

JUNE 2015

HONOLULU COMPLETE STREETS IMPLEMENTATION STUDY LOCATION REPORT

Mahoe Street/Waipahu Street at August Ahrens Elementary School (FINAL)



City & County of Honolulu
Department of Transportation Services

Prepared by
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With
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Summary: Mahoe Street/Waipahu Street at August Ahrens Elementary School

Central Oahu, Sub-Area Waipahu, Council District VIII

NEED FOR PROJECT

This location was selected for Complete Streets treatment because of the heavy volume of children walking to and from the school. Compounding this is a large volume of vehicles entering and exiting the school area through the gate on Waipahu Street and into the driveway entrance on Mahoe Street.

SUMMARY OF RECOMMENDATIONS

- Enhance bus stop zones by increasing the size of the bus stop area and adding bus amenities.
- Install sharrow markings to increase utilization of the area by people on bicycles.
- Install mini-roundabouts to calm traffic and improve traffic flow.
- Create gateways to signify the entrance into the August Ahrens Elementary School zone and to slow motorists to the target speed of 20 mph.
- Reduce corner radii and create more compact side street crossings.
- Narrow the width of the travel way on Mahoe Street and widen the sidewalk.
- Enhance pedestrian crossings with features such as curb ramps, curb extensions, and “Z-crossings”.
- Improve pedestrian facilities surrounding the School, and encourage students to walk to school.



COST BREAKDOWN

Total: \$3,120,659.14

Design: \$231,159.94

Construction: \$2,889,499.20

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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. It 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 area includes Mahoe Street and Waipahu Street in the vicinity of August Ahrens Elementary School (Figure 1). It is located in the Central Oahu Planning Area, in City Council District 8. It is ½ mile away from the future Waipahu Transit Center Station but is not within that station's TOD planning district.

The August Ahrens Elementary School has a current student population of approximately 1,350 students. According to the school administration, more than half of the students walk or bike to school, and about 50 students take the school bus. Another unknown but meaningful percentage use TheBus.

Figure 1 Study Area



NEED FOR PROJECT

This location was selected for Complete Streets treatment because of the heavy volume of children walking to and from the school. Compounding this is the large volume of vehicles entering and exiting the school area through the gate on Waipahu Street and into the driveway entrance on Mahoe Street.

On Mahoe Street, children are picked up both within the school fences and along the street. The school administrator voiced his concern about how some vehicles are operated during pickup times. There are queues of cars idling or parked along Mahoe Street, as well as a steady flow of pedestrians crossing the street to start their walk home or to board a bus.



Long queues form outside of August Ahrens Elementary School before and after school hours.



A large number of August Ahrens Elementary School students walk to school.

On Waipahu Street, there is no legal parking in front of the school. Parents instead find parking between monkey pod trees west of the entrance, along a 150-foot section of Waipahu Street just east of the entrance, or in a concrete swale across from Tucker field. At the time of the field visit, there was no official pickup or dropoff location along Waipahu Street, although the school administrator advised that a newly constructed one would open in January of 2015. Even with this new location, the capacity for storing cars waiting to pick up children is far short of the need, leading to queuing in the street and motorists waiting for one of the few spaces to vacate. The cars parking in the concrete swale make it difficult or impossible for children to walk along the school fence, forcing the students to cut in front of the cars and continue their path in the narrow space between parked cars and cars in the street. The posted speed limit is 25 mph, but vehicle speeding is a chronic concern outside of student pickup and dropoff hours. The road is long and straight with few trees or visual cues for motorists to slow their speed.

EXISTING LAND USE, TRANSPORTATION FACILITIES, AND USAGE PATTERNS

Land Use, Transportation Facilities and Traffic Accidents

Mahoe Street is classified as a local road. It loads and unloads the residential areas to its east and west and also serves the August Ahrens School. It is 42 feet wide, evenly divided by a center stripe, and allows street parking on both sides. Street parking is used sporadically and located only in a few locations. There are 4 foot wide concrete sidewalks with a 4 foot wide planting strip on both sides of the street. Sidewalks become 8 feet wide (with no planting strip) at bus stops. There are nine driveways accessing single and multifamily homes on the west-facing side of Mahoe Street between Waipahu Street and Huakai Street,

and three driveways on the east-facing side of Mahoe Street between Waipahu Street and Huakai Street. Mahoe Street carries 3,400 to 3,600 cars a day and has a 25 mph posted speed limit.

Waipahu Street is a minor arterial. It serves the residential areas to its north and south, and additionally serves August Ahrens Elementary School, Lanakila Baptist Church and School, and other destinations to the west of Paiwa Street. Waipahu Street is also a key access point to H-1. The speed limit is posted at 25 mph. Waipahu Street carries 8,600 trips a day in front of the school and 9,700 trips a day east of Peke Lane. Less than 2 percent of those trips are heavy vehicles.

The accident history is relatively light based on the records from 2007 to 2014. All of the bicycle and pedestrian accidents have occurred on Waipahu Street. There were four pedestrian accidents and one bike accident at the intersection of Waipahu Street and Mahoe Street. It also was the site of three motorcycle/moped accidents. There were seven vehicle accidents during this seven year period on Mahoe Street between Huakai Street and Waipahu Street, including one at its intersection with Waipahu Street. There were four additional vehicular accidents along Waipahu Street between Hapawalu Place and Peke Lane.

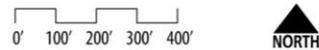
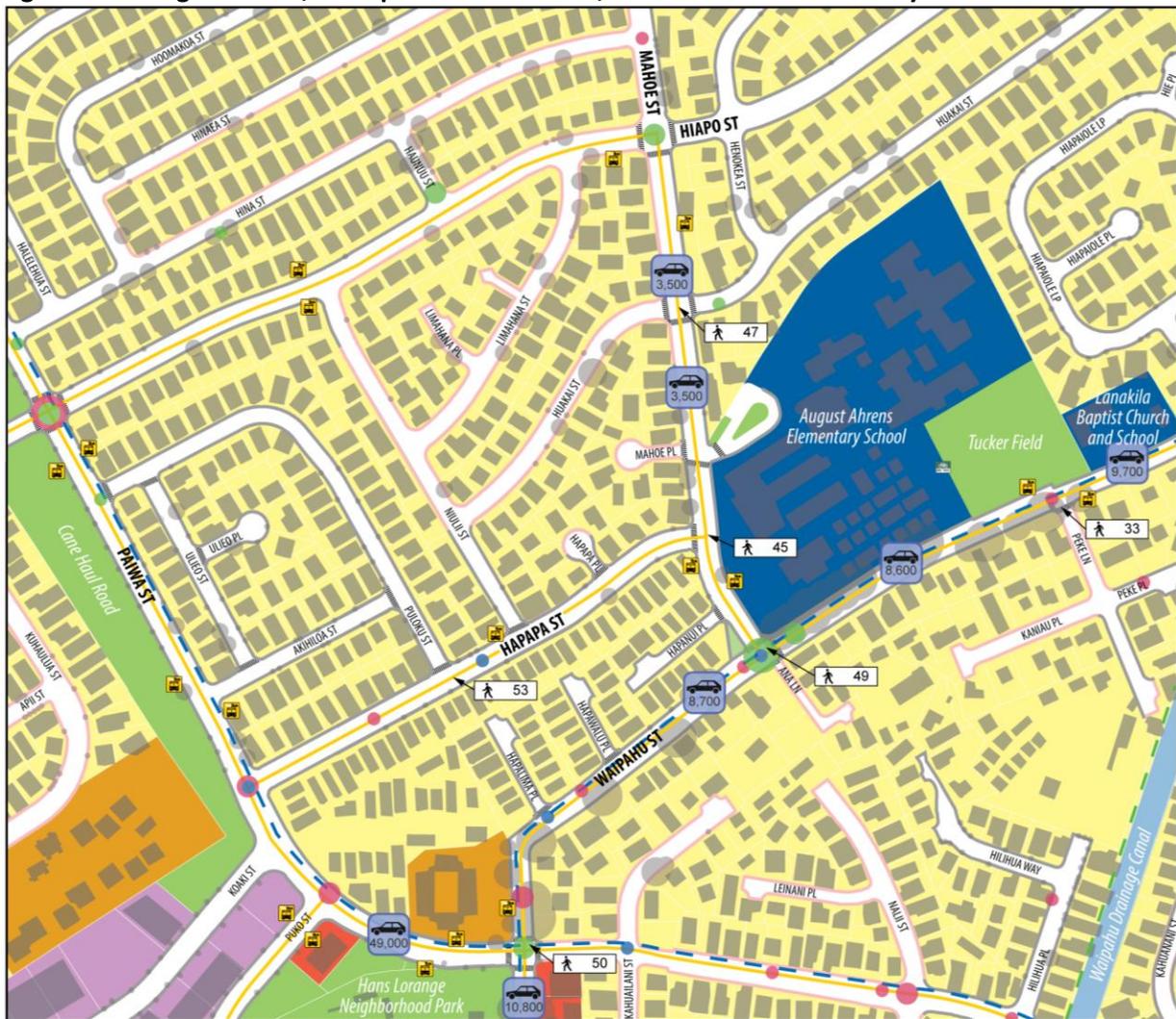
Figure 2 depicts existing land use, transportation facilities, and traffic accident data within the study area. Except for the August Ahrens Elementary School and the Lanakila Baptist Church and School, all land use adjacent to Mahoe Street and Waipahu Street are single family residences.

