

TEAHOUSE FEASIBILITY

Feasibility Analysis for the Secure, Accessible, and Self-Sustaining Design
of an On-Campus Teahouse for UC Davis

Esra Hawsawi, Nealah Lee, Kay Senn

D-Lab I

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Executive Summary

The client, Harold Linde, is designing an on-campus portable teahouse using a \$20,000 grant from the Green Initiative Fund. This teahouse is intended for a select portion of the UC Davis population interested in and engaged with tea (enthusiasts, researchers, Global Tea Initiative members) and should be as physically, mentally, and emotionally accessible to a population of diverse needs and abilities. In order to achieve these goals, the project is focused on the feasibility of this teahouse in terms of security, accessibility, and practical sustainability.

The security aim will take into consideration theft, vandalism, inappropriate use of the space, and uninvited users. Security implementations were researched and case studies of active and passive design were identified. An online sign-up system is advised as a means of limiting access to a target audience, maintaining an organized system of use, and having a clear and traceable means of identifying who used the space and when.

The accessibility aim will take into consideration the approach, entrance, and interior but not web accessibility. An in-class survey confirmed that meeting a diversity of needs requires conflicting accommodations. Therefore, the accessibility goals will be met by using the ADA 2010 Standards and universal design as guidelines and the utilization of modular furnishings within the space. It is advised that the teahouse be designed with at least one designated wheelchair space and include an accessible ramped entrance that will be taken by all parties. This can be achieved either by widening the existing doorway to a 32" minimum or by remodeling the hitch end of the space to have a manual or electric garage door mechanism (U.S. Department of Justice, 2010).

The sustainability aim will take into consideration the party responsible for the management and maintenance of the space as well as a cleaning standard operating procedure for all users. In order for this teahouse to live on after Harold has graduated, users and caretakers must be clearly identified and feel a sense of responsibility to the space. Current potential caretakers include members of the Global Tea Club student group or members of the Global Tea Initiative. As members of the student group have not responded to emails, the Global Tea Initiative may be a better choice.

After extensive analysis, it is advised that the teahouse be used as a prototype to gauge the efficacy of the accessibility, security, and sustainability efforts in situ. To that end, the teahouse can be positioned in a location for two weeks to one month and be evaluated through focus groups regarding security measures and online and in-person accessibility.

The D-Lab II consultants are recommended to focus on cost-effective modular furniture, web accessibility for the online sign-up system, creating an accessible universal entrance to the teahouse, and identifying a party who will be responsible for the space. Additionally, the students are advised to apply for a grant through the UC Davis ADA Special Access Funding Committee as the current funding for the project is estimated to be ~\$2350.

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Introduction

This project seeks to generate a feasibility analysis for the establishment of a secure, accessible, and self-sustaining teahouse on the UC Davis campus. The security aims are to prevent theft, vandalism, inappropriate use of the space, and uninvited users. The accessibility aims are to follow a universal design approach and include physical accessibility and interior modularity and customizability. The sustainability aims include the longevity of the teahouse via maintenance of the space by users and specific responsible parties.

The initial focus of the project was primarily accessibility, but as stakeholders were contacted and potential locations considered, it became clear that security was an equally important factor on the success and longevity of the space. The UC Davis Arboretum, for example, has explicitly stated theft and vandalism as concerns. Due to this, the client envisions maintaining the exterior appearance of the teahouse, as seen in Appendix A, and allowing a look into the space through the windows at all times as a crime deterrent method. Additionally, he feels an explanatory sign on the teahouse, an example in Appendix B, will help prevent curious break ins.

It is important that the design of the space be respectful, consider all users, uphold the UC Davis Principles of Community, and be located where the tea space will require minimal maintenance as a part of the client's desire for sustainability beyond materials but as a practice and experience itself. The client ideally would like the space to be used by people interested in building community and experiencing human connection and wellness over tea. The users shall provide their own tea, which they may store in a locker within the teahouse, and the space shall provide a safe and immersive environment as well as utensils such as a kettle, tea pot and cups.

It is recommended that Harold prototype the mobile teahouse in the proposed locations: the UC Davis Arboretum and Hunt Hall. The prototyping period, which may range from two weeks to a month, will allow the client to better understand the security concerns, accessibility needs, and traffic of the potential locations. The results from this prototype will inform future iterations of this space and may similarly inform extensions of this project.

