



June 2018

University of Hawaii - Mānoa Shuttle Analysis

Technical Report
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Prepared for:

University of Hawaii, Mānoa



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Introduction

The purpose of this technical report is to identify and document key service and operational characteristics of the University of Hawai'i Mānoa (UHM) Commuter Services Shuttle (the Shuttle) transit system that indicate areas for potential improvements. The Shuttle characteristics—developed from review of the previous plan, analysis of existing transit connections and campus travel patterns, and ridership data analysis of both the Shuttle and local bus (TheBus) service—are provided as findings herein. Recommendations for service improvements were developed with the following study goals in mind:

1. Identify solutions to improve student and faculty access to and throughout campus
2. Focus on near-term, implementable strategies to increase system efficiency

Key Study Findings

Key findings from the study analysis include the following:

1. The Shuttle is currently underused and there is potential for increased ridership. Past surveys have indicated an interest by University students, faculty, and staff to start using or increase use of the Shuttle service. Surveys also indicated that there are barriers to riding that range from overcrowding at peak times, scheduling conflicts with class start times, and perceptions of comfort and safety at the Shuttle stops.
2. The Shuttle campus transit service currently lacks a robust, guiding purpose, by which to identify service priorities and measure success.
3. Operational findings include:
 - Capacity is an issue during class change times
 - Intersection delay is experienced during peak travel times on and around campus. While all modes experience delay at peak times, transit is especially sensitive to delay
 - On-time performance was indicated as a barrier to regularly using the Shuttle service; however, the Shuttle App implemented in 2016, which utilizes live GPS to track the shuttles in real-time, alleviates part of this issue
4. Service findings include:
 - The Shuttle's strengths are connecting upper campus (Varney Circle) to lower campus housing, faculty housing, and classroom buildings
 - The Shuttle's weaknesses are connecting to local transit hubs (Sinclair and along University Avenue) and the low ridership to off-campus residential/commercial/employment destinations
 - Significant overlap exists between Shuttle routes and TheBus routes that pass near or through campus, particularly the Shuttle routes that serve off-campus residential/commercial destinations
 - Frequency and service span do not align with demand
 - Routing does not always align with campus travel patterns

- There may be an opportunity to increase internal campus trips, particularly among campus facilities that are geographically spaced apart, such as between faculty/student housing and upper campus
- Service to off-campus parking facilities may be better served by local TheBus service

Given these findings, the following purpose for the Shuttle is recommended: The Shuttle service exists to connect upper campus to lower campus, housing, and classroom buildings. A refined set of route(s) is included in the recommendations section, which reflects this new purpose.

Previous Plans Review

Ten previous plans and engagement efforts were reviewed to identify key transit findings and service, policy, and local coordination recommendations (**Table 1**). A common theme from the survey results reviewed is that the Shuttle is not adequately serving UHM students' transit needs. Reasons range from route scheduling and capacity to lack of shuttle stop amenities and perception of safety. Key strategies identified in several studies include improving connections to local and regional transit and addressing the need for a Shuttle hub location that better serves the needs of students.

Table 1. Summary of Previous Plan Review

Resource	Key Transit Findings / Recommendations
Parking Program Best Practices Operational Analysis and Community Engagement – UHM November 2017	Significant potential to shift trips from non-transit to transit, but service quality lags the potential demand Survey results regarding the Shuttle: <ul style="list-style-type: none"> • Stops lack perception of safety and security • Schedules do not match class schedules • Often run off schedule • Need to coordinate better with parking
Campus Parking and Services Survey Spring 2017	High demand from 7-9:30am and 4-6pm, but inadequate Shuttle service during these timeframes The Shuttle often does not run on time and routes can change without adequate notification Stops lack perception of safety and security Service to Mānoa/John A. Burns School of Medicine (JABSOM) campus desired Later evening service desired (esp. along W1)
UHM Circulation & Accessibility Plan January 2017	The Shuttle stops lack route information and seating Designate new Shuttle hub at QLC pavilion Implement floating transit islands and key corridor improvements to improve the Shuttle operations/access

Resource	Key Transit Findings / Recommendations
Oahu Regional Transportation Plan 2040 April 2016	Assumes the Honolulu Rail Transit Project will be operating; TheBus transit route system will be restructured to integrate with rail service Plans for future construction of the Honolulu Urban Bus (HUB) Circulator System, a high-frequency electric bus system connecting Downtown, Kakaako, Ala Moana, Waikiki, UHM, and Makiki
Network Concept Evaluation April 2016	Recommendations include: <ul style="list-style-type: none"> • New Shuttle hub at QLC pavilion • No new fixed-route transit pathways • New The Handi-Van access between QLC and Saunders
UHM – Commuter Services March 2016	No insights/findings related to transit
University of Hawai'i Strategic Directions 2015–2021	No insights/findings related to transit
UHM TDM Plan Draft 2012	Barriers to the Shuttle usage include: <ul style="list-style-type: none"> • Shuttle capacity • Lack of passenger amenities • No recognized brand • Intersection delay during peak periods • Incompatibility of service and route peak times Transit strategies include: <ul style="list-style-type: none"> • Redesign the Shuttle system to better serve demand generators • Designate Sinclair Circle as a transit-only facility • Develop a multimodal wayfinding program • Expand U-Pass program Focus investments on campus stop enhancements
Long Range Development Plan – UHM Campus 2007 Update	Envisions the eventual proximity to mass transit service Future transit stations are recommended to be located in the surrounding commercial districts and not on campus in order to enhance campus security, while guaranteeing service to the public as well as University students and faculty

Existing Transit Service Characteristics

The Shuttle

UHM bids out a contract to operate an 8-route shuttle transit service that offers fixed-route, 28-passenger bus service to students, faculty, staff, and visitors. Rides are free and offered weekdays during the day, with one route (N1) operating as an evening circulator. Most Shuttle stops are shared TheBus stops. Span and frequency of the eight Shuttle routes are summarized in **Table 2**. Frequencies range from 15 to 35 minutes and vary by route, but they are consistent throughout the day. Weekday span of service generally follows class times for the daytime shuttles.

Table 2. Shuttle Routes – Span and Frequency

Route No.	Route Name	Weekday Span	Weekday Frequency (minutes)
E1	Student Housing Express 1	7:00am - 5:00pm	15
E2	Student Housing Express 2	8:30am - 11:15am	15
F1	Mānoa Express	7:00am - 6:00pm	30
H1	Hawaiian Studies Express	7:30am - 4:30pm	15
JM1	Japanese Cultural Center/Mo'ili'ili Express	7:00am - 6:00pm	35
M1	Makiki Express	6:30am - 6:00pm Shuttle break: 12:30pm - 2:30pm	35
W1	Wai'ālae Avenue Express	6:30am - 6:00pm	30
N1	Night Shuttle	5:00pm - 11:15pm	30

In the context of campus mobility, each Shuttle route should serve a defined purpose—one that is neither too broad nor too narrow in scope—which can be assessed for performance at a holistic level. A route that tries to serve numerous purposes (e.g. circulate students around campus and provide direct service between two activity centers, or circulate campus and connect to off-campus residential areas) may end up performing poorly in one or more of these purposes. Each Shuttle route was assessed for primary and, if applicable, secondary purposes (**Table 3**).

According to stop-level ridership and comments received from the Spring 2017 Campus Parking and Services Survey, the following routes perform their primary route purpose successfully (though improvements regarding service characteristics such as on-time performance may still apply):

- *E1 - Link student housing to Varney Circle*
- *F1 - Link faculty housing to Varney Circle*
- *H1 - Link classroom building/parking to Varney Circle*

- W1 - Link to Wai'alaie Avenue off-campus

Table 3. Shuttle Route Purposes

Route No.	Route Name	Primary Route Purpose	Secondary Route Purpose
E1	Student Housing Express 1	Link student housing to Varney Circle	Internal campus trips
E2	Student Housing Express 2	Link student housing to Varney Circle during AM peak	Add capacity to W1 route during peak times, as needed
		Link faculty housing to Varney Circle	Serves Astronomy building, greenhouses, and northern neighborhood
F1	Mānoa Express		Serves Shidler College of Business
H1	Hawaiian Studies Express	Link classroom building/parking to Varney Circle	Internal campus trips
JM1	Japanese Cultural Center/Mo'ili'ili Express	Connect to off-campus parking and JCC	Only route to cross H1 Connects campus to Old Stadium Park
M1	Makiki Express	Link to Makiki neighborhood off-campus	N/A
W1	Wai'alaie Avenue Express	Link to Wai'alaie Avenue off-campus	N/A
N1	Night Shuttle	Upper campus circulator	Connects to TheBus local and express routes

TheBus

The City and County of Honolulu operate TheBus transit system, providing a transit option for UHM students, faculty, and staff. Four local routes (4, 6, 13, and 18) and seven express routes (80, 83, 84, 85, 90, 94, and A) serve campus, with connections primarily along University Avenue and at Sinclair Circle.

Table 4 summarizes the span and frequency of TheBus routes that serve UHM.