Usage Patterns

Table 1 describes existing usage patterns by pedestrians, bicyclists, vehicles, and transit users in the study area. Pedestrian traffic is light except during school pickup and dropoff times. Waipahu Street is particularly heavy with pedestrian activity as students head to and from parents' cars, local neighborhoods, or the bus stop next to Peke Lane. Bicycle traffic is sparse, and during the field visit, the 40-stall bike rack was empty.

There are 14 bus stops in the project area, serving seven bus routes. Four of these serve the school. The average daily ridership in 2012 was 1,313.

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



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



Mahoe Street from Waipahu Street to Hiapo 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
- Industrial
- Institutional
- Park/Open Space
- Residential

Pedestrian Facilities

- No Sidewalk
- Sidewalk
- Crosswalk

Table 1 Existing Usage Patterns along Mahoe Street and Waipahu Streets

Pedestrian use	Low pedestrian usage observed; however, much higher pedestrian usage before and after school hours.
Bicycle use	Low
Transit use	<p><u>Stop</u></p> <p>Waipahu St + Opp Peke Ln (Stop ID 1324) - 475 average daily ridership (ADR)</p> <p>Mahoe St + Waipahu St (Stop ID 1325) - 171 (ADR)</p> <p>Paiwa St + Opp Akihiloa St (Stop ID 1328) - 86 (ADR)</p> <p>Mahoe St + Hapanui Pl (Stop ID 1329) - 159 (ADR)</p> <p>Waipahu St + Mokuola St (Stop ID 1359) - 3 (ADR)</p> <p>Paiwa St + Waipahu St (Stop ID 1360) - 83 (ADR)</p> <p>Paiwa St + Hapapa St (Stop ID 1361) - 43 (ADR)</p> <p>Waipahu St + Peke Ln (Stop ID 1364) - 67 (ADR)</p> <p>Paiwa St + Waipahu St (Stop ID 1397) - 33 (ADR)</p> <p>Waipahu St + Paiwa St (Stop ID 2111) - 8 (ADR)</p> <p>Waipahu St + Mokuola St (Stop ID 2112) - 9 (ADR)</p> <p>Hapapa St + Puloku St (Stop ID 4495) - 5 (ADR)</p> <p>Puko St + Paiwa St (Stop ID 4496) - 83 (ADR)</p> <p>Puko St + Paiwa St (Stop ID 4497) - 88 (ADR)</p> <p><u>Boardings and Alightings by Route</u></p> <p>Route 43 - Waipahu-Honolulu-Alapai - 281 (ADR)</p> <p>Route E - Country Express! E - 150 (ADR)</p> <p>Route 81 - Waipahu Express - 308 (ADR)</p> <p>Route 432 - East-West Waipahu - 374 (ADR)</p> <p>Route 433 - Waipahu-Waikele Shopping Center - 134 (ADR)</p> <p>Route 434 - Waipahu-Village Park - 35 (ADR)</p> <p>Route W2 - Waipahu via Paiwa Express - 30 (ADR)</p>
Average Dailey Ridership (Source: <i>Global Stop Summary by Trip</i> , TheBus, 2012)	
Daily Vehicular Volumes (Source: <i>Historical Traffic Station Maps</i> , HDOT, 2009-2013)	<p>Farrington Hwy at Waikele Stream Bridge (2012) - 31,400</p> <p>Farrington Hwy between Kahuamoku Street and Paiwa St / Awanui St (2010) - 42,900</p> <p>Kamehameha Hwy Between Waipahu St And H-1 Off-Ramp (2012) - 56,500</p> <p>Mahoe St B/T Waipahu St And Hiapo St (2009) - 3,400</p> <p>Mahoe St: Mahoe Pl To Huakai St (2012) - 3,600</p> <p>Mahoe St: Mahoe Pl To Huakai St (2010) - 3,200</p> <p>Paiwa St: Kahuamoku St to Kahuanui St (2013) - 7,300</p> <p>Waipahu St: Puamano Pl to Mokuola St (2013) - 10,800</p> <p>Waipahu St b/t Hapawalu Pl. Ana Ln. (2009) - 8,700</p> <p>Waipahu St b/t Hianakui St Waipahu St (2009) - 8,000</p> <p>Waipahu St: Hianakui St to Waipahu St (2010) - 9,700</p>

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	<p>Waipahu St: Mahoe St to Peke Ln (2012) - 8,600</p> <p>Waipahu St: Waipahu St to Hiapo St (2011) - 9,200</p>
<p>Peak periods (Source: <i>Historical Traffic Station Maps</i>, HDOT, 2012)</p>	<p>Farrington Hwy at Waikele Stream Bridge - 7:15 to 8:15 AM, 4:00 PM to 5:00 PM</p> <p>Farrington Hwy between Kahuamoku St and Paiwa St / Awanui St - 7:15 to 8:15 AM, 3:00 PM to 4:00 PM</p> <p>Kamehameha Hwy Between Waipahu St And H-1 Off-Ramp - 8:00 to 9:00 AM, 5:30 PM to 6:30 PM</p> <p>Kilani Ave: Aoni St to Kaliponi St - 7:00 to 8:00 AM, 4:45 PM to 5:45 PM</p> <p>Kilani Ave: Kaliponi St to Ilima St - 6:30 to 7:30 AM, 4:00 PM to 5:00 PM</p> <p>Mahoe St B/T Waipahu St And Haipo St - 7:00 to 8:00 AM, 3:00 PM to 4:00 PM</p> <p>Mahoe St: Mahoe Pl to Huakai St - 7:00 to 8:00 AM, 4:15 PM to 5:15 PM</p> <p>Paiwa St: Kahuamoku St to Kahuanui St - 7:00 to 8:00 AM, 3:15 PM to 4:15 PM</p> <p>Mahoe St: Mahoe Pl to Huakai St - 7:15 to 8:15 AM, 4:45 PM to 5:45 PM</p> <p>Waipahu St B/T Hapawalu Pl. Ana Ln. - 7:00 to 8:00 AM, 3:45 PM to 4:45 PM</p> <p>Waipahu St B/T Hianakiu St Waipahu St - 7:00 to 8:00 AM, 4:00 PM to 5:00 PM</p> <p>Waipahu St: Hianakiu St to Waipahu St - 7:15 to 8:15 AM, 3:30 PM to 4:30 PM</p> <p>Waipahu St: Mahoe St to Peke Ln - 7:00 to 8:00 AM, 5:45 PM to 6:45 PM</p> <p>Waipahu St: Puamano Pl to Mokuola St - 7:00 to 8:00 AM, 3:15 PM to 4:15 PM</p> <p>Waipahu St: Waipahu St to Hiapo St - 7:00 to 8:00 AM, 4:15 PM to 5:15 PM</p>
<p>Accident History (Source: <i>State of Hawaii Motor Vehicle Accident Reports</i>, Honolulu Police Department, 2011-2014)</p>	<p>Along Waipahu St between Hapawalu Pl and Peke Ln: 4 Car/Truck Accident, 2 Motorcycle/Moped Accident, 1 Pedestrian Accident.</p> <p>At Mahoe St and Waipahu St: 1 Bicycle Accident, 1 Car/Truck Accident, 3 Motorcycle/Moped Accident, 4 Pedestrian Accident.</p> <p>Along Mahoe St between Waipahu St and Hapanui Pl: 1 Car/Truck Accident</p> <p>Along Mahoe St between Hapanui Pl and Hapapa St: 1 Car/Truck Accident</p> <p>Along Mahoe St between Hapapa St and Huakai St. : 3 Car/Truck Accident</p>
<p>Heavy vehicle usage (Source: <i>Historical Traffic Stations</i>, HDOT, 2013)</p>	<p>1.87% heavy vehicles on Waipahu St.</p>

