

MARCH, 2015

HONOLULU COMPLETE STREETS IMPLEMENTATION STUDY LOCATION REPORT

University Ave. at Metcalf St. (FINAL)



City & County of Honolulu
Department of Transportation Services

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Summary: University Avenue at Metcalf Street

Primary Urban Core Planning Area, Mānoa Sub-Area, Council District 5

NEED FOR PROJECT

University Avenue at Metcalf Street was selected due to the existing high pedestrian, bicycle, transit, and vehicle volumes that travel through the intersection daily. The current geometry of the intersection and roadway approaches encourages speeding, which puts motorists and people on foot or bike at a greater safety risk. The intersection is a key gateway into the UHM campus and surrounding neighborhood and therefore needs to enable and encourage multi-modal travel.

Applying Complete Streets to this location will better accommodate the many multi-modal users that already frequent the area, increase safety, and elevate the welcoming and user-friendly qualities that the surrounding educational institutions value.

SUMMARY OF RECOMMENDATIONS

The recommendations for University Avenue at Metcalf Street can be summarized as follows:

- Create a safer and more welcoming intersection for all transportation users at University Avenue and Metcalf Street by making it more compact and implementing place-making features.
- Convert head-in angled parking to back-in angled parking along Metcalf Street in the study area.
- Complete the sidewalk along Metcalf Street from Atherton YMCA to Wilder Avenue.
- Improve the driveway crossing along University Avenue at Sinclair Circle bus terminal to shorten the pedestrian crossing distance and improve safety.
- Complete the bicycle connection on University Avenue from Dole Street to Maile Way.
- Enhance the uncontrolled intersection crossing of University Avenue near Sinclair Circle.



COST BREAKDOWN

Total: \$1,816,761.74

Design: \$134,574.94

Construction: \$1,682,186.80

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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.

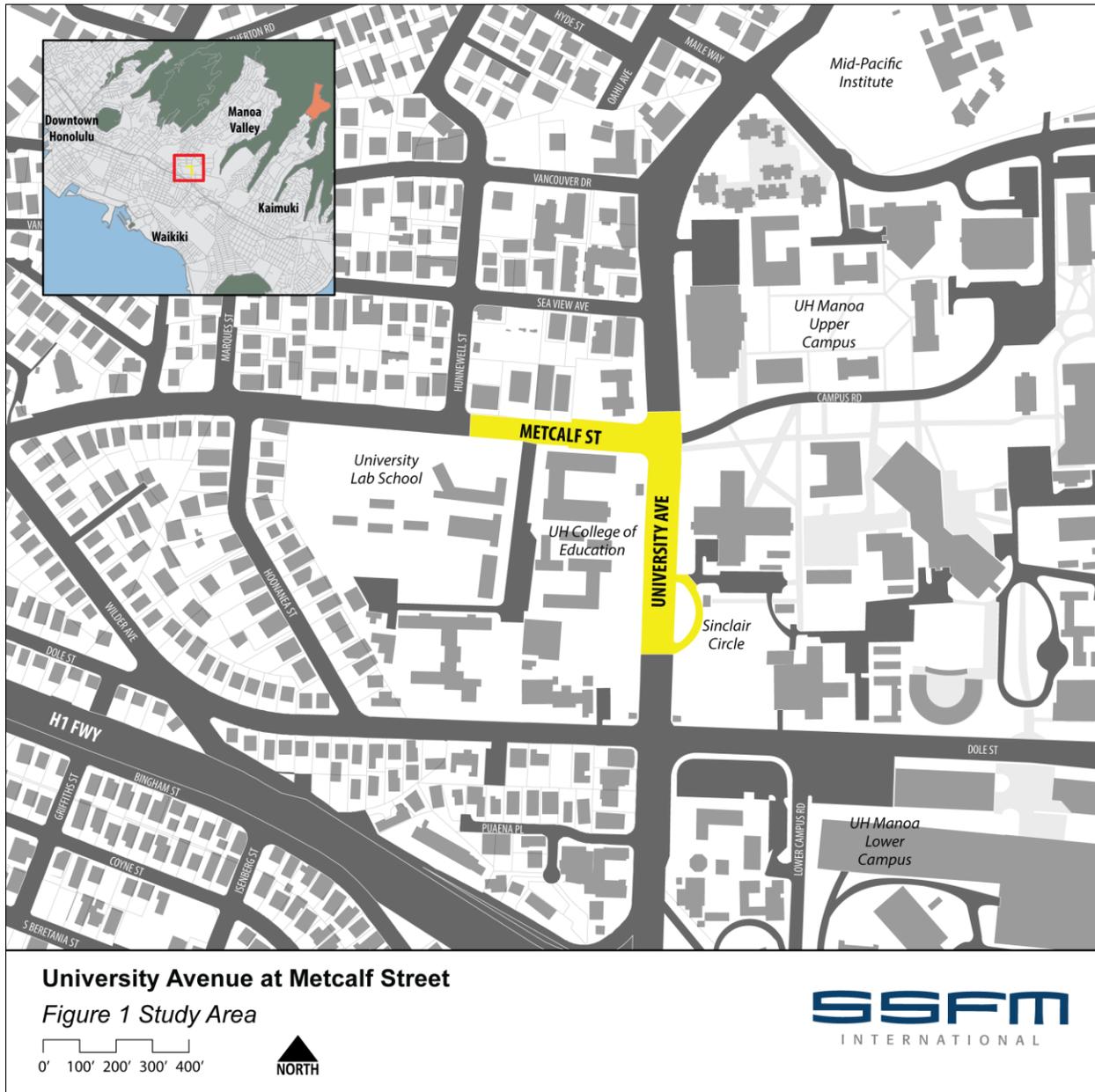
The State of Hawai'i adopted Complete Streets in 2009 and required each County to follow suit. In May 2012, the Honolulu City Council adopted a "Complete Streets" policy and passed Ordinance 12-15. The City and County of Honolulu is now taking aggressive steps to implement Complete Streets by updating policies, 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 O'ahu 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 the intersection of University Avenue at Metcalf Street (Figure 1). It is located in the Primary Urban Core Planning Area, Mānoa Sub-Area, within Council District 5. University of Hawai'i (UH), Mānoa campus is located on the Diamond Head (eastern) side of University Avenue. On the 'Ewa (western) side of this section of University Avenue is the Department of Education, the University Lab School, and also Atherton YMCA.