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Table 4. TheBus Routes - Span and Frequency

Route No.	Route Name	Weekday Span	Weekday Frequency (minutes)	6:00-10:30 am Frequency (minutes)	10:30-2:30 Midday Frequency (minutes)	2:30-7:00 pm Frequency (minutes)
1*	Kaimuki - Kalihi	4:02am - 1:25am	10-35	10-29	13-35	10-21
4*	Nuuanu - Punahou	4:59am - 12:44am	10-35	10-20	10-20	10-35
5*	Ala Moana - Mānoa	5:36am - 10:02pm	22-65	22-65	55	50-65
6*	Pauoa - Woodlawn	5:03am - 11:57pm	14-23	14-22	17-23	20-22
9*	Kaimuki - Pearl Harbor	5:00am - 11:35pm	10-60	10-30	25-60	18-32
13*	Liliha - Waikiki - University	4:06am - 12:31am	10-25	10-25	15	15-25
14*	St. Louis - Maunalani	5:16am - 10:12pm	28-60	28-60	55-60	55-60
18*	University - Ala Moana	5:46am - 9:46pm	28-71	58-70	28-66	60-71
80A	Hawaii Kai Park & Ride Express (UHM)	5:34am - 6:18pm	32-55	32-47	N/A	45-55
83*	Wahiawa Town Express (Downtown/UHM)	4:58am - 6:44pm	10-46	17-46	N/A	10-38
84*	Mililani Express (Downtown/UHM)	5:00am - 6:33pm	25-33	25-33	N/A	30
85*	Windward Express Kaneohe	5:40am - 7:01pm	15-113	15-29	N/A	32-113
85A*	Windward Express Haiku	6:05am - 5:56pm	15-32	15-20	N/A	22-32
90*	Pearl City Express	5:57am - 5:41pm	24-41	30-41	N/A	24-32
94*	Villages of Kapolei - Kaupēa Express	5:10am - 6:52pm	20-40	20	N/A	40
A	City Express	4:18am - 10:35pm	15 -31	15	14-17	15-31

* Reduced service on State Holidays

Routes in orange are Express Routes

The purpose for each of the TheBus routes that serve campus, or overlap with shuttle routes, are identified in **Table 5**. Several of the routes identified below require a transfer for a passenger to arrive on campus (1, 9, 14). However, these routes overlap with portions of the shuttle routes, and are discussed in more detail in that section on page 21.

Table 5. TheBus Route Purposes

Route No.	Route Name	Route Purpose
1	Kaimuki - Kalihi	Link Downtown Honolulu with Chinatown, Pawa'a, McCully-Mō'ili'ili, Kaimukī, and Kāhala Mall; passes near campus on Wai'ālae Avenue
4	Nuuanu - Punahou	Link UHM Campus to Chinatown, Downtown Honolulu, McCully, Waikīkī, and Alapai Transit Center
5	Ala Moana - Mānoa	Link Ala Moana Center to Mānoa Kumuone; passes north of campus on Mānoa Road
6	Pauoa - Woodlawn	Link UHM Campus to Downtown Honolulu, Ward Center, McCully-Mō'ili'ili, and Ala Moana Center
9	Kaimuki - Pearl Harbor	Link Downtown Honolulu to Pearl Harbor, Chinatown, Kalihi, Kaimukī, airport, and Ala Moana Center; passes near campus on Wai'ālae Avenue
13	Liliha - Waikiki - University	Link UHM Campus to Liliha Street, Chinatown, Downtown Honolulu, Waikiki, Kapahulu, and Kaimuki
14	St. Louis - Maunalani	Link Sierra/Lurline to Peter/Ruth; passes through St. Louis Heights and Willhelmin Rise neighborhoods east of campus, and along Wai'ālae Avenue
18	University - Ala Moana	Link UHM Campus to Ala Moana Center and Aina Haina
80A	Hawaii Kai Park & Ride Express (UHM)	Express link to HAWAII KAI PARK & RIDE - Located east of campus
83	Wahiawa Town Express (Downtown/UHM)	Express link between UHM Campus and Downtown Honolulu (west)
84	Mililani Express (Downtown/UHM)	"Express link between UHM Campus and Downtown Honolulu Express link to Wahiawa P&R - Located at Hawaii National Guard Facility, across Wheeler Air Force Base (west)"
85	Windward Express Kaneohe	Express link between UHM Campus and Kailua, 'Aiea, Kaneohe
85A	Windward Express Haiku	Express link between UHM Campus and Kaneohe via Downtown Honolulu
90	Pearl City Express	Express link between UHM Campus and Pearl City via Downtown Honolulu
94	Villages of Kapolei - Kaupē Express	Express link between UHM Campus and Villages of Kapolei
A	City Express	Express link between UHM Campus and Waipahu Leolua Street via Pearl City, 'Aiea, Pearl Harbor, Kalihi, Chinatown, Downtown Honolulu, Honolulu Civic Center, McCully, and Mō'ili'ili

University Travel Patterns

Results from recent surveys reviewed indicate service conflicts and issues around peak student travel times on campus. These peak-time issues (e.g. the Shuttle capacity, Shuttle schedule deviations, and Shuttle and class schedule incompatibilities) may be alleviated by understanding where and when students and faculty are on campus and adjusting the Shuttle service to accommodate these travel patterns.

Spring 2017 Campus Parking and Services Survey Insights

Responses to the Spring 2017 Campus Parking and Services Survey included insight on to/from-campus travel patterns, including the following:

- *Commute Times:* For most respondents at most times of day, commutes range from 10-30 minutes. This is important to consider because the Shuttle routes must offer comparable commute times in order to compete with other modes.
- *To Campus Commute:* Transit services are required consistently across a wide timespan in the morning. Respondents are arriving at campus steadily between 7:00am-9:30am, with no particular 30-minute window standing out as the most frequent arrival time (between 10-16 percent of respondents in all 30-minute slots). More than 30 percent of respondents arrive before 7:00am or after 9:30am (with an approximately even split between these two groups).
- *From Campus Commute:* 38 percent of respondents leave campus after 5:00pm, and another 32 percent leave between 4:00pm and 5:00pm.
- *Parking Supply Impact:* Students who drive to campus reportedly arrive to campus early and stay all day (i.e. do not move their car) in order to find and keep a parking spot. This may explain the discrepancy between peak classroom start/end times and when students report arriving to/leaving from campus.

Class Schedules and Seats

Class schedules for the Fall 2017 semester were analyzed to determine average weekday classroom seats per campus building for morning, midday, and afternoon time periods, each approximately four hours. Classroom seats peak in midday (10:30am-2:30pm), with a majority of campus classroom buildings experiencing greater than 300 students on an average weekday (**Figures 1-3**). The morning 4-hour time period (6:00am-10:30am) shows significantly fewer students in classes than midday; however, these averages are skewed due the very low number of class seats between 6:00am-7:30am.

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Figure 1. Average Classroom Seats: Weekday Morning (6:00am-10:00am)

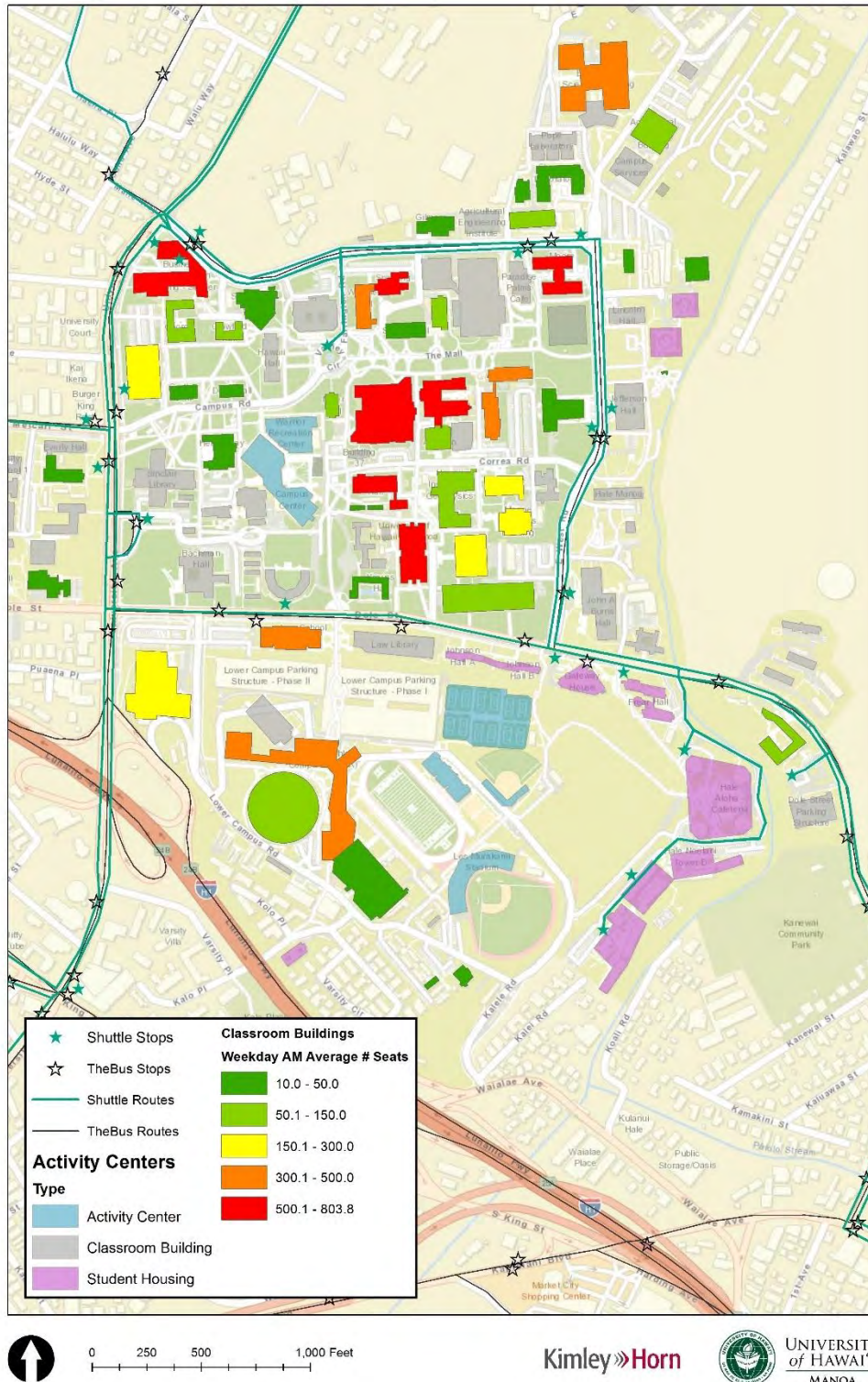
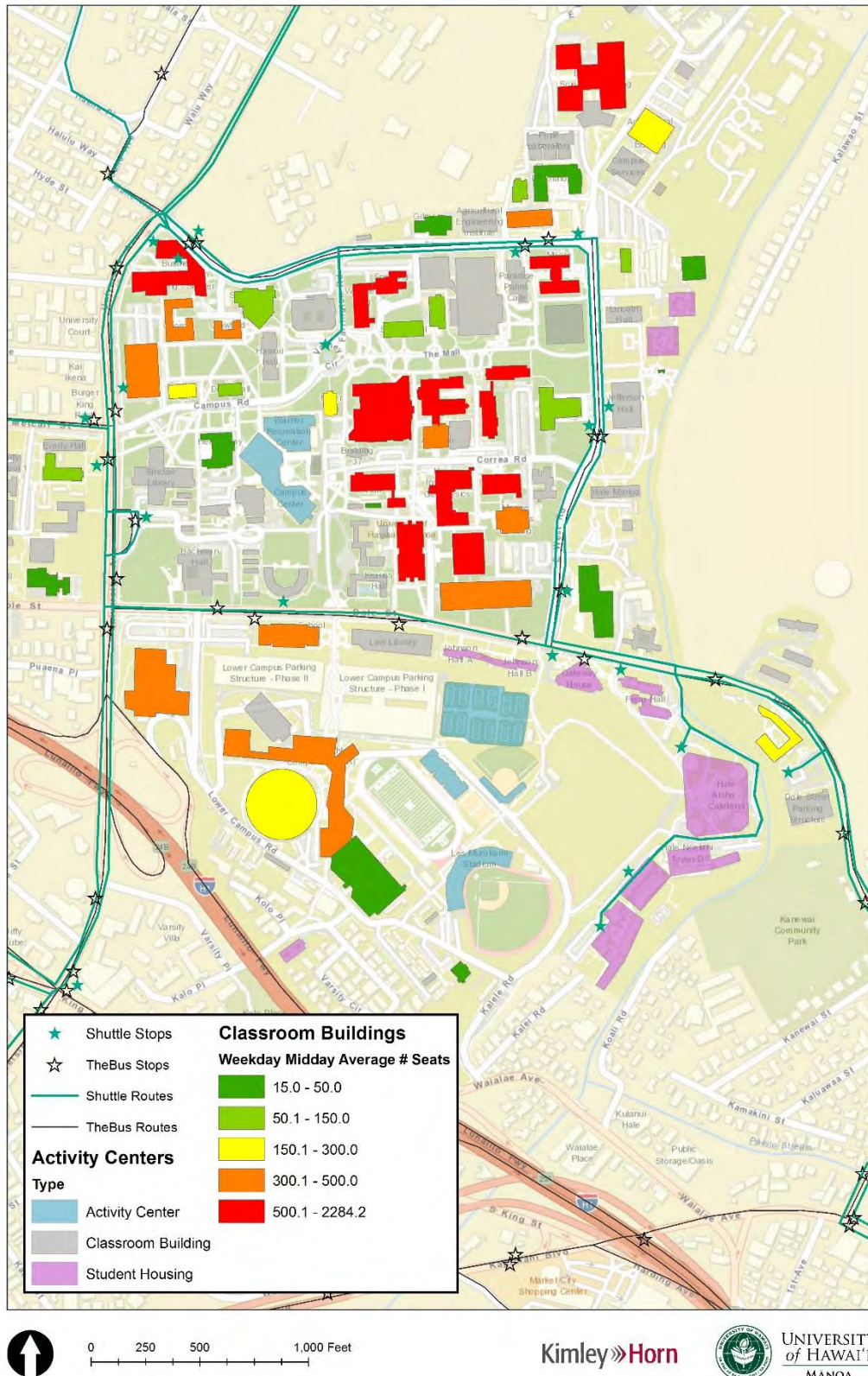