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Part Two: Field Work and Key Findings



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

STAKEHOLDER INPUT

The findings of this report are comprised of input received from participants in walking audits conducted on January 22, 2015 along Mahoe and Waipahu Streets near the August Ahrens Elementary School. Local stakeholder participation for the audit included Honolulu City Council Member Brandon Elefante, Dion Mesta of the Honolulu City Council, Dan Alexander of the Hawaii Bicycling League, Connie Herolaga of the Waipahu Neighborhood Board, and Dean Kaneshiro, Vice Principal of August Ahrens Elementary School. Representing SSFM International, Inc. were Alan Fujimori and Michael Motoki; other consultants were Dan Burden and Samantha Thomas of Bluezones, and Gary Toth of Gary Toth Consulting. Others participating included:

- City and County of Honolulu Department of Transportation Services (DTS): Mark Garrity, Kelly Cruz, Layden Akasaki, Shawn Butler, Ezra Kao, Jay Hara, Lorine Jaena, Jay Egusa, Randall Kurashige, Yamato Milner and Paul Texeira;
- Hawaii State Department of Health (DOH): Heidi Hansen-Smith;
- University of Hawaii at Manoa: Lehua Choy and Selina Stasi.

The findings are discussed in the following section.

FINDINGS

This section summarizes key findings based on observations made by the consultant team with input from Department of Transportation Services staff, State and local stakeholders.

Finding: The width and alignment of Mahoe Street encourages speeding.

Mahoe Street is a lightly travelled two-lane road (3,600 daily trips in 2012) yet extremely wide for a street that serves mainly low-density residential housing. It is 44 feet wide curb to curb and is a straight away. This encourages motorists to drive at speeds higher than the posted 25 mph speed limit. The local stakeholders verified that vehicular operating speeds greatly discourage bicyclists and pedestrians from using Mahoe Street.



Photo of Mahoe Street near the pedestrian crossing at Hiapo Street.

Finding: Most street intersections and school driveways are over-designed for vehicular traffic.

Corner radii along Mahoe Street are large. This encourages high-speed turns and elongated crossing distances for pedestrians. The crossing at Hiapo Street is 60 feet, Huakai Street is 36 feet, Mahoe Place is 34 feet and Hapapa Street is 60 feet. All of these streets are residential with some as cul-de-sac style streets. At Hina, Hinaea, and Hoomakoa Streets, there are no marked crosswalks at all.



Photo of Mahoe Street near the pedestrian crossing at Hiapo Street.

Large corner radii and a double lane driveway into August Ahrens School on Mahoe Street makes a key pedestrian crossing for students difficult. While the entrance requires two lane capacity during school drop-off and pick-up, it is excessively wide for the typical uses during the remainder of the day.

Finding: The intersection of Mahoe and Waipahu Streets is very wide, car oriented and does not respect the proximity of the school.

Wide travel lanes on Mahoe and Waipahu Streets combined with large corner radii elongate crossing distances and encourage speeding. Speeding through the intersection is made worse by the presence of a traffic signal, which encourages motorists to pick up speed to “beat the light.” This is a concern along Waipahu Street heading northeast, due to the location of the school entrance and drop-off and pickup zone 400 feet away.



Photo of Mahoe Street near the pedestrian crossing at Hiapo Street.

Finding: Pedestrian facilities are inadequate and are infringed upon by vehicles.

Sidewalks are narrow on both Waipahu and Mahoe Streets. Along Waipahu, vehicles were observed to park on the sidewalk area.

Residents regularly park their cars blocking sidewalks on the south side of Waipahu Street across from the August Ahrens Elementary School. During the walk audit, the consultant team noted that there appears to be little choice, due to the absence of alternative parking locations for residents. The school’s Vice President noted that many residents in the area have three or more cars within their households.



Parked vehicles obstruct unimproved sidewalk on Mahoe Street.



Parked vehicles obstruct unimproved sidewalk on Waipahu Street.

Finding: City bus usage is high, but no amenities are provided to make using the bus more comfortable.

The bus stop amenities along Mahoe and Waipahu Streets near the School consist of little more than a sign, with little to no seating, no shelter, and narrow waiting areas. Despite these conditions, bus usage is high.

Bus bulb curb extensions could be used to improve transit performance and user comfort. Bus bulbs eliminate the need for buses to merge into mixed traffic after every stop, and facilitate passenger boardings by allowing the bus to align directly with the curb. They also improve the comfort of waiting for the bus by providing additional space for amenities such as shelters and/or benches. These amenities increase comfort and security by keeping waiting passengers out of the rain and sun, providing the elderly or the tired with a place to sit.



A large number of August Arhens Elementary School students use TheBus after school. Left: Mahoe Street and Hapapa Street bus stop (southbound). Right: Waipahu Street and Peke Lane bus stop (eastbound).

Finding: Pedestrian facilities are inadequate to accommodate the high volumes of traffic before and after school hours.

The current routes for children going in and out of the school along Waipahu Street, combined with the informal parking in the concrete drainage channel east of the school, force children to cross in front of the parked cars and walk within a narrow space between the cars and the street.



School officials and volunteers line up near Waipahu Street gate in preparation for pickup time.



Parents begin to queue outside the main entrance to August Ahrens Elementary School.

The school currently funnels children out through a small gate just east of the row of monkeypod trees. With the new pickup and dropoff area next to Tucker Field, conditions will improve, yet the children will still be forced to cross both the entrance and exit of the new dropoff area on their way to and from bus stops or to neighborhoods to the east along Waipahu Street. They will also continue to be forced to walk within the concrete channel or within a narrow strip of paved area next to the travel way. See photos below.



In the photo above, the arrow depicts where pedestrians will be forced to cross the entrance of the new pickup and drop-off area.



The concrete drainage channel forces pedestrians to either walk within or to use the narrow paved path immediately adjacent to the travelled way.