The client is planning to create other pop-up tea spaces on campus. Erik Fausak of the Carlson Library has been working with Harold to establish a tea and wellness space in a study room in the bottom floor of the library. While a separate project, this space could be seen as an extension of the teahouse and the two may inform and influence one another. The goal of both projects is to establish a safe and inclusive space which fosters education, human interaction, and wellness through tea.

Methodology, Results, and Discussion

In order to better understand the project scope, several analytical tools were employed. These methods allowed the consultants to more clearly elucidate the nuances within and influences on the teahouse, especially in terms of stakeholders, policy, previous relevant works, and accessibility accommodations.

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SWOT Analysis

A SWOT analysis was utilized to characterize the strengths, weaknesses, opportunities, and threats facing this project (Fig 1). Subsequent SWOT analyses were performed on the potential locations for the teahouse (Fig 2, Fig 3, Appendix E). Having an existing and portable structure, funding dedicated to accessible design, and an eager and passionate client are all strengths of this project. Similarly, there is a lot of opportunity embedded in this portable teahouse as it will be the first of its kind on the UC Davis campus and has a wide range of interested parties and potential locations. Additionally, there is a chance to obtain more funding for accessible design through the ADA Special Access Funding Committee. However, the structure for this teahouse is quite compact and the longevity of the space is unknown as there is no current designated maintenance party. The ideal location for the teahouse is an ever-present question, as its placement will greatly impact the chances of external threats such as environmental factors (fires, earthquakes, flooding) and human factors (theft, vandalism, uninvited users, and improper use). While security is an aspect of this analysis, it is important to note that all security camera systems must be through the formal UC Davis system and, in the event of security threats, obtaining the records from campus IT tends to be a very slow process. As it is university policy, this system cannot be bypassed and a discreet doorbell camera cannot be installed.

Strengths	Weaknesses
<ul style="list-style-type: none"> ● Existing structure ● Existing funding: ~\$2350 ● Client ● Portability 	<ul style="list-style-type: none"> ● No maintenance party ● Confined space ● Funding ● Location
Opportunities	Threats
<ul style="list-style-type: none"> ● Novel security systems ● Multiple interested parties ● Multiple potential locations ● Further funding ● First tea lab on UC Davis campus 	<ul style="list-style-type: none"> ● Theft, vandalism, improper use ● UC Davis Security ● Environmental factors

Fig 1. Overall project SWOT analysis.

The first potential venue, the courtyard within Hunt Hall, faces the same considerations as the overall project as well as unique site-specific considerations. For example, this area is less known on campus and within the community than the Arboretum. This hall houses landscape architecture lessons and staff and the courtyard itself, shown in Appendix C, was designed by students in 2016 (UC Davis Arboretum, 2016). The courtyard is ever-evolving as students carry out projects within its confines each fall. This could be both an opportunity for and threat to the

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portable tea space. The projects could benefit the teahouse, for example, by better integrating the structure into the environment or creating passive security landscape techniques to protect it. On the other hand, the potential upheaval within the courtyard due to these projects could inhibit access to the teahouse or cause distracting noises that might prevent users from wanting to use the space while these changes are underway. The most encouraging aspect of this analysis, Fig 2, is that placement in this location could potentially foster a sense of responsibility to the space by the students and staff at Hunt Hall and resolve the current issue of a lack of maintenance party.

Strengths	Weaknesses
<ul style="list-style-type: none"> ● Secure location ● Easily accessible area ● Integrated with nature 	<ul style="list-style-type: none"> ● Public but not universally known area
Opportunities	Threats
<ul style="list-style-type: none"> ● Student projects each fall ● Potential designated maintenance party: students and faculty 	<ul style="list-style-type: none"> ● Nearby construction ● Student projects: courtyard upheaval

Fig 2. SWOT analysis for Hunt Hall courtyard location.

The Wyatt Deck at the UC Davis Arboretum, shown in Appendix D, is a better known location than the Hunt Hall courtyard and may experience more foot traffic. However, the Arboretum has already voiced concerns about the potential for theft and vandalism in this location. Additionally, if the teahouse were placed here it would have to be marked by signage in a style specific to the Arboretum. The Arboretum graphic designer declined to provide a mock-up at this time.