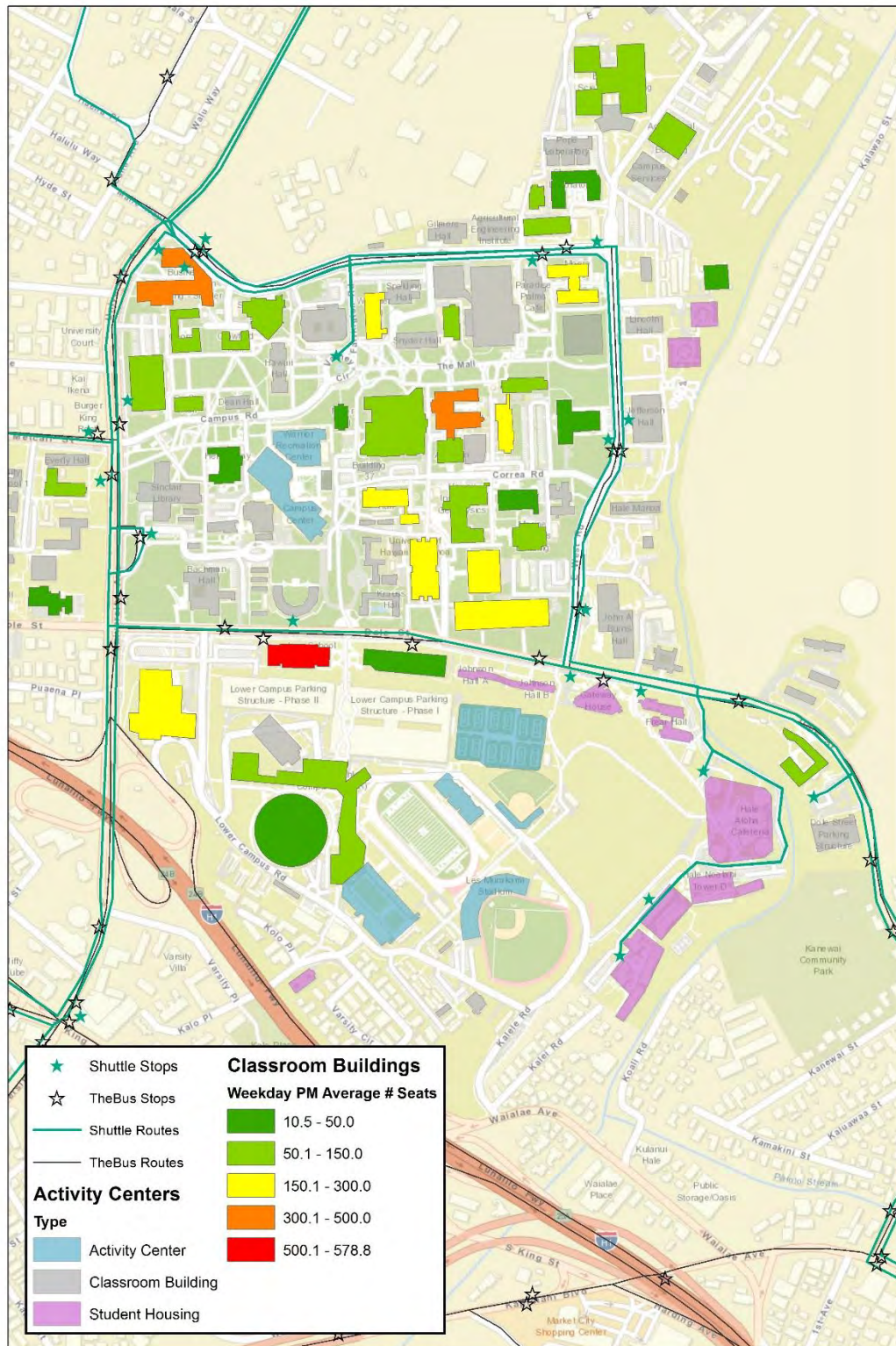
Figure 2. Average Classroom Seats: Weekday Midday (10:00am-2:30pm)



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Figure 3. Average Classroom Seats: Weekday Evening (2:45pm-7:00pm)