University Avenue is a key corridor, connecting people to Mānoa Valley and to the University of Hawai'i (UH), Mānoa campus, which is the largest university in the state and flagship campus. The intersection of Metcalf Street and University Avenue serves as one of the gateways to the University of Hawai'i at Mānoa (UHM) Campus. There are four bus stops in the study area. In the 2012-2013 school year, the enrolled student populations of UHM were approximately 20,006. The Atherton YMCA has 53 rental units with 80 beds, accommodating students of UHM and other universities in Honolulu.

Figure 1 Study Area



NEED FOR PROJECT

This location was selected as a candidate for Complete Streets for the following reasons: 1) it serves as a key gateway into the University of Hawai'i at Mānoa campus and surrounding neighborhood; 2) there are already high volumes of pedestrians and people on bicycles, and there is a potential to increase safety for these users and encourage more users; and 3) the current geometry of the intersection encourages higher vehicle speeds, which puts motorists and people on foot or bike at risk.

Many people from children to elders are walking, bicycling, and using transit to get to and from the study area. As a hub of activity and a gateway to the State's largest university, the study area is a very important place for investment in public infrastructure.

Despite the high volume of multi-modal users, the project area is missing key supporting infrastructure. There is no sidewalk on the mauka (mountainside) of Metcalf Street from the Atherton YMCA to Wilder Avenue. The connection of Dole Street and Metcalf Street bikeway facilities along University Avenue is identified in the O'ahu Bike Plan as occurring through the construction of a bike lane.

Applying Complete Streets to the intersection of University Avenue at Metcalf Street will benefit the university community in terms of safety and efficiency, and create a positive "town-gown" connection to the area by enhancing its sense of place. Town-gown refers to the relationship between residents of the surrounding neighborhood and the students and faculty associated with the school.

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.

There are several educational institutions within and near the study area, including University Lab School, Mid Pacific Institute and University of Hawai'i at Mānoa (UHM), the flagship campus of the UH system. The UHM campus defines the immediate neighborhood, and is located on University Avenue between H-1 Freeway and O'ahu Avenue. The University Lab School and Department of Education are located across University Avenue from UH. Further mauka of the study area is Mid-Pacific Institute. The area surrounding the UHM campus and along Metcalf Street is mainly residential.

Metcalf Street intersects University Avenue as a "T" intersection with Campus Drive providing pedestrian, bicycle and moped only entry on the other side of University Avenue. Metcalf Street features angled-in parking starting 250 feet back from the intersection on the 'Ewa side. There are bike lanes along Metcalf Street in either direction. Also at the intersection of University Avenue and Metcalf Street is the Atherton YMCA. This corner location features some ground floor commercial space that is currently vacant but has previously housed cafes and restaurants with some outdoor dining. Atherton YMCA provides off-campus student housing, but is currently on the market and its future use may change.

The most prominent entry to UHM is the intersection of University Avenue and Dole Street. This gateway is demarcated with arches, over the University Avenue sidewalks, and the Great Lawn fronting Bachman Hall. Makai (oceanside) of Dole Street is UHM's Lower campus. The lower campus has a parking structure

that serves the entire campus. The entry for upper campus is at University Avenue and Maile Way, at a signalized intersection 730 feet mauka of Metcalf Street. A bike route exists along Maile Way.

The major bus terminal in the mauka bound direction exists at Sinclair Circle on the Diamondhead side of University Avenue. This stop functions as the terminal point for regional express lines A and 94. Another major bus stop exists on the opposite (‘Ewa) side of University Avenue, and provides access to both express and local bus routes. Near the University Avenue and Metcalf Street intersection, there are two bus stops. One is located along Metcalf Street, approximately 100 feet from University Avenue. Lines 4, 18, and 85 serve this stop traveling in the ‘Ewa direction. The other stop is located approximately 120 feet mauka of the intersection with University Avenue. Line 6 and 13 stop there en route to Mānoa. This bus stop serves as a terminal point for line 13.

Accident records indicate that there have been six car/truck accidents, two moped-to-vehicle accidents, two bicycle accidents, and a pedestrian-to-vehicle accident at the intersection of University Avenue and Metcalf Street between 2007 and 2014. In the same time period, there were three car/truck accidents, one moped-to-vehicle accident, and one pedestrian-to-vehicle accident along University Avenue in the vicinity of the study area; and one car/truck accident on Metcalf Street in the vicinity of the study area.