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Part Three: Recommended Application of Complete Streets Concepts

This section describes the recommended application of Complete Streets concepts for Mahoe and Waipahu Streets at the August Ahrens Elementary School. 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 3-8 provide an overview of the proposed changes to Mahoe and Waipahu Streets within the study area as follows:

- Figure 3 Concepts for Waipahu Street at the Intersection with Mahoe Street
- Figure 4 Concepts for Waipahu Street between Mahoe Street and Peke Lane
- Figure 5 Concepts for Waipahu Street between Peke Lane and Waipahu Stream Drainage Canal
- Figure 6 Concepts for Mahoe Street between Hapapa Street and Huakai Street
- Figure 7 Concepts for Mahoe Street between Huakai Street and Hina Street
- Figure 8 Concepts for Mahoe Street between Hina Street and Halelehua Street

Description of Recommendations

The recommendations for Mahoe and Waipahu Streets are described below and shown on Figures 3 through 8. Table 2 is a summary list of all recommendations, the before and after effect.

A) Enhance bus stop zones

- Install bus bulb curb extensions at all four bus stops in the study area to increase the size of the bus stop waiting area and improve transit efficiency.
- Install shelters and benches at all four bus stops in the study area to improve comfort and security.

B) Install sharrow markings to increase utilization of the area by people on bicycles.

- Install sharrow markings and appropriate signage on Mahoe Street and Waipahu Street.

C) Install mini-circles or roundabouts to calm traffic and improve traffic flow.

- The center island, splitter islands, and surrounding curbs could be mountable if necessary. They should be designed to accommodate the standard 40' city bus.

- Texturize and color crosswalks to make crossing safer for pedestrians and to give motorists additional visual warnings of potential pedestrians. Crosswalks can also be raised to give an additional level of safety.



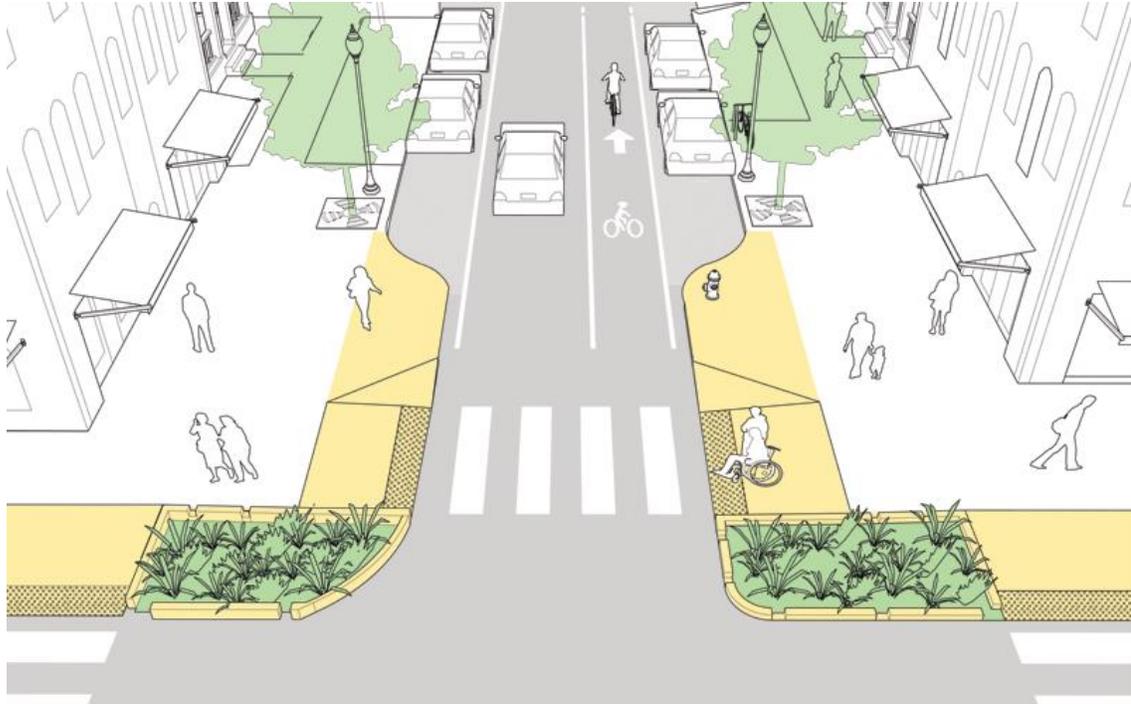
Domed mini-circle in Manitou Springs, CO.

D) Create gateways to signify the entrance into the August Ahrens Elementary School zone and to slow motorists to the target speed of 20 mph.

- Provide mini-circles or roundabouts at the intersections of Waipahu Street and Mahoe Street, Waipahu Street and Hianakiu Street, and Mahoe Street and Hiapo Street with additional landscaping and signage to instill a sense of place.
- Install curb extensions to shorten pedestrian crossing distances and to define the travel path of the roundabout.

E) Reduce corner radii and create more compact side street crossings.

- Install curb extensions at all street intersections in the study area to reduce crossing widths, turning radii, and improve sight lines, and further calm traffic. Curb extensions reduce crossing distance, improve safety for pedestrians and motorists by increasing both users' visibility, reduce speed of turning vehicles, and encourage pedestrians to cross at designated locations.
- At intersections of two longer roads, tighten corner radii to 15 feet; at all other intersections, reduce corner radii to 5 feet.
- Install bollards at intersections to slow vehicular turning movements and provide a safer walking/bicycling environment.
- Curb extensions can be designed with rain gardens or landscaping area to improve drainage and create a more attractive street.



Curb extensions with rain gardens within.

Source: <http://nacto.org/usdg/street-design-elements/curb-extensions/gateway/>

F) Narrow the width of the travel way on Mahoe Street

- Paint thick outside white lines with centerline for two 10-foot travel lanes.
- Allocate 10 feet on each side of the roadway for on-street parking.

G) Enhance pedestrian crossings

- Install one ADA compliant curb ramp per crosswalk rather than a single ramp at the apex of the curve.
- Install curb extensions to reduce pedestrian crossing distances (see Recommendation E).
- At the intersection of Mahoe Street and Hina Street, install center medians before and after crosswalks on Mahoe Street to protect pedestrians and slow traffic.
- Convert the pedestrian crossings at the intersections of Waipahu Street and Peke Lane to a “Z-crossing.” The shape forces pedestrians to turn and face oncoming traffic, increasing visibility between pedestrians and motorists.

H) Improve pedestrian facilities surrounding the School, and encourage students to walk to school.

- Create a new pathway for children exiting the School that reroutes children behind the School Drop-off zone. This will avoid the existing problem of walking in a narrow space between the cars parked in the concrete channel and live traffic.
- Reward students who are walking to school by giving them a 10 to 15 minutes earlier dismissal or another incentive.