0 250 500 1,000 Feet

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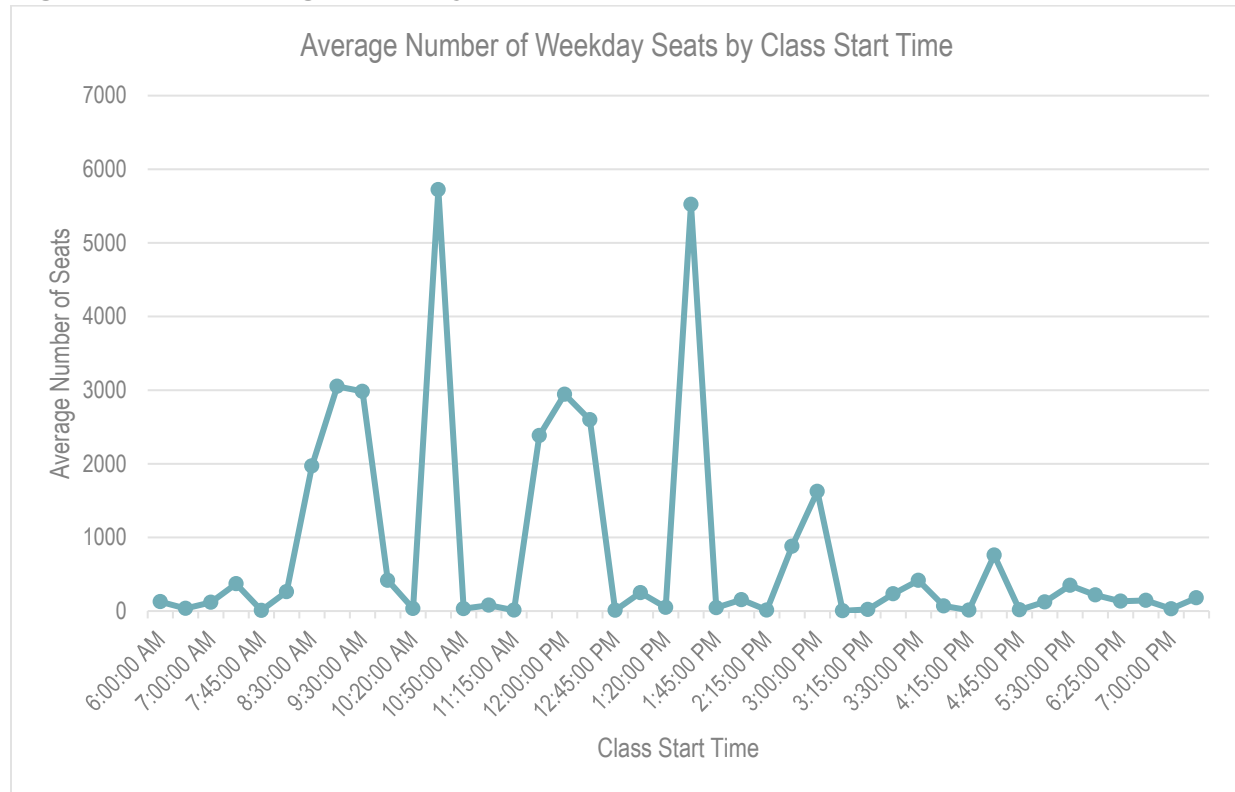
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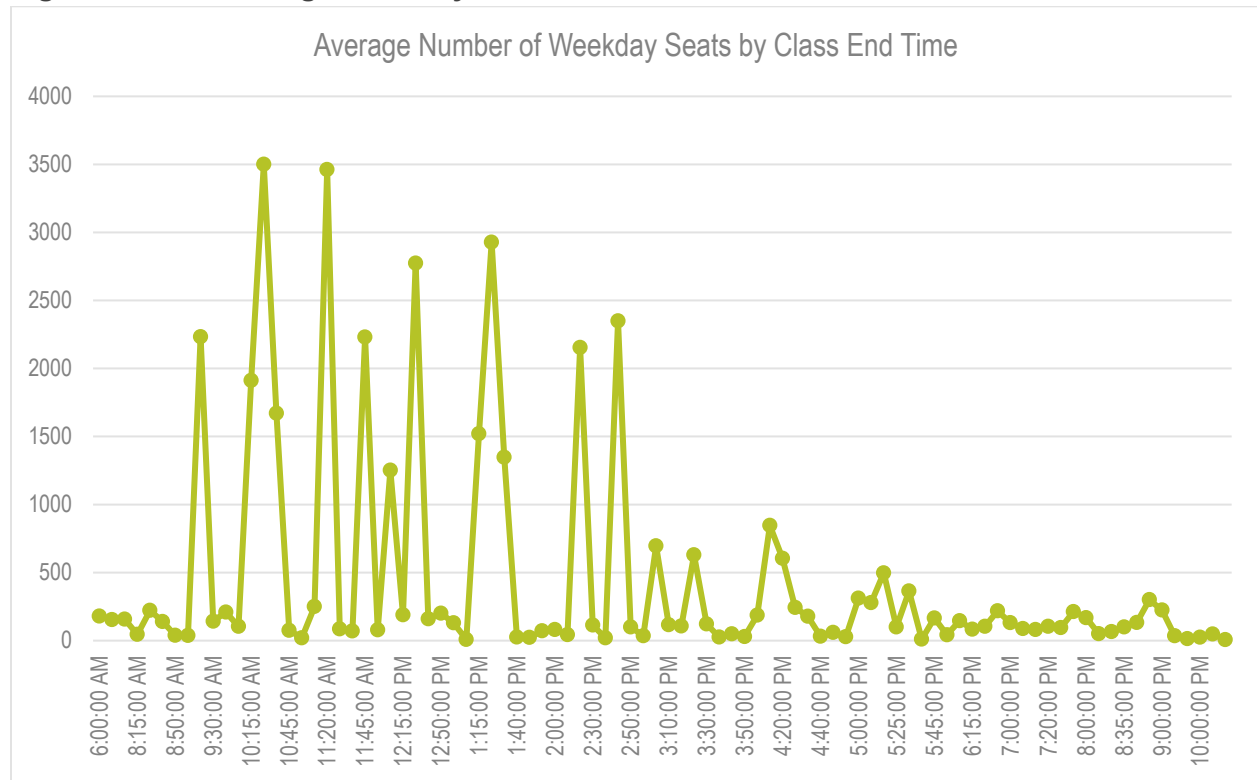
The number of students starting class peaks at 10:30am and 1:30pm on an average weekday (**Figure 4**). These peaks in class start times could indicate potential peak Shuttle ridership periods. Higher demand for the Shuttle may occur mid-morning leading up to 10:30am; a slightly smaller peak (due to a percentage of students already on campus) may occur around midday. The afternoon experiences a sharp decrease in number of students in class, with a small peak of classes starting at 3:00pm. While the class schedule indicates potential for ridership peaks during the times indicated, anecdotally we have heard that students are spending more time on campus than required by their class schedule.

Figure 4. Peak Average Weekday Class Start Times



Class end times also were analyzed (**Figure 5**). Class end times are more evenly spread throughout the day than class start times. Average weekday peaks in class end times occur at 10:20am and 11:20am. End peak times indicate that the Shuttle should experience another surge in ridership just after these times, as a large number of students are leaving campus or traveling to another area within campus.

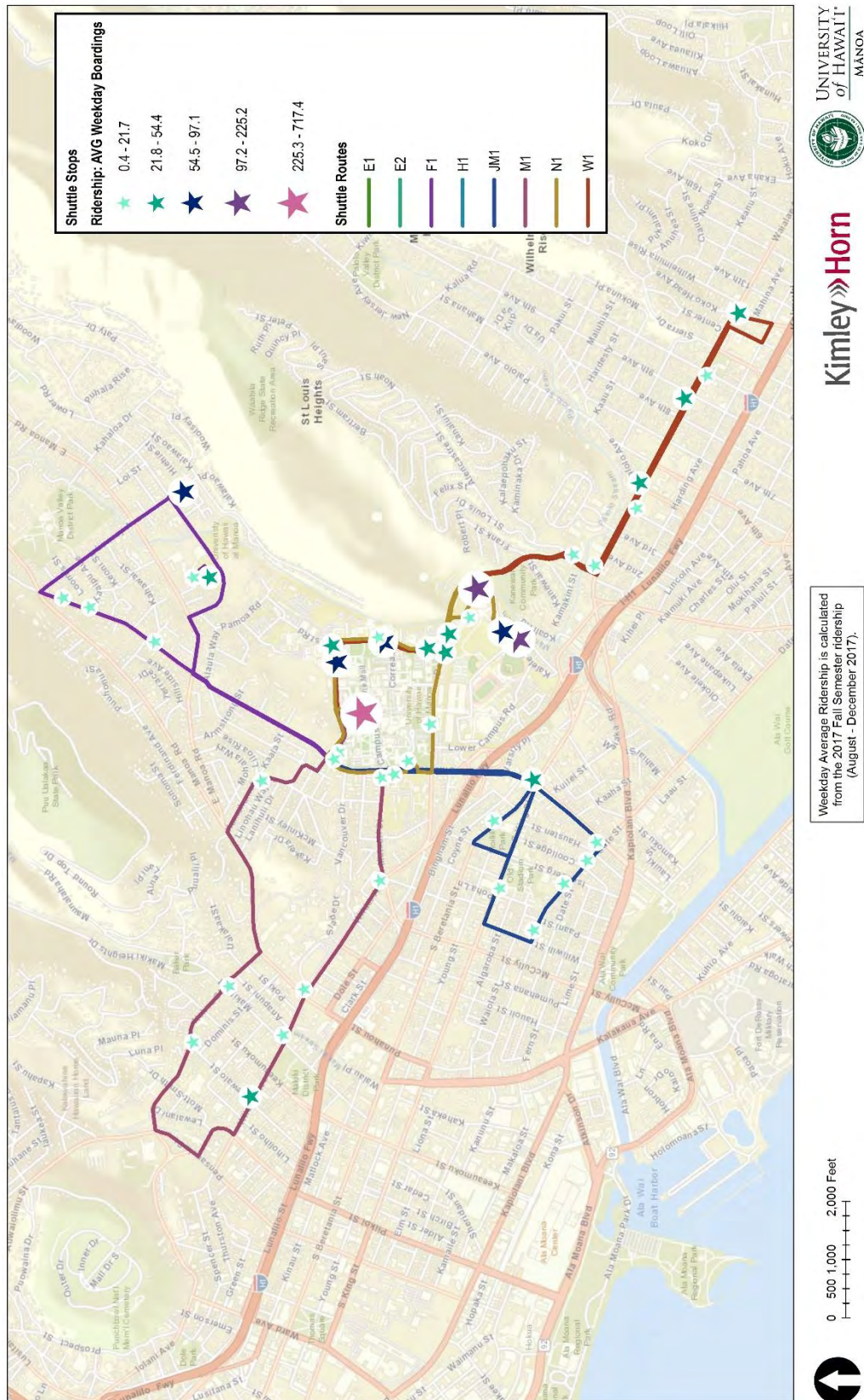
Figure 5. Peak Average Weekday Class End Times



Shuttle Ridership

Ridership data for the Shuttle between mid-August and December 2017 was mapped as average weekday boardings by stop (**Figure 6**). The significantly higher ridership at Varney Circle and student and faculty campus housing indicate that a majority of the Shuttle usage is by students and faculty that live in campus housing, traveling to and from upper campus. In contrast, significantly lower ridership is experienced along the longer, off-campus loops to surrounding neighborhoods, such as along the northern loop of F1 and along much of the loop of M1. Intermediate ridership is experienced at key destinations off-campus, such as classroom buildings not located in upper campus and along much of the W1 alignment.

Figure 6: Shuttle Average Weekday Ridership



TheBus Ridership and Passenger Loads

Stop-level ridership data from mid-August to December 2017 also was analyzed for the City of Honolulu's local bus service, TheBus. TheBus serves the west side of the UHM upper campus at stops primarily along University Avenue and at Sinclair Circle. Average weekday ridership was mapped for TheBus stops that generally operate along the Shuttle routes and TheBus routes that serve campus (**Figure 7**). TheBus average weekday ridership at stops around UHM tends to be about double that of the Shuttle ridership. The stops along University and at Sinclair Circle experience the highest ridership of the stops analyzed in the area. These stops serve both local and express routes and serve as termini or major east-west connecting points. TheBus stops along Wilder Avenue also experience higher ridership.