Usage Patterns

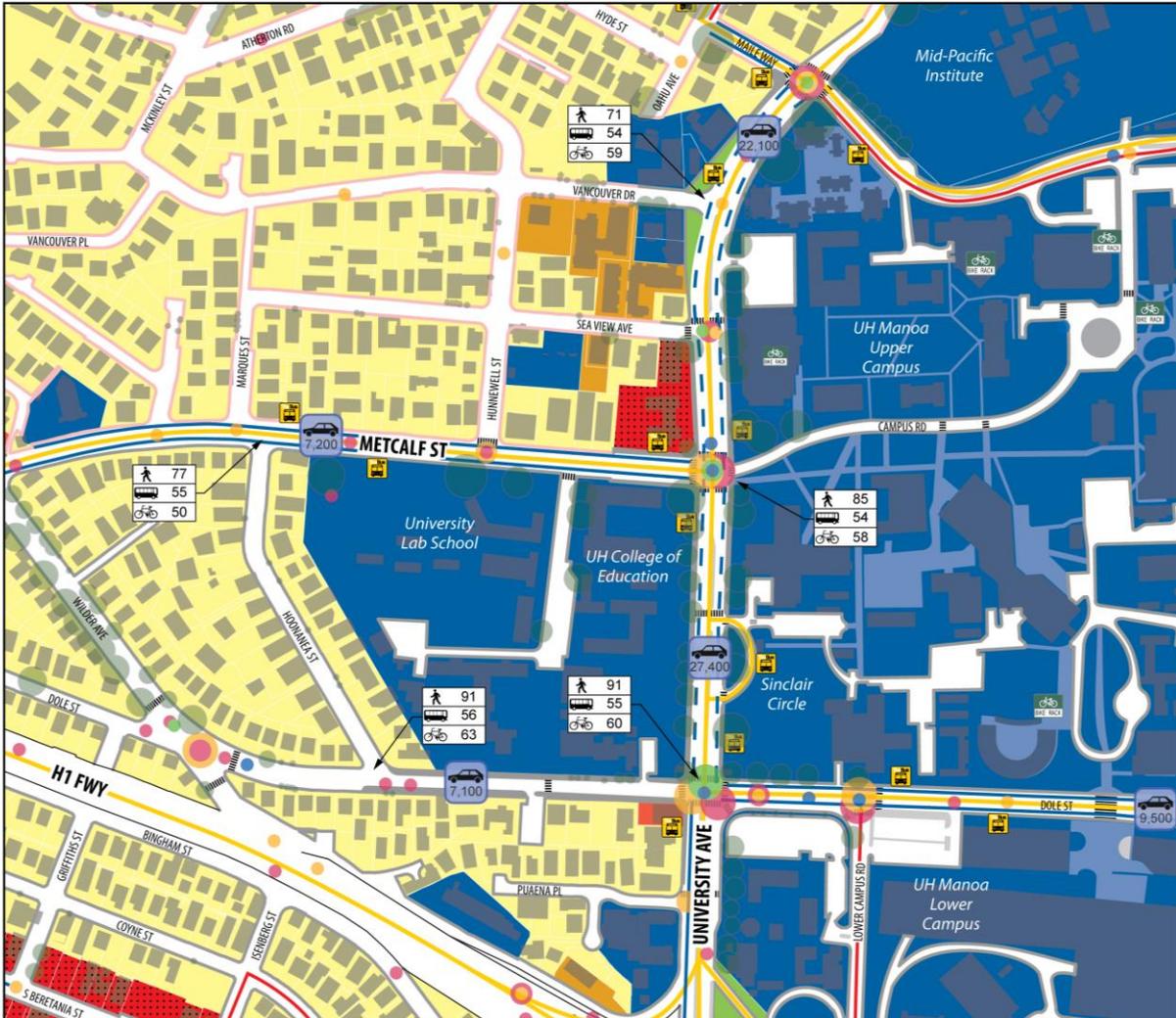
Table 1 describes existing usage patterns by pedestrians, bicyclists, vehicles, and transit users in the study area. The intersection of University Avenue and Metcalf Street is an important pedestrian gateway to UHM. Currently demarcated by temporary barriers, the Diamond Head side of the intersection provides a pedestrian, bicycle and moped only entry through Campus Drive. UHM’s recent *2012 Landscape Master Plan* and *2012 Campus Transportation Demand Management Plan* call for a permanent closing of Campus Road to vehicular traffic, converting it into a shared bike/pedestrian path.

Bicycle count data is not available for the study area, although counts from nearby intersections provide some indication of volume. According to Hawaii Bicycling League three-day average count data from 2014, bicycle use is high due to UHM attracting people to its campus throughout the day. There are an average of 432 cyclists within a four-hour period at the intersection of University Avenue and King Street.

Data from TheBus indicates that public transit use along University Avenue is high. Sinclair Circle has the most daily riders at 2,207. There are 1,231 daily riders at the makai leg of University Avenue and Metcalf Street, fronting the College of Education. The bus stop on the mauka leg of University Avenue and Metcalf Street has 554 riders per day, and the bus stop on the ‘Ewa leg of Metcalf Street and University Avenue has 490 daily riders.

2012 traffic count data indicates average daily vehicular volumes of 34,174 on University Avenue between Dole Street and Metcalf Street. The same data indicated 7,983 vehicles daily on Metcalf Street, between Ho‘onanea Street and Hunnewell Street, which is located near University Lab School. The area has a high volume of school bus and public transit bus use, and a moderate volume of other large vehicles.

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



University Avenue at Metcalf Street

<p>Bicycle Facilities Existing=Solid, Proposed=dashed</p> <ul style="list-style-type: none"> Lane Path Route Bicycle Racks 	<p>Traffic Accidents</p> <ul style="list-style-type: none"> 1 crash 2 crashes 3-9 crashes 10+ crashes <p>Red = Car/Truck, Orange = Motorcycle/Moped, Blue = Bicyclist, Green = Pedestrian</p>	<p>Existing Land Use</p> <ul style="list-style-type: none"> Apartment Business Mixed Use Institutional Park/Open Space Residential
<p>Transit Facilities</p> <ul style="list-style-type: none"> Bus Route Bus Stop 	<p>Traffic Counts</p> <ul style="list-style-type: none"> Average Daily Traffic 	<p>Pedestrian Facilities</p> <ul style="list-style-type: none"> No Sidewalk Sidewalk Crosswalk
<p>Walk Scores</p> <ul style="list-style-type: none"> Walk Score ## Transit Score ## Bike Score ## 	<p>Street Trees</p> <ul style="list-style-type: none"> Canopy Diameter 	