Table 2 Proposed Design Changes to Mahoe Street and Waipahu Street

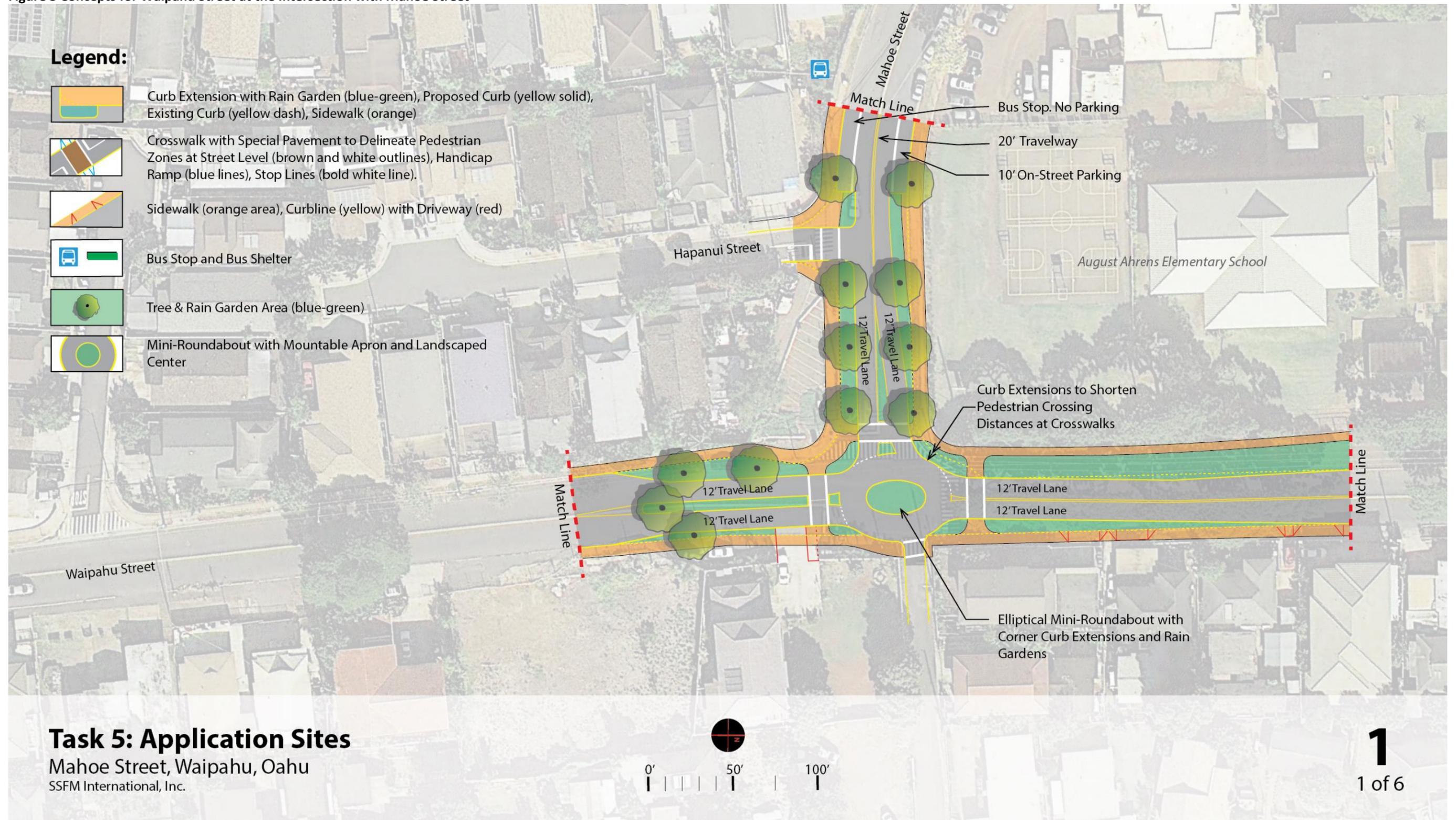
	CURRENT	AFTER RECOMMENDATIONS ARE IMPLEMENTED
Type of Facility	Urban Minor Arterial (Waipahu St)	Same.
Street Width and number of lanes.	<p>Mahoe St between Waipahu St and Halelehua St: one 21' through lane in each direction with on street parking on both sides of the road. Entire roadway width is 42'.</p> <p>Waipahu St between Mahoe St and Hiapo St: one 24' through lane in the westbound direction, one 16' through lane in the eastbound direction. Between Mahoe St and Peke Ln: one 16' through lane in each direction however, street width varies.</p>	<p>Mahoe St between Waipahu St and Halelehua St: 10' on-street parking on both sides of the road, 20' two-directional travel way.</p> <p>Waipahu St between Mahoe St and Hiapo St: Same.</p>
Posted Speed Limit	25 mph on Mahoe St and 25 mph on Waipahu Street	Same.
Crosswalk Length (longest)	Mahoe St and Hiapo St (west leg): 61'	Mahoe St and Hiapo St (west leg): 61'
Distance to side streets	~870' from Peke Ln to Mahoe St, ~470' from Mahoe St to Hapawalu Pl, ~230' from Hapawalu Pl to Hapalima Pl.	Same.
Driveways	9 driveways to single and multifamily homes on west-facing side of Mahoe St between Waipahu St and Huakai St, 3 driveway on east-facing side of Mahoe St between Waipahu St and Huakai St.	Same.
Parking	<p>Unmarked on street parking along Mahoe St. On the westbound side of Waipahu St, parking on unimproved shoulder/asphalt sidewalk.</p> <p>Staff parking at August Ahrens Elementary School is inadequate; some have to double park and/or park on grass.</p>	10' on-street parking on both sides of the road.
Sidewalks	<p>Mahoe St: 4' concrete sidewalks with a 4' planting strip on both sides of the street. Sidewalks become 8' (with no planting strip) at bus stops.</p> <p>Waipahu St: ~4' asphalt sidewalks from Mahoe St to Peke Ln on the mauka side with frequent utility pole and landscaping constriction, ~6' with parked car obstructions.</p>	Same.

HONOLULU COMPLETE STREETS PROJECT IMPLEMENTATION STUDY

Transit Routes / Stops / Shelters	There are 5 stops in the immediate project area.	Enhance transit stops with shelters and benches.
Proximity to future rail	Within ½-mile of the Waipahu Transit Center Station, but not within the ¼-mile TOD planning area.	Same.
Bicycle features	40-stall “comb-style” bicycle rack located between Tucker Field and August Ahrens Elementary School classrooms.	Sharrows on Mahoe St and Waipahu St.
Nearby Schools	August Ahrens Elementary School	Same.
Nearby Institutions	Lanakila Baptist Church and School, Bethel Chapel Assembly of God, Hans L'Orange Park	Same.

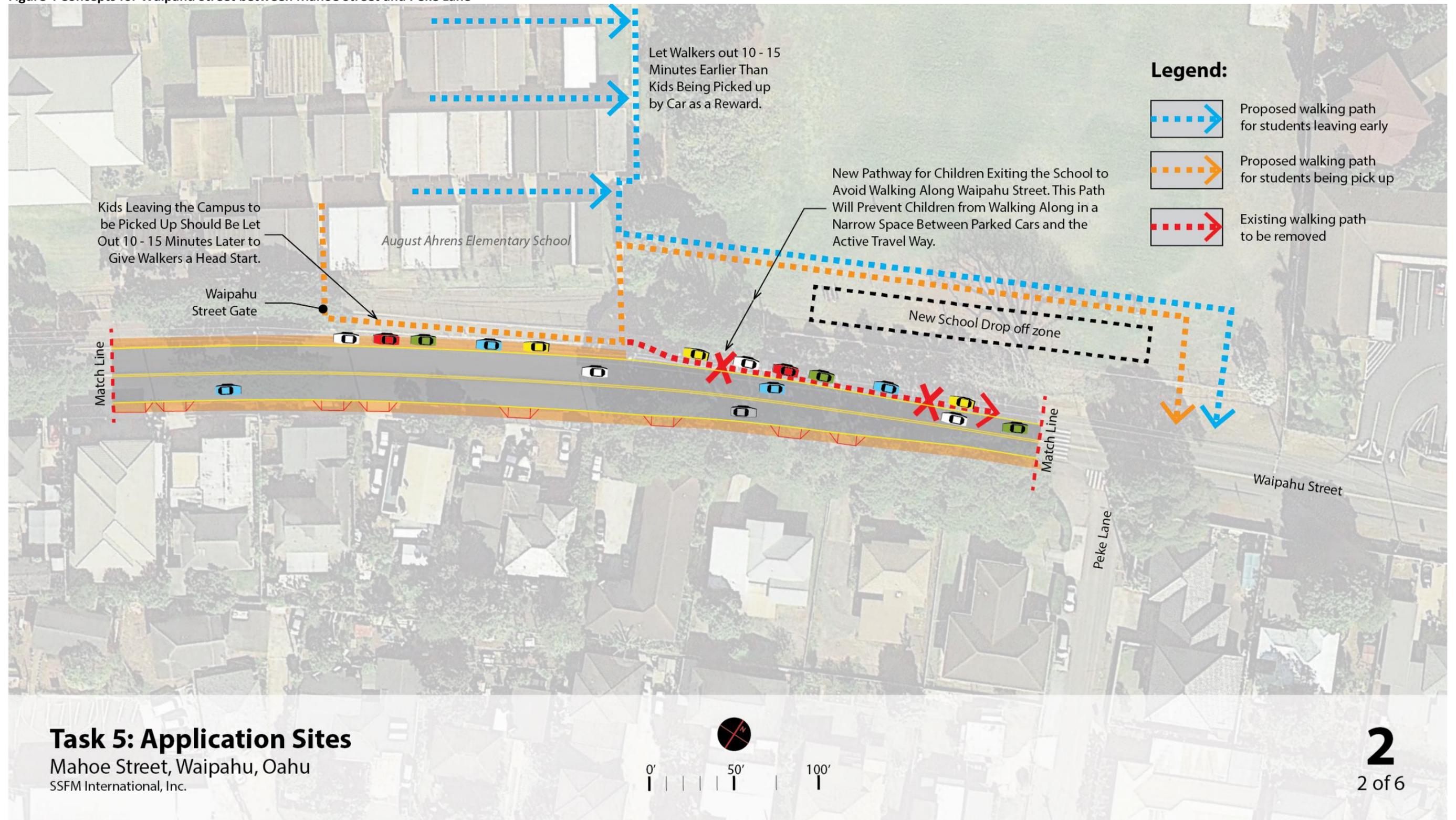
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Figure 3 Concepts for Waipahu Street at the Intersection with Mahoe Street