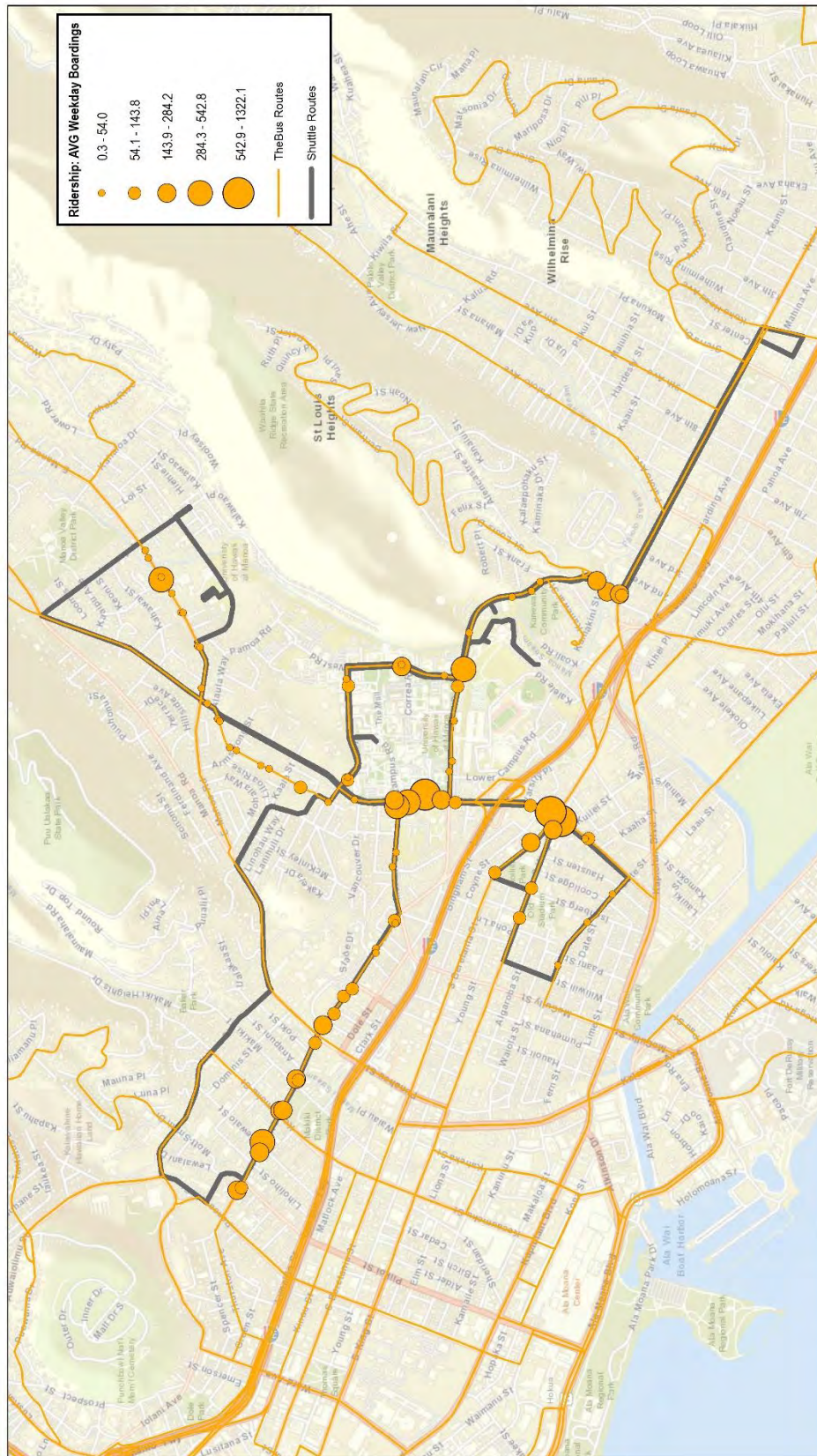
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Figure 7: TheBus Average Weekday Ridership



Only showing stops which lie along Shuttle routes
and are on TheBus routes which serve campus.
Weekday Average Ridership is calculated from mid-August - December 2017.



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Average weekday passenger load data, provided by Honolulu's Public Transportation Department, was mapped at the route and stop level for the TheBus routes and stops that serve campus or generally align with the Shuttle routes. Although TheBus routes around campus experience gradations in average weekday passenger loads, none of the stops or routes analyzed had weekday averages at or near capacity (**Figures 8-9**).

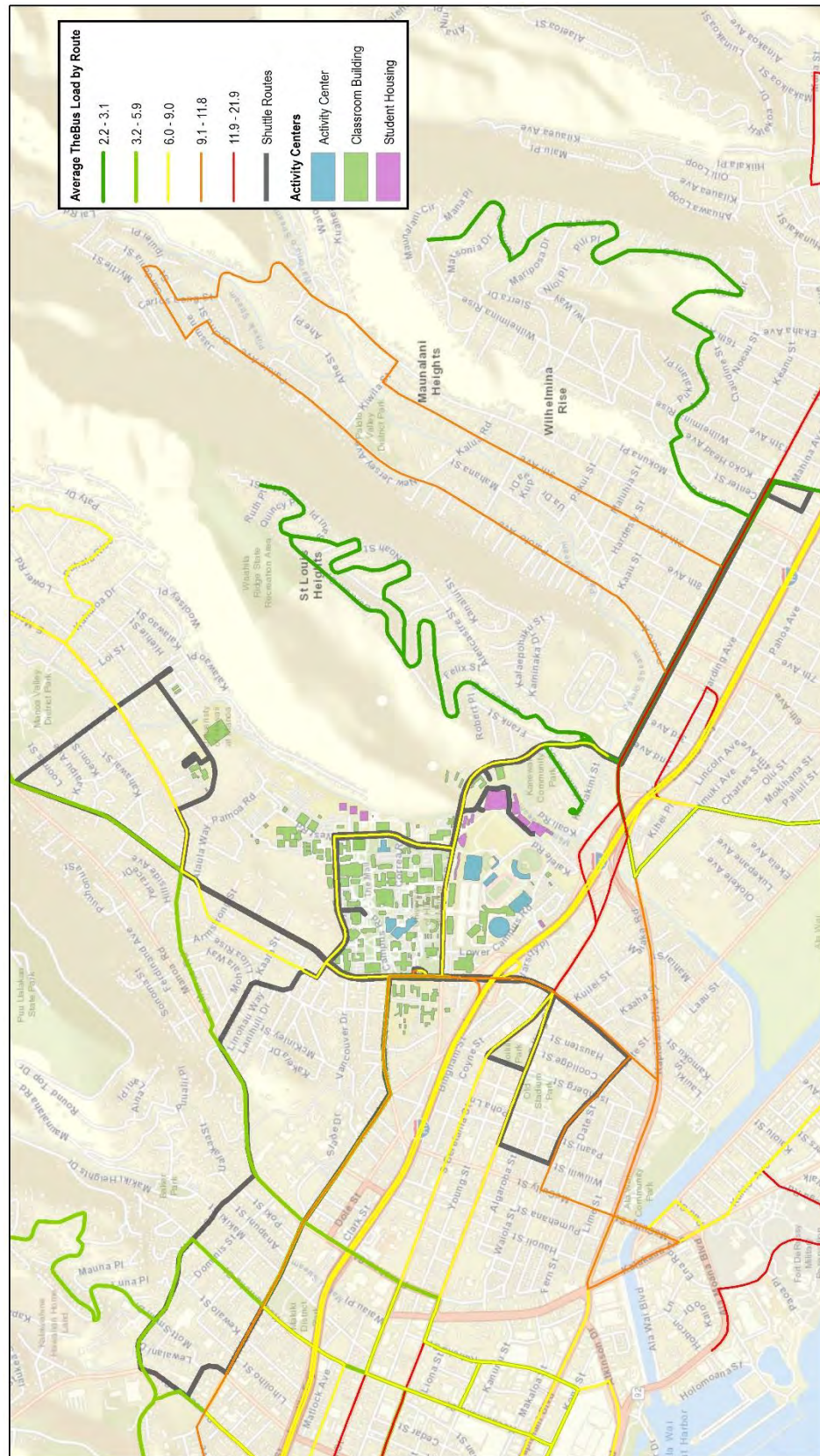
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Figure 8: TheBus Average Passenger Loads by Route



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Average load data was provided
by Honolulu Public Transportation
Department on April 26, 2018.