Table 1 Existing Usage Patterns along University Avenue at Metcalf

Pedestrian use	High pedestrian use due to UHM attracting people to its campus throughout the day
Bicycle use (Source: Hawaii Bicycle League three-day average daily bicycle counts, 2014)	High bicycle use due to UHM attracting people to its campus throughout the day (average 432 in a four-hour time period at University Avenue and King Street)
Transit use (Average daily boardings + alightings) (Source: <i>Global Stop Summary by Trip</i> , TheBus, 2012)	Sinclair Circle: 2,207 University Ave + Metcalf St: 1,231 University Ave + Opposite Metcalf St: 554 Metcalf St + University Ave: 490 University Ave + Vancouver Dr: 29 Maile Way + University Ave: 106 University Ave + Dole St: 519 Total: 5,136 (average daily)
Daily Vehicular Volumes (Source: <i>Historical Traffic Station Maps</i> , HDOT, 2012)	7,983 ADT on Metcalf Street between Ho'onanea Street and Hunnewell Street. 34,174 ADT on University Avenue between Dole Street and Metcalf Street (<i>Historical Traffic Station Maps</i> , HDOT)
Use by trucks or large vehicles	High volume of school and transit bus use with a moderate volume of other large vehicles.
Peak periods (Source: <i>Historical Traffic Station Maps</i> , HDOT, 2012)	University Avenue between Dole Street and Metcalf Street: 07:00 AM to 08:00 AM, and 04:15 PM to 05:15 PM Metcalf Street between Ho'onanea Street and Hunnewell Street: 07:00 AM to 08:00 AM, and 03:00 PM to 04:00 PM
Accident History (Sources: <i>State of Hawai'i Motor Vehicle Accident Reports</i> , Honolulu Police Department, Records Division, 2011-2014)	Between 2007 and 2014, there were 7 car/truck accidents, 4 moped-to-vehicle accidents, 1 bicycle-to-vehicle accident, and 2 pedestrian-to-vehicle accident at the intersection of University Avenue and Metcalf Street. There were also 3 car/truck accidents, 1 moped-to-vehicle accidents, 1 bicyclists-to-vehicle accident, and 1 pedestrian-to-vehicle accident, along University Avenue near the project; and 1 car/truck accident and 2 moped-to-vehicle accidents on Metcalf Street near the project.
Other	This intersection is an important pedestrian gateway to UHM, which is the largest university in the state (20,006 students enrolled in 2013). UHM will also convert Campus Road into a shared bike/pedestrian path. Access to the University Lab School is off Metcalf.

Part Two: Field Work and Key Findings



The walking audit brought together 26 leaders on July 18, 2014 from the City and County of Honolulu, the University of Hawai'i at Mānoa, and several key state partners including the state Senator staff representative, Hawai'i State Department of Health, and Hawaii Bicycling League.

STAKEHOLDER INPUT

The findings of this report are informed by input received from community stakeholders that participated in a walking audit along University Avenue between Metcalf Street and Dole Street near UH. SSFM International, Inc., and a team of national consultants, including Dan Burden, national walkability expert, led a walking audit at UHM along University Avenue on July 18, 2014. The following stakeholder groups participated, in part, in the walking audit:

- City and County of Honolulu Department of Transportation Services (DTS), including Mark Garrity, Randall Kurashige, Jack Patterson, Erron Redoble, Rika Uechi, Tammy Nakajo, Kelly Cruz, Peggy Ho, Darin Anbe, Chris Sayers, and Greg Tsugawa;
- City and County of Honolulu Department of Facility Maintenance (DFM), including Roger Dona, Patrick Vea, and Kyle Oyasato;
- Heidi Hansen-Smith, Hawai'i State Department of Health (DOH);
- Tom Heinrich, Staff for Hawai'i State Senator Brian Taniguchi;
- University of Hawai'i at Mānoa staff, including Jason Perreira, Ryan Fujii, Sharon Williams, and Cate Matsushima;
- Neighborhood leaders including the Hawai'i Bicycling League (HBL), Daniel Alexander; and
- Consultant Team: Mike Packard, Alan Fujimori, Juanita Wolfgramm and Noah Baron from SSFM, Dan Burden and Samantha Thomas from Blue Zone, Gary Toth from Gary Toth Associates

The walk audit group discussed conditions that affect active living, social connectivity, access to daily needs, and safe routes to school, work and play for University Avenue at Metcalf Street.

The participants observed vehicles traveling at higher than posted speeds along University Avenue. They noted the overly wide intersection with Metcalf Street, and commented on safety concerns related to the unsignalized crossing at the intersection of University Avenue with Sinclair Circle. There was an overall desire to evolve University Avenue at Metcalf Street into a true gateway for the UHM campus and surrounding neighborhood. The attendees suggested ways to enhance the walkability and bikeability of the corridor and celebrate people and place while slowing down vehicles. These ideas included gateway treatments to create a sense of arrival to the campus and neighborhood.



Participants shared visions, barriers, and opportunities for Complete Streets along University Avenue during the walking audit from Metcalf Street to Dole Street. The goal of the walking audit was to discuss possible treatments for the intersection of University Avenue and Metcalf Street to improve pedestrian, bicycle, transit, and automobile safety and accessibility.

Photo descriptions: Top row – Local representatives share concerns in the area; Middle row - Participants review existing conditions and opportunities; Bottom row - Participants review walking audit findings.

During the walking audit, participants agreed that creating a more compact intersection is an opportunity to create a positive “town-gown” connection that fosters a safer, more walkable, vibrant and livable campus and neighborhood. It is also an excellent opportunity for the City and the University to partner to improve active transportation connections. This could lead to improved social benefits, including creating the connections between people that tend to be correlated with better public health, higher educational performance and improved public safety.



University Avenue at Metcalf Street is a pedestrian and bicycle rich area due to the University of Hawai‘i drawing thousands of student and staff to its campus throughout the day, all year round.