Strengths	Weaknesses
<ul style="list-style-type: none"> ● Integrated with nature ● Universally known location 	<ul style="list-style-type: none"> ● Lack of maintenance party ● Not most aesthetic location ● Off main Arboretum trail ● Requires Arboretum specific signage
Opportunities	Threats
<ul style="list-style-type: none"> ● New security systems ● Not required to follow ADA standards 	<ul style="list-style-type: none"> ● Security: vandalism, theft, improper use ● Environmental factors

Fig 3. SWOT analysis for Arboretum Wyatt Deck location.

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An additional SWOT analysis was carried out for the Carlson Library location, a separate tea space project, as seen in Appendix E.

Evaluative Matrix

An evaluative matrix was constructed to better visualize and quantify the prospective venues in terms of the main tenets guiding the project.

Location	Accessibility (4)	Security (4)	Sustainability (3)	Total
Hunt Courtyard	2	2	2	6
Wyatt Deck	2	1	1	4
Carlson Library	2	3	3	8

Table 1. An evaluative matrix for three potential tea space locations.

This table quickly visualizes the current rating for accessibility, security, and self-sustainability for the three potential tea space locations as determined by SWOT analysis. The Carlson Library is a separate yet similar project and would not take place within the portable tea space. The study room within the library is on the bottom floor and can be accessed by stairs or an elevator, neither of which are up to the 2010 ADA code. However, the space is more secure due to its location and current key check-out system and is already maintained. The two locations for the portable teahouse were given the same rating for accessibility, as the structure is the same and requires alterations before being deemed fully accessible. As the Wyatt Deck location is a security concern, and the Arboretum has shown no interest in maintaining the teahouse, it has received the lowest marks for security and sustainability. Therefore, the Hunt Hall courtyard currently appears to be a slightly better choice.

Stakeholders Analysis

A stakeholders analysis was performed to identify the diverse parties involved in this project and to characterize their importance and interest in the project. This analysis, Fig 4, is not exhaustive but identifies important parties (designated by green circles) and key players (designated by yellow stars). This analysis has undergone several iterations and reflects the most current understanding of the project and those who care about and influence it.

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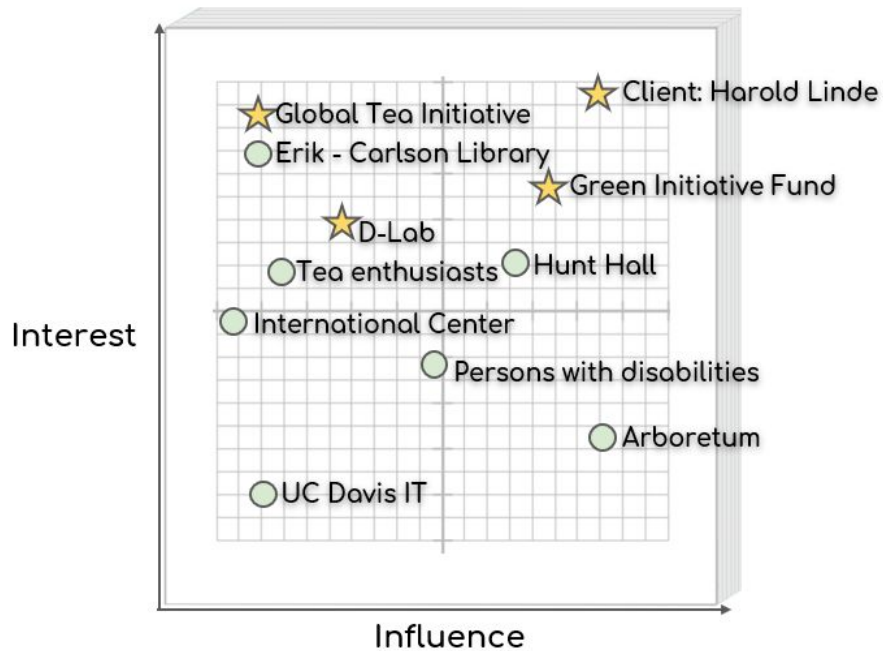


Fig 4. Stakeholders Analysis. Green circles identify parties of consideration and yellow stars identify key players.

It should be the goal of D-Lab II consultants to identify a party responsible for the management and upkeep of the teahouse, and ideally this group would place near Harold on the four quadrant chart. Despite lacking a clear maintenance party, it is imperative that a cleaning system be in place for all users. This after-use standard operating procedure should highlight basic space care such as wiping down surfaces (tables, chairs, counters, and benches), sweeping the floors, locking up all tea paraphernalia, and removing any trash. Additionally, a small vacuum or dust buster should be kept within the space for clean up, especially if service dogs have been in the teahouse. Designating the portable tea space as a fragrance free zone and frequent cleaning with unscented products and a vacuum will help to maintain “an accessible shared air space” (Lazard, 2019).