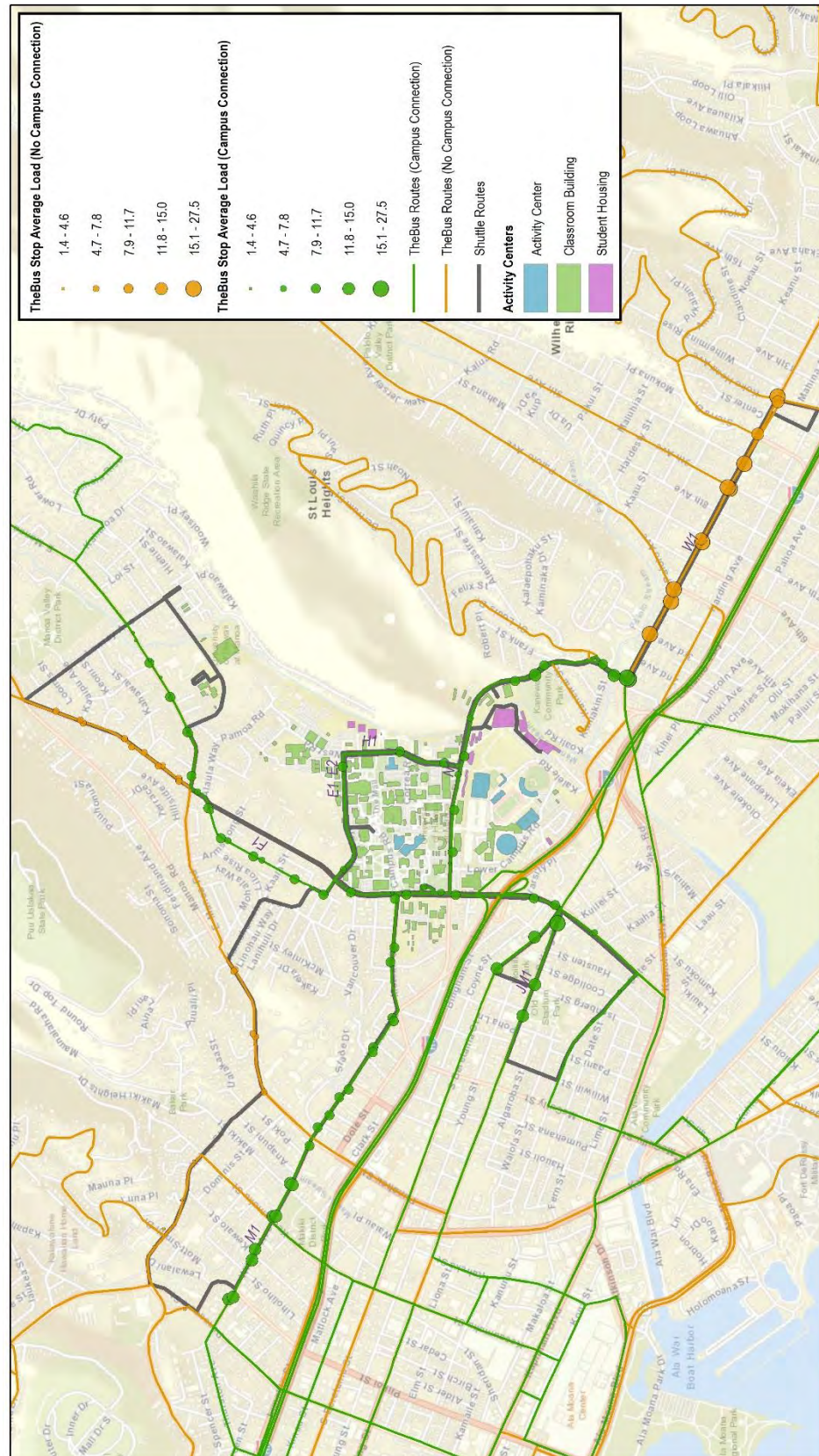
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Figure 9: TheBus Average Passenger Loads by Stop



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Average load data was provided
by Honolulu Public Transportation
Department on April 26, 2018.

Shuttle Overlap with TheBus

The purpose of the Shuttle is currently unclear to both transit providers and passengers. One of the causes of this ambiguity is the overlap with the existing transit system. To understand the extent that the Shuttle system overlaps with TheBus, maps of Shuttle routes and nearby TheBus routes are provided. The maps are coupled with tables, which provide frequency and span information for both Shuttle routes and those TheBus routes which are considered overlapping.

There is significant overlap between W1/H1/E1/E2 and several TheBus routes, though some of that overlap requires a transfer for a passenger to make it all the way to campus. However, the connection that Routes E1/E2 provide between student housing and the main campus is not duplicated by TheBus, and therefore remains an important service for UHM to provide. F1 overlaps with existing transit for large portions, but also provides a unique connection between faculty housing, the Astronomy buildings, and the main campus. There is significant overlap on M1 and JM1, and they can likely be eliminated as a result. More details about eliminating or combining routes can be found in the recommendations section.

Student Housing Express, Hawaiian Studies Express, Wai'ālae Avenue Express

The Student Housing Express buses (E1 and E2), Hawaiian Studies Express (H1), and the Wai'ālae Avenue Express (W1) overlap several local TheBus routes. TheBus Routes 6 and 13 circulate upper campus, overlapping all four Shuttle routes. Frequencies are comparable to the Shuttles and TheBus routes run for a greater span of the day. Routes 13 and 18 run along Dole Street, which overlap with portions of W1 and H1. Route 18 has a lower and more variable frequency than the H1 and W1. Routes 1, 9, and 14 run along Wai'ālae Avenue, overlapping with W1; however, they require a transfer to Routes 13 or 18 to access campus. Routes 1 and 9 are more frequent than W1; Route 14 is not as frequent. E1, E2, H1, and W1 are generally well-covered by local transit, but still provide a valuable link between student housing and campus, which is particularly important given the topography of the campus. **Table 6** and **Figure 10** detail the overlap of E1/E2/H1/W1 and TheBus routes.

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Table 6. E1, E2, H1, W1 Overlap with TheBus Routes

Route No.	Route Name	Weekday Span	Weekday Frequency (minutes)	6:00-10:30 am Frequency (minutes)	10:30-2:30 Midday Frequency (minutes)	2:30-7:00 pm Frequency (minutes)
E1	Student Housing Express 1	7:00am - 5:00pm	15	15	15	15
E2	Student Housing Express 2	8:30am - 11:15am	15	15	N/A	N/A
H1	Hawaiian Studies Express	7:30am - 4:30pm	15	15	15	N/A
6	Pauoa - Woodlawn	5:03am - 11:57pm	14-23	14-22	17-23	20-22
13	Liliha - Puunui	4:06am - 12:31am	10-25	10-25	15	15-25
18	University - Ala Moana	5:46am - 9:46pm	28-71	58-70	28-66	60-71
W1	Wai'ālae Avenue Express	6:30am - 6:00pm	30	30	30	30
1^	Kaimuki - Kalihi	4:02am - 1:25am	10-35	10-29	13-35	10-21
9^	Kaimuki - Pearl Harbor	5:00am - 11:35pm	10-60	10-30	25-60	18-32
13	Liliha - Puunui	4:06am - 12:31am	10-25	10-25	15	15-25
14^	St Louis - Maunalani	5:16am - 10:12pm	28-60	28-60	55-60	55-60
18	University - Ala Moana	5:46am - 9:46pm	28-71	58-70	28-66	60-71

^ = requires transfer to other buses in list

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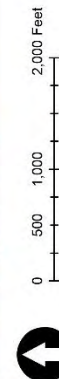
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Figure 10: E1, E2, W1, H1 Overlap with TheBus Routes



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Only showing stops which lie along Shuttle routes
and are on TheBus routes which serve campus.



Night Shuttle

The Night Shuttle (N1) overlaps with several local TheBus routes. Routes 6 and 13 circulate upper campus, overlapping N1. Frequencies are higher than the N1, and TheBus routes operate for a greater span of the day, including running later than the N1. Routes 13 and 18 run along Dole Street, overlapping with portions of the N1. Route 18 has a more variable frequency than the N1 and a weekday span of service that ends earlier than the N1. Generally, the N1 is well-covered by existing local transit along much of the route but still provides a valuable link to student housing in the evenings. **Table 7** and **Figure 11** detail the overlap of N1 and TheBus routes.

Table 7. N1 Overlap with TheBus Routes

Route No.	Route Name	Weekday Span	Weekday Frequency (minutes)	6:00-10:30 am Frequency (minutes)	10:30-2:30 Midday Frequency (minutes)	2:30-7:00 pm Frequency (minutes)
N1	Night Shuttle	5:00pm - 11:15pm	30	Night Shuttle	5:00pm - 11:15pm	30
6	Pauoa - Woodlawn	5:03am - 11:57pm	14-23	14-22	17-23	20-22
13	Liliha - Puunui	4:06am - 12:31am	10-25	10-25	15	15-25
18	University - Ala Moana	5:46am - 9:46pm	28-71	58-70	28-66	60-71

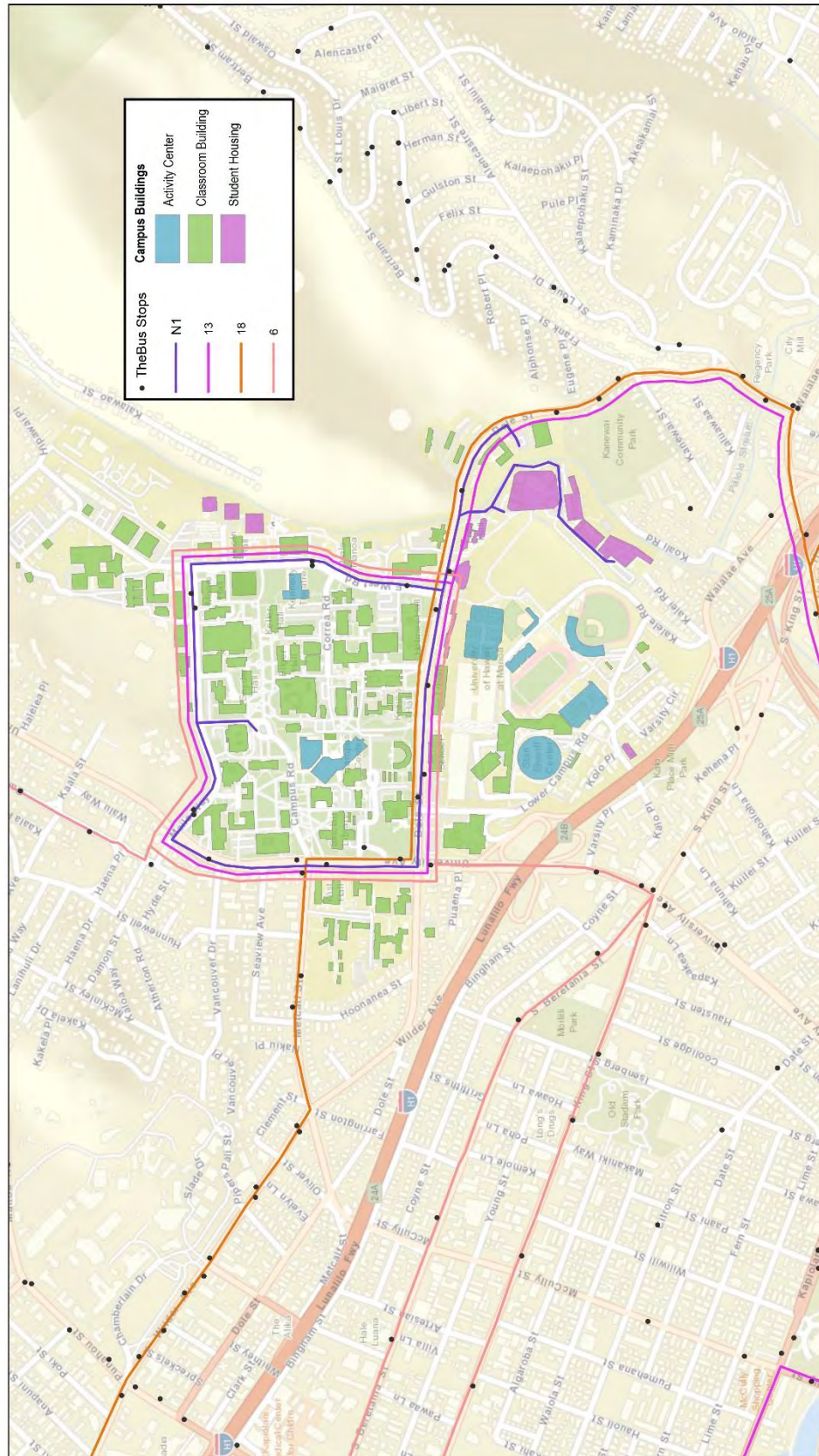
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Figure 11: N1 Overlap with TheBus Routes