Left – Bicyclist along Metcalf Street, Right – Pedestrians crossing University Avenue at Metcalf Street



During the hour-long walking audit of University Avenue at Metcalf Street, many people were observed walking, bicycling, and using transit. **Photo Description** (From left column, first row) – Bicyclist on the bike way of Metcalf St.; Pedestrians waiting signals at intersection of University Ave. and Metcalf St.; People waiting for the bus at the bus stop at Metcalf and University; Pedestrians walking close to Campus Rd. towards University Ave. From right column, first row – Pedestrian, bicyclists and motor vehicle crossing the intersection. A person on the wheel waiting for signal at the intersection.; People getting off from the bus at the Sinclair Circle.; Pedestrians near the bus stop at Metcalf.

FINDINGS

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

Finding: The built design speed is higher than the posted speed

University Avenue is a gateway into both the UHM campus and Mānoa Valley, starting at Dole Street. The built design speed of University Avenue was observed to be significantly higher than the posted speed limit (25 mph). There are physical and painted cues reinforcing the desired (target) speed, including archways over the sidewalk and the word “school” painted within the travel lanes. However, motorists’ speeds remain high and additional treatments are needed to reinforce the target and posted speed for the corridor, which is 25 mph.



Pavement markings indicate a school zone along University Avenue near Metcalf Street.

University Avenue between Dole Street and Maile Way is wide; it is a 6-lane road, with 10 foot inside travel lanes and 11 foot outside travel lanes. In some sections a center turn lane or painted/raised medians are present. There are segments where the outermost lane in either direction is used for on-street parking. Typically, the wider a road is, the faster people tend to drive. University Avenue moves a lot of traffic: 26,025 to 34,174 vehicles per day. It also serves a large number of people on foot and on bicycles. Along University Avenue, and specifically at the intersection with Metcalf Street, the street configuration needs to give a visual clue to drivers that they have arrived into the neighborhood, into a school zone, to an active place where other multimodal users abound.

Finding: Corner Radii are large, encouraging high-speed right turn movements

Large corner radii encourage high-speed right turns, increase the crossing distance for a pedestrian, and increasing pedestrian’s exposure to a potential conflict. Curb extensions or bulb-outs are a solution to remove excess pavement and make intersections more compact, safe, and efficient for all users. The existence of bike lanes along Metcalf Street allows for smaller corner radii while still permitting the design turning template.



A bus turning left through the intersection.

Finding: The intersection of University Avenue and Metcalf Street is a large, complex intersection with many users and turning movements



The intersection of University Avenue and Metcalf Street

University Avenue and Metcalf Street create a complex intersection due to many turning movements. Metcalf Street creates a “T” with University Avenue and has two lanes, one for right turns and the other for left turns. This creates eight (8) vehicle-to-vehicle potential points of conflict and five (5) vehicle-to-pedestrian points of conflict. The existing crossings are appropriately marked, yet there is no median crossing island to help break the crossing distance into manageable portions. High volumes of vehicles plus people walking, biking and accessing transit make this a key intersection to apply measures that shorten crossing distances, reduce pedestrian exposure, and minimize vehicle delays.

Finding: Campus Road, across University Avenue from Metcalf Street, does not present the best gateway treatment into the UHM Campus

Campus Road, across from Metcalf Street, is closed to vehicle traffic, but still looks and operates like a street that is designed primarily for automobiles. UHM has plans to change Campus Road to a pedestrian/bicycle-only access. As part of that, more permanent features should be considered to create a welcoming gateway for pedestrians and bicyclist entering campus.



Blocked UHM Campus Road entry from University Ave and Metcalf

Finding: The wide driveway crossing at Sinclair Circle and conflicting vehicular traffic movements result in increased pedestrian exposure with vehicles

The driveway crossing at Sinclair Circle is 40 feet wide and features a dedicated lane for right turn movements onto University Avenue. This turn lane, coupled with wide corner radii, creates a more auto-focused environment instead of fostering the pedestrian-friendly environment that the campus is working towards. Two-way driveways typically do not need to be wider than 28 feet, and the largest vehicle turning template should set the design.



Crossing close to Sinclair Circle.

Finding: An enhanced crossing at University Avenue and Sinclair Circle would benefit walkers

Many people were observed crossing at the unsignalized crossing at University Avenue and Sinclair Circle. A pedestrian has to cross six lanes of moving vehicles, or 70 feet of roadway at this location. The advanced stop bar is placed 25 feet back from the crossing, which is ample, however more can be done to enhance the visibility of the crosswalk and improve the yielding behavior of motorists. The dedicated makai-bound left turn lane along University Avenue could be removed and replaced with a raised and landscaped median. The crossing can also be enhanced with street lighting as well as pedestrian activated crossing beacons.



Pedestrian crossing University Avenue, close to Sinclair Circle.

Finding: Pedestrians, bicyclists, and parked cars share the same space along University Avenue and Metcalf Street



Left: Pedestrians walking along University Ave. Right: Bike lanes and on-street parking on Metcalf St.

Sidewalks along University Avenue are eight feet wide and adjacent to the travel lane, lacking a buffer from moving traffic. On Metcalf Street, sidewalks run the makai length, but are missing on the mauka side of the street from the Atherton YMCA to Wilder Avenue. Five-foot bicycle lanes exist on Metcalf Street. University Avenue lacks dedicated bicycle facilities, but is marked as a bicycle route on the O’ahu Bike Plan. 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. There is head-in angled parking on Metcalf (makai) for the first block (250 feet) from the intersection with University Avenue. University Avenue has on-street parking mauka of Metcalf Street, however during peak hours the lane converts to a travel lane. The recommendations in the next section aim to complete the pedestrian and bicycle circuit and to alleviate some of the existing mixing of uses.



Vehicles and school buses parked on Metcalf Street.