Policy Analysis

A policy analysis was carried out to elucidate the legal constraints the teahouse must abide by. As there are not yet direct policies in place for security measures for on-campus teahouses or measures for self-sustainability, this analysis was primarily focused on accessibility law and the legal guidelines for accessible design. The most influential modern legislation concerning accessibility are the 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design, put forth in September of 2010 by the United States Department of Justice as regulatory revisions to the original ADA of 1990 (U.S. Department of Justice, 2010). It was determined, however, that the portable tea space is not directly subject to these requirements and accessible

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accommodations will therefore use these ADA Standards as guidelines where appropriate. The most important changes advised are to designate a wheelchair space within the teahouse, to widen the entrance threshold to a minimum of 32” or use the back end as a garage door, and to design a universal ramped structure to this threshold (U.S. Department of Justice, 2010). As the project is not subjective to restrictive, granular standards, the client and consultants can proceed to the building stage and approach universal design in a purely creative and unrestricted way. Universal design is an approach which seeks to actively achieve accessibility from the initial planning phases and prevent any users from feeling marginalized. According to Mace (1985), universal design is “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.” There are seven principles of universal design as outlined and defined by Story (1998). These have been adapted by Iwarsson and Stahl (2009) as shown in Table 2. These principles highlight social inclusion and set forth a design concept which is, by nature, usable, accommodating, and effective for a diverse population with a diverse set of abilities. This approach is focused on broad usability, “a measure of the effectiveness, efficiency, and satisfaction with which specified users can achieve specified goals in a particular environment” (International Organization for Standardization, 1998). Using these guidelines, the teahouse can be designed in a human-centric manner and cater to users of all abilities.

<i>Principle</i>	<i>Definition</i>
1. Equitable use	Usable and marketable to people with diverse abilities
2. Flexibility in use	Accommodates a wide range of individual preference and abilities
3. Simple and intuitive use	Easy to understand, regardless of experience, knowledge, language skills or current concentration level
4. Perceptible information	Communicates necessary information effectively, regardless of ambient conditions or sensory abilities
5. Tolerance for error	Minimizes hazards and adverse consequences of accidental or unintended actions
6. Low physical effort	Can be used efficiently and comfortably, with a minimum of fatigue
7. Size and space for approach and use	Appropriate size and space for approach, reach, manipulation, and use regardless of body size, posture, or mobility

†Centre for Universal Design, North Carolina State University, NC, US (Follette Story, 2001).

Table 2. The 7 principles of universal design by Story (1998), adapted by Iwarsson & Stahl (2009).

Case Study: Security Design

To advise our client on best practice security measures, various security design case studies were researched for inspiration. From this research, two types of security design strategies were identified: active and passive security. In architecture, passive security design incorporates security measures that reinforce the effects of its environment to discreetly provide preventative security measures. Active security design is defined as “readily visible and more in line with what most people think of as traditional security” and examples include obvious barricades, metal detectors, and security guards (A. Zahner). Active security usually requires more maintenance than passive security strategies. The successful architect firm Zahner designed the award-winning Australian Embassy in Jakarta, Indonesia. This case study serves as a model for

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passive security design by maximizing its environment to provide ultimate security methods and can serve as inspiration for security designs of the teahouse. It is suggested that the client incorporate aspects of passive security to aid the immersive tea experience as well as aspects of active security such as an online check-in and check out system to monitor users. Though forms of passive security such as hidden location, dual-authentication access or solar electronic keypad can blend into the design of the space, it is important that more obvious signs of security are put into place as a strategy to tackle ongoing vandalism issues in the UC Davis Arboretum. Additionally, passive security measures may require more effort to monitor due to the public location of the space.

