place bike lane word, symbol and arrow makings (MUTCD Figure 9C-3) at the beginning of the bike lane, at the far side of all bike path (after intersections), and in green conflict areas.
- At the right-turn lane at Liliha Street and School Street, install "Begin Right Turn Lane Yield to Bikes" (MUTCD R4-4) sign to indicate the motorist must yield to bicyclists in the mixing zone.

C) Add curb extensions to shorten crossing distance

- Stripe curb extensions.

D) Plant trees in curb extensions to add shade and greenery

- None.

E) Stripe crosswalks at all intersection leg

- Restripe crosswalks with advanced stop lines and signage along the uncontrolled through street approach.

F) Protect crosswalks with signage and safety enhancements such as RRFBs

- Install "State Law Stop for Pedestrian within Crosswalk" sign (R1-6a) at unsignalized mid-block crosswalks.

G) Install median islands where possible

- Stripe median islands.

H) Off-set road to maintain on-street parking

- Restripe roadway (see Recommendation A, B, C).

Mid-Term Actions (1 to 5 years):

A) Implement road diet, transitioning street from four to three vehicle lanes

- Install asphalt concrete (A/C) berms (or similar) to extend roadway in places (see Recommendations C, G, and H).

B) Improve bike facilities

- Install bike parking in curb extensions or underutilized parking stalls.

C) Add curb extensions to shorten crossing distance

- Install A/C (or similar) curb extensions.

D) Plant trees in curb extensions to add shade and greenery

- Install planters.

F) Protect crosswalks with signage and safety enhancements such as RRFBs

- Install RRFBs.

G) Install median islands where possible

- Work with property owners to consolidate redundant driveways.
- Close driveways using bollards for planters.
- Install medians using asphalt concrete berms.

H) Off-set road to maintain on-street parking

- Use A/C berms (or similar) to off-set parking.

Longer-Term Actions (5 years and Beyond):

A) Implement road diet, transitioning street from four to three vehicle lanes

- None.

B) Improve bike facilities

- None.

C) Add curb extensions to shorten crossing distance

- Construct concrete curb extensions that are flush to existing sidewalk.
- Where space permits, install tree wells for street trees.

D) Plant trees in curb extensions to add shade and greenery

- See Recommendation C.

E) Stripe crosswalks at all intersection leg

- None.

F) Protect crosswalks with signage and safety enhancements such as RRFBs

- Construct concrete curb extensions that are flush with the existing sidewalk (see Recommendation C).

G) Install median islands where possible

- Reconstruct median island and provide space for landscaping.
- Reconstruct sidewalk where driveways were eliminated.

H) Off-set road to maintain on-street parking

- See Recommendation C.

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Part Five: Cost Sheet

ITEM	UNIT	QUANTITY	UNIT COST	TOTAL COST
Removals/Demo				
Demolish existing sidewalk	Sq. Ft.	6335	$ 5.00	$ 31,675.00
Demolish existing Pavement	Sq. Ft.	4910	$ 8.00	$ 39,280.00
Erosion Control	L.S.	1	$ 10,000.00	$ 10,000.00
Site improvements				
Roadway				
Mill and Overlay existing AC pavement	Sq. Ft.	91911	$ 6.00	$ 551,466.00
Curb Gutter and Sidewalk	Sq. Ft.	14120	$ 20.00	$ 282,400.00
Drainage works	each	6	$ 7,000.00	$ 42,000.00
Raised Median	Sq. Ft.	820	$ 20.00	$ 16,400.00
4" Stripe (white/Yellow)	Lin. Ft.	7525	$ 6.00	$ 45,150.00
12"stripe (white)	Lin. Ft.	1180	$ 9.00	$ 10,620.00
5' Bike lane (Green)	Sq. Ft.	5010	$ 9.00	$ 45,090.00
Striping Symbols	each	58	$ 300.00	$ 17,400.00
Intersection				
Traffic Signal Modification	each	2	$ 350,000.00	$ 700,000.00
Landscaping				
Trees	each	23	$ 1,000.00	$ 23,000.00
Misc.				
Traffic Control	L.S.		5%	$ 90,724.05
Mobilization	L.S.		10%	$ 181,448.10
Contingency - 25%			25%	$ 453,620.25
Design				
Design Cost			8%	$ 203,221.87
TOTAL CONSTRUCTION				**$ 2,540,273.40**
TOTAL COST				**$ 2,743,495.27**