Part Three: Recommended Application of Complete Streets Concepts

This section describes the recommended application of Complete Streets concepts for University Avenue at Metcalf 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
- Promote safer street crossings, and
- Strengthen the sense of arrival

COMPLETE STREETS RECOMMENDATIONS

Conceptual Illustrations of Recommendations

Figure 3 graphically shows how Complete Streets principles can be applied to transform University Avenue at Metcalf Street within the study area. These recommended changes are described in the following section and summarized in Table 2.

Description of Recommendations

The improvements depicted in Figure 3 support the following recommendations:

- A) Create a safer and more welcoming intersection for all transportation users at the intersection of University Avenue and Metcalf Street by making it more compact and implementing place-making features.**
 - Reduce the curb radius to make the intersection safer for all users.
 - Apply place-making treatments, such as special pavement or a University logo within the intersection, to create a sense of place.
 - Convert the painted median to a raised landscaped planter.
- B) Convert head-in angled parking to back-in angled parking along Metcalf Street in the study area.**
- C) Complete the sidewalk along Metcalf Street from Atherton YMCA to Wilder Avenue.**
 - Put the bus stop on a curb extension (bus bulb out).
 - Extend the mauka-side sidewalk from Atherton YMCA to Wilder Avenue.
- D) Improve the driveway crossing at Sinclair Circle bus terminal to shorten the pedestrian crossing distance and improve safety.**
 - Remove the right turn lane to shorten the pedestrian crossing distance.
 - Remove left turn lane on University Avenue in the makai direction and convert the median to a raised landscaped planter.

E) Complete bicycle connection on University Avenue from Dole Street to Metcalf Street.

- Designate the outermost mauka-bound travel lane as a shared bus-bike lane from Dole Street to Maile Way through marking and signage.
 - i. The minimum lane width should be at least 13' wide.
 - ii. Install "Bus Only" or pavement markings (see MUTCD Section 3B.22).
 - iii. Install signage that indicates only bikes and buses are permitted to use this lane.
 - iv. Consider red-pigmented pavement when repaving lane.

F) Enhance the unsignalized crossing across University Avenue near Sinclair Circle.

- Place an advanced stop bar setback 20'-25' from the crosswalk on both directions of University Avenue.
- Install a pedestrian-activated pedestrian beacon, such as a Rectangular Rapid Flashing Beacon (RRFB)

These recommended changes are summarized in Table 2.

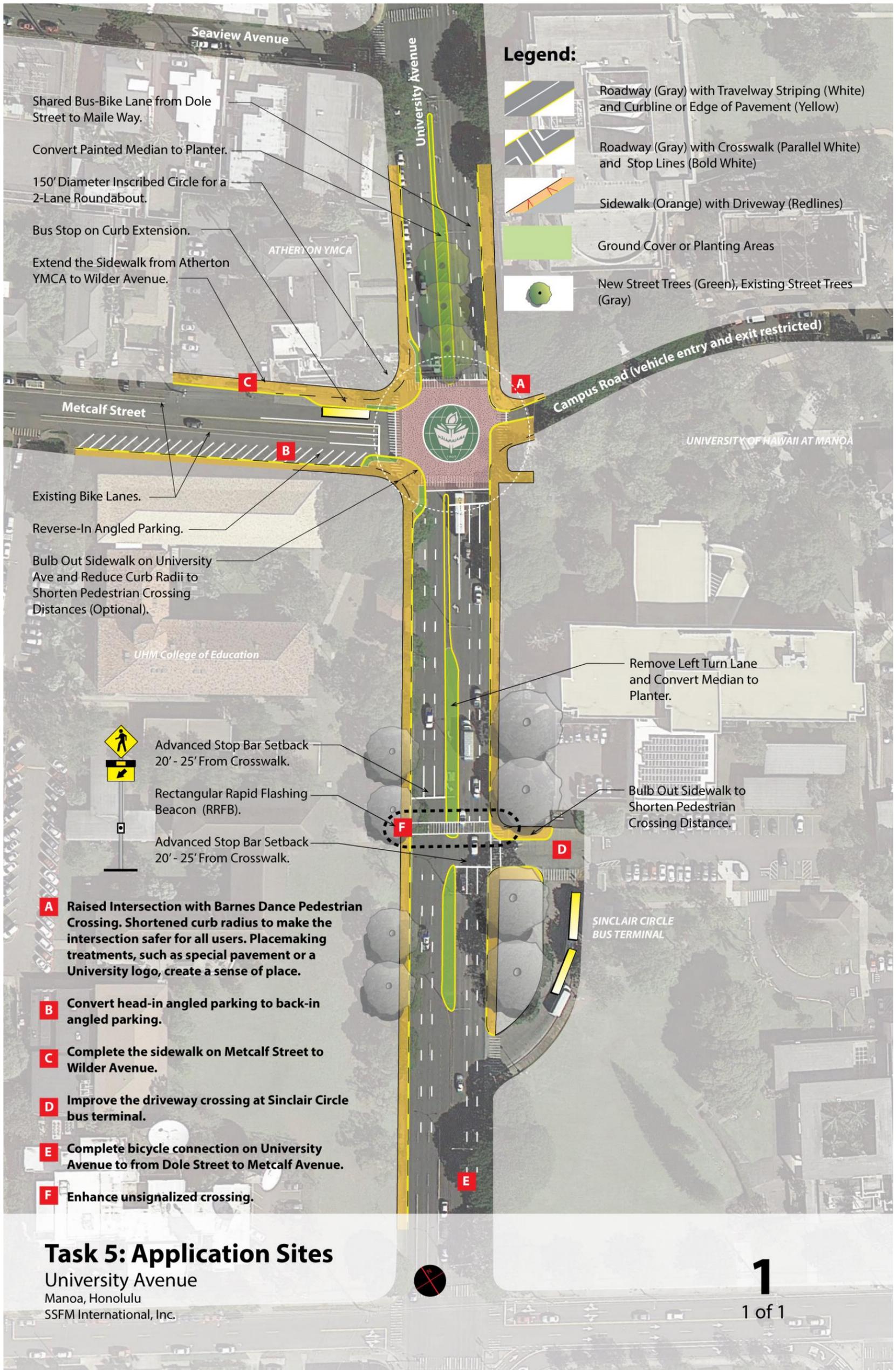
Table 2 Proposed Design Changes to University Avenue