In-Class Survey

An in-class survey was conducted to inform the accessible accommodations that will be constructed and prototyped in D-Lab II. This activity was modeled after a D-Lab I assignment in which students were designated roles as persons with a variety of physical and mental abilities and asked to interact with the Manetti Shrem Museum of Art while embodying their new identity. This survey was given to 18 students, 16 of which had previously taken on such a role. The students were asked to re-embody these characters and to imagine their experiences in a 113 ft² teahouse. The questions and responses can be found in Appendix F. This survey took the place of a more representative focus group. The original plan was to have the teahouse in the Arboretum location by the end of winter quarter and to conduct an in-depth focus group with interabled students and the help of Student Disability Services. The time constraints and evolving location considerations, however, led us to conduct an in-class survey. The feedback demonstrates that an interabled population will have conflicting needs and accommodations. Therefore, it is important to recognize the physical elements within the teahouse that can be added, adjusted, or taken away to accommodate a variety of needs. This feedback will better inform interior design considerations as well as the selection process for a focus group in D-Lab II. The client is also urged to make note of the Smithsonian Guidelines for Accessible Design (2009) which provides clear specifications for tactile, auditory, and visual elements within a facility and advise for input of persons with disabilities throughout all aspects of design. These design considerations allow customizability (e.g. adjustable lighting intensity and temperature) and should continue to be iterated based on participant feedback. The client can use the teahouse as a prototype to test out modular and customizable accommodations and get user feedback before finalizing the space and experience.

SketchUp Modeling

Using the 2010 ADA Standards and survey responses as design guidelines, the teahouse was modeled in SketchUp using the actual dimensions of the space, shown in Appendix G, at 1" to 1' scale.

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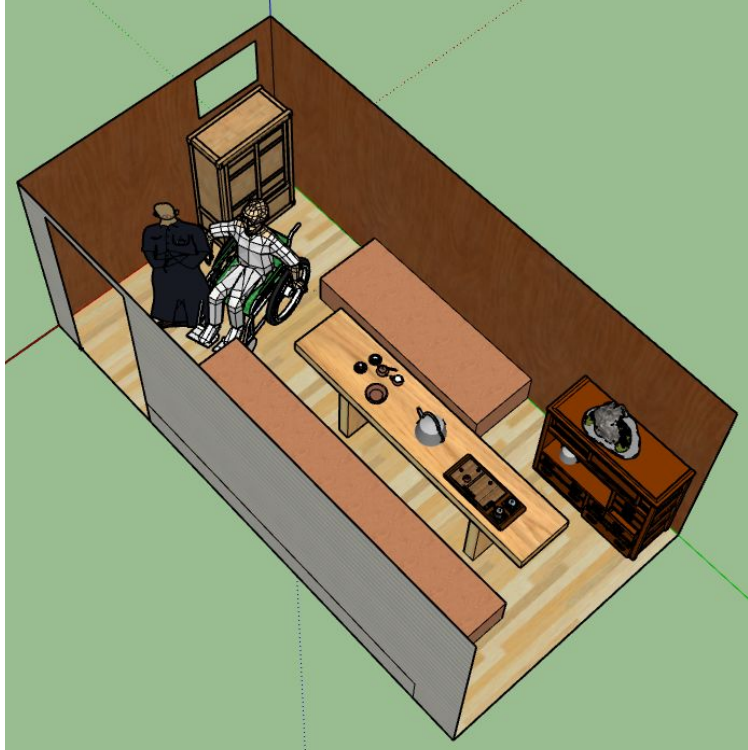


Fig 5. SketchUp model at 1" to 1' scale.

The SketchUp models, Fig 5 and Appendix H, represent the actual teahouse and use the survey responses to guide the design. These models show a widened doorway for the current entrance as well as an open hitch end where a garage door mechanism could be fitted. While both modifications could be observed, having two entrances would greatly increase security concerns as users would be responsible for making sure both are locked up before leaving.

Case Study: Japanese teahouses and chashitsu

As the Global Tea Initiative is a stakeholder, it is assumed the space will cater to international tea ceremonies. In Japanese teahouse design the concept of chashitsu is the idea that the space should instill a different feeling and awareness within the user than the surrounding environment. Many of the architectural guidelines to achieve this immersive feeling align with the teahouse structure and the client's vision. Chashitsu is best achieved in small, rustic, wooden and free-standing structures. The interior design features include a low ceiling, minimal decorations, minimal visible storage space, and small windows to filter natural light. The guidelines perfectly align with the dimensions, exterior, and interior of the portable tea space. To best achieve this feeling of separate space, as well as accessibility, the interior design considerations should focus on modular furniture that maximize storage space while maintaining a minimal aesthetic. For example, chairs and tables that fit into the walls of the teahouse could provide extra seating when needed or be neatly out of sight. Images in Appendix I display current commercial designs of

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height adjustable tables and chairs that can correspond to the abilities of users. These furnishings can serve as inspiration for the consultants in the building phase of D-Lab II.