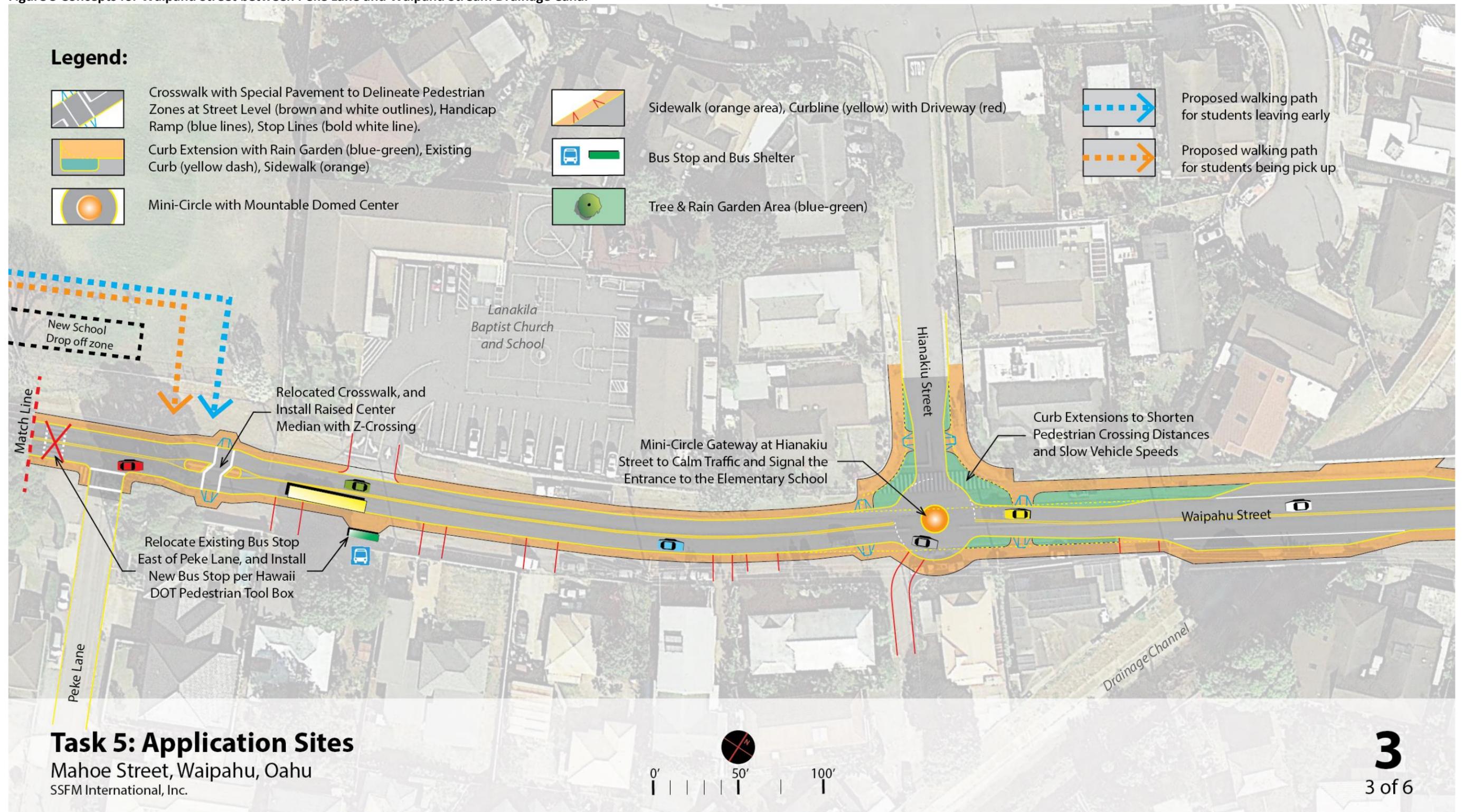
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Figure 4 Concepts for Waipahu Street between Mahoe Street and Peke Lane



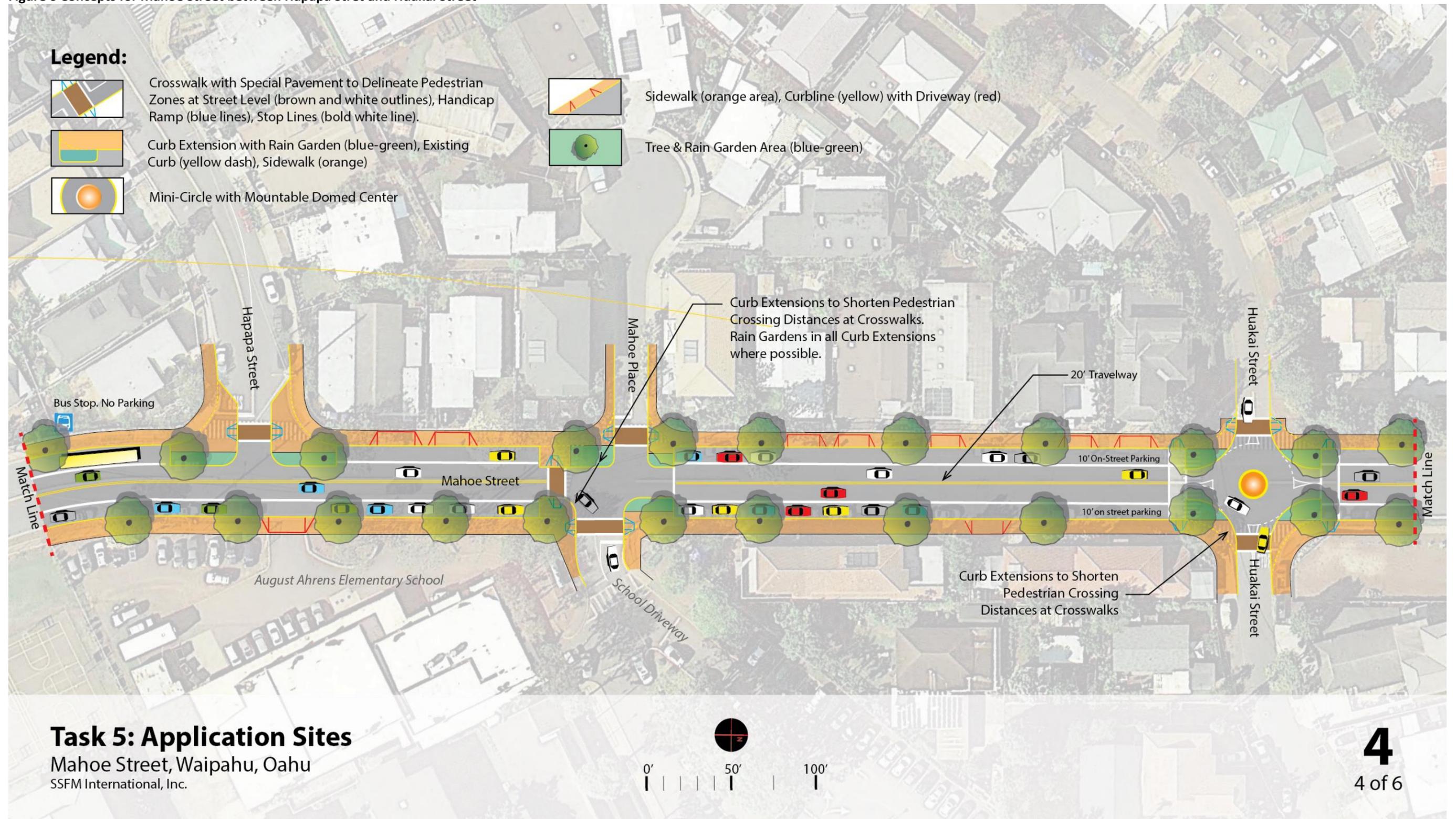
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Figure 5 Concepts for Waipahu Street between Peke Lane and Waipahu Stream Drainage Canal