	CURRENT	AFTER RECOMMENDATIONS ARE IMPLEMENTED
Type of Facility	Intersection of minor arterial (Metcalf Street) and principal arterial (University Avenue)	Place-making would occur to transform intersection into an attractive entry
Street Width	University Avenue (north leg): 74' University Avenue (south leg): 73' Metcalf Street (west leg): 64' Campus Road (east leg): 30'	Bulb outs would narrow the street width: University Avenue (north leg): 63' University Avenue (south leg): 63' Metcalf Street (west leg): 34' Campus Road (east leg): 24'
Speed Limit	University Avenue: 25 mph Metcalf Street: 25 mph	No Change
Crosswalk Length (longest)	University Avenue and Metcalf Street (north leg): 83'	University Avenue and Metcalf (north leg): 61'. Does not consider diagonal pedestrian crossing distances, which are permitted at Barnes Dance pedestrian crossings.
Number of lanes	University Avenue: Six lanes (makai leg) including a dedicated left turn lane. Five lanes (mauka leg). Metcalf Street: Two vehicle lanes, two bike lanes.	University Avenue: Six lanes (makai leg) including a dedicated left turn lane and shared transit/bike lane. Five lanes (mauka leg) which includes a shared transit/bike lane. Metcalf Street: Same.
Distance to side streets	Closest streets are Dole (800 feet) and Maile Way (730 feet).	No Change
Driveways	Driveways to surface parking lots at Sinclair Circle and at UH School of Architecture, Driveway access to the University at Campus Road, one driveway between 'Ewa side of Metcalf and Seaview Avenue. On Metcalf St, three Mauka driveways, one Makai drive way.	Sinclair Circle side street entry would be narrowed to include single shared left/right egress lane.
Parking	On-street metered parking on University between Metcalf and Maile Way (19 stalls on Diamond head side, 19 stalls on 'Ewa side). Parking on 'Ewa side is not permitted during AM peak periods. UHM Architecture Building Parking Lot (private). On street metered parking on Metcalf between University and Hunnewell Street (23 stalls fronting UHM College of Education, 4 stalls on Mauka side).	Parking on Metcalf would be converted to angled back-in. Parking on mauka side of University Avenue would be made permanent.

HONOLULU COMPLETE STREETS PROJECT IMPLEMENTATION STUDY

	CURRENT	AFTER RECOMMENDATIONS ARE IMPLEMENTED
Sidewalks	University Ave: Attached, 8 feet wide. Metcalf Street: Sidewalks on makai side. Missing on mauka side from Atherton YMCA to Wilder Street	Complete sidewalk on mauka side of Metcalf Street, from University Avenue to Wilder Avenue.
Transit Routes, Stops, Shelters	Three transit stops located at the University and Metcalf intersection, and transit center at Sinclair circle.	No Change
Proximity to future rail	HART initial alignment ends at Ala Moana Shopping Center where a transfer to bus must be made to reach the University at Sinclair Circle.	No Change
Bicycle features	Bike lanes on Metcalf; University Avenue is designated as a bike lane, but no markings exist. University Avenue is in the O'ahu Bike Plan to have bike lanes.	Mauka-bound: shared-use lane (bike and transit) on University between Dole and Maile Way. Makai-bound: sharrows on University between Dole and Maile Way. Improve bicycle route through signage and colored pavement marking
Nearby Schools	University of Hawai'i at Mānoa, Mid-Pacific Institute, Hawai'i Academy of Sciences, University Lab School.	No Change
Nearby Institutions	YMCA	No Change

Figure 3 Concepts for University Avenue and Metcalf Street



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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 taken within 1 year. Mid-term actions are those that may be taken within 5 year. Longer-term actions are those that may require or warrant a longer planning horizon due to logistical, financial, or other considerations.

Near-Term Actions (Within 1 year):

- A)** *Create a safer and more welcoming intersection for all transportation users at the intersection of University Avenue and Metcalf Street by making it more compact and implement place-making features.*
- Paint curb extensions on the Metcalf Street leg on both corners.
- B)** *Convert head-in angled parking to head-out, or back-in, angled parking along Metcalf Street in the Study Area.*
- Use paint to restripe the parking on the makai side of Metcalf Street with head-out angled (or reverse angled) parking. Head-out angled parking maximizes use of adjacent land. It is the safest way to park a car. It allows a motorist to see approaching vehicles or bicyclists. In addition, head out angled parking places the trunk closest to the curb and the car doors open to shepherd children away from the road and towards the curb. Parking bay depths should be 15 feet. An added two feet of space is picked up when valley gutters are used, making the total parking bay depth 17 feet.
- D)** *Improve the driveway crossing at Sinclair Circle bus terminal to shorten the pedestrian crossing distance and increase safety.*
- Reduce the crossing distance of Sinclair Circle by hatching out the 'Ewa-bound right turn lane using pavement marking, consolidating left and right turns into one lane.
- E)** *Complete the bicycle connection on University Avenue from Dole Street to Metcalf Street*
- Better mark the bicycle route on University Avenue from Dole Street through the Metcalf intersection by making the mauka-bound outside travel lane a dedicated shared Bus/Bike lane. Signify this through signage, pavement markings, and painting the lane (red) which is used in other municipalities throughout the country.
- F)** *Enhance the unsignalized crossing across University Avenue near Sinclair Circle.*
- Enhance the unsignalized crossing of University Avenue at Sinclair Circle by hatching out the dedicated left-turn lane along University Avenue with pavement marking. Advanced stop bars should be marked 20 feet back from unsignalized marked crosswalks.