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Only showing stops which lie along Shuttle routes
and are on TheBus routes which serve campus

Mānoa Express Overlap with TheBus

The Mānoa Express (F1) has some overlap with two existing local TheBus routes, Routes 6 and 5. Route 6 overlaps with F1 along East Mānoa Avenue and circulates campus. In addition, Route 6 comes twice as often as F1 for much of the day. Route 5 overlaps with F1 along Oahu Avenue but requires a transfer to Route 6 to reach campus. However, Route 5 is much less frequent than F1, particularly after the morning period. The Astronomy buildings and faculty housing are not currently served by TheBus and neither is Lowrey Avenue, which connects Oahu Avenue to East Mānoa Road near the Mānoa Valley District Park. Walking between East Manoa Road and Manoa Road is viable given the short distance (less than half a mile) and the relatively flat topography of this area. Route F1 is therefore generally well-covered by local transit, but still provides a valuable link between upper campus and faculty housing and Astronomy.

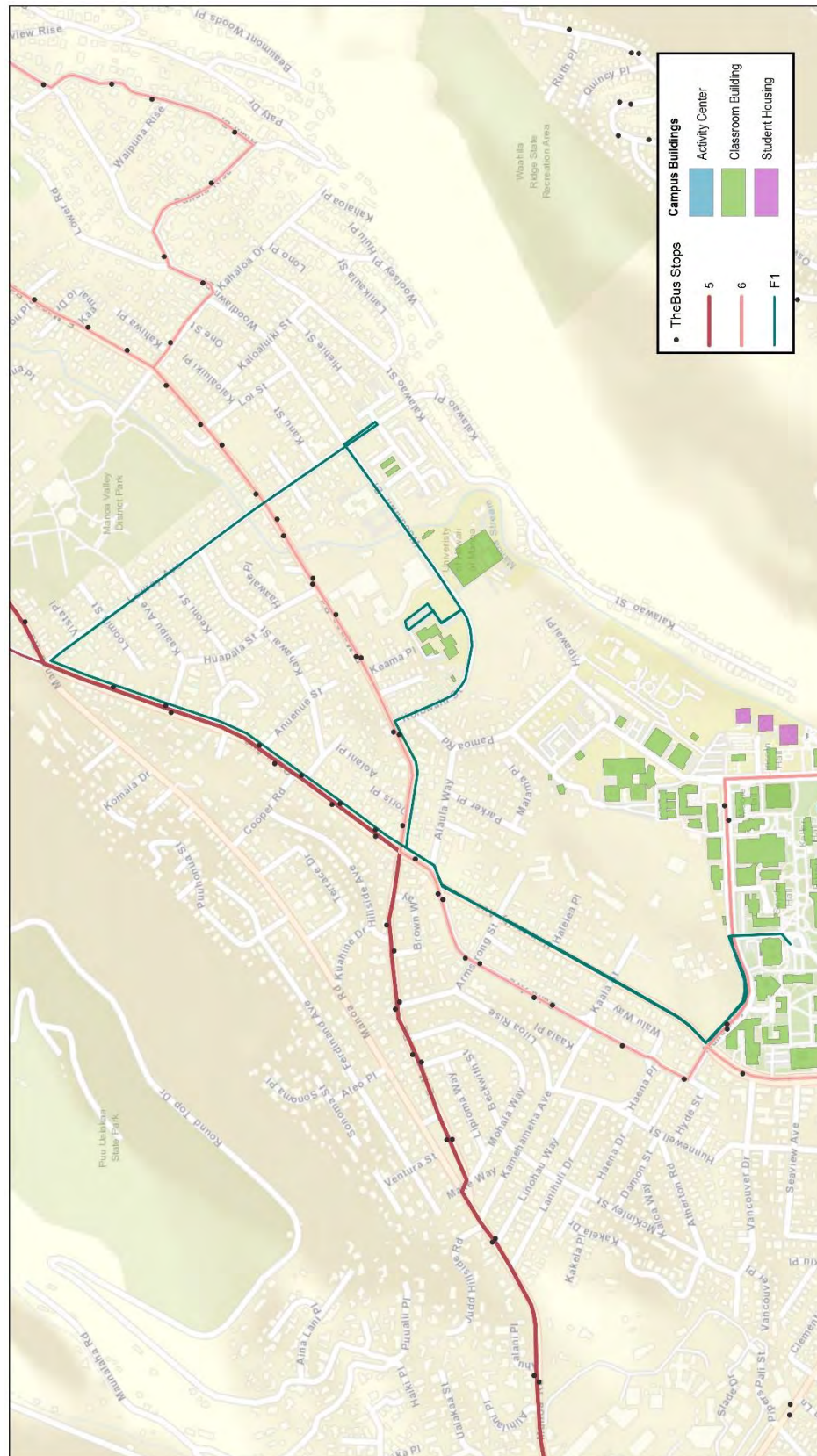
Table 8 and **Figure 12** detail the overlap of F1 and TheBus routes.

Table 8. F1 Overlap with TheBus

Route No.	Route Name	Weekday Span	Weekday Frequency (minutes)	6:00-10:30 am Frequency (minutes)	10:30-2:30 Midday Frequency (minutes)	2:30-7:00 pm Frequency (minutes)
F1	Mānoa Express	7:00am - 6:00pm	30	30	30	30
5 [^]	Ala Moana - Mānoa	5:36am - 10:02pm	22-65	22-65	55	50-65
6	Pauoa - Woodlawn	5:03am - 11:57pm	14-23	14-22	17-23	20-22

[^] = requires transfer to other bus in list

Figure 12: F1 Overlap with TheBus Routes



Japanese Cultural Center/Mo'ili'ili Express Overlap with TheBus

The Japanese Cultural Center/Mo'ili'ili Express (JM1) overlaps with two local TheBus routes, Routes 4 and 6. Route 4 covers JM1 along Citron Street and University Avenue, and Route 6 covers JM1 along South King Street and South Beretania Street. Both routes provide direct access to campus, and walking between them is viable, given the short distance (approximately a quarter mile) and the relatively flat topography in this area. As such, JM1 route is well-covered by the existing transit system and does not provide a unique connection to campus. **Table 9** and **Figure 13** detail the overlap of JM1 and Routes 4 and 6.