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Figure 6 Concepts for Mahoe Street between Hapapa Street and Huakai Street

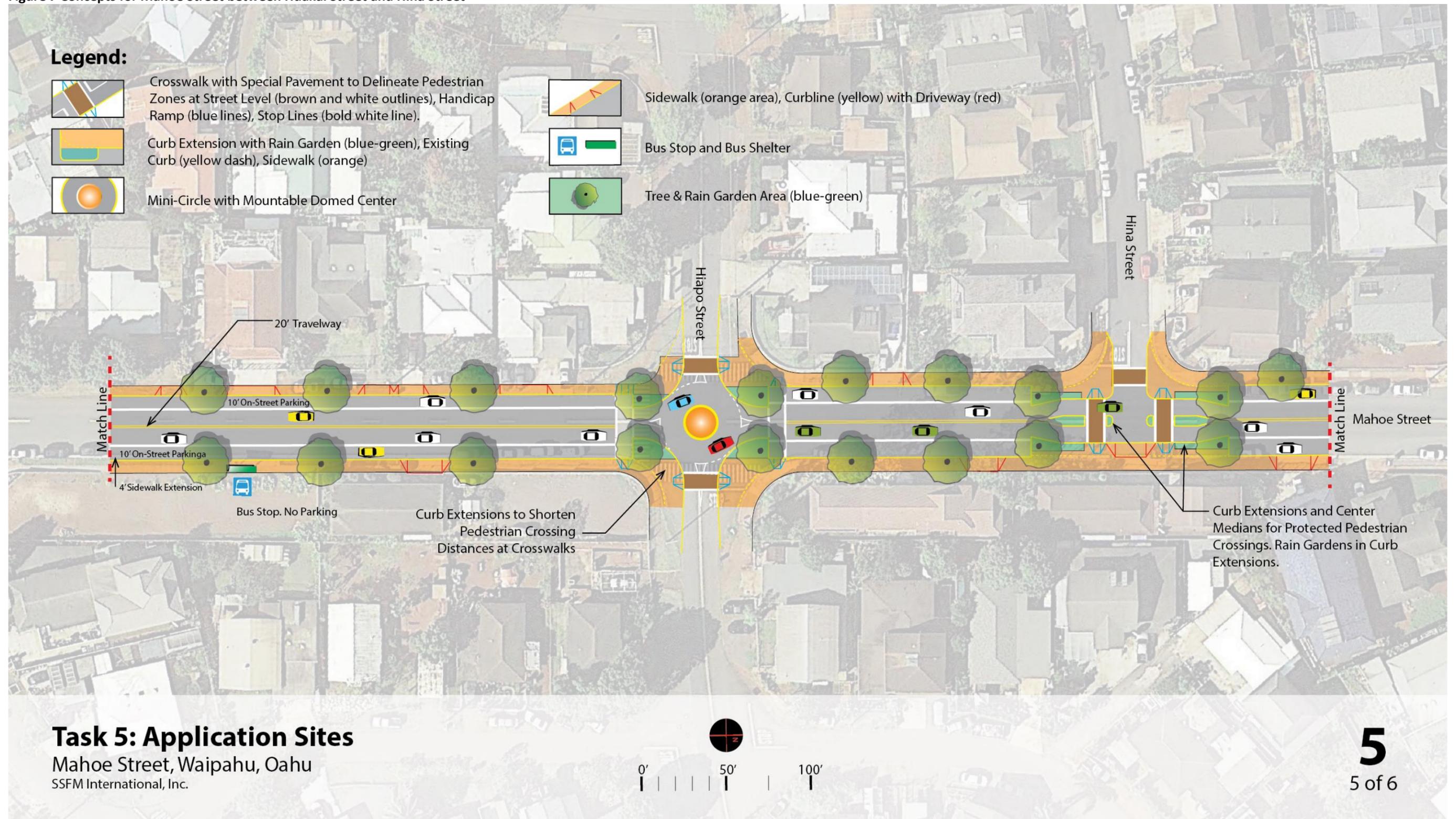


Task 5: Application Sites

Mahoe Street, Waipahu, Oahu
 SSFM International, Inc.

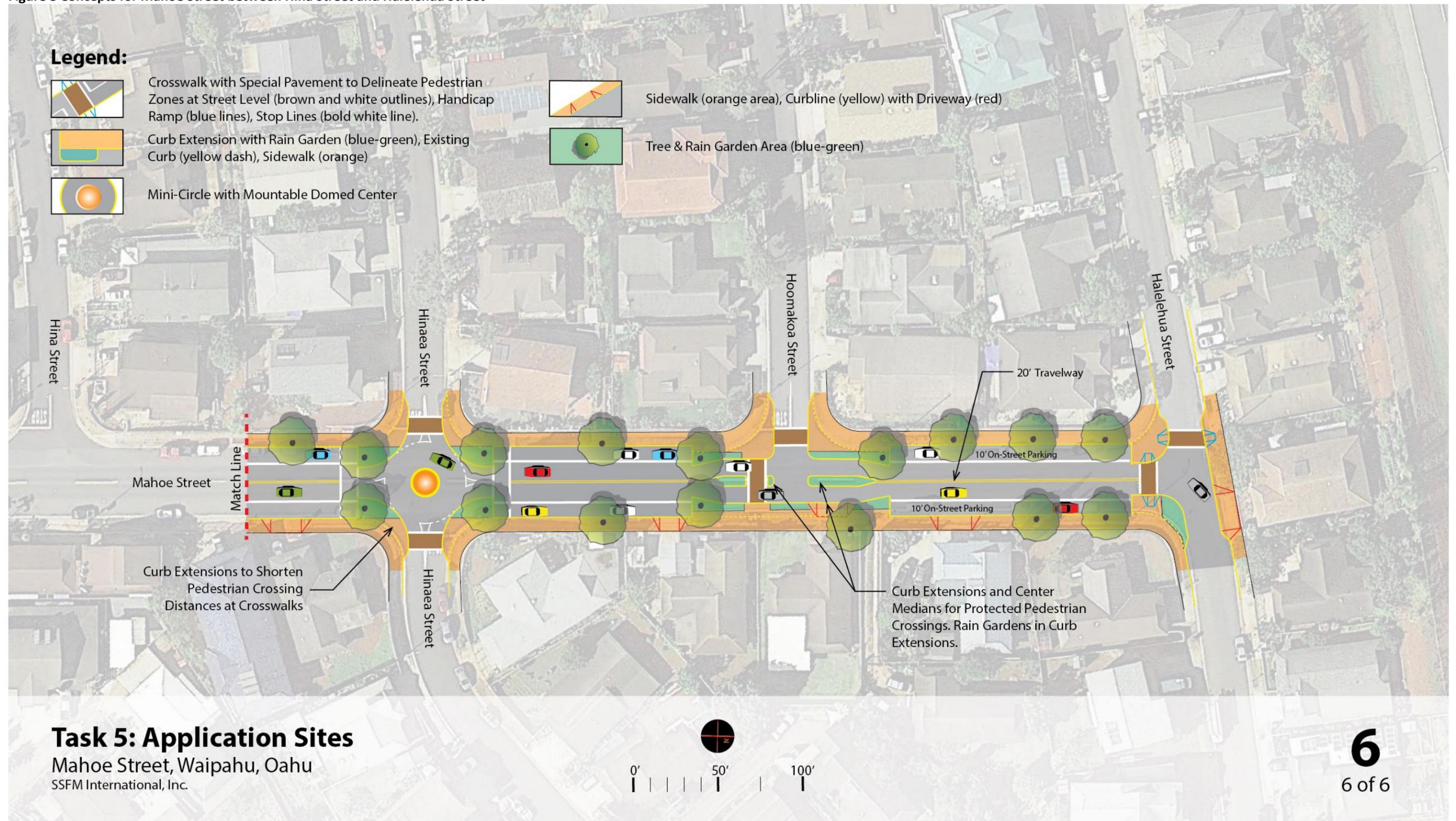
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Figure 7 Concepts for Mahoe Street between Huakai Street and Hina Street