Reconfigurable Self-Assembling Robots

Roombots are a series of small, round robots with a metal spring on top and three thin metal legs. Rubenstein et. al described these reconfigurable robots LEGO bricks that can be stacked upon each other to create various structures and/or combined with furniture and other objects, changing not only their shape, but also their functionality. Mondada et.al demonstrated this by creating a Roombot bed which could slowly adjust into a seated position. Another example provided was a table that could move into a corner of the room or tilt itself to help a book slide into a person's hands. If incorporated in the project's design, Roombots could be a replacement for or an addition to typical pieces of furniture. According to CBC, they cost just under \$1,000 apiece. Incorporating them at the current stage of the project and using the current budget may not be feasible, however, it would be a very efficient and sustainable investment that could last decades. Incorporating modern design ideas to the aesthetics of the interior design can appeal to the users of the project's space.

Conclusions and Recommendations

In conclusion, it is recommended that this project proceed to the building phase of D-Lab II as it has promise and holds various opportunities to highlight various cultures, connect participants, and bring wellness to the UC Davis community. As highlighted throughout this report, there are three main principles on which the feasibility of this project hinges: accessible design for all, security, and self-sustainability. The accessible design is inherent to the overall project whereas the security and sustainability measures are location dependent. A SWOT analysis identified the constraints of the current proposed locations and an evaluative matrix quickly summarizes these results.

Ultimately, it is recommended that the client take advantage of the portability of the teahouse and undergo a prototyping period in these locations as a means of better determining the influence of the external environment on the sustainability and usability of the space. It is recommended that D-Lab II consultants use the prototyping period and the completed SWOT analyses as a means of selecting a more permanent location for the teahouse. However, should an invested organization exuberantly take on the management of the project, it may be determined that the teahouse be continuously mobilized across the campus rather than having an established resting place.

It is recommended that this prototyping period also include an in-space focus group using an interabled population as selected with the assistance of Student Disability Services. Focus groups would allow persons with a variety of abilities to interact with the space and share their impressions and concerns. D-Lab II students are encouraged to apply for a grant through the UC

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Davis ADA Special Access Funding Committee to assist with the costs inherent to iterative accessible design. Additionally, while web accessibility was not part of the scope of this project it should be of importance in D-Lab II and the online sign-up system for the portable teahouse should follow the Web Content Accessibility Guidelines, the UC Information Technology Accessibility Policy, and the UC Web Accessibility Guidelines (W3, 2018; Tevis, 2017; University of California, 2020).

The success of this space relies on a currently unanswered question: who will take care of it? It is of utmost importance to the longevity of this project that the client clearly appoint a responsible maintenance party. As the teahouse will be on the UC Davis campus and universities are subject to high student and personnel turnover, it is recommended that the responsible party be an invested group or organization with an on-campus presence.

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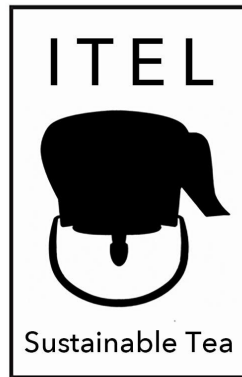
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Appendices

Appendix A. Teahouse exterior. Current external appearance of the portable tea space.



Appendix B. Teahouse logo. Proposed logo for the portable tea space and pop-up tea spaces.



Appendix C. Map of Hunt Hall courtyard location. Student plots clearly depicted.



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Appendix D. Photograph of the Wyatt Deck location within the UC Davis Arboretum.



Appendix E. SWOT analysis for Carlson Library location.

Strengths	Weaknesses
<ul style="list-style-type: none">● Accessible location● Indoor environment● Secured by UCD● Maintained by UCD	<ul style="list-style-type: none">● Not portable● Subject to ADA standards● Less design flexibility● Only one key
Opportunities	Threats
<ul style="list-style-type: none">● No external design required● New target audience: vet med● Educational tea podcasts● Guided tea sessions led weekly	<ul style="list-style-type: none">● Near other study rooms, disruptions● Loss of key (only one)