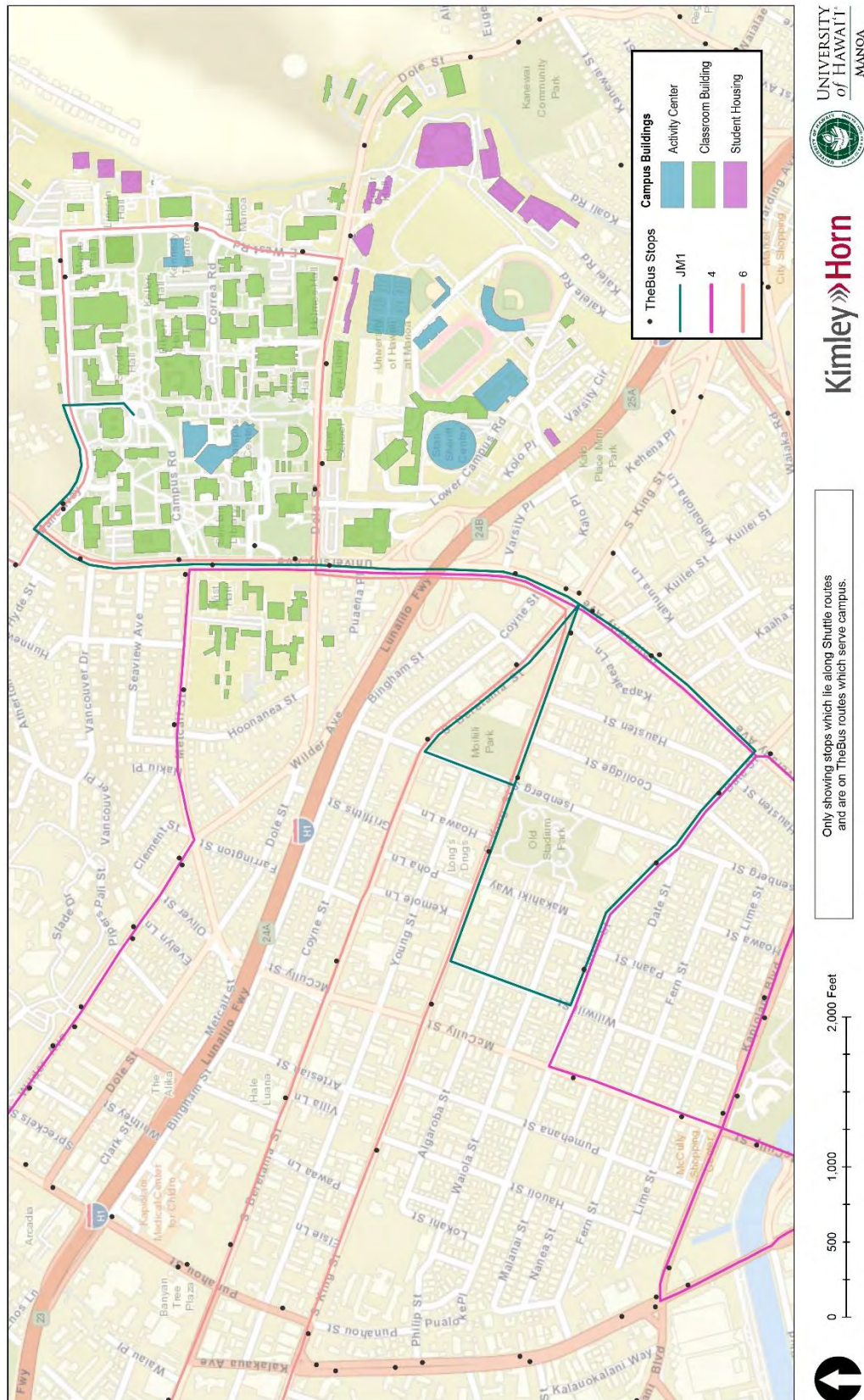
Table 9. JM1 Overlap with The Bus

Route No.	Route Name	Weekday Span	Weekday Frequency (minutes)	6:00-10:30 AM Frequency (minutes)	10:30-2:30 Midday Frequency (minutes)	2:30-7:00 PM Frequency (minutes)
JM1	Japanese Cultural Center/Mo'ili'ili Express	7:00am - 6:00pm	35	35	35	35
4	Nuuanu - Punahou	4:59am - 12:44am	10-35	10-20	10-20	10-35
6	Pauoa - Woodlawn	5:03am - 11:57pm	14-23	14-22	17-23	20-22

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Figure 13: JM1 Overlap with TheBus Routes



Maikiki Express Overlap with TheBus

M1 overlaps with two local TheBus routes. Routes 4 and 18 run along Wilder Avenue, the southern portion of the route, and. Both provide direct access to campus. Route 4 has greater frequency than M1 for most of the day, and both routes have longer spans of service. The northern portion is not covered by any TheBus routes, along Nehoa Road. However, walking between Nehoa and Wilder is viable given the short distance (less than half a mile) and the relatively flat topography. Therefore, M1 does not provide a substantially unique connection to campus. **Table 10** and **Figure 14** detail the overlap of M1 and TheBus routes.

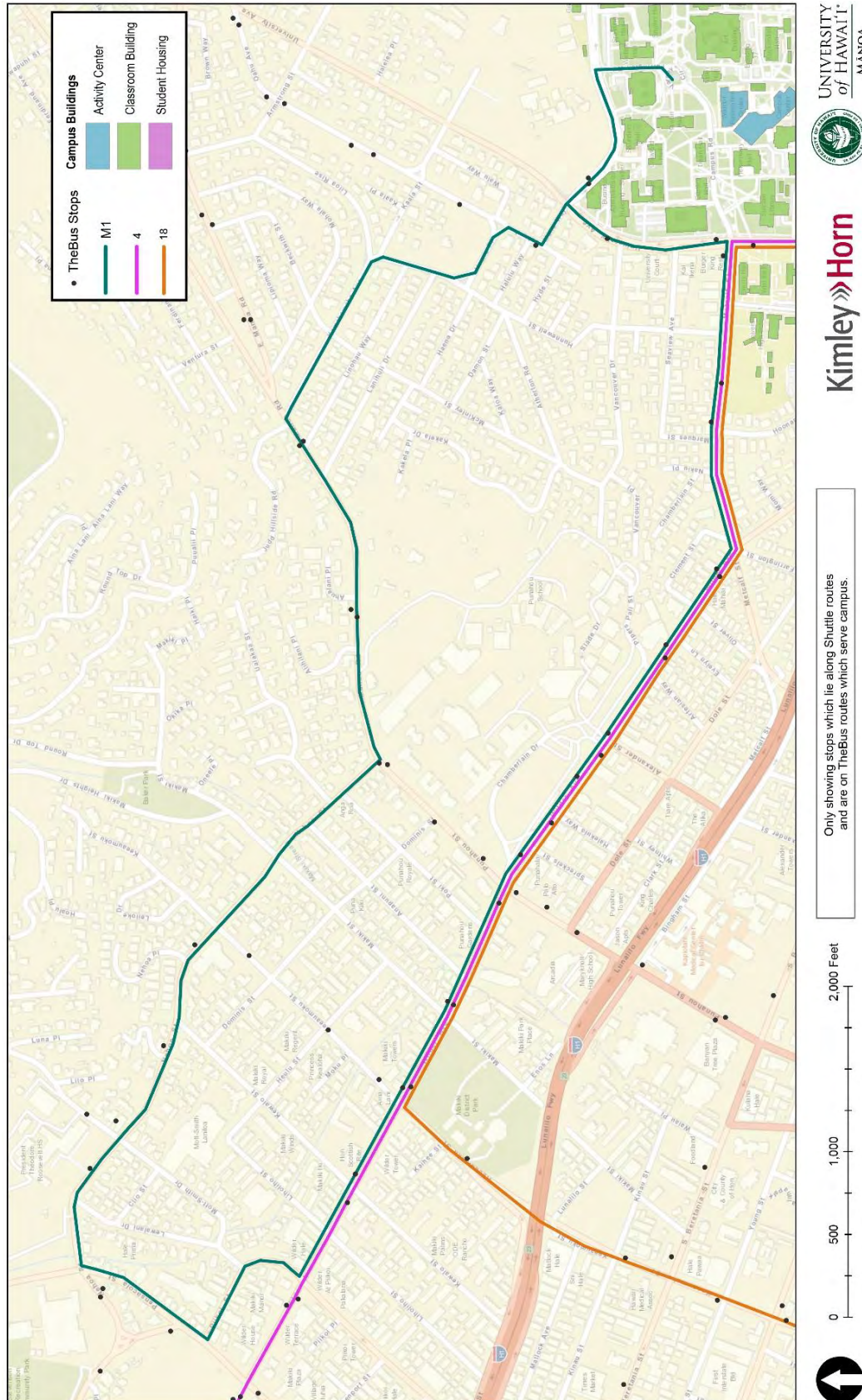
Table 10. M1 Overlap with TheBus

Route No.	Route Name	Weekday Span	Weekday Frequency (minutes)	6:00-10:30 am Frequency (minutes)	10:30-2:30 Midday Frequency (minutes)	2:30-7:00 pm Frequency (minutes)
M1	Makiki Express	6:30am - 12:30pm 2:30pm - 6:00pm	35	35	N/A	35
4	Nuuanu - Punahou	4:59am - 12:44am	10-35	10-20	10-20	10-35
18	University - Ala Moana	5:46am - 9:46pm	28-71	58-70	28-66	60-71

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Figure 14: M1 Overlap with TheBus Routes



Recommendations

Shuttle Purpose Recommendation

A key finding of this study is that the Shuttle campus transit service currently lacks a central, robust, guiding purpose. Such a purpose should define the Shuttle's primary function and provide a stated goal by which to identify service priorities and measure success. A recommended purpose is as follows:

UHM Commuter Services Shuttle Purpose: The UHM Commuter Services Shuttle's primary function is to provide a convenient and comfortable transportation option to students, faculty, staff, and visitors traveling between campus facilities, such as housing and classroom buildings, that are not otherwise easily connected by walking, biking, or by local transit options.

Shuttle Operations Recommendation

Based on the significant overlap identified between the Shuttle and TheBus, it is recommended that operation of routes JM1 and M1 is discontinued. Routes E1/E2 provide a valuable connection between student housing and the main campus, particularly given the steep climb required to get from student housing to the main campus. The four daytime shuttles (W1, H1, 1, and E2) that overlap near campus are recommended as a single Shuttle route. While W1 extends beyond campus, based on the existing ridership on this route, the lack of a connecting local TheBus route, and the desire for alternative modal access to campus, continued service along W1 is recommended.

While TheBus Route 6 operates near the existing F1 route, continued service on a portion of route F1 is recommended due to the ridership along this route and the connection to faculty housing. Due to the low ridership and impact on operations, it is recommended that the northern half of the loop on the north end of the route be discontinued.

Consolidating F1 with the combination of routes W1, H1, E1, and E2 would provide the opportunity to have a one-seat ride to the Business Administration building or the buildings on the far northern part of campus near faculty housing from the southern end of campus and student housing. Since this would create a long cycle time for the Shuttle, multiple buses are recommended to operate on this route to increase the Shuttle frequency. If the option to consolidate F1 with the combination of the other four routes is pursued, it is recommended that the Shuttle no longer stop in Varney Circle and instead stop on Maille Way at Farrington Road.

While N1 provides service to the student housing, similar to Routes E1/E2, this route has significantly less ridership. Additionally, TheBus Route 6 and 13 overlap most of N1 at a greater frequency. The UHM Department of Public Safety (DPS) provides walking escorts and vehicle transportation for members of the UHM community walking alone at night. Due to the availability of this service as well as the overlap with Routes 6 and 13, it is recommended that operation of N1 is discontinued.

The consolidation of Shuttle routes would allow UHM to reduce resources spent on the Shuttle, while continuing Shuttle operations with a defined purpose.