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Figure 8 Concepts for Mahoe Street between Hina Street and Halelehua Street



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Part Four: Implementation

This section looks at the recommendations and sorts them according to how soon they can be implemented. 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) Enhance bus stop zones.

- Install bus shelters and benches where existing sidewalks are wide enough.

B) Install sharrow markings to increase utilization of the area by people on bicycles.

- Install sharrow markings and appropriate signage on Mahoe Street and Waipahu Street.

C) Install mini-circles and roundabouts to calm traffic and improve traffic flow.

- Use striping, bollards, and planters to delineate mini-circles and roundabouts.
- Remove the traffic signal at the intersection of Waipahu Street and Mahoe Street and install a mini-roundabout using striping, bollards, and planters.

D) Create gateways to signify the entrance into the August Ahrens Elementary School zone and to slow motorists to the target speed of 20 mph.

- None.

E) Reduce corner radii and create more compact side street crossings.

- Use striping to reduce curb radii.
- Install bollards in the newly striped curb extensions.

F) Narrow the width of the travel way on Mahoe Street.

- Paint thick outside white lines with centerline for two 10-foot travel lanes.

G) Enhance pedestrian crossings.

- Restripe the crosswalk at Waipahu Street and Peke Lane to a “Z-crossing”.
- Stripe a center median at the intersection of Mahoe Street and Hina Street and install planters or bollards.

H) Improve pedestrian facilities surrounding the School, and encourage students to walk to school.

- Begin program to reward students who are walking to school by giving them a 10 to 15 minutes earlier dismissal or another incentive.

Mid-Term Actions (1 to 5 years):

A) Enhance bus stop zones.

- Bulb out bus stop area with asphalt concrete (A/C) berms (or similar). Fill curb extensions with A/C pavement.
- Install bus shelters and bus stops.

B) Install sharrow markings to increase utilization of the area by people on bicycles.

- None.

C) Install mini-circles or roundabouts to calm traffic and improve traffic flow.

- Use A/C berms (or similar) to delineate mini-circles or roundabouts and curb extensions.

D) Create gateways to signify the entrance into the August Ahrens Elementary School zone and to slow motorists to the target speed of 20 mph.

- Install landscaping and signage to instill a sense of place and to welcome people to school zone.

E) Reduce corner radii and create more compact side street crossings.

- Use A/C berms (or similar) to delineate curb extensions, while providing breaks for crosswalks.

F) Narrow the width of the travel way on Mahoe Street.

- None.

G) Enhance pedestrian crossings.

- Install A/C curb extensions (see Recommendation E).

H) Improve pedestrian facilities surrounding the School, and encourage students to walk to school.

- Create a new pathway for children exiting the School to reroute children behind the School Drop off zone.

Longer-Term Actions (5 years and Beyond):

A) Enhance bus stop zones.

- Construct permanent bus bulb at bus stops in the study area.

B) Install sharrow markings to increase utilization of the area by people on bicycles.

- None.

C) Install mini-circles and roundabouts to calm traffic and improve traffic flow.

- Construct permanent mini-circles and roundabouts and repave the roadway to ensure proper drainage flows (see Recommendation E).
- Install mountable center islands and splitter islands, and provide landscaping area where space permits.

D) Create gateways to signify the entrance into the August Ahrens Elementary School zone and to slow motorists to the target speed of 20 mph.

- None.

E) Reduce corner radii and create more compact side street crossings.

- Install permanent curb extensions at all street intersection that are flush with the existing sidewalk.
- Construct rain gardens or landscaping area in curb extensions. Repave the roadway to redirect storm water and ensure proper drainage.

F) Narrow the width of the travel way on Mahoe Street.

- None.

G) Enhance pedestrian crossings.

- Texturize and color crosswalks to make crossing safer for pedestrians and to give motorists additional visual warnings of potential pedestrians.
- Install raised crosswalks to provide an additional level of safety.

H) Improve pedestrian facilities surrounding the School, and encourage students to walk to school.

- None.

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Part Five: Cost Sheet

<i>ITEM</i>	<i>UNIT</i>	<i>QUANTITY</i>	<i>UNIT COST</i>	<i>TOTAL COST</i>
Removals/Demo				
Remove existing traffic signal	each	1	\$ 100,000.00	\$ 100,000.00
Demolish existing sidewalk	Sq. Ft.	2238	\$ 5.00	\$ 11,190.00
Demolish existing Pavement	Sq. Ft.	15403	\$ 8.00	\$ 123,224.00
Erosion Control	L.S.	1	\$ 10,000.00	\$ 10,000.00
Site improvements				
Roadway				
Mill and Overlay existing AC pavement	Sq. Ft.	96325	\$ 6.00	\$ 577,950.00
Curb Gutter and Sidewalk	Sq. Ft.	18054	\$ 20.00	\$ 361,080.00
Crosswalk - Special	Sq. Ft.	3740	\$ 40.00	\$ 149,600.00
Drainage works		14	\$ 14,000.00	\$ 196,000.00
4" Stripe (white/Yellow)	Lin. Ft.	8466	\$ 6.00	\$ 50,796.00
12"stripe (white)	Lin. Ft.	232	\$ 9.00	\$ 2,088.00
Intersection				
Mini Single Lane Roundabout	each	1	\$ 350,000.00	\$ 350,000.00
includes sidewalk, roadway, striping and lighting				
Mini-Circle Mountable Domed Center	each	4	\$ 15,000.00	\$ 60,000.00
Landscaping				
Trees	each	72	\$ 1,000.00	\$ 72,000.00
Misc.				
Traffic Control	L.S.	1	5%	\$ 103,196.40
Mobilization	L.S.	1	10%	\$ 206,392.80
Contingency - 25%	L.S.	1	25%	\$ 515,982.00
Design				
Design Cost			8%	\$ 231,159.94
TOTAL CONSTRUCTION				\$ 2,889,499.20
TOTAL COST				\$ 3,120,659.14