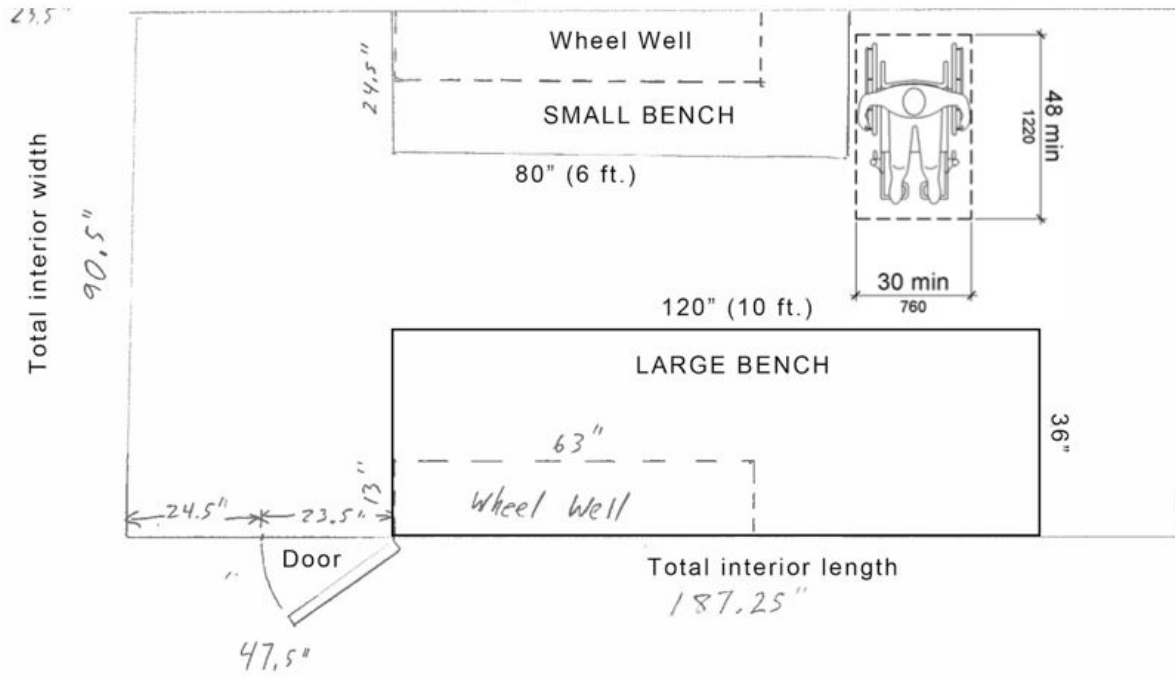
Appendix F. Survey data and responses.

[Survey Questions](#)

[Survey Responses](#)

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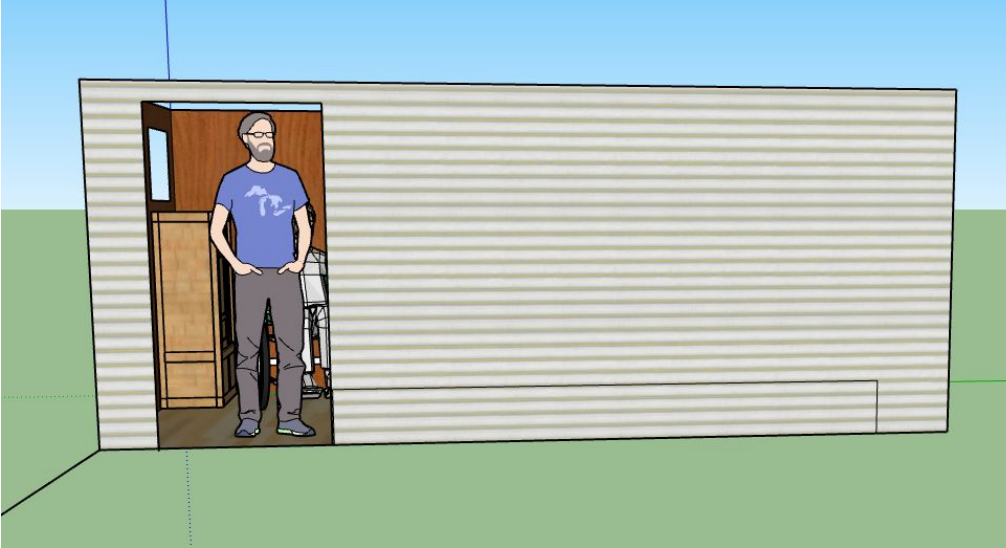
Appendix G. Current teahouse dimensions and proposed wheelchair space.



Appendix H. SketchUp models at 1" to 1' scale.



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Appendix I. Available modular furniture designs with minimalist aesthetics.