Mid-Term Actions (1 to 5 years):

- A)** *Create a safer and more welcoming intersection for all transportation users at the intersection of University Avenue and Metcalf Street by making it more compact and implement place-making features.*
- Install curb extensions on the Metcalf Street leg on both corners using raised berm.
 - Extend the mauka raised median using raised berm. Include a median nose, giving a pedestrian a safe place to wait if they were not able to make the crossing in the given signal cycle. Extend the makai raised median beyond the crosswalk using a raised berm.
- C)** *Complete the sidewalk along Metcalf Street from Atherton YMCA to Wilder Avenue.*
- Complete the sidewalk on the mauka side of Metcalf Street from Atherton YMCA to Wilder Avenue using a raised berm to separate pedestrian from vehicle traffic.
- D)** *Improve the driveway crossing at Sinclair Circle bus terminal to shorten the pedestrian crossing distance and increase safety.*
- Reduce the crossing distance of Sinclair Circle by removing the 'Ewa-bound right turn lane, consolidating left and right turns into one lane, and installing a curb extension using a raised berm.
- F)** *Enhance the unsignalized crossing across University Avenue near Sinclair Circle.*
- Enhance the unsignalized crossing of University Avenue at Sinclair Circle by installing raised berm that acts to extend the existing median. Include median nose to divide the crossing in half such that a person on foot only needs to stop for one side of traffic at a time.

Longer-Term Actions (5 years and Beyond):

- A)** *Create a safer and more welcoming intersection for all transportation users at the intersection of University Avenue and Metcalf Street by making it more compact and implement place-making features.*
- Install curb extensions on the Metcalf Street leg on both corners. The curb extension also creates place for an outdoor room or rain garden. Another benefit, curb extensions inset the parking and would allow for a few additional parking spots on Metcalf Street.
 - Extend and landscape the mauka raised median, removing the painted hatching on University Avenue, as motorists are not allowed to take a left onto Campus Drive. Include a median nose, giving a pedestrian a safe place to wait if they were not able to make the crossing in the given signal cycle. Extend the makai raised median beyond the crosswalk.
 - Create a raised crossing at the Campus Drive crossing.
 - Consider building a raised intersection. Raised intersections are used at intersections where roundabouts or mini-circles are not functional or practical, and where speeds need to be brought under control; they cover the entire intersection. A raised intersection can be expensive, due to their potential need for drainage treatments. However, they have the advantage of keeping speeds at 15-25 mph 24 hours a day.
 - A place-making treatment can be included at this intersection by painting a symbol within the intersection that connects the roadway to UH.
- C)** *Complete the sidewalk along Metcalf Street from Atherton YMCA to Wilder Avenue.*
- Complete the sidewalk on the mauka side of Metcalf Street from Atherton YMCA to Wilder Avenue. The sidewalk 'walk-talk' zone, or the central section of the sidewalk, should be a minimum of 5 feet wide to allow two people to walk side by side comfortably. Due to the higher pedestrian level in this area the recommended sidewalk width is 6 to 8 feet.
- D)** *Improve the driveway crossing at Sinclair Circle bus terminal to shorten the pedestrian crossing distance and increase safety.*
- Reduce the crossing distance of Sinclair Circle by removing the 'Ewa-bound right turn lane, consolidating left and right turns into one lane, and installing a curb extension.
- F)** *Enhance the unsignalized crossing across University Avenue near Sinclair Circle.*
- Enhance the unsignalized crossing of University Avenue at Sinclair Circle by extending and widening the raised median. Include landscaping and a median nose to divide the crossing in half such that a person on foot only needs to stop for one side of traffic at a time. Improve pedestrian safety and motorist stopping behavior with a Rectangular Rapid Flashing Beacon or pedestrian hybrid beacon.

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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				
Demolish existing sidewalk	Sq. Ft.	1810	\$ 5.00	\$ 9,050.00
Demolish existing Pavement	Sq. Ft.	15900	\$ 8.00	\$ 127,200.00
Erosion Control	L.S.	1	\$ 10,000.00	\$ 10,000.00
Site improvements				
Roadway				
Mill and Overlay existing AC pavement	Sq. Ft.	38454	\$ 6.00	\$ 230,724.00
Curb Gutter and Sidewalk	Sq. Ft.	5930	\$ 20.00	\$ 118,600.00
Drainage works	each	3	\$ 7,000.00	\$ 21,000.00
Raised Median	Sq. Ft.	5010	\$ 20.00	\$ 100,200.00
Rectangular Rapid Flashing Beacon	each	1	\$ 15,000.00	\$ 15,000.00
Power Supply	each	1	\$ 50,000.00	\$ 50,000.00
Ducting	Lin. Ft.	300	\$ 70.00	\$ 21,000.00
4" Stripe (white/Yellow)	Lin. Ft.	4450	\$ 6.00	\$ 26,700.00
12"stripe (white)	Lin. Ft.	326	\$ 9.00	\$ 2,934.00
Striping Symbols	each	4	\$ 300.00	\$ 1,200.00
Intersection				
Raised Intersection with Barnes Dance Ped Crossing	Sq. Ft.	6762	\$ 17.00	\$ 114,954.00
Traffic Signal Modification	each	1	\$ 350,000.00	\$ 350,000.00
Landscaping				
Trees	each	3	\$ 1,000.00	\$ 3,000.00
Misc.				
Traffic Control	L.S.	1	5%	\$ 60,078.10
Mobilization	L.S.	1	10%	\$ 120,156.20
Contingency - 25%			25%	\$ 300,390.50
Design				
Design Cost			8%	\$ 134,574.94
TOTAL CONSTRUCTION				\$ 1,682,186.80
TOTAL COST				\$ 1,816,761.74